PROJECT MANUAL FOR:

CENTRAL FALLS HIGH SCHOOL

CENTRAL FALLS HIGH SCHOOL
10 HIGGINSON AVE, CENTRAL FALLS, RI

100% CONSTRUCTION DOCUMENTS

PREPARED BY:

Ai3 ARCHITECTS, Inc.
111 Speen Street
Suite 300
Framingham, MA 01701

VOLUME 1 OF 3
OCTOBER 13, 2023
Project #: 2202.02

PROJECT DIRECTORY

OWNER
City of Central Falls
Central Falls City Hall
580 Broad Street
Central Falls, Rhode Island 02863

OWNER'S PROJECT MANAGER
Peregrine Group LLC
Rumford Center, Building No. 3
20 Newman Avenue, Suite 1005
Rumford, Rhode Island 02916

CGA Project Management, LLC
P.O. Box 3147
187 Plymouth Avenue
Fall River, Massachusetts, 02722

ARCHITECT
Ai3 Architects, LLC
111 Speen Street, Suite 300
Framingham, Massachusetts 01701

CONSULTANTS

LANDSCAPE ARCHITECT
Traverse Landscape Architects
150 Chestnut Street, 4th Floor
Providence, RI 02903

CODE CONSULTANT
Cosentini Associates, Inc.
101 Federal Street, 6th Floor
Boston, MA 02110

STRUCTURAL ENGINEER
Pare Corporation
10 Lincoln Rd, Suite 210
Foxboro, MA 02035

CIVIL ENGINEER
The Vertex Companies, Inc.
400 Libbey Parkway
Weymouth, MA 02189

MECHANICAL, ELECTRICAL, PLUMBING, AND FIRE PROTECTION ENGINEERING
Griffith & Vary, Inc.
12 Kendrick Road
Wareham, MA 02571

GEOTECHNICAL ENGINEER
Haley & Aldrich, Inc.
70 Blanchard Road, Suite 204
Burlington, Massachusetts 01803

ENVIRONMENTAL CONSULTANT
Universal Environmental Consultants
12 Brewster Road
Framingham, Massachusetts 01702

ENERGY MODELING CONSULTANT
Andelman & Lelek Engineering
1408 Providence Highway
Norwood, Massachusetts 02062

DOOR HARDWARE CONSULTANT

Spec Consultants, LLC
16 N. Mark Drive
Oxford, Connecticut 067478

SPECIFICATIONS CONSULTANT

Wil-Spec LLC
375 Main Street
Boxford, Massachusetts 01921

FOOD SERVICE CONSULTANT

Crabtree McGrath Associates, Inc.
161 West Main Street
Georgetown, Massachusetts 01833

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ADVERTISEMENT FOR BIDS

The City of Central Falls Rhode Island, through the Central Falls School District ("Awarding Authority," "City") will receive sealed bids for the following:

CENTRAL FALLS HIGH SCHOOL

Sealed Bids shall be received at the City of Central Falls City Clerk's Office, no later than 3:00 PM on **Tuesday, February 13, 2024** for the new "Central Falls High School, 10 Higginson Avenue, Central Falls, Rhode Island.

Bids received after the stipulated time shall not be accepted and will be returned unopened.

Bids will be openly received by any Bidder that believes they have suitable qualifications and capabilities to successfully perform the Work and who are in compliance with criteria specified in Document 00 45 13 - BIDDER'S QUALIFICATIONS AND EVALUATION, bound herewith, The Awarding Authority will review every Bidder's qualifications by an evaluation process utilizing the documented mathematical point system as specified. A summary report of Bidders evaluation results will not be Public Record, but shall be available to Bidders upon request. Bidders failing to meet the specified criteria or minimum point score required by the evaluation process will be automatically disqualified, and their Bids rejected. Bidders are strongly encouraged to review the criteria and evaluation point system and determine for themselves their own suitability to submit a Bid.

Bids received without the required qualification documents and their supporting documentation will be rejected without consideration.

Bids received without all required supporting documents will be deemed incomplete and rejected for failure to comply with the Bidding Requirements of this Contract.

Availability of Documents: Copies of the bid documents may be downloaded from the City Hall website or "BidNet Direct" website, https://www.centralfallsri.gov/purchasing/page/solicitations starting December 14, 2023.

Pre-Bid Conference: A **Non- Mandatory** Pre-Bid on site conference is scheduled for **Wednesday, December 20, 2023 @ 2:00 pm** at 10 Higginson Avenue, Central Falls, RI 02863. Copies of the bid documents may be downloaded from the City Hall website starting **Thursday, December 14, 2023**.

Time of Completion: The Project shall be Substantially Completed in pre-defined Phases (refer to Phasing Drawings):

Phase 1: August 2025

Phase 2: December 2025

Receipt of Bids: All Bids must be submitted in sealed envelopes addressed to Alberto DeBurgo City Clerk, City Clerk's Office, City Hall, 580 Broad St, Central Falls, RI 02863, and must be plainly marked in the lower left hand corner, **"Central Falls High School"**. Provide two (2) hard copies and one (1) electronic copy on USB with your Bid Submittal.

Pursuant to R.I.G.L. §45-55-5(d) Bids will be publicly opened in full view of the public at the time and place designated above. Each bid, together with the name of the bidder, shall be recorded and an abstract made available to the public.

Subsequent to the awarding of the bid, all documents pertinent to the awarding of the bid shall be made available and open to public inspection and retained in the Bid Record File.

Pursuant to R.I.G.L. §45-55-5, the award shall be made to the responsive and responsible bidder whose bid is the lowest, evaluated bid price. The Awarding Authority's Selection Criteria that will be used to determine the lowest, evaluated bid price is identified in Document 002113 - INSTRUCTIONS TO BIDDERS.

Subject only to RIGL §45-55-7, "*Negotiations After Unsuccessful Competitive Sealed Bidding*", The City of Central Falls and Central Falls School District (Awarding Authority) will not meet with any Bidder, either Post-Bid and prior to Contract Award, to discuss Bidder's Qualifications, or other aspects of Bids received. Bids will be evaluated solely on the written Bid Documents and attachments submitted by each Bidder.

No Bids may be withdrawn for a period of 60 calendar days subsequent to the date of the bid opening.

Bid Security: All General Bid proposals shall be accompanied by a bid deposit in an amount not less than five percent (5%) of the value of the bid. Bid deposits, payable to the "*City of Central Falls*" shall be in the form of either a BID BOND, or a CERTIFIED or TREASURER'S CHECK issued by a responsible bank or trust company. Cash and company checks are not acceptable.

Sales Tax: Materials, equipment and supplies to be used on this project are exempt from sales tax to the extent provided by Rhode Island Sales and Use Tax Act, Chapter 18, Title 44 of the General Laws 1956, as amended. Bidders should not include taxes in figuring or in references to any bid.

Contract: Agreement Form *(AIA Form A101), Standard Form of Agreement Between Owner and Contractor where the basis of payment is a Stipulated*, as amended by Owner.

Wages: Under requirements of Rhode Island General Law 37-13, this project is a prevailing wage project and requires a 5% Bid Bond.

MBE/WBE Participation: This project/contract is subject to the requirements of R.I.G.L. 37-14.1-6. The Contractor shall use best efforts to award minority and women owned business enterprises twenty-five percent (25%) of the dollar value of the entire project. Provided, however, that minority and women owned business enterprises shall be awarded a minimum of fifteen percent (15%) of the dollar value of the entire project. Of that fifteen percent (15%), minority business enterprises owned and controlled by a minority owner, as defined in § 37-14.1-3, shall be awarded a minimum of seven and one-half percent (7.5%), and minority business enterprises owned and controlled by a woman shall be awarded a minimum of seven- and one-half percent (7.5%).

Performance, Labor and Materials Bonds: A one hundred percent (100%) Performance Bond and a one hundred percent (100%) Labor and Materials Payment Bond will be required from the successful General Contract Bidder at time of Award.

Any Questions & Responses will be included in an **Addendum** to be issued periodically during the bidding period, on the City Website.

The City of Central Falls and Central Falls School District (Awarding Authority) reserves the right to waive any informality and to reject any and all bids or to accept any bids deemed to be in the best interest of the City and School District.

End of Document

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Document 00 21 13

INSTRUCTIONS TO BIDDERS

1.1 THE OFFERING

A. The City of Central Falls Rhode Island, through the Central Falls School District (“Awarding Authority,” “City”) seeks qualified General Contract Bidders (“Respondent") for the Project “Central Falls High School”, located at 10 Higginson Avenue, Central Falls, Rhode Island.

1. The City intends to award a single stipulated sum Contract for performance of all Work required by the Contract Documents.
2. Respondents may only propose to complete the project in its entirety; segregated bids will not be accepted.

1.2 DESCRIPTION OF WORK

A. The project involves the following scope and as may be additionally indicated on the Drawings, dated October 13, 2023.

1. Work includes construction of the new 123,844 gross square foot Central Falls High School building located at 10 Higginson Avenue, Central Falls, Rhode Island. The site is comprised of approximately 6.5 acres of land within the scope of work. The new Central Falls High School will serve grades 9 through 12.

   The new building will be located on the site of the existing football field, International Meat Market, baseball/ softball field and basketball courts. Prior to commencement of new construction, abatement and demolition of the existing structures will take place.

   Exterior work will include the completion of related site improvements, underground utilities, parking and on-site service and fire access roadways, and multi-use athletic field. The scope of site work includes ground improvement, erosion control, roadways, pedestrian sidewalks, drainage improvements, retaining walls, earthwork, utility services, landscaping, site amenities, fencing, and athletic features. This Project has been designated as a Northeast Collaborative for High Performance Schools (or “NE-CHPS”) Project integrating into the construction the Owner’s environmental operational mission. The Work of this Contract includes the construction process and special documentation, materials utilized, and the resulting building must meet the specified sustainability requirements.
2. All work will be completed in a workmanlike manner, subject to inspection and approval by the City. No bid shall include elements beyond the scope of work identified.

B. Type of Bid: Stipulated Sum.

C. Substantial Completion: The Project shall be Substantially Completed in two pre-defined Phases (refer to Phasing Drawings):

Phase 1 Substantial Completion: August 2025

Phase 2 Substantial Completion: December 2025

D. Performance and Payment Bonds: A one hundred percent (100%) Performance Bond and a one hundred percent (100%) Labor and Materials Payment Bond will be required from the successful bidder.

1. Bonding Firms and Insurers providing required bonds and insurance shall be,
   a. Licensed to do business in the state of Rhode Island,
   b. Rated in current edition Best's Insurance Guide and,
   c. Approved by Owner before work is begun.
2. Contractor's failure to provide required bonds and Certificates of Insurance in accordance with Contract Documents and acceptable to Owner will be considered a contract violation.
   a. Attorneys in fact signing Bid or Contract Bonds shall file with said bond(s) a certified copy of their Power of Attorney to sign said bond(s).

E. Wage Requirements: Prospective bidders are hereby informed that this Contract in accordance with Rhode Island General Law 37-13, and Rhode Island Department of Labor, will be subject to Federal Davis- Bacon Act Wage Rates. Contractors must refer to the applicable Davis Bacon Wage Determination rate schedule bound herewith. The prevailing wage rates to be applied are those that are effective as of the date of the awarding of the contract to the General Contractor. Contractors must also adjust employees' hourly wage rates (if applicable) every July 1st, in accordance with any updated Davis Bacon Wage Determination rates. All contractors and subcontractors will be subject to and monitored for conformance with the Federal Prevailing Wage Rates. Prevailing wage rates are included in the Contract Documents as well as available online at https://sam.gov/content/wage-determinations

1.3 PERMITS, FEES AND TAXES

A. Building Permits and Fees: Permits are required for the commencing and completion of the work.
   1. All local (municipal) permit fees are waived by the City of Central Falls. All required state fees are to be paid for by the Contractor responsible for performing the Work related to the State permits.

B. Rhode Island Sales Tax: The City and Central Falls School District are exempt from the payment of the Rhode Island Sales Tax under the 1956 General Laws of the State of Rhode Island, 44-18-30, Paragraph 1, as amended.

C. Federal Excise Taxes: The City and Central Falls School District are exempt from the payment of any excise tax or federal transportation taxes. The price bid must be exclusive of taxes and will be so construed.

1.4 EXAMINATION AND PROCUREMENT OF DOCUMENTS:

A. Digital (.pdf) copies of the documents may be downloaded through the City of Central Falls website, www.centralfallsri.us, by following the "Invitations to Bid" link on the home page. Full documents will be available to all bidders. Any Bidder or concerned parties who need further assistance in locating or retrieving the documents may contact the City Clerk, Alberto DeBurgo, at (401) 616-2414 or Adeburgo@centralfallsri.us for assistance. Arrangements for hard copies of bidding documentation can also be made by contacting the City Clerk's office. Documents will be available at bidder's cost of printing as a means of assuring that all appropriate materials are provided.

B. Site Examination / Pre-bid Conference: At 10 Higginson Avenue, Central Falls, Rhode Island) on December 20, 2023 @ 2:00 pm.

1. Purpose:
   a. Assist Bidders in understanding the intent of the Bidding Documents,
   b. Review with the Architect/Engineer ambiguities, inconsistencies, errors or omissions discovered in the Bidding Documents,
   c. Provide for identification and discussion of potential problems that may arise during the administration of any subsequent contract,
   d. Provide an opportunity for an examination of the existing structure to the extent reasonably discoverable by nondestructive means,
   e. Permit bidders an opportunity to visit the site for determining extent of work, and quantities of materials required for the Work
2. Attendance:
   a. General Contract Bidders are strongly encouraged to attend.
   b. All potential subcontractors, sub-subcontractors, and product vendors are openly invited to attend the Pre-bid Conference, attendance is not mandatory.
   c. Random visits to the site and any contact with building staff or students by potential bidders is strictly prohibited.

1.5 INSTRUCTIONS TO BIDDERS AND SUBMISSION OF BIDS

A. Respondents to this request for bids must submit their proposals no later than specified date and time. An official authorized to bind the Respondent to the provisions of its response must sign the Response Form. The City will review all responses and reserves the right to accept or reject any and all responses.
   1. All bids must be received by 3:00 PM. in the Office of the City Clerk on February 13, 2024. **NO BIDS WILL BE ACCEPTED AFTER 3:00 PM**.

B. Sealed bids will be accepted in the office of the City Clerk to the attention of Alberto DeBurgo, City Hall, Central Falls, Rhode Island, until the time indicated, for the commodities, equipment or services listed in the specifications, and will be then publicly opened and read aloud in person at 4:45pm at City Hall, 580 Broad Street, Central Falls, RI 02863.

C. Bid must be submitted in a sealed envelope and addressed to:

   City of Central Falls
   Attn: Alberto DeBurgo
   City Clerk
   580 Broad St.
   Central Falls, RI 02863

   1. Lower left corner of envelope must contain the following identification: "*SEALED BID, Central Falls High School*".
   2. Provide two (2) hard copies and one (1) electronic copy on USB with your Bid Submittal

D. Bids received prior to the time opening will be securely kept, unopened. No responsibility will be attached to an officer or person for the premature opening of a bid not properly addressed and identified.

E. Any deviation from the specifications must be noted in writing and attached as a part of the bid. The bidder shall indicate the item or part with the deviation and indicate how the bid will deviate from specifications.

F. Negligence on the part of the bidder in preparing the bid confers no rights for the withdrawal of the bid after it has been opened.

G. Any bidder may withdraw their bid by written request at any time prior to the advertised time for opening. Telephone bids, amendments, or withdrawals will not be accepted.

H. No Bidder shall modify, withdraw or cancel his proposal or any part thereof for a period of sixty (60) calendar days after date for receipt of proposals.

1.6 BIDDER'S CONTENT

A. Bids shall be submitted as two hardcopies and one electronic copy on a USB stick.

B. All bids shall include the following content:

1. Cover letter: The cover letter should introduce the Respondent and address their interest for the project. The cover letter should include a narrative describing the contractor: the type of services provided, the location of its operations, the number and location of employees, etc. The cover letter should describe major upcoming projects and likely availability to complete additional projects in the next six (6) months.
2. Bid Form: Bidders shall completely fill-in the Bid Form bound herewith. Modify Bid form only as specified by Written Addendum.
    a. All blank spaces on Bid Form shall be filled in; numbers shall be stated in both writing and numerals.
    b. Bidders shall acknowledge all alternates, allowances and addenda where indicated on the Bid Form.
    c. Proposals shall include cost breakdowns and all attachments indicated on the sample Bid Form and as required in these Instructions to Bidders.
    d. Proposals shall be completed without interlineation, alterations or erasures.
    e. Completed Proposals shall be signed with legal signature of Bidder.
3. Bid Security: Bid proposals shall be accompanied by a bid security deposit. Bids are to be secured for a period of thirty (60) days following the closing date for receiving Bids, in the amount of five percent (5%). Bid security may be provided by any of the following: Bid Bond, Treasurer's Check, or Certified check, made payable to "City of Central Falls". Cash and company checks are not acceptable
4. Bonding Eligibility Notarized assurance of Bidder's bonding eligibility for Performance and Payment Bonds, written on surety company's own letterhead.
5. Contractor's Qualification Statement (AIA FORM A305), which is in addition to the cover letter described above and shall include Bidder's Qualification Attachments as required by Document 00 45 13 – BIDDERS QUALIFICATIONS AND EVALUATION.

1.7 BIDDERS REPRESENTATIONS

A. The Bidder by making a Proposal represents the following:

1. The Bidder has read and understands the Bidding Documents and the Bid is made in accordance with them.

2. The Bidder has visited the site, become familiar with location conditions under which the Work is to be performed and has carefully examined the Bidding Documents, together with all Addenda issued, received and acknowledged below, and familiarized himself or herself with the legal requirements (federal, state, and local laws, ordinances, rules and regulations) and other conditions which may affect the cost, progress or performance of Work.
3. The Bid is based upon the materials, equipment and systems required by the Bid Documents without exceptions.
4. The Bidder acknowledges that his or her failure to acquaint himself or herself with the existing conditions and Contract Documents shall in no way relieve the Bidder from any obligations with respect to his or her bid.

1.8 QUALIFICATIONS OF BIDDERS

A. The City may make such investigations as it deems necessary to determine the ability of the bidder to perform the work. The bidder shall furnish the City with all such information and date for the purpose as may be requested.

1.9 INDEMNIFICATION AND HOLD HARMLESS

A. Any Questions and Responses will be included in Addenda to be issued on Addendum to be issued periodically during the bidding period, on the City Website.

B. No interpretation on the meaning of the plans, specifications or other contract document will be made to any bidder orally. Every request for such interpretations should be in writing addressed to Ai3 Architects, Inc., 111 Speen Street, Suite 300 Framingham, MA 01701, and to be given consideration must be received prior to 3:00pm on January 30, 2024.
   1. Email address for Requests for Information, Attention Kristen Kendall: kendall@ai3architects.com.

1.10 PROPERTY LOST, DAMAGED OR DESTROYED

A. Any property or work to be provided by bidder will remain at the bidder's risk until written acceptance by the City of Central Falls and the bidder will replace, at bidder's expense, all property or work lost, damaged or destroyed by any cause whatsoever.

1.11 EVIDENCE OF INSURANCE

A. A policy of auto, general liability and property damage insurance shall be attached hereto, covering any and all work performed under a contract between the City of Central Falls and Bidder, naming the City of Central Falls, the Central Falls School District, and the State of Rhode Island as an additional insured shall be made part of any contract between the City and Bidder. Amounts of Insurance shall be not less than the amounts specified in Document 00 73 16 – INSURANCE REQUIREMENTS. A policy of professional liability or errors and omissions insurance covering any and all work performed under any contract between the City and bidder naming said bidder shall be attached hereto. A copy of workers compensation insurance policy shall be attached, as required by Rhode Island law for this bid and covering all work to be performed under any contract between the City and bidder naming the bidder as insured shall be attached hereto. The City, upon award of bid, will request verification from the insurance company to ensure

that the agent has properly notified the company and that coverage has been bound.

1.12 DISADVANTAGED BUSINESS ENTERPRISES (DBE) GOAL

A. The bidder shall include a plan for meeting the goal of 25 percent, a minimum of 10 percent of the value of the bid is required by State-of-Rhode-Island-certified Disadvantaged Business Enterprises (DBE's). The successful bidder must indicate the DBE's it intends to utilize to achieve the above-stated percentage prior to award of the contract.

1.13 GENERAL CONDITIONS, TERMS AND LIMITATIONS

A. The issuance of this request for bids, the submission of a response by any Respondent, or acceptance of such response by the City do not individually or collectively obligate the City in any manner. The City reserves the right (1) to amend, modify, or withdraw this request for bids, (2) to revise any requirements of the request for bids, (3) to require supplemental statements or information from any Respondent, (4) to accept or reject any or all responses, (5) to extend the deadline for submission of responses, (6) to negotiate or hold discussions with any Respondent and to waive defects and allow corrections of deficient responses, and (7) to cancel this request for bids, in whole or in part, if the City deems it in their best interest to do so. The City may exercise these rights at any time without notice and without liability to any Respondent for their expenses incurred in the preparation of the responses. The City does not assume any liability for any pre-contractual activity and/or costs incurred by the Respondents to this request for bids and reserves all its rights in law and equity with respect to this request for bids.

B. All submissions become the property of the City. The City shall be entitled to retain and use for the project without compensation to any Respondent any information submitted, including, but not limited to, any concept, element or idea (including financial structures) disclosed in or evident in the submission or meetings or interviews with Respondents. The City believes the information in this request for bids is accurate, but the City makes no warranties to such accuracy and assumes no responsibility for errors or omissions contained herein.

C. The City shall be the sole decision maker of whether a response complies with the requirements of the request for bids and whether responses have merit. Nothing contained in this request for bids shall limit the City in its selection of entities to be invited to respond to future solicitations for this project or future projects, nor limit the City's discretion in any way in formulating and adopting a development plan for the site. Submission of a response to this request for bids by any Respondent constitutes Respondent's permission and consent to inquiries by the City concerning the Respondent and its ability to undertake the development project, including checking references, credit checks, and similar investigations.

D. It is the policy of the City to comply with all municipal, state and federal laws, policies, orders, rules and regulations, which prohibit unlawful discrimination.

End of Document

Document 00 41 13

FORM FOR GENERAL BID

BID OF: _____.

(Name of Bidder)

TO: City of Central Falls and Central Falls School District herein called the "Awarding Authority" or "City", per the attention of:

City of Central Falls
Attn: Alberto DeBurgo, City Clerk
City Clerk's Office
580 Broad St.
Central Falls, RI 02863

A. The undersigned Bidder proposes and agrees, if this Bid is accepted, to enter into an Agreement with Owner in the form included in the Bidding Documents, to complete all Work as specified and indicated in the Bidding Documents for the stipulated Contract Price stated herein, and within the time limit indicated in this Bid and in compliance with the Contract Documents and all applicable legal requirements.

B. The undersigned Bidder hereby declares that he or she has visited the site and the conditions present and has carefully examined the Bidding Documents, together with all Addenda issued, received and acknowledged below, and has familiarized himself or herself with the legal requirements (federal, state, and local laws, ordinances, rules and regulations) and other conditions which may affect the cost, progress or performance of Work, and has made independent investigations, deemed necessary by the Bidder.

C. The undersigned Bidder hereby offers and agrees to provide all labor, services, products, and materials required in the performance of Work to complete the following named project:

Central Falls High School
10 Higginson Avenue
Central Falls, Rhode Island 02863

to the satisfaction of the Awarding Authority and the Architect and in accordance with the accompanying Bidding and Contract Documents, dated: October 13, 2023, as prepared by: Ai3 Architects, LLC., Framingham, Massachusetts, for the Contract price specified below, subject to additions and deductions according to the terms of the Contract Documents.

D. The proposed total contract price is: (Base Bid - NOT INCLUDING ALTERNATES)

…… Dollars
(total contact price amount in words, which governs)

($ ……)
(total contract price amount in numbers)

E. Addenda: The Bidder acknowledges receipt of the following addenda, and has taken them into consideration in the preparation of this Bid:

Addenda Nº. ___, dated: _____. Addenda Nº. ___, dated: _____.

Addenda Nº. ___, dated: _____. Addenda Nº. ___, dated: _____.

Addenda Nº. ___, dated: _____. Addenda Nº. ___, dated: _____.

F. Accompanying this proposal is a bid surety in the form of: (Bid bond) (Certified check) (Treasurer's check), payable to "City of Central Falls" in the amount of

$ .....

(bond amount in numbers)

G. Cost Breakdown of total contract price:

(Sum of breakdown equals Proposed Bid Price).

1.	Insurance	$.....
2.	Overhead and Profit	$.....
3.	General Conditions & Miscellaneous	$.....
4.	Shop Drawings, Product Data, Samples, and Other Specified Submittals	$.....
5.	Inspections and Testing,	$.....
6.	Asbestos remediation and related scope,	$.....
7.	Site and building demolition,	$.....
8.	Cast-in-place concrete including formwork, waterstops, reinforcing, grouting, underslab vapor retarders, and accessories	$.....
9.	Precast architectural concrete,	$.....
10.	Concrete finishing, concrete sealers,	$.....
11.	Precast architectural concrete,	$.....
12.	Masonry,	$.....
13.	Structural steel and steel decking,	$.....
14.	Cold-formed metal framing,	$.....
15.	Metal fabrications, stairs and railings,	$.....
16.	Rough carpentry,	$.....
17.	Sheathing,	$.....
18.	Finish Carpentry, interior and exterior,	$.....
19.	Architectural woodwork, solid surfacing,	$.....
20.	Waterproofing,	$.....
21.	Thermal insulation, closed cell sprayed foam insulation	$.....
22.	Sprayed acoustical plaster,	$.....

23.	Exterior finish system,	$.....
24.	Air and vapor barriers	$.....
25.	Metal wall panels, with associate cladding support	$.....
26.	Composite wall panels, with associated cladding support	$.....
27.	Fiber cement siding, with associated cladding support	$.....
28.	PVC roofing system, roof specialties, roof accessories, vegetated roof systems	$.....
29.	Sheet metal roofing, sheet metal flashing and trim,	$.....
30.	Fireproofing,	$.....
31.	Firestopping,	$.....
32.	Joint sealants and expansion joints,	$.....
33.	Hollow metal doors and frames, flush wood doors, door hardware, sound control doors	$.....
34.	Sliding door systems, coiling counter doors, coiling doors and grilles, sliding glass panels, multi-leaf vertical lift doors, flexible strip doors, pass windows	$.....
35.	Bullet resistant storefront, bullet resistant panels	$.....
36.	Storefront, entrances, and curtain walls, fire rated glazing systems	$.....
37.	Glazing, and glazing films	$.....
38.	Louvers and vents	$.....
39.	Non-load bearing framing, shaft wall gypsum board and sheathing, access doors, and acoustical insulation	$.....
40.	Tiling	$.....
41.	Acoustical Ceilings	$.....
42.	Wood strip and plank flooring, resilient wood flooring, athletic wood flooring	$.....
43.	Resilient floor, rubber flooring, static control flooring, resilient base	$.....
44.	Resinous flooring	$.....
45.	Carpeting, carpet tile, entry mats and grates	$.....
46.	Wall coverings, vinyl wall cladding, sanitary wall panels	$.....
47.	Acoustical room components	$.....
48.	Painting and Coatings	$.....
49.	Toilet compartments, toilet accessories, cubicle curtain track.	$.....
50.	Lockers	$.....

51.	Folding panel partitions	$.....
52.	Miscellaneous specialties (*not otherwise broken out*)	$.....
53.	Appliances, and food service equipment	$.....
54.	Laboratory equipment, chemical storage, kilns	$.....
55.	Theater and stage equipment	$.....
56.	Interior Gymnasium equipment, all types	$.....
57.	Exterior playfield equipment and structures	$.....
58.	Window treatment	$.....
59.	Manufactured Casework, all types	$.....
60.	Audience seating	$.....
61.	Bleachers	$.....
62.	Metal building systems, pre-engineered restroom	$.....
63.	Elevators	$.....
64.	Fire Protection	$.....
65.	Plumbing	$.....
66.	Heating, Ventilating & Air Conditioning	$.....
67.	Electrical, communications, electronic safety and security	$.....
68.	Earthwork	$.....
69.	Exterior improvements (excluding lawns and planting)	$.....
70.	Lawns, plants, and related soils	$.....
71.	Utilities (excluding Municipal Drainage Infrastructure)	$.....
72.	Municipal Drainage Infrastructure	$.....
	Total (Items 1 through 72) Total should equal amount of base bid.	$.....

H. Changes to the Contract: The undersigned Bidder proposes the following maximum mark-up percentages for Contractor's fee, overhead, profit and taxes, computed on the total of labor and materials only, which apply to ADDITIONAL WORK authorized by the Owner during the performance of the Work.

1. For subcontractors, allow 10 percent (10%) on their own work.
2. For the Contractor, allow 5 percent (5%) on the Work of subcontractors.
3. For the Contractor, allow 10 percent (10%) on Work of his/her own employees.

I. The Bidder hereby agrees to commence work within 7 days from Date of Agreement, to pursue the Work with diligence, and bring the Phase 1 of the Project to Substantial Completion, or Owner acceptance for occupancy prior to August, 2025, and Substantial Completion of Phase 2 prior to December, 2025.

J. The undersigned agrees that, if he is selected as the Contractor, he will within 30 calendar days, after presentation thereof by the Owner, execute a contract in accordance with the terms of this Proposal and furnish a Performance Bond and also a Labor and Material or Payment Bond, each of a surety company qualified to do business under the laws of the State of Rhode Island and satisfactory to the Owner and each in the sum of the contract price, the premiums for which are to be paid by the Contractor and are included in the contract price.

K. The undersigned Bidder agrees to provide, as an integral part of this Bid, a separate attachment, entitled "CONTRACTOR'S QUALIFICATION STATEMENT".

L. Labor: The undersigned hereby certifies that he/she is able to furnish labor and services that can work in harmony with all other elements of labor employed or to be employed on the Work.

M. The Bidder agrees that this Bid shall be good and may not be withdrawn for a period of 60 calendar days after the scheduled closing time for receipt of bids.

N. The Bidder understands the Owner's right to reject any and all bids.

O. The undersigned further certifies under the penalties of perjury that this bid is an all respects bona fide, fair, and made without collusion, or fraud with any other person. As used in this document, the word "person" shall mean any natural person, joint venture, partnership, corporation, or other business or legal entity.

Date of Bid: …… .....

.....
(Name of Bidder - Company Name)

BY .....
(Name of person signing Bid & Title)

.....
(Business Mailing Address)

.....
(City/Town, State and Zip Code)

Corporate Seal .....
(Business Telephone Number)

Note: If the bidder is a corporation, indicate state of incorporation under signature and affix corporate seal; if partnership, give full names and residential address of all partners; and if an individual give residential address if different from business address.

End of Document

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DRAFT **AIA® Document A310™ – 2010**

Bid Bond

CONTRACTOR:
(Name, legal status and address)
« »« »
« »

SURETY:
(Name, legal status and principal place of business)
« »« »
« »

OWNER:
(Name, legal status and address)
« »« »
« »

BOND AMOUNT: $ « »

PROJECT:
(Name, location or address, and Project number, if any)
« »
« »
« »

The Contractor and Surety are bound to the Owner in the amount set forth above, for the payment of which the Contractor and Surety bind themselves, their heirs, executors, administrators, successors and assigns, jointly and severally, as provided herein. The conditions of this Bond are such that if the Owner accepts the bid of the Contractor within the time specified in the bid documents, or within such time period as may be agreed to by the Owner and Contractor, and the Contractor either (1) enters into a contract with the Owner in accordance with the terms of such bid, and gives such bond or bonds as may be specified in the bidding or Contract Documents, with a surety admitted in the jurisdiction of the Project and otherwise acceptable to the Owner, for the faithful performance of such Contract and for the prompt payment of labor and material furnished in the prosecution thereof; or (2) pays to the Owner the difference, not to exceed the amount of this Bond, between the amount specified in said bid and such larger amount for which the Owner may in good faith contract with another party to perform the work covered by said bid, then this obligation shall be null and void, otherwise to remain in full force and effect. The Surety hereby waives any notice of an agreement between the Owner and Contractor to extend the time in which the Owner may accept the bid. Waiver of notice by the Surety shall not apply to any extension exceeding sixty (60) days in the aggregate beyond the time for acceptance of bids specified in the bid documents, and the Owner and Contractor shall obtain the Surety's consent for an extension beyond sixty (60) days.

If this Bond is issued in connection with a subcontractor's bid to a Contractor, the term Contractor in this Bond shall be deemed to be Subcontractor and the term Owner shall be deemed to be Contractor.

When this Bond has been furnished to comply with a statutory or other legal requirement in the location of the Project, any provision in this Bond conflicting with said statutory or legal requirement shall be deemed deleted herefrom and provisions conforming to such statutory or other legal requirement shall be deemed incorporated herein. When so furnished, the intent is that this Bond shall be construed as a statutory bond and not as a common law bond.

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This document has important legal consequences. Consultation with an attorney is encouraged with respect to its completion or modification.

Any singular reference to Contractor, Surety, Owner or other party shall be considered plural where applicable.

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Signed and sealed this « » day of « » , « »

	« »
	(Contractor as Principal) *(Seal)*
	« »
(Witness)	*(Title)*
	« »
	(Surety) *(Seal)*
	« »
(Witness)	*(Title)*

Document 00 43 23

BID ATTACHMENT
ALTERNATES FORM

A. Alternates: The Bidder submits the following alternate prices, as described in the Bidding Documents, which are to be added to or deducted from the Contract Price indicated on the Bid Form, as may be selected by the Owner for inclusion into this Contract. (In the event that an alternate does not affect the Contract Price, the Bidder shall remark “No Change”.)

B. Alternates listed herein are described in Section 01 23 00 – ALTERNATIVES and in individual Specification Sections

Alternate Number	Description	Add Alternates	Deduct Alternates
1	Theatrical Equipment	$ ……	$ ……
2	Outdoor Furniture	$ ……	$ ……
3	Outdoor Classroom	$ ……	$ ……
4	Resilient Tile Flooring	$ ……	$ ……
5	Freight Farm Unit	$ ……	$ ……
6	Throwing Events	$ ……	$ ……
7	Classroom Lighting	$ ……	$ ……
8	Classroom Doc Cameras	$ ……	$ ……
9	Sports Lighting	$ ……	$ ……
10	Trees	$ ……	$ ……

End of Document

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Section 00 43 93

BID SUBMITTAL CHECKLIST

1.1 GENERAL REQUIREMENTS

A. This Checklist is a guide to General Contract Bidders in the assembly of their bid submittal. Each Bidder shall include the following attachments. Bids submitted without **all** of the following items shall be considered incomplete and are subject to rejection.

1.2 BIDDERS CHECKLIST

A. All forms must be completed in full.

_____ Document 00 41 13 Bid Form

_____ Document 00 43 13 Bid Security, *AIA Form A310 -Bid Bond or suitable Bid Security furnished.*

_____ Document 00 43 23 Bid Attachment – Alternates Form

_____ Document 00 45 13 Contractor's Qualification Statement, AIA FORM A305 and qualification attachments as required by INSTRUCTIONS TO BIDDERS, and BIDDER'S QUALIFICATIONS AND EVALUATION.

_____ Bond Eligibility Notarized assurance of Bidder's bonding eligibility on surety company's own letterhead, in compliance with 220-RICR-30-00-4.6(D)(4)(d).

_____ Document 00 45 19 Non-Collusion Affidavit

_____ Document 00 45 39 DBE Special Provision Affidavit

_____ Document 00 45 43 Certificate of Authority to Sign Contract on Behalf of Corporation

_____ Document 00 45 44 Foreign Corporation Certification

_____ Document 00 45 47 Tax Compliance Certification, with attachment of Letter of Good Standing from the Rhode Island Department of Revenue - Division of Taxation.

_____ Document 00 45 49 Prompt Payment to Subcontractors Affidavit

End of Document

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Document 00 45 13

BIDDERS QUALIFICATIONS AND EVALUATION

1.1 GENERAL

A. General:

1. Each bidder must submit with its bid, a completed copy of Contractor's Qualification Statement (AIA Form A305 edition) and necessary attachments, showing that it is eligible to bid on this Project.
2. Proposals received from Bidders who do not meet the minimum specified qualifications will be immediately disqualified and their bids rejected.
3. Bidders will be immediately disqualified and their bids rejected, upon discovery of false or misleading information contained in submitted Qualification Statements and supporting data.
4. All disqualified Bidders will be notified in writing, and the reason for rejection will be noted.

B. Evaluation of Qualifications: Bidders will be evaluated based upon two factors (1) Management Experience and (2) Project Experience.

1.2 MINIMUM QUALIFICATIONS TO SUBMIT BIDS

A. Bids will be considered only from those Bidders who can substantiate compliance with ALL of the following requirements.

1. Minimum 7 years in business as a General Contractor in the State of Rhode Island, (or adjoining states).
2. Minimum 3 years in business as a General Contractor in the State of Rhode Island, (or adjoining states), doing business under the same name as present.
3. Business has a current valid license to do general construction in the State of Rhode Island as a prime contractor for the construction of buildings (including new construction and/or renovations).
4. Project superintendent minimum of ten (10) years experience in the construction industry in general construction of buildings (including new construction and/or renovations). Include submittal of a resume and references is required. References require names and current phone numbers to contact. Indicate length of service with current employer.
5. Minimum 3 previous and successful federal, state or municipal projects in the past 5 years. Projects must be of equal type of construction, having a minimum construction cost of Ten (10) million dollars (excluding cost of furnishings, and design/engineering fees). Successful projects should be determined as being (1) actually completed, and received Final Owner Acceptance, (2) completed on-schedule, (3) without legal judgements against the Contractor.

B. For each listed referenced project, provide as a minimum the following information:

- Name of Project and Address.
- Date of Award of Contract.

- Date of Substantial Completion of Project.
- Date of Final Completion of Project.
- Initial cost of Contract (initial bid proposal)
- Final Cost of Work (including all change orders and adjustments)
- Owner's name and address, name of Owner's contact person and current telephone number.
- Architect's name and address, Principal in Charge's name, and current telephone number.
- Contractor's project superintendent's name.

C. Bonding Capacity: Proof of total construction company bonding capability, and proof of being able to furnish for Labor and Material, or Payment Bond, and Performance Bond for this Project "Central Falls High School". Bonding capacity shall be not less than One Hundred Percent (100%) of the Construction Cost of this Project.

1. Submit Notarized letter from Bonding Company on Surety's own Letterhead. Surety company shall be qualified to do business under the laws of the State of Rhode Island in compliance with 220-RICR-30-00-4.6(D)(4)(d)***.
   a. *** Provide an original commitment letter from a Surety Company licensed in the State of Rhode Island and whose name appears on the United State Treasury Department Circular 570, stating the vendor's aggregate bonding capacity and single contract limit. A Power-of Attorney or Attorney-in- Fact form must be attached to the letter. The letter must be less than three (3) months old on the date of Bid.

D. Contract Failures: No failures of projects completed in the past 3 years. Failures defined as any one of the following, (1) failed to complete the Work. (2) Outstanding legal judgments, arbitration proceedings or suits pending or awarded regarding issues which are beyond the issue of subcontractor payments (3) Date of Final Completion of Project exceeds Date of Substantial Completion by more than 6 months.

1.3 EVALUATION CRITERIA FOR CONSIDERATION OF BIDS

A. Based on the evaluation criteria set forth herein, the Awarding Authority will assign points for each evaluation criterion category and subcategory provided herein.

1. The following Minimum Scores are required as threshold to accept Bidders:
   a. Management Experience: MINIMUM 25 POINTS.
   b. Project Experience: MINIMUM 19 POINTS.

B. Management Experience - (50 points available in this category; minimum of 25 points required in this category for Bid Acceptance):

1. **Business Owners** [220-RICR-30-00-4.6(D)(1)(a)]**:** Provide the name, title, including a detailed description of the role and job responsibilities, scope of work and numbers of years with the firm for each of the business owner(s) of the firm. If the respondent General Contractor is a partnership, **Bidders MUST** provide the requested information for each general and limited partner. If the respondent General Contractor is a corporation or limited liability

company, **Bidders MUST** provide the requested information for each officer, director and/or member.

a. (3 points)

2. **Management Personnel** [220-RICR-30-00-4.6(D)(1)(c)]: Provide the name, title, including a detailed description of the role and job responsibilities, scope of work, education, construction experience, years with the firm and a list of all projects completed for all management personnel who will have any direct or indirect responsibility over the Project, including but not limited to Project Executives, Project Managers, Field Superintendents and Field Engineers.

a. (10 points)

3. **Similar Project** Experience [220-RICR-30-00-4.6(D)(1)(c)]***:** Provide the project name(s), description, scope of work, original contract sum, final contract sum with explanation, and date of completion for each and every project undertaken by the firm in the last (5) five years. *For purposes of this Bid, "similar projects" shall mean *public or private school construction projects in Rhode Island and/or adjacent States. with scopes similar to the project description, of similar size and cost, either Renovation or New Construction.*

a. (up to 20 points available, four points per reference provided)

4. **Terminations**** [220-RICR-30-00-4.6(D)(1)(e)]**:** Provide a list of any project (public or private) on which the firm was the General Contractor and was terminated, held in default, or failed to complete the work within the last ten (10) years. Include the name of the project, the time-frame of the project and circumstances surrounding the termination or default. ***Bidders are additionally required to include listing all projects in the past 10 years which were not completed or otherwise terminated at no fault of General Contractor. As example, projects stopped due to lack of funding. "No fault" terminations are not included in the evaluation for points*.

a. (No terminations in ten years = 5 points)

5. **Lawsuits** [220-RICR-30-00-4.6(D)(1)(f)]: Provide a list of all lawsuits in which the General Contractor is a defendant or defendant-in-counterclaim with regard to public construction contracts within the last 5 years. Please include among the lawsuits requested in the previous sentence, payment bond lawsuits, and mechanics lien lawsuits. If the lawsuit was pending at any time during the last five (5) years (which includes any lawsuit that was commenced, dismissed, or resolved by settlement or judgment during that time), then it must be listed. Please note that the lawsuits listed shall not include actions that primarily involve personal injury, workers' compensation claims, or where the sole cause of action involves the General Contractor's exercise of its rights for direct payment.

a. (No lawsuits in five years = 5 points)

6. **Safety Record** [220-RICR-30-00-4.6(D)(1)(g)]: Provide the five (5) year history of the General Contractor's workers' compensation experience modifier. In addition, provide documentation from the General Contractor's insurance carrier supporting the rating history provided.

a. (Up to 2 points available, based on insurance rating)

7. **MBE/WBE and Workforce Compliance Record** [220-RICR-30-00-4.6(D)(1)(h)]**:** Provide information and evidence of the General Contractor's compliance record with respect to Minority Business Enterprise (MBE) and Women Business Enterprise (WBE) goals and workforce inclusion goals for all projects completed within the last five (5) years, which had such goals.
   a. (Full Workforce Compliance = 5 points)

C. Project Experience- (37 points available in this category; a minimum of 19 points required in this category for Bid Acceptance)

1. **Project References** [220-RICR-30-00-4.6(D)(2)(a)] *{with additional criteria as modified herein regarding academic facilites}* **:** A minimum of three (3) references from public or private, school projects (of similar size, scope and type to this project) are required that the Contractor has performed within the past five (5) years. Information provided shall at least include project name and the names of the owners and architects, with current address, current telephone, current fax numbers, current email address and current contact person for each.
   a. (up to 20 points available, 4 points per reference)
2. **Public Project Record** [220-RICR-30-00-4.6(D)(2)(c)]: Provide a list of all completed non-academic public building construction projects including municipal, state and federal public works building construction projects worked on during the past five (5) years with the project name, scope of work, contract value, start date, completion date, status of the project, owner's name (including address, telephone number, fax number, and contact person) and architect's name (including address, telephone number, fax number and contact person).
   a. (Up to 12 points, 3 points per reference)
3. **Credit References** [220-RICR-30-00-4.6(D)(2)(b)]: Provide a minimum of five (5) credit references, including current telephone, fax number and email address of a contact person from key suppliers, vendors and banks. Additionally a credit reference letter from the Bidder's bank(s) is required.
   a. (5 points)

1.4 SELF EVALUATION SCORING TABLE

A. The following Table is provided as a convenience to assist Bidders with an organized tool for self-evaluation prior to submitting Bids, using the criteria specified herein above. Self-evaluation does NOT mean that the actual evaluation by the Awarding Authority will result in the same score, nor does it mean Bids will be accepted for consideration. This is only a tool to assist bidders to see if they may might meet the necessary qualification requirements. This page is NOT to be included with Bids.

1. Management Experience:
   - Business Owners (3 points) _____
   - Management Personnel (10 points) _____
   - Similar Project Experience (up to 20 points) _____
   - Terminations, none (5 points) _____
   - Lawsuits, none (3 points) _____

- Safety Record (up to 3 points) _____
- Full MBE/WBE Compliance (2 points) _____

Total Management Points (*minimum 25 required*) _____

2. References Experience:
   - Academic Project References (up to 20 points) _____
   - Non-Academic Public Projects (up to 12 points) _____
   - Credit References (up to 5 points) _____

   Total References Points (*minimum 19 required*) _____

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AIA® Document A305® – 2020

Contractor's Qualification Statement

THE PARTIES SHOULD EXECUTE A SEPARATE CONFIDENTIALITY AGREEMENT IF THEY INTEND FOR ANY OF THE INFORMATION IN THIS A305-2020 TO BE HELD CONFIDENTIAL.

SUBMITTED BY:
(Organization name and address.)
« »

SUBMITTED TO:
(Organization name and address.)
« »

TYPE OF WORK TYPICALLY PERFORMED
(Indicate the type of work your organization typically performs, such as general contracting, construction manager as constructor services, HVAC contracting, electrical contracting, plumbing contracting, or other.)
« »

THIS CONTRACTOR'S QUALIFICATION STATEMENT INCLUDES THE FOLLOWING:
(Check all that apply.)

[« »] Exhibit A – General Information
[« »] Exhibit B – Financial and Performance Information
[« »] Exhibit C – Project-Specific Information
[« »] Exhibit D – Past Project Experience
[« »] Exhibit E – Past Project Experience (Continued)

CONTRACTOR CERTIFICATION
The undersigned certifies under oath that the information provided in this Contractor's Qualification Statement is true and sufficiently complete so as not to be misleading.

_____ « »
Organization's Authorized Representative Signature **Date**

« »
_____
Printed Name and Title

NOTARY
State of: « »
County of: « »
Signed and sworn to before me this « » day of « » « »

_____
Notary Signature

My commission expires: « »

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DRAFT AIA® Document A305® – 2020
Exhibit A

General Information

This Exhibit is part of the Contractor's Qualification Statement, submitted by « » and dated the « » day of « » in the year « »
(In words, indicate day, month and year.)

§ A.1 ORGANIZATION
§ A.1.1 Name and Location
§ A.1.1.1 Identify the full legal name of your organization.

« »

§ A.1.1.2 List all other names under which your organization currently does business and, for each name, identify jurisdictions in which it is registered to do business under that trade name.

« »

§ A.1.1.3 List all prior names under which your organization has operated and, for each name, indicate the date range and jurisdiction in which it was used.

« »

§ A.1.1.4 Identify the address of your organization's principal place of business and list all office locations out of which your organization conducts business. If your organization has multiple offices, you may attach an exhibit or refer to a website.

« »

§ A.1.2 Legal Status
§ A.1.2.1 Identify the legal status under which your organization does business, such as sole proprietorship, partnership, corporation, limited liability corporation, joint venture, or other.

« »

.1 If your organization is a corporation, identify the state in which it is incorporated, the date of incorporation, and its four highest-ranking corporate officers and their titles, as applicable.

« »

.2 If your organization is a partnership, identify its partners and its date of organization.

« »

.3 If your organization is individually owned, identify its owner and date of organization.

« »

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.4 If the form of your organization is other than those listed above, describe it and identify its individual leaders:

« »

§ A.1.2.2 Does your organization own, in whole or in part, any other construction-related businesses? If so, identify and describe those businesses and specify percentage of ownership.

« »

§ A.1.3 Other Information

§ A.1.3.1 How many years has your organization been in business?

« »

§ A.1.3.2 How many full-time employees work for your organization?

« »

§ A.1.3.3 List your North American Industry Classification System (NAICS) codes and titles. Specify which is your primary NAICS code.

« »

§ A.1.3.4 Indicate whether your organization is certified as a governmentally recognized special business class, such as a minority business enterprise, woman business enterprise, service disabled veteran owned small business, woman owned small business, small business in a HUBZone, or a small disadvantaged business in the 8(a) Business Development Program. For each, identify the certifying authority and indicate jurisdictions to which such certification applies.

« »

§ A.2 EXPERIENCE

§ A.2.1 Complete Exhibit D to describe up to four projects, either completed or in progress, that are representative of your organization's experience and capabilities.

§ A.2.2 State your organization's total dollar value of work currently under contract.

« »

§ A.2.3 Of the amount stated in Section A.2.2, state the dollar value of work that remains to be completed:

« »

§ A.2.4 State your organization's average annual dollar value of construction work performed during the last five years.

« »

§ A.3 CAPABILITIES

§ A.3.1 List the categories of work that your organization typically self-performs.

« »

§ A.3.2 Identify qualities, accreditations, services, skills, or personnel that you believe differentiate your organization from others.

« »

§ A.3.3 Does your organization provide design collaboration or pre-construction services? If so, describe those services.

« »

§ A.3.4 Does your organization use building information modeling (BIM)? If so, describe how your organization uses BIM and identify BIM software that your organization regularly uses.

« »

§ A.3.5 Does your organization use a project management information system? If so, identify that system.

« »

§ A.4 REFERENCES

§ A.4.1 Identify three client references:
(Insert name, organization, and contact information)

« »

§ A.4.2 Identify three architect references:
(Insert name, organization, and contact information)

« »

§ A.4.3 Identify one bank reference:
(Insert name, organization, and contact information)

« »

§ A.4.4 Identify three subcontractor or other trade references:
(Insert name, organization, and contact information)

« »

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DRAFT AIA® Document A305® – 2020 Exhibit B

Financial and Performance Information

This Exhibit is part of the Contractor's Qualification Statement, submitted by « » and dated the « » day of « » in the year « »
(In words, indicate day, month and year.)

§ B.1 FINANCIAL

§ B.1.1 Federal tax identification number:

« »

§ B.1.2 Attach financial statements for the last three years prepared in accordance with Generally Accepted Accounting Principles, including your organization's latest balance sheet and income statement. Also, indicate the name and contact information of the firm that prepared each financial statement.

« »

§ B.1.3 Has your organization, its parent, or a subsidiary, affiliate, or other entity having common ownership or management, been the subject of any bankruptcy proceeding within the last ten years?

« »

§ B.1.4 Identify your organization's preferred credit rating agency and identification information.
(Identify rating agency, such as Dun and Bradstreet or Equifax, and insert your organization's identification number or other method of searching your organization's credit rating with such agency.)

« »

§ B.2 DISPUTES AND DISCIPLINARY ACTIONS

§ B.2.1 Are there any pending or outstanding judgments, arbitration proceedings, bond claims, or lawsuits against your organization, its parent, or a subsidiary, affiliate, or other entity having common ownership or management, or any of the individuals listed in Exhibit A, Section 1.2, in which the amount in dispute is more than $75,000?
(If the answer is yes, provide an explanation.)

« »

§ B.2.2 In the last five years has your organization, its parent, or a subsidiary, affiliate, or other entity having common ownership or management:
(If the answer to any of the questions below is yes, provide an explanation.)

.1 failed to complete work awarded to it?

« »

.2 been terminated for any reason except for an owners' convenience?

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« »

.3 had any judgments, settlements, or awards pertaining to a construction project in which your organization was responsible for more than $75,000?

« »

.4 filed any lawsuits or requested arbitration regarding a construction project?

« »

§ B.2.3 In the last five years, has your organization, its parent, or a subsidiary, affiliate, or other entity having common ownership or management; or any of the individuals listed in Exhibit A Section 1.2:
(If the answer to any of the questions below is yes, provide an explanation.)

.1 been convicted of, or indicted for, a business-related crime?

« »

.2 had any business or professional license subjected to disciplinary action?

« »

.3 been penalized or fined by a state or federal environmental agency?

« »

DRAFT AIA® Document A305® – 2020
Exhibit C

Project Specific Information

This Exhibit is part of the Contractor's Qualification Statement, submitted by « » and dated the « » day of « » in the year « »
(In words, indicate day, month and year.)

PROJECT:
(Name and location or address.)

« »
« »

CONTRACTOR'S PROJECT OFFICE:
(Identify the office out of which the contractor proposes to perform the work for the Project.)

« »

TYPE OF WORK SOUGHT
(Indicate the type of work you are seeking for this Project, such as general contracting, construction manager as constructor, design-build, HVAC subcontracting, electrical subcontracting, plumbing subcontracting, etc.)

« »

CONFLICT OF INTEREST
Describe any conflict of interest your organization, its parent, or a subsidiary, affiliate, or other entity having common ownership or management, or any of the individuals listed in Exhibit A Section 1.2, may have regarding this Project.

« »

§ C.1 PERFORMANCE OF THE WORK
§ C.1.1 When was the Contractor's Project Office established?

« »

§ C.1.2 How many full-time field and office staff are respectively employed at the Contractor's Project Office?

« »

§ C.1.3 List the business license and contractor license or registration numbers for the Contractor's Project Office that pertain to the Project.

« »

§ C.1.4 Identify key personnel from your organization who will be meaningfully involved with work on this Project and indicate (1) their position on the Project team, (2) their office location, (3) their expertise and experience, and (4) projects similar to the Project on which they have worked.

« »

§ C.1.5 Identify portions of work that you intend to self-perform on this Project.

« »

§ C.1.6 To the extent known, list the subcontractors you intend to use for major portions of work on the Project.

« »

§ C.2 EXPERIENCE RELATED TO THE PROJECT

§ C.2.1 Complete Exhibit D to describe up to four projects performed by the Contractor's Project Office, either completed or in progress, that are relevant to this Project, such as projects in a similar geographic area or of similar project type. If you have already completed Exhibit D, but want to provide further examples of projects that are relevant to this Project, you may complete Exhibit E.

§ C.2.2 State the total dollar value of work currently under contract at the Contractor's Project Office:

« »

§ C.2.3 Of the amount stated in Section C.2.2, state the dollar value of work that remains to be completed:

« »

§ C.2.4 State the average annual dollar value of construction work performed by the Contractor's Project Office during the last five years.

« »

§ C.2.5 List the total number of projects the Contractor's Project Office has completed in the last five years and state the dollar value of the largest contract the Contractor's Project Office has completed during that time.

« »

§ C.3 SAFETY PROGRAM AND RECORD

§ C.3.1 Does the Contractor's Project Office have a written safety program?

« »

§ C.3.2 List all safety-related citations and penalties the Contractor's Project Office has received in the last three years.

« »

§ C.3.3 Attach the Contractor's Project Office's OSHA 300a Summary of Work-Related Injuries and Illnesses form for the last three years.

§ C.3.4 Attach a copy of your insurance agent's verification letter for your organization's current workers' compensation experience modification rate and rates for the last three years.

§ C.4 INSURANCE

§ C.4.1 Attach current certificates of insurance for your commercial general liability policy, umbrella insurance policy, and professional liability insurance policy, if any. Identify deductibles or self-insured retentions for your commercial general liability policy.

§ C.4.2 If requested, will your organization be able to provide property insurance for the Project written on a builder's risk "all-risks" completed value or equivalent policy form and sufficient to cover the total value of the entire Project on a replacement cost basis?

« »

§ C.4.3 Does your commercial general liability policy contain any exclusions or restrictions of coverage that are prohibited in AIA Document A101-2017, Exhibit A, Insurance A.3.2.2.2? If so, identify.

« »

§ C.5 SURETY

§ C.5.1 If requested, will your organization be able to provide a performance and payment bond for this Project?

« »

§ C.5.2 Surety company name:

« »

§ C.5.3 Surety agent name and contact information:

« »

§ C.5.4 Total bonding capacity:

« »

§ C.5.5 Available bonding capacity as of the date of this qualification statement:

« »

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DRAFT AIA® Document A305® – 2020
Exhibit D

Contractor's Past Project Experience

	1	2	3	4
PROJECT NAME				
PROJECT LOCATION				
PROJECT TYPE				
OWNER				
ARCHITECT				
CONTRACTOR'S PROJECT EXECUTIVE				
KEY PERSONNEL (include titles)				
PROJECT DETAILS	Contract Amount Completion Date % Self-Performed Work	Contract Amount Completion Date % Self-Performed Work	Contract Amount Completion Date % Self-Performed Work	Contract Amount Completion Date % Self-Performed Work
PROJECT DELIVERY METHOD	☐ Design-bid-build ☐ Design-build ☐ CM constructor ☐ CM advisor ☐ Other:	☐ Design-bid-build ☐ Design-build ☐ CM constructor ☐ CM advisor ☐ Other:	☐ Design-bid-build ☐ Design-build ☐ CM constructor ☐ CM advisor ☐ Other:	☐ Design-bid-build ☐ Design-build ☐ CM constructor ☑ CM advisor ☐ Other:
SUSTAINABILITY CERTIFICATIONS				

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DRAFT AIA® Document A305® – 2020 Exhibit E

Contractor's Past Project Experience, Continued

	1	2	3	4
PROJECT NAME				
PROJECT LOCATION				
PROJECT TYPE				
OWNER				
ARCHITECT				
CONTRACTOR'S PROJECT EXECUTIVE				
KEY PERSONNEL (include titles)				
PROJECT DETAILS	Contract Amount Completion Date % Self-Performed Work	Contract Amount Completion Date % Self-Performed Work	Contract Amount Completion Date % Self-Performed Work	Contract Amount Completion Date % Self-Performed Work
PROJECT DELIVERY METHOD	☐ Design-bid-build ☐ Design-build ☐ CM constructor ☐ CM advisor ☐ Other:	☐ Design-bid-build ☐ Design-build ☐ CM constructor ☐ CM advisor ☐ Other:	☐ Design-bid-build ☐ Design-build ☐ CM constructor ☐ CM advisor ☐ Other:	☐ Design-bid-build ☐ Design-build ☐ CM constructor ☑ CM advisor ☐ Other:
SUSTAINABILITY CERTIFICATIONS				

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STATEMENT OF NON-COLLUSION

I,_____, _____, of _____
(Name) (Title) (General Bidder)
whose principal place of business is located at _____
(Address)
_____
do hereby certify that:

1. The proposed bid price has been arrived at independently, without collusion, consultation or communication with any other contractor or with any competitor.

2. The said bid price was not disclosed by the Bidder and was not knowingly discussed prior to the bid submission, directly or indirectly, with any other contractor or any competitor.

3. No attempt was made by the Bidder to induce any other person, partnership or corporation to submit or not to submit a proposal for the purpose of restricting competition.

4. This bid is in all respects bona fide, fair and made without collusion or fraud with any other person. As used in this section the word "person" shall mean any natural person, joint venture, partnership, corporation, or other business or legal entity.

Signed under the pains of perjury this _____day of _, 20_____.

_____
Name of General Bidder

By:_____

Title:_____

State of Rhode Island)

)SS:

County of _____)

On this, the_____day of _____, 20____, before me a notary public, the undersigned officer, personally appeared_____, known to me (or satisfactorily proven) to be the person whose name is subscribed to the within instrument, and acknowledged that he executed the same for the purposes therein contained.

In witness hereof, I hereunto set my hand and official seal.

_____

Notary Public

My Commission Expires:_____

END STATEMENT OF NON-COLLUSION

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DBE SPECIAL PROVISION

DISADVANTAGED BUSINESS ENTERPRISE AFFIRMATIVE ACTION CERTIFICATION FOR CONTRACTORS AND CONSULTANTS

With respect to the above numbered project, I hereby certify that I am the _____ and duly authorized representative of _____ whose address is _____ _____.

I do hereby certify that it is the intention of the above organization to affirmatively seek out and consider Disadvantaged Business Enterprises to participate in this contract as contractors, subcontractors and/or suppliers of materials and services. I agree to comply with the requirements of the U.S. Department of Transportation's regulations 49 CFR Part 26.

I understand and agree that any and all contracting in connection with this contract, whether undertaken prior to or subsequently to award of contract, will be in accordance with this provision. I also understand and agree that no contracting will be approved until the State Department of Transportation has reviewed and approved the affirmative actions taken by the above organization.

DEFINITIONS:

A "Broker," for purposes of this provision, is a DBE that has entered into a legally binding relationship to provide goods or services delivered or performed by a third party.

A "DBE Contractor" or "DBE Subcontractor," for purposes of this provision, is a DBE that has entered into a legally binding relationship with an obligation to furnish services, including the materials necessary to complete such services.

"Disadvantaged Business Enterprise" or "DBE," for purposes of this provision, means a for-profit small business concern certified by the Rhode Island Department of Administration, under U.S. Department of Transportation certification guidelines (a) that is at least 51 percent owned by one or more socially and economically disadvantaged individuals or, in the case of any corporation, in which 51 percent of the stock is owned by one or more such individuals; and (b) whose management and daily business operations are controlled by one or more of the socially and economically disadvantaged individuals who own it.

A "Joint Venture," for purposes of this provision, is an association of a DBE firm and one or more other firms to carry out a single, for-profit business enterprise, for which the parties combine their property, capital, efforts, skills and knowledge, and in which the DBE is responsible for a distinct, clearly defined portion of the work of the contract and whose share in the capital contribution, control, management, risks, and profits of the joint venture are commensurate with its ownership interest.

A "Manufacturer," for purposes of this provision, is a DBE that operates or maintains a factory or establishment that produces, on the premises, the materials, supplies, articles or equipment required under the contract and of the general character described by the specifications.

A "Regular Dealer" is a DBE that owns, operates, or maintains a store, warehouse, or other establishment in which the materials, supplies, articles or equipment of the general character described by the specifications and required under the contract are bought, kept in stock, and regularly sold or leased to the

public in the usual course of business. In the sale of bulk items, such as cement, asphalt, steel and stone, a DBE firm may be considered a "regular dealer" if it owns and operates the distribution equipment used to deliver its products. Any additional equipment used by a regular dealer shall be through long-term lease agreements rather than on an ad hoc or contract-by-contract basis.

"Race conscious" measures (goals) or programs are those that are focused specifically on assisting DBEs.

"Race neutral" measures (goals) or programs are those that are, or can be, used to assist all small businesses, including DBEs.

"Small Business Concern" means, with respect to firms seeking to participate as DBEs in DOT-assisted contracts, a small business concern as defined pursuant to Section 3 of the Small Business Act and Small Business Administration regulations implementing it (13 CFR part 121), and that does not also exceed the cap on average annual gross receipts specified in 49 CFR 26.65(b).

"Socially and economically disadvantaged individual" means any individual who is a citizen (or lawfully admitted permanent resident) of the United States and who has been subjected to racial or ethnic prejudice or cultural bias within American society because of his or her identity as a member of a group and without regard to his or her individual qualities. The social disadvantage must stem from circumstances beyond the individual's control.

1. Any individual who a recipient finds to be a socially and economically disadvantaged individual on a case-by-case basis.
2. Any individual in the following groups, members of which are rebuttably presumed to be socially and economically disadvantaged:
    a. "Black Americans," which includes persons having origins in any of the Black racial groups of Africa;
    b. "Hispanic Americans," which includes persons of Mexican, Puerto Rican, Cuban, Dominican, Central or South America, or other Spanish or Portuguese culture or origin, regardless of race;
    c. "Native Americans," which includes persons who are enrolled members of a federally or State recognized Indian Tribe[1], Alaska Natives, or Native Hawaiians;
    d. "Asian-Pacific Americans," which includes persons whose origins are from Japan, China, Taiwan, Korea, Burma (Myanmar), Vietnam, Laos, Cambodia (Kampuchea), Thailand, Malaysia, Indonesia, the Philippines, Brunei, Samoa, Guam, the U.S. Trust Territories of the Pacific Islands (Republic of Palau), Republic of Northern Marianas Islands, Macao, Fiji, Tonga, Kirbati, Tuvalu, Nauru, Federated States of Micronesia, or Hong Kong;
    e. "Subcontinent Asian Americans," this includes persons whose origins are from India, Pakistan, Bangladesh, Bhutan, the Maldives Islands, Nepal, or Sri Lanka;
    f. Women; and
    g. Any additional groups whose members are designated as socially and economically disadvantaged by the Small Business Administration (SBA), at such as time as the SBA designation becomes effective.
3. Being born in a particular country does not, standing alone, mean that a person is necessarily a member of one of the groups listed in this definition.

[1] A "tribally-owned concern" means any concern at least 51 percent (51%) owned by an Indian tribe as defined in 49 CFR 26.5.

I. GENERAL REQUIREMENTS AND SANCTIONS:

A. Failure by the Contractor to demonstrate every good faith effort in fulfilling its DBE commitment during the construction period will result in the reduction in contract payments by the amount determined by multiplying the awarded contract value by the established DBE percentage (listed in Section II. A. below), and subtracting the dollar value of the work actually performed by DBE contractors. This action will not preclude RIDOT from imposing sanctions or other remedies available as specified in paragraphs below.

B. Contractors and subcontractors are advised that failure to carry out the requirements of this provision shall constitute a breach of contract and, after notification by the Department, may result in termination of the agreement or contract by the Department, or such remedy as the Department deems appropriate. Greater detail of the rules and regulations regarding DBE utilization can be found in the Rules and Regulations for RIDOT DBE Program.

C. Brokering of work by DBEs is not allowed and is a contract violation unless DBE is a certified DBE broker. A DBE firm involved in brokering of work may have their certification removed or suspended and shall be subject to the sanctions stated herein. Any firm that engages in willful falsification, distortion or misrepresentation with respect to any facts related to the project shall be subject to sanctions described in paragraph (B) above and referred to the U.S. Department of Transportation's Office of the Inspector General for prosecution under Title 18, USC Section 1001.

D. The Disadvantaged Business Enterprises Directory or other available resources may be obtained at the Rhode Island Department of Transportation Office of Civil Rights (OCR), 2 Capitol Hill, Providence, RI 02903, or at http://odeo.ri.gov/.

E. The utilization of Disadvantaged Business Enterprises is in addition to all other equal opportunity requirements of this contract. The Contractor shall keep such records as are necessary to determine compliance with its Disadvantaged Business Enterprises Utilization obligations. The records kept by the Contractor shall include:
   1. The number of DBE contractors, subcontractors and suppliers; and the type of work, materials or services being performed on or incorporated in this project.
   2. The progress and efforts being made in seeking out DBE contractor organizations and individual DBE contractors for work on this project.
   3. Documentation of all correspondence, contacts, telephone calls, etc. necessary to obtain the services of DBEs on this project.
   4. Copies of canceled checks or other documentation that substantiates payments to DBE firms.
   5. All such records must be maintained for a period of three (3) years following acceptance of final payment and will be available for inspection by RIDOT and the Federal Highway Administration.

F. A contractor for a construction contract will not be eligible for award of contract under this invitation for bids unless such contractor has submitted, at the time of the Bid Opening, this Certification. A Consultant will be required to sign this Certification at the time of the contract execution or the award of contract will be nullified.

II. PRE-AWARD REQUIREMENTS:

A. Prior to contract award and within five (5) days from the opening of bids, the contractor/consultant shall, at a minimum, take the following actions to meet the race-conscious goal established by OCR, hereinafter referred to as the 'contract goal,':
   1. Appoint an EEO Officer to administer the Contractor's DBE obligations.
   2. Submit to the RIDOT Construction Section for approval any subcontractor and/or supplier, and submit executed subcontract agreement(s)/purchase orders, including a detailed description of the

work and price, between the contractor and the qualified DBE to be utilized during the performance of work. In the case of consultant contracts, the consultant shall submit the above DBE obligation as stated in the Scope of Work. This DBE obligation shall be included in the proposal submission to the Design Section, and include the name of the DBE, scope of work, and the actual dollar value.

3. Each construction subcontract submitted shall be accompanied by a completed "DBE Utilization Plan" that specifies the items of work to be performed and the contractor's commitment to complete each subcontract entered into with a DBE pursuant to meeting the contract goal stated herein.
4. Any subcontract for materials or supplies provided by a DBE broker, or for other services not provided directly by a DBE firm, shall be accompanied by the RIDOT Broker Affidavit form.

B. In the event that the cumulative percentages submitted do not equal or exceed the contract goal, RIDOT will conduct a good faith effort (GFE) review to determine the extent of the prime contractor's efforts to seek out DBEs and afford adequate subcontracting opportunities to meet the contract goal. Evidence in support of the prime's actions must be submitted using RIDOT's Good Faith Effort Form (GFEF). This form contains examples of the types of evidence set forth in 49 CFR Part 26, Appendix A. RIDOT will consider this and other relevant evidence in making its GFE determination.

1. Where RIDOT has determined that the prime contractor made every good faith effort to meet the contract goal, the contract shall be awarded.
2. Where RIDOT has determined that the prime contractor failed to make every good faith effort in meeting the contract goal, the contract shall not be awarded, and an opportunity for administrative reconsideration shall be provided.

III. CONSTRUCTION PERIOD REQUIREMENTS:

A. Counting of Participation and Commercially Useful Function (CUF)

The total dollar value of a prime contract awarded to a DBE will be counted toward the DBE requirement. Likewise, all subcontract work performed by a DBE will count toward the DBE requirement.

The allowable value of a subcontract with DBE participation will be treated as the commitment of the prime contractor toward meeting the contract goal. The specific rules for crediting DBE participation toward contract goals are as follows:

1. When a DBE participates in a contract, RIDOT will consider only the value of the work actually performed by the DBE toward DBE goals. RIDOT includes the entire amount of that portion of a construction contract (or other contract not covered by paragraph (3) of this section) that is performed by the DBE's own forces. RIDOT credits the cost of supplies and materials purchased or leased by the DBE subcontractor for the work of the contract. However, supplies and equipment the DBE subcontractor purchases or leases from the prime contractor or its affiliate are not counted toward participation.
2. RIDOT credits the entire amount of fees or commissions charged by a DBE firm for providing a bona fide service, such as professional, technical, consultant, or managerial services, or for providing bonds or insurance specifically required for the performance of a USDOT-assisted contract, toward DBE goals, provided the fee is determined to be reasonable and not excessive as compared with fees customarily allowed for similar services.
3. When a DBE subcontracts part of the work of its contract to another firm, the value of the subcontracted work may be counted toward DBE goals only if the DBE's subcontractor is itself a DBE. Work that a DBE subcontracts to a non-DBE firm does not count toward DBE goals.
4. When a DBE performs as a participant in a *joint venture*, RIDOT will count a portion of the total dollar value of the contract equal to the distinct, clearly defined portion of the work of the contract that the DBE performs with its own forces toward DBE goals.

RIDOT will count expenditures to a DBE contractor toward DBE goals only if the DBE is performing a commercially useful function (CUF) on that contract.

1. A DBE performs a CUF when it is responsible for execution of the work of the contract, and is carrying out its responsibilities by actually performing, managing, and supervising the work involved. To perform a commercially useful function, the DBE must also be responsible, with respect to materials and supplies used on the contract, for negotiating price, determining quality and quantity, ordering the material, and installing (where applicable) and paying for the material itself. To determine whether a DBE is performing a commercially useful function, RIDOT evaluates the amount of work subcontracted, industry practices, whether the amount the firm is to be paid under the contract is commensurate with the work it is actually performing and the DBE credit claimed for its performance of the work, and other relevant factors. Even if a DBE is performing pursuant to normal industry practices, if those practices, in fact, erode the ability of the DBE to control its work and remain independent, the practice may affect how much can be credited toward the DBE goal and may raise questions about the DBE eligibility.
2. Suppliers: A supplier is considered to perform a CUF when it packages, i.e. takes quotes from several manufacturers, and/or sells from its own inventory in order to provide one or more items to a contractor. A supplier may own a franchise and/or may be a factory representative to one or more manufacturers. Consistent with a contractor's probable needs, a supplier, not a contractor, may place orders for production with manufacturers.
3. "Pass through" supply operations occur when the contractor decides what items shall be bought from what sources and/or agrees directly with the manufacturer, or other non-DBE party, to schedule delivery and/or directs adjustments and/or routes payments and purchase orders through the DBE. Pass through operations are not commercially useful functions and will not be counted toward contract goals.
4. Management: The DBE must manage the work that has been contracted to its firm. The DBE owner must supervise daily operations, either personally, or with a full-time, skilled and knowledgeable superintendent employed by and paid wages by the DBE. The superintendent must be present on the job site and under the DBE owner's direct supervision. The DBE owner must make all operational and managerial decisions for the firm. Mere performance of administrative duties is not considered supervision of daily operations.
5. Workforce: In order to be considered an independent business, a DBE must keep a regular workforce. DBEs cannot "share" employees with non-DBE contractors, particularly the prime contractor. The DBE shall perform its work with employees normally employed by and under the DBE's control, see paragraph 9 of this section. The DBE must be responsible for payroll and labor compliance requirements for all employees performing on the contract and is expected to prepare and finance the payrolls. Direct or indirect payments by any other contractor are not allowed.
6. Trucking: RIDOT will consider the following factors in determining whether a DBE trucking company is performing a CUF. The DBE must manage and supervise the entire trucking operation for which it is responsible on a particular contract, and there cannot be a contrived arrangement for the purpose of meeting DBE goals.
    a. The DBE itself must own and operate at least one fully licensed, insured, and operational vehicle being used on the contract.
    b. The DBE must receive compensation for the total value of the services it provides on the contract using vehicles it owns, insures, and which are operated by drivers it employs.
    c. The DBE may lease vehicles from another DBE firm, including an owner-operator who is certified as a DBE. The DBE which leases vehicles from another DBE shall receive credit for the total value of the services the lessee DBE provides on the contract.
    d. The DBE may also lease vehicles from a non-DBE firm, including from an owner-operator. The DBE which leases vehicles from a non-DBE is entitled to credit for the total value of

services provided by non-DBE lessees not to exceed the value of services provided by DBE-owned vehicles on the contract. Additional participation by non-DBE lessees receives credit only for the fee or commission it receives as a result of the lease arrangement.

Example to this subsection (6) (d): DBE firm X uses two of its own trucks on a contract. It leases two trucks from DBE firm Y and six trucks from non-DBE firm Z. DBE credit would be awarded for the total value of transportation services provided by firm X and firm Y, and may also be awarded for the total value of transportation services provided by four of the six trucks provided by firm Z. In all, full credit would be allowed for the participation of eight trucks. With respect to the other two trucks provided by firm Z, DBE credit could be awarded only for the fees or commission pertaining to those trucks firm X receives as a result of the lease with firm Z.

e. For purposes of this subsection, a lease must indicate that the DBE has exclusive use of and control over vehicles used on the project. This does not preclude vehicles from working for others during the term of the lease with the consent of the DBE, so long as the lease gives the DBE absolute priority for the use of the leased vehicle. Leased vehicles must display the name and identification number of the DBE.

7. All expenditures with manufacturers and suppliers must be properly documented in writing in order to count toward a DBE obligation. RIDOT will count expenditures with DBEs for materials or supplies toward DBE goals as follows:
   a. For a DBE contractor (furnish and install) to receive credit for supplying materials, the DBE must perform the following four functions: (1) negotiate price; (2) determine quality and quantity; (3) order the materials; and (4) pay for the material itself. If the DBE does not perform all of these functions, it has not performed a CUF with respect to obtaining the materials, and the cost of the materials may not be counted toward the DBE goal. Invoices for the material should show the payor as the DBE.
   b. If the materials or supplies are purchased from a DBE manufacturer, RIDOT will count 100 percent of the cost of the materials or supplies.
   c. If the materials or supplies are purchased from a DBE regular dealer, RIDOT will count 60 percent of the cost of the materials or supplies toward DBE goals.
   d. With respect to flaggers, when flaggers are provided, RIDOT will count 60 percent of the labor. When traffic signs are included with flaggers, the work will be counted as 100 percent.
   e. With respect to materials or supplies purchased from a DBE which is neither a manufacturer nor a regular dealer, RIDOT will count the entire amount of fees or commissions charged for assistance in the procurement of the materials and supplies, or fees or transportation charges for the delivery of materials and supplies required on a job site, toward DBE goals, provided RIDOT determines the fees to be reasonable and not excessive as compared with fees customarily allowed for similar services. The fees will be evaluated by RIDOT after receiving the Broker's Affidavit Form from the DBE. RIDOT will not count any portion of the cost of the materials and supplies themselves toward DBE goals.
8. Subcontractor: A subcontractor arrangement exists when a person or firm has a contractual obligation to perform a defined portion of the contract work and the following conditions are present:
   a. Compensation is determined by the amount of work accomplished, rather than being paid on an hourly basis.
   b. The subcontractor exercises control over work methods (except as limited by project specifications), while furnishing and managing its own labor and equipment with only minimal, general supervision being exercised by the prime contractor.

c. The personnel involved in the DBE subcontractor's portion of the project are both under the subcontractor's direct supervision and identified on its payroll records. When warranted by unique circumstances of a project, a DBE subcontractor may be permitted to employ on a limited basis specialty trades personnel who are not normally employed by the DBE subcontractor.
d. Second tier DBE subcontracting will be approved only in accordance with normal industry practice and when the type of work differs from work which the DBE usually performs.

9. All factors pertaining to the unique conditions of a project shall be considered in determining whether a DBE subcontractor relationship actually exists on the project. A DBE subcontractor may need to lease/rent equipment, other than over-the-road trucks, and/or augment its workforce with additional skilled personnel in order to perform certain project-related work. The DBE subcontractor is required to arrange for the necessary equipment through rental/leasing agreements, as necessary. (Off-the-road equipment, such as "Euclids," may be rented/leased from the prime contractor even though the CUF guidelines prohibit rental/lease of over-the-road trucks from the prime contractor.) Likewise, in limited instances, the prime contractor may provide some, but not all, personnel to the DBE subcontractor when the following conditions are present:
   a. A DBE must perform or exercise responsibility for at least 30 percent of the total cost of its contract with its own work force.
   b. The DBE must not subcontract a greater portion of the work of a contract than would be expected on the basis of normal industry practice for the type of work involved.
   c. The personnel must have a specialized expertise which has not been mastered by the DBE's own skilled/supervising/managerial personnel.
   d. Such personnel must be placed on the DBE's payroll and come under the direct supervision of the DBE for the performance of the particular subcontract work.
   e. The deployment of such personnel must be accomplished within the framework of a mentor-protégé agreement; or for emergency purposes, by contract change order. All instances of combining personnel must be for developmental purposes in which teaching/demonstration/consulting to the DBE must occur.
   f. Long term, continual (e.g. from one contract to another) or chronic use by a DBE firm, of personnel normally employed by another specific firm, lacking a mentor-protégé agreement which is being carried out in good faith, is not consistent with the CUF guidelines.
   g. To place entire work crews on DBE's payrolls when such personnel are normally employed by another specific firm is not consistent with the CUF guidelines.
   h. A DBE may need to lease/rent equipment, except for over-the-road trucks, in order to be properly equipped to execute the work of a mentor-protégé agreement. In such cases where the DBE has investigated several possible sources of such equipment within a reasonable geographical area to the project, the DBE may find the best offer was made by the prime contractor or another subcontractor on the project. In such cases, the DBE may rent/lease such equipment from the prime or another subcontractor, provided that the use of such equipment is material to demonstrating/teaching objectives set forth in the mentor-protégé agreement. Thus, the DBE's regular employees, not those temporarily furnished by the prime contractor, or another subcontractor, shall operate such equipment for the majority of the time during which the equipment is used in the work of the DBE subcontractor under the mentor-protégé agreement.
   i. A DBE's use of equipment owned by a prime contractor or another subcontractor or without an appropriate mentor/protégé program is inconsistent with the CUF guidelines and will result in noncompliance.

10. If a contractor or subcontractor is not certified as a DBE by the Minority Business Enterprise Compliance Office under the specific NAICS code of line items identified in the contract, at the

time of the execution of the contract or issuance of the purchase order, RIDOT will not count that firm's participation toward any DBE goals, except as provided in 49 CFR 26.87(i).

11. RIDOT will not count toward the contract goal the dollar value of work performed by a contractor or subcontractor after it has ceased to be a certified DBE.
12. RIDOT will not count the participation of a DBE subcontractor toward a contractor's final compliance with its DBE obligations on a contract until all payments being credited have been fully paid to the DBE.

B. DBE Replacement and Termination:

The contractor shall utilize the specific DBEs listed to perform the work and supply the materials for which each is listed unless the contractor obtains RIDOT's written consent as provided in this section; and unless RIDOT's consent is provided under this paragraph, the contractor shall not be entitled to any payment for work or material unless it is performed or supplied by the listed DBE.

1. Good Cause for Replacement or Termination

The prime contractor must provide the Department's OCR with a copy of its "Intent to Substitute /Terminate" notice to the DBE setting forth the reasons for the request. This notice must advise the DBE that it has five (5) days to respond (to prime and State) with objections and why the State should not approve the prime's proposed action.

After adequate notice by the Contractor, if any DBE is unable to perform work committed toward the goal, the DBE shall provide to the OCR a signed statement stating why it is unable to complete the work. The Contractor shall document its efforts to have another DBE perform the item or to have a DBE perform other items to replace the original DBE commitment amounts. In the event the Contractor is not able to find replacement DBE work, the Contractor must provide the OCR with documentation clearly evidencing its good faith efforts. Contractors are prohibited from terminating for convenience any DBE firm used to fulfill a commitment pursuant to meeting the contract goal stated herein.

Prior to substitution or termination of a DBE subcontractor, the contractor shall demonstrate good cause and obtain written approval from the OCR.

In accordance with 49 CFR Part 26.53 good cause includes the following circumstances:

a. The listed DBE subcontractor fails or refuses to execute a written contract;
b. The listed DBE subcontractor fails or refuses to perform the work of its subcontract in a way consistent with normal industry standards. Provided, however, that good cause does not exist if the failure or refusal of the DBE subcontractor to perform its work on the subcontract results from the bad faith or discriminatory action of the prime contractor;
c. The listed DBE subcontractor fails or refuses to meet the prime contractor's reasonable, nondiscriminatory bond requirements;
d. The listed DBE subcontractor becomes bankrupt, insolvent, or exhibits credit unworthiness;
e. The listed DBE subcontractor is ineligible to work on public works projects because of suspension and debarment proceedings pursuant 2 CFR Parts 180, 215 and 1200 or applicable state law;
f. RIDOT determines that the listed DBE subcontractor is not a responsible contractor;
g. The listed DBE subcontractor voluntarily withdraws from the project and provides to RIDOT written notice of its withdrawal;
h. The listed DBE is ineligible to receive DBE credit for the type of work required;

i. A DBE owner dies or becomes disabled with the result that the listed DBE contractor is unable to complete its work on the contract;
j. Other documented good cause that RIDOT determines compels the termination of the DBE subcontractor. Provided, that good cause does not exist if the prime contractor seeks to terminate a DBE it relied upon to obtain the contract so that the prime contractor can self-perform the work for which the DBE contractor was engaged or so that the prime contractor can substitute another DBE or non-DBE contractor after contract award.

In addition to post-award terminations, the provisions of this section apply to pre-award deletions of or substitutions for DBE firms put forward by offerors in negotiated procurements.

Failure by the contractor to carry out the requirements of this part is a material breach of the contract and may result in the termination of the contract or such other remedies that RIDOT deems appropriate.

2. Good Faith Efforts to Replace

When a DBE subcontractor is terminated as provided in paragraph (1) of this section, or fails to complete its work on the contract for any reason, RIDOT requires the prime contractor to make good faith efforts to find another DBE subcontractor to substitute for the original DBE. These good faith efforts shall be directed at finding another DBE to perform at least the same amount of work under the contract as the DBE that was terminated, to the extent needed to meet the contract goal RIDOT established for the procurement. The good faith efforts shall be documented by the contractor. If RIDOT requests documentation under this provision, the contractor shall submit the documentation within 7 days, which may be extended for an additional 7 days if necessary at the request of the contractor, and RIDOT shall provide a written determination to the contractor stating whether or not good faith efforts have been demonstrated. The determination shall be made by the DBELO, under the criteria established below.

If there is a change order to a contract on which there is a DBE contract goal, then that contract goal applies to the change order as well as to the original contract. In the event of significant change orders, good faith efforts are required dependent upon the type of change order; RIDOT determines on a case-by-case basis what constitutes good faith efforts in the context of a particular change order. This could include modifying the contract goal amount applicable to the change order if circumstances warrant. When a change order decreases work, i.e. RIDOT determines specific line items are no longer necessary on a contract or there is a quantity change on an item, no good faith effort must be shown. However, when an increase of work occurs or there is a termination of a DBE, good faith efforts must be shown in accordance with the preceding requirements.

C. Monthly Payment Certifications:

All contractors on RIDOT projects are required to certify their payments to subcontractors by use of RIDOT's contractor compliance software on a minimum of a monthly basis (which, at time of publishing, is Prism). A project may not proceed to finalization without the input of this information. RIDOT's Prompt Payment Clause applies to both DBE and non-DBE subcontracts. The Contractor is responsible for the subcontractors' compliance with the submission of their payment reporting by way of this software.

D. Joint Check Procedure for DBEs:

A prime contractor must receive written approval by the Department's DBELO before using a joint check for materials/supplies called for under a subcontract with a DBE. Joint check requests shall be submitted by the prime contractor to the Department's OCR in writing along with a Joint Check Affidavit and the subcontract agreement. The following are general conditions that must be met regarding joint check use:

1. The use of the joint check shall only be allowed by exception and shall not compromise the independence of the DBE;
2. The second party (typically the prime contractor) acts solely as a guarantor;
3. The DBE must release the check to the supplier;
4. The subcontract agreement must reflect the total contract value, including the cost of materials and installation; actual payments for work performed by the DBE may reflect labor only; and
5. The DBE remains responsible for negotiation of price, determining quality and quantity, ordering materials and installing (where applicable) and paying for the material itself.

IV. FINAL SUBCONTRACTOR PAYMENTS AND RELEASE OF RETAINAGE

Prior to receiving final payment, the Contractor shall provide to the Resident Engineer certification of the dollars paid to each DBE firm using Form "DBE Request for Verification Payment." The certification shall be dated and signed by a responsible officer of the Contractor and by the DBE. Falsification of this certification will result in sanctions listed in Sections I. of this provision.

If this contract contains a DBE goal, the Contract Compliance Officer with the OCR will verify that the Contractor has attained the DBE goal specified on said project or has provided adequate documentation justifying a lesser amount. The final estimate will not be paid to the Contractor until proper certifications have been made.

When a subcontractor's work is satisfactorily complete (i.e., all the tasks called for in the subcontract have been accomplished and documented), and the Department has partially accepted the work and all payments have been certified by the Contractor and subcontractor on the "Certification of Progress Payment" form, the Prime Contractor shall release all retainage held by the Prime Contractor within thirty (30) days of satisfactory completion of the subcontractor's work. The subcontractor shall submit to the Prime Contractor the final executed form within ten (10) days of receipt of payment.

_____

Signature of Contractor or Consultant

_____

Date

CERTIFICATE OF AUTHORITY TO SIGN CONTRACT ON BEHALF OF CORPORATION

At a duly authorized meeting of the Board of Directors of the

_____held on _____
(Name of Corporation) (Date)

at which all the Directors were present or waived notice, it was

voted that,

_____ _____
(Name) (Officer)

of this Company, be and he/she hereby is authorized to execute

contracts and bonds in the name and behalf of said company, and

affix its Corporate Seal thereto, and such execution of any

Contract or

obligation in this Company's name on its behalf by such

_____under seal of the company,
shall be (Officer)

valid and binding upon this Company.

A TRUE COPY,
ATTEST: _____
(Clerk)

PLACE OF BUSINESS _____

_____

DATE OF THIS CONTRACT _____

I hereby certify that I am the clerk of the _____

_____that _____

is the duly elected _____of

said company, and the above vote has not been amended or

rescinded and remains in full force and effect as of the date of this

Contract.

_____
(Clerk) (Corporate Seal)

DO NOT REMOVE
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FOREIGN CORPORATION CERTIFICATION

AFFIDAVIT OF COMPLIANCE
Form AF-4A 1/78

EXECUTIVE OFFICE FOR
ADMINISTRATION AND FINANCE

State of Rhode Island

_____ RHODE ISLAND BUSINESS CORPORATION

_____ NON PROFIT CORPORATION

_____ FOREIGN (non-Rhode Island Corporation)

1. _____, _____President ___Clerk of

_____whose principal office
is (Name of Corporation

located _____

do hereby certify that the above named Corporation has filed with the State Secretary all certificates and annual reports required by (Business Corporation), (Foreign Corporation), or (non-profit Corporation) of the Rhode Island General Laws.

SIGNED UNDER THE PENALTIES OF PERJURY THIS _____day of _____. 20____.

Signature of responsible Corporate Officer _____

DO NOT REMOVE
THIS PAGE INTENTIONALLY LEFT BLANK

Document 00 45 47

TAX COMPLIANCE CERTIFICATION

Pursuant to Rhode Island General Law, 220-RICR-30-00, 4.6(D)(1)(b I certify under the penalties of perjury that, to my best knowledge and belief, the within named bidder has complied with all laws of the State of Rhode Island relating to taxes, reporting of employees and contractors, and withholding and remitting child support.

Additionally, attached is LETTER OF GOOD STANDING FROM THE RHODE ISLAND DEPARTMENT OF REVENUE - DIVISION OF TAXATION, and said letter is dated not greater than 30 days prior to date Bids are due.

_____ _____

Social Security Number or or Federal Identification Number

Signature of Individual Bidder
Corporate Bidder Name

By: _____
Corporate Officer
(if applicable)

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Section 00 45 49

PROMPT PAYMENT TO SUBCONTRACTORS AFFIDAVIT

PROMPT PAYMENT TO SUBCONTRACTORS [220-RICR-30-00-4.6(D)(4)]

Subcontractor Claim Certification

The person signing below represents, under penalty of perjury, that:

1) There are no current/pending subcontractor claims for nonpayment against the vendor (or against a bond issued to the vendor);
2) There have been no subcontractor claims for nonpayment made against the vendor (or against a bond issued to the vendor) for the past five (5) years); and
3) If subcontractor claims have been made for nonpayment against the vendor (or against a bond issued to the vendor) during the past five (5) years, the vendor must disclose the nature of the claim, the amount in dispute, and how the claim resolved.

**Attach Disclosure(s)*

_____ _____

Sign Name Date

_____

Print Name and Title

End of Document

DO NOT REMOVE
THIS PAGE INTENTIONALLY LEFT BLANK

DRAFT AIA® Document A101® – 2017

Standard Form of Agreement Between Owner and Contractor where the basis of payment is a Stipulated Sum

AGREEMENT made as of the « » day of « » in the year « »
(In words, indicate day, month and year.)

BETWEEN the Owner:
(Name, legal status, address and other information)

« »« »
« »
« »
« »

and the Contractor:
(Name, legal status, address and other information)

« »« »
« »
« »
« »

for the following Project:
(Name, location and detailed description)

« »
« »
« »

The Architect:
(Name, legal status, address and other information)

« »« »
« »
« »
« »

The Owner and Contractor agree as follows.

ADDITIONS AND DELETIONS: The author of this document has added information needed for its completion. The author may also have revised the text of the original AIA standard form. An *Additions and Deletions Report* that notes added information as well as revisions to the standard form text is available from the author and should be reviewed.

This document has important legal consequences. Consultation with an attorney is encouraged with respect to its completion or modification.

The parties should complete A101®–2017, Exhibit A, Insurance and Bonds, contemporaneously with this Agreement. AIA Document A201®–2017, General Conditions of the Contract for Construction, is adopted in this document by reference. Do not use with other general conditions unless this document is modified.

ELECTRONIC COPYING of any portion of this AIA® Document to another electronic file is prohibited and constitutes a violation of copyright laws as set forth in the footer of this document.

TABLE OF ARTICLES

ARTICLE 1 THE CONTRACT DOCUMENTS

The Contract Documents consist of this Agreement, Conditions of the Contract (General, Supplementary, and other Conditions), Drawings, Specifications, Addenda issued prior to execution of this Agreement, other documents listed in this Agreement, and Modifications issued after execution of this Agreement, all of which form the Contract, and are as fully a part of the Contract as if attached to this Agreement or repeated herein. The Contract represents the entire and integrated agreement between the parties hereto and supersedes prior negotiations, representations, or agreements, either written or oral. An enumeration of the Contract Documents, other than a Modification, appears in Article 9.

ARTICLE 2 THE WORK OF THIS CONTRACT

The Contractor shall fully execute the Work described in the Contract Documents, except as specifically indicated in the Contract Documents to be the responsibility of others.

ARTICLE 3 DATE OF COMMENCEMENT AND SUBSTANTIAL COMPLETION

§ 3.1 The date of commencement of the Work shall be:
(Check one of the following boxes.)

[« »] The date of this Agreement.

[« »] A date set forth in a notice to proceed issued by the Owner.

[« X »] Established as follows:
(Insert a date or a means to determine the date of commencement of the Work.)

« **Commencement of Work - February 1, 2024**-»

If a date of commencement of the Work is not selected, then the date of commencement shall be the date of this Agreement.

§ 3.2 The Contract Time shall be measured from the date of commencement of the Work.

§ 3.3 Substantial Completion

§ 3.3.1 Subject to adjustments of the Contract Time as provided in the Contract Documents, the Contractor shall achieve Substantial Completion of the entire Work:
(Check one of the following boxes and complete the necessary information.)

[« »] Not later than « » (« ») calendar days from the date of commencement of the Work.

[« X »] By the following date: « **Phase I – On or before June 30, 2025**
Phase II – On or before December 31, 2025 »

§ 3.3.2 Subject to adjustments of the Contract Time as provided in the Contract Documents, if portions of the Work are to be completed prior to Substantial Completion of the entire Work, the Contractor shall achieve Substantial Completion of such portions by the following dates:

Portion of Work	Substantial Completion Date

§ 3.3.3 If the Contractor fails to achieve Substantial Completion as provided in this Section 3.3, liquidated damages, if any, shall be assessed as set forth in Section 4.5.

ARTICLE 4 CONTRACT SUM

§ 4.1 The Owner shall pay the Contractor the Contract Sum in current funds for the Contractor's performance of the Contract. The Contract Sum shall be « » ($ « »), subject to additions and deductions as provided in the Contract Documents.

§ 4.2 Alternates

§ 4.2.1 Alternates, if any, included in the Contract Sum:

Item	Price

§ 4.2.2 Subject to the conditions noted below, the following alternates may be accepted by the Owner following execution of this Agreement. Upon acceptance, the Owner shall issue a Modification to this Agreement.
(Insert below each alternate and the conditions that must be met for the Owner to accept the alternate.)

Item	Price	Conditions for Acceptance

§ 4.3 Allowances, if any, included in the Contract Sum:
(Identify each allowance.)

Item	Price

§ 4.4 Unit prices, if any:
(Identify the item and state the unit price and quantity limitations, if any, to which the unit price will be applicable.)

Item	Units and Limitations	Price per Unit ($0.00)

§ 4.5 Liquidated damages, if any:
(Insert terms and conditions for liquidated damages, if any.)

« »

§ 4.6 Other:
(Insert provisions for bonus or other incentives, if any, that might result in a change to the Contract Sum.)

« »

ARTICLE 5 PAYMENTS

§ 5.1 Progress Payments

§ 5.1.1 Based upon Applications for Payment submitted to the Architect by the Contractor and Certificates for Payment issued by the Architect, the Owner shall make progress payments on account of the Contract Sum to the Contractor as provided below and elsewhere in the Contract Documents.

§ 5.1.2 The period covered by each Application for Payment shall be one calendar month ending on the last day of the month~~, or as follows:~~**.**

« »

§ 5.1.3 Provided that an Application for Payment is received by the Architect not later than the « **16th** » day of a month, the Owner shall make payment of the amount certified to the Contractor not later than the « **15th** » day of the «**following** » month. If an Application for Payment is received by the Architect after the application date fixed above, payment of the amount certified shall be made by the Owner not later than «**thirty** » («**30** ») days after the Architect receives the Application for Payment.
(Federal, state or local laws may require payment within a certain period of time.)

§ 5.1.4 Each Application for Payment shall be based on the most recent schedule of values submitted by the Contractor in accordance with the Contract Documents. The schedule of values shall allocate the entire Contract Sum among the various portions of the Work. The schedule of values shall be prepared in such form, and supported by such data to substantiate its accuracy, as the Architect may require. This schedule of values shall be used as a basis for reviewing the Contractor's Applications for Payment.

§ 5.1.5 Applications for Payment shall show the percentage of completion of each portion of the Work as of the end of the period covered by the Application for Payment.

§ 5.1.6 In accordance with AIA Document A201™–2017, General Conditions of the Contract for Construction, and subject to other provisions of the Contract Documents, the amount of each progress payment shall be computed as follows:

§ 5.1.6.1 The amount of each progress payment shall first include:

- **.1** That portion of the Contract Sum properly allocable to completed Work;
- **.2** That portion of the Contract Sum properly allocable to materials and equipment delivered and suitably stored at the site for subsequent incorporation in the completed construction, or, if approved in advance by the Owner, suitably stored off the site at a location agreed upon in writing; and
- **.3** That portion of Construction Change Directives that the Architect determines, in the Architect's professional judgment, to be reasonably justified.

§ 5.1.6.2 The amount of each progress payment shall then be reduced by:

- **.1** The aggregate of any amounts previously paid by the Owner;
- **.2** The amount, if any, for Work that remains uncorrected and for which the Architect has previously withheld a Certificate for Payment as provided in Article 9 of AIA Document A201–2017;
- **.3** Any amount for which the Contractor does not intend to pay a Subcontractor or material supplier, unless the Work has been performed by others the Contractor intends to pay;
- **.4** For Work performed or defects discovered since the last payment application, any amount for which the Architect may withhold payment, or nullify a Certificate of Payment in whole or in part, as provided in Article 9 of AIA Document A201–2017; and
- **.5** Retainage withheld pursuant to Section 5.1.7.

§ 5.1.7 Retainage

§ 5.1.7.1 For each progress payment made prior to Substantial Completion of the Work, the Owner may withhold the following amount, as retainage, from the payment otherwise due:
(Insert a percentage or amount to be withheld as retainage from each Application for Payment. The amount of retainage may be limited by governing law.)

« **Five Percent (5%)** »

§ 5.1.7.1.1 The following items are not subject to retainage:
(Insert any items not subject to the withholding of retainage, such as general conditions, insurance, etc.)

« **Owner-procured materials/products, if applicable.** »

§ 5.1.7.2 Reduction or limitation of retainage, if any, shall be as follows:
(If the retainage established in Section 5.1.7.1 is to be modified prior to Substantial Completion of the entire Work, including modifications for Substantial Completion of portions of the Work as provided in Section 3.3.2, insert provisions for such modifications.)

« »

§ 5.1.7.3 Except as set forth in this Section 5.1.7.3, upon Substantial Completion of the Work, the Contractor may submit an Application for Payment that includes the retainage withheld from prior Applications for Payment pursuant to this Section 5.1.7. The Application for Payment submitted at Substantial Completion shall not include retainage as follows:
(Insert any other conditions for release of retainage upon Substantial Completion.)

« »

§ 5.1.8 If final completion of the Work is materially delayed through no fault of the Contractor, the Owner shall pay the Contractor any additional amounts in accordance with Article 9 of AIA Document A201–2017.

§ 5.1.9 Except with the Owner's prior approval, the Contractor shall not make advance payments to suppliers for materials or equipment which have not been delivered and stored at the site.

§ 5.2 Final Payment

§ 5.2.1 Final payment, constituting the entire unpaid balance of the Contract Sum, shall be made by the Owner to the Contractor when

.1 the Contractor has fully performed the Contract except for the Contractor's responsibility to correct Work as provided in Article 12 of AIA Document A201–2017, and to satisfy other requirements, if any, which extend beyond final payment; and

.2 a final Certificate for Payment has been issued by the Architect.

§ 5.2.2 The Owner's final payment to the Contractor shall be made no later than 30 days after the issuance of the Architect's final Certificate for Payment, or as follows:

« »

§ 5.3 Interest

Payments due and unpaid under the Contract shall bear interest from the date payment is due at the rate stated below, or in the absence thereof, at the legal rate prevailing from time to time at the place where the Project is located.
(Insert rate of interest agreed upon, if any.)

« **Zero percent (0%)** ~~» % « »~~

ARTICLE 6 DISPUTE RESOLUTION

§ 6.1 Initial Decision Maker

The Architect will serve as the Initial Decision Maker pursuant to Article 15 of AIA Document A201–2017, unless the parties appoint below another individual, not a party to this Agreement, to serve as the Initial Decision Maker.
(If the parties mutually agree, insert the name, address and other contact information of the Initial Decision Maker, if other than the Architect.)

« »
« »
« »

« »

§ 6.2 Binding Dispute Resolution

For any Claim subject to, but not resolved by, mediation pursuant to Article 15 of AIA Document A201–2017, the method of binding dispute resolution shall be as follows:
(Check the appropriate box.)

[« X »] Arbitration pursuant to Section 15.4 of AIA Document A201–2017

[« »] Litigation in a court of competent jurisdiction

[« »] Other *(Specify)*

« »

If the Owner and Contractor do not select a method of binding dispute resolution, or do not subsequently agree in writing to a binding dispute resolution method other than litigation, Claims will be resolved by litigation in a court of competent jurisdiction.

ARTICLE 7 TERMINATION OR SUSPENSION

§ 7.1 The Contract may be terminated by the Owner or the Contractor as provided in Article 14 of AIA Document A201–2017.

§ 7.1.1 ~~If the Contract is terminated for the Owner's convenience in accordance with Article 14 of AIA Document A201–2017, then the Owner shall pay the Contractor a termination fee as follows:~~
~~*(Insert the amount of, or method for determining, the fee, if any, payable to the Contractor following a termination for the Owner's convenience.)*~~

~~« »~~**[[RESERVED]]**

§ 7.2 The Work may be suspended by the Owner as provided in Article 14 of AIA Document A201–2017.

ARTICLE 8 MISCELLANEOUS PROVISIONS

§ 8.1 Where reference is made in this Agreement to a provision of AIA Document A201–2017 or another Contract Document, the reference refers to that provision as amended or supplemented by other provisions of the Contract Documents.

§ 8.2 The Owner's representative:
(Name, address, email address, and other information)

« »
« »
« »
« »
« »
« »

§ 8.3 The Contractor's representative:
(Name, address, email address, and other information)

« »
« »
« »
« »
« »
« »

§ 8.4 Neither the Owner's nor the Contractor's representative shall be changed without ten days' prior notice to the other party.

§ 8.5 Insurance and Bonds

§ 8.5.1 The Owner and the Contractor shall purchase and maintain insurance as set forth in AIA Document A101™–2017, Standard Form of Agreement Between Owner and Contractor where the basis of payment is a Stipulated Sum, Exhibit A, Insurance and Bonds, and elsewhere in the Contract Documents.

§ 8.5.2 The Contractor shall provide bonds as set forth in AIA Document A101™–2017 Exhibit A, and elsewhere in the Contract Documents.

§ 8.6 Notice in electronic format, pursuant to Article 1 of AIA Document A201–2017, may be given in accordance with AIA Document E203™–2013, Building Information Modeling and Digital Data Exhibit, if completed, or as otherwise set forth below:
(If other than in accordance with AIA Document E203–2013, insert requirements for delivering notice in electronic format such as name, title, and email address of the recipient and whether and how the system will be required to generate a read receipt for the transmission.)

« »

§ 8.7 Other provisions:

« »

ARTICLE 9 ENUMERATION OF CONTRACT DOCUMENTS

§ 9.1 This Agreement is comprised of the following documents:

.1 AIA Document A101™–2017, Standard Form of Agreement Between Owner and Contractor

.2 AIA Document A101™–2017, Exhibit A, Insurance and Bonds

.3 AIA Document A201™–2017, General Conditions of the Contract for Construction

.4 AIA Document E203™–2013, Building Information Modeling and Digital Data Exhibit, dated as indicated below:
(Insert the date of the E203-2013 incorporated into this Agreement.)

« »

.5 Drawings

Number	Title	Date

.6 Specifications

Section	Title	Date	Pages

.7 Addenda, if any:

Number	Date	Pages

Portions of Addenda relating to bidding or proposal requirements are not part of the Contract Documents unless the bidding or proposal requirements are also enumerated in this Article 9.

.8 Other Exhibits:
(Check all boxes that apply and include appropriate information identifying the exhibit where required.)

[« »] AIA Document E204™–2017, Sustainable Projects Exhibit, dated as indicated below:
(Insert the date of the E204-2017 incorporated into this Agreement.)

« »

[« »] The Sustainability Plan:

Title	Date	Pages

[« »] Supplementary and other Conditions of the Contract:

Document	Title	Date	Pages

.9 Other documents, if any, listed below:
(List here any additional documents that are intended to form part of the Contract Documents. AIA Document A201™–2017 provides that the advertisement or invitation to bid, Instructions to Bidders, sample forms, the Contractor's bid or proposal, portions of Addenda relating to bidding or proposal requirements, and other information furnished by the Owner in anticipation of receiving bids or proposals, are not part of the Contract Documents unless enumerated in this Agreement. Any such documents should be listed here only if intended to be part of the Contract Documents.)

« »

This Agreement entered into as of the day and year first written above.

OWNER *(Signature)*	**CONTRACTOR** *(Signature)*
« »« »	« »« »
(Printed name and title)	*(Printed name and title)*

DRAFT AIA® Document A101® – 2017 Exhibit A

Insurance and Bonds

This Insurance and Bonds Exhibit is part of the Agreement, between the Owner and the Contractor, dated the « » day of « » in the year « »
(In words, indicate day, month and year.)

for the following **PROJECT**:
(Name and location or address)

« »
« »

THE OWNER:
(Name, legal status and address)

« »« »
« »

THE CONTRACTOR:
(Name, legal status and address)

« »« »
« »

TABLE OF ARTICLES

ARTICLE A.1 GENERAL

The Owner and Contractor shall purchase and maintain insurance, and provide bonds, as set forth in this Exhibit. As used in this Exhibit, the term General Conditions refers to AIA Document A201™–2017, General Conditions of the Contract for Construction.

ARTICLE A.2 OWNER'S INSURANCE

§ A.2.1 General

Prior to commencement of the Work, the Owner shall secure the insurance, and provide evidence of the coverage, required under this Article A.2 and, upon the Contractor's request, provide a copy of the property insurance policy or policies required by Section A.2.3. The copy of the policy or policies provided shall contain all applicable conditions, definitions, exclusions, and endorsements.

§ A.2.2 Liability Insurance

The Owner shall be responsible for purchasing and maintaining the Owner's usual general liability insurance.

§ A.2.3 Required Property Insurance

ADDITIONS AND DELETIONS: The author of this document has added information needed for its completion. The author may also have revised the text of the original AIA standard form. An *Additions and Deletions Report* that notes added information as well as revisions to the standard form text is available from the author and should be reviewed.

This document has important legal consequences. Consultation with an attorney is encouraged with respect to its completion or modification.

This document is intended to be used in conjunction with AIA Document A201®–2017, General Conditions of the Contract for Construction. Article 11 of A201®–2017 contains additional insurance provisions.

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§ A.2.3.1 ~~Unless this obligation is placed on the Contractor pursuant to Section A.3.3.2.1, the Owner shall purchase and maintain, from an insurance company or insurance companies lawfully authorized to issue insurance in the jurisdiction where the Project is located, property insurance written on a builder's risk "all-risks" completed value or equivalent policy form and sufficient to cover the total value of the entire Project on a replacement cost basis. The Owner's property insurance coverage shall be no less than the amount of the initial Contract Sum, plus the value of subsequent Modifications and labor performed and materials or equipment supplied by others. The property insurance shall be maintained until Substantial Completion and thereafter as provided in Section A.2.3.1.3, unless otherwise provided in the Contract Documents or otherwise agreed in writing by the parties to this Agreement. This insurance shall include the interests of the Owner, Contractor, Subcontractors, and Sub-subcontractors in the Project as insureds. This insurance shall include the interests of mortgagees as loss payees.~~**[[RESERVED]]**

§ A.2.3.1.1 Causes of Loss. The insurance required by this Section A.2.3.1 shall provide coverage for direct physical loss or damage, and shall not exclude the risks of fire, explosion, theft, vandalism, malicious mischief, collapse, earthquake, flood, or windstorm. The insurance shall also provide coverage for ensuing loss or resulting damage from error, omission, or deficiency in construction methods, design, specifications, workmanship, or materials. Sub-limits, if any, are as follows:
(Indicate below the cause of loss and any applicable sub-limit.)

Causes of Loss	Sub-Limit

§ A.2.3.1.2 Specific Required Coverages. The insurance required by this Section A.2.3.1 shall provide coverage for loss or damage to falsework and other temporary structures, and to building systems from testing and startup. The insurance shall also cover debris removal, including demolition occasioned by enforcement of any applicable legal requirements, and reasonable compensation for the Architect's and Contractor's services and expenses required as a result of such insured loss, including claim preparation expenses. Sub-limits, if any, are as follows:
(Indicate below type of coverage and any applicable sub-limit for specific required coverages.)

Coverage	Sub-Limit

§ A.2.3.1.3 Unless the parties agree otherwise, upon Substantial Completion, the Owner shall continue the insurance required by Section A.2.3.1 or, if necessary, replace the insurance policy required under Section A.2.3.1 with property insurance written for the total value of the Project that shall remain in effect until expiration of the period for correction of the Work set forth in Section 12.2.2 of the General Conditions.

§ A.2.3.1.4 Deductibles and Self-Insured Retentions. If the insurance required by this Section A.2.3 is subject to deductibles or self-insured retentions, the Owner shall be responsible for all loss not covered because of such deductibles or retentions.

§ A.2.3.2 Occupancy or Use Prior to Substantial Completion. The Owner's occupancy or use of any completed or partially completed portion of the Work prior to Substantial Completion shall not commence until the insurance company or companies providing the insurance under Section A.2.3.1 have consented in writing to the continuance of coverage. The Owner and the Contractor shall take no action with respect to partial occupancy or use that would cause cancellation, lapse, or reduction of insurance, unless they agree otherwise in writing.

§ A.2.3.3 Insurance for Existing Structures
If the Work involves remodeling an existing structure or constructing an addition to an existing structure, the Owner shall purchase and maintain, until the expiration of the period for correction of Work as set forth in Section 12.2.2 of the General Conditions, "all-risks" property insurance, on a replacement cost basis, protecting the existing structure against direct physical loss or damage from the causes of loss identified in Section A.2.3.1, notwithstanding the undertaking of the Work. The Owner shall be responsible for all co-insurance penalties.

§ A.2.4 Optional Extended Property Insurance.
The Owner shall purchase and maintain the insurance selected and described below.

(Select the types of insurance the Owner is required to purchase and maintain by placing an X in the box(es) next to the description(s) of selected insurance. For each type of insurance selected, indicate applicable limits of coverage or other conditions in the fill point below the selected item.)

[« »] **§ A.2.4.1 Loss of Use, Business Interruption, and Delay in Completion Insurance**, to reimburse the Owner for loss of use of the Owner's property, or the inability to conduct normal operations due to a covered cause of loss.

« »

[« »] **§ A.2.4.2 Ordinance or Law Insurance**, for the reasonable and necessary costs to satisfy the minimum requirements of the enforcement of any law or ordinance regulating the demolition, construction, repair, replacement or use of the Project.

« »

[« »] **§ A.2.4.3 Expediting Cost Insurance**, for the reasonable and necessary costs for the temporary repair of damage to insured property, and to expedite the permanent repair or replacement of the damaged property.

« »

[« »] **§ A.2.4.4 Extra Expense Insurance**, to provide reimbursement of the reasonable and necessary excess costs incurred during the period of restoration or repair of the damaged property that are over and above the total costs that would normally have been incurred during the same period of time had no loss or damage occurred.

« »

[« »] **§ A.2.4.5 Civil Authority Insurance**, for losses or costs arising from an order of a civil authority prohibiting access to the Project, provided such order is the direct result of physical damage covered under the required property insurance.

« »

[« »] **§ A.2.4.6 Ingress/Egress Insurance**, for loss due to the necessary interruption of the insured's business due to physical prevention of ingress to, or egress from, the Project as a direct result of physical damage.

« »

[« »] **§ A.2.4.7 Soft Costs Insurance**, to reimburse the Owner for costs due to the delay of completion of the Work, arising out of physical loss or damage covered by the required property insurance: including construction loan fees; leasing and marketing expenses; additional fees, including those of architects, engineers, consultants, attorneys and accountants, needed for the completion of the construction, repairs, or reconstruction; and carrying costs such as property taxes, building permits, additional interest on loans, realty taxes, and insurance premiums over and above normal expenses.

« »

§ A.2.5 Other Optional Insurance.

The Owner shall purchase and maintain the insurance selected below.

(Select the types of insurance the Owner is required to purchase and maintain by placing an X in the box(es) next to the description(s) of selected insurance.)

[« »] **§ A.2.5.1 Cyber Security Insurance** for loss to the Owner due to data security and privacy breach, including costs of investigating a potential or actual breach of confidential or private information. *(Indicate applicable limits of coverage or other conditions in the fill point below.)*

« »

[« »] **§ A.2.5.2 Other Insurance**
(List below any other insurance coverage to be provided by the Owner and any applicable limits.)

Coverage	Limits

ARTICLE A.3 CONTRACTOR'S INSURANCE AND BONDS

§ A.3.1 General

§ A.3.1.1 Certificates of Insurance. The Contractor shall provide certificates of insurance acceptable to the Owner evidencing compliance with the requirements in this Article A.3 at the following times: (1) prior to commencement of the Work; (2) upon renewal or replacement of each required policy of insurance; and (3) upon the Owner's written request. An additional certificate evidencing continuation of commercial liability coverage, including coverage for completed operations, shall be submitted with the final Application for Payment and thereafter upon renewal or replacement of such coverage until the expiration of the periods required by Section A.3.2.1 and Section A.3.3.1. The certificates will show the Owner as an additional insured on the Contractor's Commercial General Liability and excess or umbrella liability policy or policies.

§ A.3.1.2 Deductibles and Self-Insured Retentions. The Contractor shall disclose to the Owner any deductible or self-insured retentions applicable to any insurance required to be provided by the Contractor.

§ A.3.1.3 Additional Insured Obligations. To the fullest extent permitted by law, the Contractor shall cause the commercial general liability coverage to include (1) the Owner, the Architect, and the Architect's consultants as additional insureds for claims caused in whole or in part by the Contractor's negligent acts or omissions during the Contractor's operations; and (2) the Owner as an additional insured for claims caused in whole or in part by the Contractor's negligent acts or omissions for which loss occurs during completed operations. The additional insured coverage shall be primary and non-contributory to any of the Owner's general liability insurance policies and shall apply to both ongoing and completed operations. To the extent commercially available, the additional insured coverage shall be no less than that provided by Insurance Services Office, Inc. (ISO) forms CG 20 10 07 04, CG 20 37 07 04, and, with respect to the Architect and the Architect's consultants, CG 20 32 07 04.

§ A.3.2 Contractor's Required Insurance Coverage

§ A.3.2.1 The Contractor shall purchase and maintain the following types and limits of insurance from an insurance company or insurance companies lawfully authorized to issue insurance in the jurisdiction where the Project is located. The Contractor shall maintain the required insurance until the expiration of the period for correction of Work as set forth in Section 12.2.2 of the General Conditions, unless a different duration is stated below:
(If the Contractor is required to maintain insurance for a duration other than the expiration of the period for correction of Work, state the duration.)

« »

§ A.3.2.2 Commercial General Liability

§ A.3.2.2.1 Commercial General Liability insurance for the Project written on an occurrence form with policy limits of not less than «**One Million Dollars** » ($ « **1,000,000.00** ») each occurrence, « **Five Million Dollars** » ($ « **5,000,000.00** ») general aggregate, and « » ($ « ») aggregate for products-completed operations hazard, providing coverage for claims including

.1 damages because of bodily injury, sickness or disease, including occupational sickness or disease, and death of any person;

.2 personal injury and advertising injury;

.3 damages because of physical damage to or destruction of tangible property, including the loss of use of such property;

.4 bodily injury or property damage arising out of completed operations; and
.5 the Contractor's indemnity obligations under Section 3.18 of the General Conditions.

§ A.3.2.2.2 The Contractor's Commercial General Liability policy under this Section A.3.2.2 shall not contain an exclusion or restriction of coverage for the following:

.1 Claims by one insured against another insured, if the exclusion or restriction is based solely on the fact that the claimant is an insured, and there would otherwise be coverage for the claim.
.2 Claims for property damage to the Contractor's Work arising out of the products-completed operations hazard where the damaged Work or the Work out of which the damage arises was performed by a Subcontractor.
.3 Claims for bodily injury other than to employees of the insured.
.4 Claims for indemnity under Section 3.18 of the General Conditions arising out of injury to employees of the insured.
.5 Claims or loss excluded under a prior work endorsement or other similar exclusionary language.
.6 Claims or loss due to physical damage under a prior injury endorsement or similar exclusionary language.
.7 Claims related to residential, multi-family, or other habitational projects, if the Work is to be performed on such a project.
.8 Claims related to roofing, if the Work involves roofing.
.9 Claims related to exterior insulation finish systems (EIFS), synthetic stucco or similar exterior coatings or surfaces, if the Work involves such coatings or surfaces.
.10 Claims related to earth subsidence or movement, where the Work involves such hazards.
.11 Claims related to explosion, collapse and underground hazards, where the Work involves such hazards.

§ A.3.2.3 Automobile Liability covering vehicles owned, and non-owned vehicles used, by the Contractor, with policy limits of not less than « **One Million Dollars** » ($ « **1,000,000.00** ») ~~per acciden~~**combined single limit**~~t~~, for bodily injury, death of any person, and property damage arising out of the ownership, maintenance and use of those motor vehicles along with any other statutorily required automobile coverage.

§ A.3.2.4 The Contractor may achieve the required limits and coverage for Commercial General Liability and Automobile Liability through a combination of primary and excess or umbrella liability insurance, provided such primary and excess or umbrella insurance policies result in the same or greater coverage as the coverages required under Section A.3.2.2 and A.3.2.3, and in no event shall any excess or umbrella liability insurance provide narrower coverage than the primary policy. The excess policy shall not require the exhaustion of the underlying limits only through the actual payment by the underlying insurers.

§ A.3.2.5 Workers' Compensation at statutory limits.

§ A.3.2.6 Employers' Liability with policy limits not less than « » ($ « ») each accident, « » ($ « ») each employee, and « **One Million Dollars** » ($ « **1,000,000.00** ») policy limit.

§ A.3.2.7 Jones Act, and the Longshore & Harbor Workers' Compensation Act, as required, if the Work involves hazards arising from work on or near navigable waterways, including vessels and docks

§ A.3.2.8 If the Contractor is required to furnish professional services as part of the Work, the Contractor shall procure Professional Liability insurance covering performance of the professional services, with policy limits of not less than « » ($ « ») per claim and « » ($ « ») in the aggregate.

§ A.3.2.9 If the Work involves the transport, dissemination, use, or release of pollutants, the Contractor shall procure Pollution Liability insurance, with policy limits of not less than « » ($ « ») per claim and « » ($ « ») in the aggregate.

§ A.3.2.10 Coverage under Sections A.3.2.8 and A.3.2.9 may be procured through a Combined Professional Liability and Pollution Liability insurance policy, with combined policy limits of not less than « » ($ « ») per claim and « » ($ « ») in the aggregate.

§ A.3.2.11 Insurance for maritime liability risks associated with the operation of a vessel, if the Work requires such activities, with policy limits of not less than « » ($ « ») per claim and « » ($ « ») in the aggregate.

§ A.3.2.12 Insurance for the use or operation of manned or unmanned aircraft, if the Work requires such activities, with policy limits of not less than « » ($ « ») per claim and « » ($ « ») in the aggregate.

§ A.3.3 Contractor's Other Insurance Coverage

§ A.3.3.1 Insurance selected and described in this Section A.3.3 shall be purchased from an insurance company or insurance companies lawfully authorized to issue insurance in the jurisdiction where the Project is located. The Contractor shall maintain the required insurance until the expiration of the period for correction of Work as set forth in Section 12.2.2 of the General Conditions, unless a different duration is stated below:
(If the Contractor is required to maintain any of the types of insurance selected below for a duration other than the expiration of the period for correction of Work, state the duration.)

« »

§ A.3.3.2 The Contractor shall purchase and maintain the following types and limits of insurance in accordance with Section A.3.3.1.
(Select the types of insurance the Contractor is required to purchase and maintain by placing an X in the box(es) next to the description(s) of selected insurance. Where policy limits are provided, include the policy limit in the appropriate fill point.)

[« X »] **§ A.3.3.2.1** Property insurance of the same type and scope satisfying the requirements identified in Section A.2.3, which, if selected in this section A.3.3.2.1, relieves the Owner of the responsibility to purchase and maintain such insurance except insurance required by Section A.2.3.1.3 and Section A.2.3.3. The Contractor shall comply with all obligations of the Owner under Section A.2.3 except to the extent provided below. The Contractor shall disclose to the Owner the amount of any deductible, and the Owner shall be responsible for losses within the deductible. Upon request, the Contractor shall provide the Owner with a copy of the property insurance policy or policies required. The Owner shall adjust and settle the loss with the insurer and be the trustee of the proceeds of the property insurance in accordance with Article 11 of the General Conditions unless otherwise set forth below:
(Where the Contractor's obligation to provide property insurance differs from the Owner's obligations as described under Section A.2.3, indicate such differences in the space below. Additionally, if a party other than the Owner will be responsible for adjusting and settling a loss with the insurer and acting as the trustee of the proceeds of property insurance in accordance with Article 11 of the General Conditions, indicate the responsible party below.)

« **The Contractor shall purchase and maintain, from an insurance company or insurance companies lawfully authorized to issue insurance in the jurisdiction where the Project is located, property insurance written on a builder's risk "all-risks" completed value or equivalent policy form and sufficient to cover the total value of the entire Project on a replacement cost basis. The builder's risk insurance shall be maintained until Substantial Completion and thereafter as provided in Section A.2.3.1.3, unless otherwise provided in the Contract Documents or otherwise agreed in writing by the parties to this Agreement. This insurance shall include the interests of the Owner, Contractor, Subcontractors, and Sub-subcontractors in the Project as insureds. This insurance shall include the interests of mortgagees as loss payees.** »

[« »] **§ A.3.3.2.2 Railroad Protective Liability Insurance**, with policy limits of not less than « » ($ « ») per claim and « » ($ « ») in the aggregate, for Work within fifty (50) feet of railroad property.

[« »] **§ A.3.3.2.3 Asbestos Abatement Liability Insurance**, with policy limits of not less than « » ($ « ») per claim and « » ($ « ») in the aggregate, for liability arising from the encapsulation, removal, handling, storage, transportation, and disposal of asbestos-containing materials.

[« »] **§ A.3.3.2.4** Insurance for physical damage to property while it is in storage and in transit to the

construction site on an "all-risks" completed value form.

[« »] **§ A.3.3.2.5** Property insurance on an "all-risks" completed value form, covering property owned by the Contractor and used on the Project, including scaffolding and other equipment.

[« »] **§ A.3.3.2.6 Other Insurance**
(List below any other insurance coverage to be provided by the Contractor and any applicable limits.)

Coverage	Limits

§ A.3.4 Performance Bond and Payment Bond
The Contractor shall provide surety bonds, from a company or companies lawfully authorized to issue surety bonds in the jurisdiction where the Project is located, as follows:
(Specify type and penal sum of bonds.)

Type	Penal Sum ($0.00)
Payment Bond	**Aggregate value of the Contract**
Performance Bond	**Aggregate value of the Contract**

Payment and Performance Bonds shall be AIA Document A312™, Payment Bond and Performance Bond, or contain provisions identical to AIA Document A312™, current as of the date of this Agreement.

ARTICLE A.4 SPECIAL TERMS AND CONDITIONS
Special terms and conditions that modify this Insurance and Bonds Exhibit, if any, are as follows:

« »

DO NOT REMOVE
THIS PAGE INTENTIONALLY LEFT BLANK

TAX COMPLIANCE CERTIFICATION

Pursuant to Rhode Island General Law, 220-RICR-30-00, 4.6(D)(1)(b I certify under the penalties of perjury that, to my best knowledge and belief, the within named bidder has complied with all laws of the State of Rhode Island relating to taxes, reporting of employees and contractors, and withholding and remitting child support.

Additionally, attached is LETTER OF GOOD STANDING FROM THE RHODE ISLAND DEPARTMENT OF REVENUE - DIVISION OF TAXATION, and said letter is dated not greater than 30 days prior to date Bids are due.

_____ _____

Social Security Number or or Federal Identification Number

Signature of Individual Bidder
Corporate Bidder Name

By: _____
Corporate Officer
(if applicable)

DO NOT REMOVE
THIS PAGE INTENTIONALLY LEFT BLANK

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Performance Bond

CONTRACTOR:
(Name, legal status and address)

« »« »
« »

SURETY:
(Name, legal status and principal place of business)

« »« »
« »

OWNER:
(Name, legal status and address)

« »« »
« »

CONSTRUCTION CONTRACT
Date: « »
Amount: $ « »
Description:
(Name and location)

« »
« »

BOND
Date:
(Not earlier than Construction Contract Date)
« »
Amount: $ « »
Modifications to this Bond: **« »** None **« »** See Section 16

CONTRACTOR AS PRINCIPAL		**SURETY**	
Company:	*(Corporate Seal)*	Company:	*(Corporate Seal)*
Signature:		Signature:	
Name and Title:	« »« »	Name and Title:	« »« »

(Any additional signatures appear on the last page of this Performance Bond.)

(FOR INFORMATION ONLY — Name, address and telephone)

AGENT or **BROKER:**

« »
« »
« »

OWNER'S REPRESENTATIVE:
(Architect, Engineer or other party:)

« »
« »
« »
« »
« »
« »

ADDITIONS AND DELETIONS: The author of this document has added information needed for its completion. The author may also have revised the text of the original AIA standard form. An *Additions and Deletions Report* that notes added information as well as revisions to the standard form text is available from the author and should be reviewed.

This document has important legal consequences. Consultation with an attorney is encouraged with respect to its completion or modification.

Any singular reference to Contractor, Surety, Owner or other party shall be considered plural where applicable.

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§ 1 The Contractor and Surety, jointly and severally, bind themselves, their heirs, executors, administrators, successors and assigns to the Owner for the performance of the Construction Contract, which is incorporated herein by reference.

§ 2 If the Contractor performs the Construction Contract, the Surety and the Contractor shall have no obligation under this Bond, except when applicable to participate in a conference as provided in Section 3.

§ 3 If there is no Owner Default under the Construction Contract, the Surety's obligation under this Bond shall arise after

.1 the Owner first provides notice to the Contractor and the Surety that the Owner is considering declaring a Contractor Default. Such notice shall indicate whether the Owner is requesting a conference among the Owner, Contractor and Surety to discuss the Contractor's performance. If the Owner does not request a conference, the Surety may, within five (5) business days after receipt of the Owner's notice, request such a conference. If the Surety timely requests a conference, the Owner shall attend. Unless the Owner agrees otherwise, any conference requested under this Section 3.1 shall be held within ten (10) business days of the Surety's receipt of the Owner's notice. If the Owner, the Contractor and the Surety agree, the Contractor shall be allowed a reasonable time to perform the Construction Contract, but such an agreement shall not waive the Owner's right, if any, subsequently to declare a Contractor Default;

.2 the Owner declares a Contractor Default, terminates the Construction Contract and notifies the Surety; and

.3 the Owner has agreed to pay the Balance of the Contract Price in accordance with the terms of the Construction Contract to the Surety or to a contractor selected to perform the Construction Contract.

§ 4 Failure on the part of the Owner to comply with the notice requirement in Section 3.1 shall not constitute a failure to comply with a condition precedent to the Surety's obligations, or release the Surety from its obligations, except to the extent the Surety demonstrates actual prejudice.

§ 5 When the Owner has satisfied the conditions of Section 3, the Surety shall promptly and at the Surety's expense take one of the following actions:

§ 5.1 Arrange for the Contractor, with the consent of the Owner, to perform and complete the Construction Contract;

§ 5.2 Undertake to perform and complete the Construction Contract itself, through its agents or independent contractors;

§ 5.3 Obtain bids or negotiated proposals from qualified contractors acceptable to the Owner for a contract for performance and completion of the Construction Contract, arrange for a contract to be prepared for execution by the Owner and a contractor selected with the Owner's concurrence, to be secured with performance and payment bonds executed by a qualified surety equivalent to the bonds issued on the Construction Contract, and pay to the Owner the amount of damages as described in Section 7 in excess of the Balance of the Contract Price incurred by the Owner as a result of the Contractor Default; or

§ 5.4 Waive its right to perform and complete, arrange for completion, or obtain a new contractor and with reasonable promptness under the circumstances:

.1 After investigation, determine the amount for which it may be liable to the Owner and, as soon as practicable after the amount is determined, make payment to the Owner; or

.2 Deny liability in whole or in part and notify the Owner, citing the reasons for denial.

§ 6 If the Surety does not proceed as provided in Section 5 with reasonable promptness, the Surety shall be deemed to be in default on this Bond seven days after receipt of an additional written notice from the Owner to the Surety demanding that the Surety perform its obligations under this Bond, and the Owner shall be entitled to enforce any remedy available to the Owner. If the Surety proceeds as provided in Section 5.4, and the Owner refuses the payment or the Surety has denied liability, in whole or in part, without further notice the Owner shall be entitled to enforce any remedy available to the Owner.

§ 7 If the Surety elects to act under Section 5.1, 5.2 or 5.3, then the responsibilities of the Surety to the Owner shall not be greater than those of the Contractor under the Construction Contract, and the responsibilities of the Owner to the Surety shall not be greater than those of the Owner under the Construction Contract. Subject to the commitment by the Owner to pay the Balance of the Contract Price, the Surety is obligated, without duplication, for

.1 the responsibilities of the Contractor for correction of defective work and completion of the Construction Contract;

.2 additional legal, design professional and delay costs resulting from the Contractor's Default, and resulting from the actions or failure to act of the Surety under Section 5; and

.3 liquidated damages, or if no liquidated damages are specified in the Construction Contract, actual damages caused by delayed performance or non-performance of the Contractor.

§ 8 If the Surety elects to act under Section 5.1, 5.3 or 5.4, the Surety's liability is limited to the amount of this Bond.

§ 9 The Surety shall not be liable to the Owner or others for obligations of the Contractor that are unrelated to the Construction Contract, and the Balance of the Contract Price shall not be reduced or set off on account of any such unrelated obligations. No right of action shall accrue on this Bond to any person or entity other than the Owner or its heirs, executors, administrators, successors and assigns.

§ 10 The Surety hereby waives notice of any change, including changes of time, to the Construction Contract or to related subcontracts, purchase orders and other obligations.

§ 11 Any proceeding, legal or equitable, under this Bond may be instituted in any court of competent jurisdiction in the location in which the work or part of the work is located and shall be instituted within two years after a declaration of Contractor Default or within two years after the Contractor ceased working or within two years after the Surety refuses or fails to perform its obligations under this Bond, whichever occurs first. If the provisions of this Paragraph are void or prohibited by law, the minimum period of limitation available to sureties as a defense in the jurisdiction of the suit shall be applicable.

§ 12 Notice to the Surety, the Owner or the Contractor shall be mailed or delivered to the address shown on the page on which their signature appears.

§ 13 When this Bond has been furnished to comply with a statutory or other legal requirement in the location where the construction was to be performed, any provision in this Bond conflicting with said statutory or legal requirement shall be deemed deleted herefrom and provisions conforming to such statutory or other legal requirement shall be deemed incorporated herein. When so furnished, the intent is that this Bond shall be construed as a statutory bond and not as a common law bond.

§ 14 Definitions

§ 14.1 Balance of the Contract Price. The total amount payable by the Owner to the Contractor under the Construction Contract after all proper adjustments have been made, including allowance to the Contractor of any amounts received or to be received by the Owner in settlement of insurance or other claims for damages to which the Contractor is entitled, reduced by all valid and proper payments made to or on behalf of the Contractor under the Construction Contract.

§ 14.2 Construction Contract. The agreement between the Owner and Contractor identified on the cover page, including all Contract Documents and changes made to the agreement and the Contract Documents.

§ 14.3 Contractor Default. Failure of the Contractor, which has not been remedied or waived, to perform or otherwise to comply with a material term of the Construction Contract.

§ 14.4 Owner Default. Failure of the Owner, which has not been remedied or waived, to pay the Contractor as required under the Construction Contract or to perform and complete or comply with the other material terms of the Construction Contract.

§ 14.5 Contract Documents. All the documents that comprise the agreement between the Owner and Contractor.

§ 15 If this Bond is issued for an agreement between a Contractor and subcontractor, the term Contractor in this Bond shall be deemed to be Subcontractor and the term Owner shall be deemed to be Contractor.

§ 16 Modifications to this bond are as follows:

« »

(Space is provided below for additional signatures of added parties, other than those appearing on the cover page.)

CONTRACTOR AS PRINCIPAL		**SURETY**	
Company:	*(Corporate Seal)*	Company:	*(Corporate Seal)*
Signature:		Signature:	
Name and Title:	« »« »	Name and Title:	« »« »
Address:	« »	Address:	« »

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Payment Bond

CONTRACTOR:
(Name, legal status and address)

« »« »
« »

SURETY:
(Name, legal status and principal place of business)

« »« »
« »

OWNER:
(Name, legal status and address)

« »« »
« »

CONSTRUCTION CONTRACT
Date: « »
Amount: $ « »
Description:
(Name and location)

« »
« »

BOND
Date:
(Not earlier than Construction Contract Date)
« »
Amount: $ « »
Modifications to this Bond: « » None « » See Section 18

CONTRACTOR AS PRINCIPAL
Company: *(Corporate Seal)*

Signature: _____
Name and Title: « »« »

SURETY
Company: *(Corporate Seal)*

Signature: _____
Name and Title: « »« »

(Any additional signatures appear on the last page of this Payment Bond.)

(FOR INFORMATION ONLY — Name, address and telephone)
AGENT or **BROKER:**

« »
« »
« »

OWNER'S REPRESENTATIVE:
(Architect, Engineer or other party:)

« »
« »
« »
« »
« »
« »

ADDITIONS AND DELETIONS: The author of this document has added information needed for its completion. The author may also have revised the text of the original AIA standard form. An *Additions and Deletions Report* that notes added information as well as revisions to the standard form text is available from the author and should be reviewed.

This document has important legal consequences. Consultation with an attorney is encouraged with respect to its completion or modification.

Any singular reference to Contractor, Surety, Owner or other party shall be considered plural where applicable.

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§ 1 The Contractor and Surety, jointly and severally, bind themselves, their heirs, executors, administrators, successors and assigns to the Owner to pay for labor, materials and equipment furnished for use in the performance of the Construction Contract, which is incorporated herein by reference, subject to the following terms.

§ 2 If the Contractor promptly makes payment of all sums due to Claimants, and defends, indemnifies and holds harmless the Owner from claims, demands, liens or suits by any person or entity seeking payment for labor, materials or equipment furnished for use in the performance of the Construction Contract, then the Surety and the Contractor shall have no obligation under this Bond.

§ 3 If there is no Owner Default under the Construction Contract, the Surety's obligation to the Owner under this Bond shall arise after the Owner has promptly notified the Contractor and the Surety (at the address described in Section 13) of claims, demands, liens or suits against the Owner or the Owner's property by any person or entity seeking payment for labor, materials or equipment furnished for use in the performance of the Construction Contract and tendered defense of such claims, demands, liens or suits to the Contractor and the Surety.

§ 4 When the Owner has satisfied the conditions in Section 3, the Surety shall promptly and at the Surety's expense defend, indemnify and hold harmless the Owner against a duly tendered claim, demand, lien or suit.

§ 5 The Surety's obligations to a Claimant under this Bond shall arise after the following:

§ 5.1 Claimants, who do not have a direct contract with the Contractor,

- **.1** have furnished a written notice of non-payment to the Contractor, stating with substantial accuracy the amount claimed and the name of the party to whom the materials were, or equipment was, furnished or supplied or for whom the labor was done or performed, within ninety (90) days after having last performed labor or last furnished materials or equipment included in the Claim; and
- **.2** have sent a Claim to the Surety (at the address described in Section 13).

§ 5.2 Claimants, who are employed by or have a direct contract with the Contractor, have sent a Claim to the Surety (at the address described in Section 13).

§ 6 If a notice of non-payment required by Section 5.1.1 is given by the Owner to the Contractor, that is sufficient to satisfy a Claimant's obligation to furnish a written notice of non-payment under Section 5.1.1.

§ 7 When a Claimant has satisfied the conditions of Sections 5.1 or 5.2, whichever is applicable, the Surety shall promptly and at the Surety's expense take the following actions:

§ 7.1 Send an answer to the Claimant, with a copy to the Owner, within sixty (60) days after receipt of the Claim, stating the amounts that are undisputed and the basis for challenging any amounts that are disputed; and

§ 7.2 Pay or arrange for payment of any undisputed amounts.

§ 7.3 The Surety's failure to discharge its obligations under Section 7.1 or Section 7.2 shall not be deemed to constitute a waiver of defenses the Surety or Contractor may have or acquire as to a Claim, except as to undisputed amounts for which the Surety and Claimant have reached agreement. If, however, the Surety fails to discharge its obligations under Section 7.1 or Section 7.2, the Surety shall indemnify the Claimant for the reasonable attorney's fees the Claimant incurs thereafter to recover any sums found to be due and owing to the Claimant.

§ 8 The Surety's total obligation shall not exceed the amount of this Bond, plus the amount of reasonable attorney's fees provided under Section 7.3, and the amount of this Bond shall be credited for any payments made in good faith by the Surety.

§ 9 Amounts owed by the Owner to the Contractor under the Construction Contract shall be used for the performance of the Construction Contract and to satisfy claims, if any, under any construction performance bond. By the Contractor furnishing and the Owner accepting this Bond, they agree that all funds earned by the Contractor in the performance of the Construction Contract are dedicated to satisfy obligations of the Contractor and Surety under this Bond, subject to the Owner's priority to use the funds for the completion of the work.

§ 10 The Surety shall not be liable to the Owner, Claimants or others for obligations of the Contractor that are unrelated to the Construction Contract. The Owner shall not be liable for the payment of any costs or expenses of any Claimant under this Bond, and shall have under this Bond no obligation to make payments to, or give notice on behalf of, Claimants or otherwise have any obligations to Claimants under this Bond.

§ 11 The Surety hereby waives notice of any change, including changes of time, to the Construction Contract or to related subcontracts, purchase orders and other obligations.

§ 12 No suit or action shall be commenced by a Claimant under this Bond other than in a court of competent jurisdiction in the state in which the project that is the subject of the Construction Contract is located or after the expiration of one year from the date (1) on which the Claimant sent a Claim to the Surety pursuant to Section 5.1.2 or 5.2, or (2) on which the last labor or service was performed by anyone or the last materials or equipment were furnished by anyone under the Construction Contract, whichever of (1) or (2) first occurs. If the provisions of this Paragraph are void or prohibited by law, the minimum period of limitation available to sureties as a defense in the jurisdiction of the suit shall be applicable.

§ 13 Notice and Claims to the Surety, the Owner or the Contractor shall be mailed or delivered to the address shown on the page on which their signature appears. Actual receipt of notice or Claims, however accomplished, shall be sufficient compliance as of the date received.

§ 14 When this Bond has been furnished to comply with a statutory or other legal requirement in the location where the construction was to be performed, any provision in this Bond conflicting with said statutory or legal requirement shall be deemed deleted herefrom and provisions conforming to such statutory or other legal requirement shall be deemed incorporated herein. When so furnished, the intent is that this Bond shall be construed as a statutory bond and not as a common law bond.

§ 15 Upon request by any person or entity appearing to be a potential beneficiary of this Bond, the Contractor and Owner shall promptly furnish a copy of this Bond or shall permit a copy to be made.

§ 16 Definitions

§ 16.1 Claim. A written statement by the Claimant including at a minimum:

- **.1** the name of the Claimant;
- **.2** the name of the person for whom the labor was done, or materials or equipment furnished;
- **.3** a copy of the agreement or purchase order pursuant to which labor, materials or equipment was furnished for use in the performance of the Construction Contract;
- **.4** a brief description of the labor, materials or equipment furnished;
- **.5** the date on which the Claimant last performed labor or last furnished materials or equipment for use in the performance of the Construction Contract;
- **.6** the total amount earned by the Claimant for labor, materials or equipment furnished as of the date of the Claim;
- **.7** the total amount of previous payments received by the Claimant; and
- **.8** the total amount due and unpaid to the Claimant for labor, materials or equipment furnished as of the date of the Claim.

§ 16.2 Claimant. An individual or entity having a direct contract with the Contractor or with a subcontractor of the Contractor to furnish labor, materials or equipment for use in the performance of the Construction Contract. The term Claimant also includes any individual or entity that has rightfully asserted a claim under an applicable mechanic's lien or similar statute against the real property upon which the Project is located. The intent of this Bond shall be to include without limitation in the terms "labor, materials or equipment" that part of water, gas, power, light, heat, oil, gasoline, telephone service or rental equipment used in the Construction Contract, architectural and engineering services required for performance of the work of the Contractor and the Contractor's subcontractors, and all other items for which a mechanic's lien may be asserted in the jurisdiction where the labor, materials or equipment were furnished.

§ 16.3 Construction Contract. The agreement between the Owner and Contractor identified on the cover page, including all Contract Documents and all changes made to the agreement and the Contract Documents.

§ 16.4 Owner Default. Failure of the Owner, which has not been remedied or waived, to pay the Contractor as required under the Construction Contract or to perform and complete or comply with the other material terms of the Construction Contract.

§ 16.5 Contract Documents. All the documents that comprise the agreement between the Owner and Contractor.

§ 17 If this Bond is issued for an agreement between a Contractor and subcontractor, the term Contractor in this Bond shall be deemed to be Subcontractor and the term Owner shall be deemed to be Contractor.

§ 18 Modifications to this bond are as follows:

« »

(Space is provided below for additional signatures of added parties, other than those appearing on the cover page.)

CONTRACTOR AS PRINCIPAL		**SURETY**	
Company:	*(Corporate Seal)*	Company:	*(Corporate Seal)*
Signature:		Signature:	
Name and Title:	« »« »	Name and Title:	« »« »
Address:	« »	Address:	« »

Document 00 63 13

REQUEST FOR INTERPRETATION (RFI) FORM

Date Submitted: _____

To the Architect: Ai3 Architects, LLC
111 Speen Street, Suite 300
Framingham, Massachusetts 01701

Architect's Assigned RFI # _____

A/E Project Number: 2202.02

Submitted By: Company: _____

Address _____

References: Specification Section Number: _____

Article/ Paragraph / Subparagraph: _____

Drawing Number: _____

Detail Number: _____

Request: _____

☐ Refer to Attachment(s) _____

_____

_____

_____

_____

Signed By: _____

Response: _____

_____

_____

_____

_____

_____

☐ Refer to Attachment(s)

Response From: _____

Signed by: _____

Copies to: ☐Owner ☐Consultants ☐ _____

Date Received at Architect _____

☐_____ ☐_____ ☐ _____
☐_____ ☐_____ ☐ File

End of Document

Date Returned by Architect
_____

Document 00 63 25

SUBSTITUTION REQUEST FORM

Date Submitted: _____ Architect's Project Number: 2202.02

Project: CENTRAL FALLS HIGH SCHOOL

To the Architect: Ai3 Architects, LLC
111 Speen Street, Suite 300
Framingham, Massachusetts 01701

Submitted By: Company Name: _____

The General Contractor proposes the following substitution in pursuant to Rhode Island 220-RICR-30-00-5, and the requirements of the Contract Documents:

References:

Specification Section Number: --------- _____

Article / Paragraph / Subparagraph: -- _____

Drawing Number: ---------- _____

Detail Number: ---------- _____

Scope of Substitution: _____

_____

Impact on Project Schedule ☐ None ☐ Yes [Add] [Deduct] # of Calendar Days _____

Impact on Related Work: ☐ None ☐ Yes - explain: _____

_____

List all Deviations from specified requirements: _____

_____

_____
Attach Additional Sheets if necessary to describe deviations

Attachments: Attach supporting documentation sufficient for Architect to evaluate substitution. Substitution Request Forms submitted without adequate documentation will be returned without review.

Attachments: ☐ Drawings ☐ Product Data ☐ Reports ☐ _____
☐ Samples ☐ Warranties ☐ Tests ☐ _____

In addition to specific product information, attachments shall address the following issues:

- Manufacturer's Name, Address and Phone Number.
- Point by point comparative with specified product.
- Age of product availability in US marketplace
- List of 3 Similar installations, include Project Name, A/E and A/E phone number

Response Date: List date by which response by Architect is requested to maintain project schedule and allow sufficient time for inclusion of proposed substitution.

Requested Response Date *: _____

* shall be not less than 10 working days from date substitution request is received.

Contractor's Certification: The Contractor certifies substitution complies with the project requirements and with the General Conditions by initiating each line below:

Investigation: ---------- _____

Warranties and Guarantees: ---------- _____

Cost Data:---------- _____

Coordination of Substitute: ---------- _____

Submitted by:
(company name & address) _____

_____

_____

Authorized Signature _____

Notations listed below shall have the same meaning as on Architect's review stamp.
Clarifications to or changes in project schedule or time shall be processed using standard project forms.

Architect's Response:

No Exceptions Taken:---------- _____

Make Corrections Noted:---------- _____

Submit Specified Item: ---------- _____

Confirm Revise and Resubmit: ---------- _____

Rejected: ---------- _____

Remarks: _____

_____

_____

_____

_____

Date: _____

Signed: _____

End of Document

DRAFT

AIA® Document A201® – 2017

General Conditions of the Contract for Construction

for the following PROJECT:
(Name and location or address)

« »
« »

THE OWNER:
(Name, legal status and address)

« »« »
« »

THE ARCHITECT:
(Name, legal status and address)

« »« »
« »

TABLE OF ARTICLES

ADDITIONS AND DELETIONS: The author of this document has added information needed for its completion. The author may also have revised the text of the original AIA standard form. An *Additions and Deletions Report* that notes added information as well as revisions to the standard form text is available from the author and should be reviewed.

This document has important legal consequences. Consultation with an attorney is encouraged with respect to its completion or modification.

For guidance in modifying this document to include supplementary conditions, see AIA Document A503™, Guide for Supplementary Conditions.

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INDEX
(Topics and numbers in bold are Section headings.)

ARTICLE 1 GENERAL PROVISIONS

§ 1.1 Basic Definitions

§ 1.1.1 The Contract Documents

The Contract Documents are enumerated in the Agreement between the Owner and Contractor (hereinafter the Agreement) and consist of the Agreement, Conditions of the Contract (General, Supplementary and other Conditions), Drawings, Specifications, Addenda issued prior to execution of the Contract, other documents listed in the Agreement, and Modifications issued after execution of the Contract. A Modification is (1) a written amendment to the Contract signed by both parties, (2) a Change Order, (3) a Construction Change Directive, or (4) a written order for a minor change in the Work issued by the Architect. Unless specifically enumerated in the Agreement, the Contract Documents do not include the advertisement or invitation to bid, Instructions to Bidders, sample forms, other information furnished by the Owner in anticipation of receiving bids or proposals, the Contractor's bid or proposal, or portions of Addenda relating to bidding or proposal requirements.

§ 1.1.2 The Contract

The Contract Documents form the Contract for Construction. The Contract represents the entire and integrated agreement between the parties hereto and supersedes prior negotiations, representations, or agreements, either written or oral. The Contract may be amended or modified only by a Modification. The Contract Documents shall not be construed to create a contractual relationship of any kind (1) between the Contractor and the Architect or the Architect's consultants, (2) between the Owner and a Subcontractor or a Sub-subcontractor, (3) between the Owner and the Architect or the Architect's consultants, or (4) between any persons or entities other than the Owner and the Contractor. The Architect shall, however, be entitled to performance and enforcement of obligations under the Contract intended to facilitate performance of the Architect's duties.

§ 1.1.3 The Work

The term "Work" means the construction and services required by the Contract Documents, whether completed or partially completed, and includes all other labor, materials, equipment, and services provided or to be provided by the Contractor to fulfill the Contractor's obligations. The Work may constitute the whole or a part of the Project.

§ 1.1.4 The Project

The Project is the total construction of which the Work performed under the Contract Documents may be the whole or a part and which may include construction by the Owner and by Separate Contractors.

§ 1.1.5 The Drawings

The Drawings are the graphic and pictorial portions of the Contract Documents showing the design, location and dimensions of the Work, generally including plans, elevations, sections, details, schedules, and diagrams.

§ 1.1.6 The Specifications

The Specifications are that portion of the Contract Documents consisting of the written requirements for materials, equipment, systems, standards and workmanship for the Work, and performance of related services.

§ 1.1.7 Instruments of Service

Instruments of Service are representations, in any medium of expression now known or later developed, of the tangible and intangible creative work performed by the Architect and the Architect's consultants under their respective professional services agreements. Instruments of Service may include, without limitation, studies, surveys, models, sketches, drawings, specifications, and other similar materials.

§ 1.1.8 Initial Decision Maker

The Initial Decision Maker is the person identified in the Agreement to render initial decisions on Claims in accordance with Section 15.2. The Initial Decision Maker shall not show partiality to the Owner or Contractor and shall not be liable for results of interpretations or decisions rendered in good faith.

§ 1.2 Correlation and Intent of the Contract Documents

§ 1.2.1 The intent of the Contract Documents is to include all items necessary for the proper execution and completion of the Work by the Contractor. The Contract Documents are complementary, and what is required by one shall be as binding as if required by all; performance by the Contractor shall be required only to the extent consistent with the Contract Documents and reasonably inferable from them as being necessary to produce the indicated results.

§ 1.2.1.1 The invalidity of any provision of the Contract Documents shall not invalidate the Contract or its remaining provisions. If it is determined that any provision of the Contract Documents violates any law, or is otherwise invalid or unenforceable, then that provision shall be revised to the extent necessary to make that provision legal and enforceable. In such case the Contract Documents shall be construed, to the fullest extent permitted by law, to give effect to the parties' intentions and purposes in executing the Contract.

§ 1.2.2 Organization of the Specifications into divisions, sections and articles, and arrangement of Drawings shall not control the Contractor in dividing the Work among Subcontractors or in establishing the extent of Work to be performed by any trade.

§ 1.2.3 Unless otherwise stated in the Contract Documents, words that have well-known technical or construction industry meanings are used in the Contract Documents in accordance with such recognized meanings.

§ 1.3 Capitalization

Terms capitalized in these General Conditions include those that are (1) specifically defined, (2) the titles of numbered articles, or (3) the titles of other documents published by the American Institute of Architects.

§ 1.4 Interpretation

In the interest of brevity the Contract Documents frequently omit modifying words such as "all" and "any" and articles such as "the" and "an," but the fact that a modifier or an article is absent from one statement and appears in another is not intended to affect the interpretation of either statement.

§ 1.5 Ownership and Use of Drawings, Specifications, and Other Instruments of Service

§ 1.5.1 The Architect and the Architect's consultants shall be deemed the authors and owners of their respective Instruments of Service, including the Drawings and Specifications, and retain all common law, statutory, and other reserved rights in their Instruments of Service, including copyrights. The Contractor, Subcontractors, Sub-subcontractors, and suppliers shall not own or claim a copyright in the Instruments of Service. Submittal or distribution to meet official regulatory requirements or for other purposes in connection with the Project is not to be construed as publication in derogation of the Architect's or Architect's consultants' reserved rights.

§ 1.5.2 The Contractor, Subcontractors, Sub-subcontractors, and suppliers are authorized to use and reproduce the Instruments of Service provided to them, subject to any protocols established pursuant to Sections 1.7 and 1.8, solely and exclusively for execution of the Work. All copies made under this authorization shall bear the copyright notice, if any, shown on the Instruments of Service. The Contractor, Subcontractors, Sub-subcontractors, and suppliers may not use the Instruments of Service on other projects or for additions to the Project outside the scope of the Work without the specific written consent of the Owner, Architect, and the Architect's consultants.

§ 1.6 Notice

§ 1.6.1 Except as otherwise provided in Section 1.6.2, where the Contract Documents require one party to notify or give notice to the other party, such notice shall be provided in writing to the designated representative of the party to whom the notice is addressed and shall be deemed to have been duly served if delivered in person, by mail, by courier, or by electronic transmission if a method for electronic transmission is set forth in the Agreement.

§ 1.6.2 Notice of Claims as provided in Section 15.1.3 shall be provided in writing and shall be deemed to have been duly served only if delivered to the designated representative of the party to whom the notice is addressed by certified or registered mail, or by courier providing proof of delivery.

§ 1.7 Digital Data Use and Transmission

The parties shall agree upon protocols governing the transmission and use of Instruments of Service or any other information or documentation in digital form. The parties will use AIA Document E203™–2013, Building Information Modeling and Digital Data Exhibit, to establish the protocols for the development, use, transmission, and exchange of digital data.

§ 1.8 Building Information Models Use and Reliance

Any use of, or reliance on, all or a portion of a building information model without agreement to protocols governing the use of, and reliance on, the information contained in the model and without having those protocols set forth in AIA Document E203™–2013, Building Information Modeling and Digital Data Exhibit, and the requisite AIA Document

G202™–2013, Project Building Information Modeling Protocol Form, shall be at the using or relying party's sole risk and without liability to the other party and its contractors or consultants, the authors of, or contributors to, the building information model, and each of their agents and employees.

ARTICLE 2 OWNER

§ 2.1 General

§ 2.1.1 The Owner is the person or entity identified as such in the Agreement and is referred to throughout the Contract Documents as if singular in number. The Owner shall designate in writing a representative who shall have express authority to bind the Owner with respect to all matters requiring the Owner's approval or authorization. Except as otherwise provided in Section 4.2.1, the Architect does not have such authority. The term "Owner" means the Owner or the Owner's authorized representative.

§ 2.1.2 The Owner shall furnish to the Contractor, within fifteen days after receipt of a written request, information necessary and relevant for the Contractor to evaluate, give notice of, or enforce mechanic's lien rights. Such information shall include a correct statement of the record legal title to the property on which the Project is located, usually referred to as the site, and the Owner's interest therein.

§ 2.2 Evidence of the Owner's Financial Arrangements

§ 2.2.1 Prior to commencement of the Work and upon written request by the Contractor, the Owner shall furnish to the Contractor reasonable evidence that the Owner has made financial arrangements to fulfill the Owner's obligations under the Contract. The Contractor shall have no obligation to commence the Work until the Owner provides such evidence. If commencement of the Work is delayed under this Section 2.2.1, the Contract Time shall be extended appropriately.

§ 2.2.2 Following commencement of the Work and upon written request by the Contractor, the Owner shall furnish to the Contractor reasonable evidence that the Owner has made financial arrangements to fulfill the Owner's obligations under the Contract only if (1) the Owner fails to make payments to the Contractor as the Contract Documents require; (2) the Contractor identifies in writing a reasonable concern regarding the Owner's ability to make payment when due; or (3) a change in the Work materially changes the Contract Sum. If the Owner fails to provide such evidence, as required, within fourteen days of the Contractor's request, the Contractor may immediately stop the Work and, in that event, shall notify the Owner that the Work has stopped. However, if the request is made because a change in the Work materially changes the Contract Sum under (3) above, the Contractor may immediately stop only that portion of the Work affected by the change until reasonable evidence is provided. If the Work is stopped under this Section 2.2.2, the Contract Time shall be extended appropriately and the Contract Sum shall be increased by the amount of the Contractor's reasonable costs of shutdown, delay and start-up, plus interest as provided in the Contract Documents.

§ 2.2.3 After the Owner furnishes evidence of financial arrangements under this Section 2.2, the Owner shall not materially vary such financial arrangements without prior notice to the Contractor.

§ 2.2.4 Where the Owner has designated information furnished under this Section 2.2 as "confidential," the Contractor shall keep the information confidential and shall not disclose it to any other person. However, the Contractor may disclose "confidential" information, after seven (7) days' notice to the Owner, where disclosure is required by law, including a subpoena or other form of compulsory legal process issued by a court or governmental entity, or by court or arbitrator(s) order. The Contractor may also disclose "confidential" information to its employees, consultants, sureties, Subcontractors and their employees, Sub-subcontractors, and others who need to know the content of such information solely and exclusively for the Project and who agree to maintain the confidentiality of such information.

§ 2.3 Information and Services Required of the Owner

§ 2.3.1 Except for permits and fees that are the responsibility of the Contractor under the Contract Documents, including those required under Section 3.7.1, the Owner shall secure and pay for necessary approvals, easements, assessments and charges required for construction, use or occupancy of permanent structures or for permanent changes in existing facilities.

§ 2.3.2 The Owner shall retain an architect lawfully licensed to practice architecture, or an entity lawfully practicing architecture, in the jurisdiction where the Project is located. That person or entity is identified as the Architect in the Agreement and is referred to throughout the Contract Documents as if singular in number.

§ 2.3.3 If the employment of the Architect terminates, the Owner shall employ a successor to whom the Contractor has no reasonable objection and whose status under the Contract Documents shall be that of the Architect.

§ 2.3.4 The Owner shall furnish surveys describing physical characteristics, legal limitations and utility locations for the site of the Project, and a legal description of the site. The Contractor shall be entitled to rely on the accuracy of information furnished by the Owner but shall exercise proper precautions relating to the safe performance of the Work.

§ 2.3.5 The Owner shall furnish information or services required of the Owner by the Contract Documents with reasonable promptness. The Owner shall also furnish any other information or services under the Owner's control and relevant to the Contractor's performance of the Work with reasonable promptness after receiving the Contractor's written request for such information or services.

§ 2.3.6 Unless otherwise provided in the Contract Documents, the Owner shall furnish to the Contractor one copy of the Contract Documents for purposes of making reproductions pursuant to Section 1.5.2.

§ 2.4 Owner's Right to Stop the Work

If the Contractor fails to correct Work that is not in accordance with the requirements of the Contract Documents as required by Section 12.2 or repeatedly fails to carry out Work in accordance with the Contract Documents, the Owner may issue a written order to the Contractor to stop the Work, or any portion thereof, until the cause for such order has been eliminated; however, the right of the Owner to stop the Work shall not give rise to a duty on the part of the Owner to exercise this right for the benefit of the Contractor or any other person or entity, except to the extent required by Section 6.1.3.

§ 2.5 Owner's Right to Carry Out the Work

If the Contractor defaults or neglects to carry out the Work in accordance with the Contract Documents and fails within a ten-day period after receipt of notice from the Owner to commence and continue correction of such default or neglect with diligence and promptness, the Owner may, without prejudice to other remedies the Owner may have, correct such default or neglect. Such action by the Owner and amounts charged to the Contractor are both subject to prior approval of the Architect and the Architect may, pursuant to Section 9.5.1, withhold or nullify a Certificate for Payment in whole or in part, to the extent reasonably necessary to reimburse the Owner for the reasonable cost of correcting such deficiencies, including Owner's expenses and compensation for the Architect's additional services made necessary by such default, neglect, or failure. If current and future payments are not sufficient to cover such amounts, the Contractor shall pay the difference to the Owner. If the Contractor disagrees with the actions of the Owner or the Architect, or the amounts claimed as costs to the Owner, the Contractor may file a Claim pursuant to Article 15.

ARTICLE 3 CONTRACTOR

§ 3.1 General

§ 3.1.1 The Contractor is the person or entity identified as such in the Agreement and is referred to throughout the Contract Documents as if singular in number. The Contractor shall be lawfully licensed, if required in the jurisdiction where the Project is located. The Contractor shall designate in writing a representative who shall have express authority to bind the Contractor with respect to all matters under this Contract. The term "Contractor" means the Contractor or the Contractor's authorized representative.

§ 3.1.2 The Contractor shall perform the Work in accordance with the Contract Documents.

§ 3.1.3 The Contractor shall not be relieved of its obligations to perform the Work in accordance with the Contract Documents either by activities or duties of the Architect in the Architect's administration of the Contract, or by tests, inspections or approvals required or performed by persons or entities other than the Contractor.

§ 3.2 Review of Contract Documents and Field Conditions by Contractor

§ 3.2.1 Execution of the Contract by the Contractor is a representation that the Contractor has visited the site, become generally familiar with local conditions under which the Work is to be performed, and correlated personal observations with requirements of the Contract Documents.

§ 3.2.2 Because the Contract Documents are complementary, the Contractor shall, before starting each portion of the Work, carefully study and compare the various Contract Documents relative to that portion of the Work, as well as the information furnished by the Owner pursuant to Section 2.3.4, shall take field measurements of any existing conditions related to that portion of the Work, and shall observe any conditions at the site affecting it. These obligations are for the purpose of facilitating coordination and construction by the Contractor and are not for the purpose of discovering errors, omissions, or inconsistencies in the Contract Documents; however, the Contractor shall promptly report to the Architect any errors, inconsistencies or omissions discovered by or made known to the Contractor as a request for information in such form as the Architect may require. It is recognized that the Contractor's review is made in the Contractor's capacity as a contractor and not as a licensed design professional, unless otherwise specifically provided in the Contract Documents.

§ 3.2.3 The Contractor is not required to ascertain that the Contract Documents are in accordance with applicable laws, statutes, ordinances, codes, rules and regulations, or lawful orders of public authorities, but the Contractor shall promptly report to the Architect any nonconformity discovered by or made known to the Contractor as a request for information in such form as the Architect may require.

§ 3.2.4 If the Contractor believes that additional cost or time is involved because of clarifications or instructions the Architect issues in response to the Contractor's notices or requests for information pursuant to Sections 3.2.2 or 3.2.3, the Contractor shall submit Claims as provided in Article 15. If the Contractor fails to perform the obligations of Sections 3.2.2 or 3.2.3, the Contractor shall pay such costs and damages to the Owner, subject to Section 15.1.7, as would have been avoided if the Contractor had performed such obligations. If the Contractor performs those obligations, the Contractor shall not be liable to the Owner or Architect for damages resulting from errors, inconsistencies or omissions in the Contract Documents, for differences between field measurements or conditions and the Contract Documents, or for nonconformities of the Contract Documents to applicable laws, statutes, ordinances, codes, rules and regulations, and lawful orders of public authorities.

§ 3.3 Supervision and Construction Procedures

§ 3.3.1 The Contractor shall supervise and direct the Work, using the Contractor's best skill and attention. The Contractor shall be solely responsible for, and have control over, construction means, methods, techniques, sequences, and procedures, and for coordinating all portions of the Work under the Contract. If the Contract Documents give specific instructions concerning construction means, methods, techniques, sequences, or procedures, the Contractor shall evaluate the jobsite safety thereof and shall be solely responsible for the jobsite safety of such means, methods, techniques, sequences, or procedures. If the Contractor determines that such means, methods, techniques, sequences or procedures may not be safe, the Contractor shall give timely notice to the Owner and Architect, and shall propose alternative means, methods, techniques, sequences, or procedures. The Architect shall evaluate the proposed alternative solely for conformance with the design intent for the completed construction. Unless the Architect objects to the Contractor's proposed alternative, the Contractor shall perform the Work using its alternative means, methods, techniques, sequences, or procedures.

§ 3.3.2 The Contractor shall be responsible to the Owner for acts and omissions of the Contractor's employees, Subcontractors and their agents and employees, and other persons or entities performing portions of the Work for, or on behalf of, the Contractor or any of its Subcontractors.

§ 3.3.3 The Contractor shall be responsible for inspection of portions of Work already performed to determine that such portions are in proper condition to receive subsequent Work.

§ 3.4 Labor and Materials

§ 3.4.1 Unless otherwise provided in the Contract Documents, the Contractor shall provide and pay for labor, materials, equipment, tools, construction equipment and machinery, water, heat, utilities, transportation, and other facilities and services necessary for proper execution and completion of the Work, whether temporary or permanent and whether or not incorporated or to be incorporated in the Work.

§ 3.4.2 Except in the case of minor changes in the Work approved by the Architect in accordance with Section 3.12.8 or ordered by the Architect in accordance with Section 7.4, the Contractor may make substitutions only with the consent of the Owner, after evaluation by the Architect and in accordance with a Change Order or Construction Change Directive.

§ 3.4.3 The Contractor shall enforce strict discipline and good order among the Contractor's employees and other persons carrying out the Work. The Contractor shall not permit employment of unfit persons or persons not properly skilled in tasks assigned to them.

§ 3.5 Warranty

§ 3.5.1 The Contractor warrants to the Owner and Architect that materials and equipment furnished under the Contract will be of good quality and new unless the Contract Documents require or permit otherwise. The Contractor further warrants that the Work will conform to the requirements of the Contract Documents and will be free from defects, except for those inherent in the quality of the Work the Contract Documents require or permit. Work, materials, or equipment not conforming to these requirements may be considered defective. The Contractor's warranty excludes remedy for damage or defect caused by abuse, alterations to the Work not executed by the Contractor, improper or insufficient maintenance, improper operation, or normal wear and tear and normal usage. If required by the Architect, the Contractor shall furnish satisfactory evidence as to the kind and quality of materials and equipment.

§ 3.5.2 All material, equipment, or other special warranties required by the Contract Documents shall be issued in the name of the Owner, or shall be transferable to the Owner, and shall commence in accordance with Section 9.8.4.

§ 3.6 Taxes

The Contractor shall pay sales, consumer, use and similar taxes for the Work provided by the Contractor that are legally enacted when bids are received or negotiations concluded, whether or not yet effective or merely scheduled to go into effect.

§ 3.7 Permits, Fees, Notices and Compliance with Laws

§ 3.7.1 Unless otherwise provided in the Contract Documents, the Contractor shall secure and pay for the building permit as well as for other permits, fees, licenses, and inspections by government agencies necessary for proper execution and completion of the Work that are customarily secured after execution of the Contract and legally required at the time bids are received or negotiations concluded.

§ 3.7.2 The Contractor shall comply with and give notices required by applicable laws, statutes, ordinances, codes, rules and regulations, and lawful orders of public authorities applicable to performance of the Work.

§ 3.7.3 If the Contractor performs Work knowing it to be contrary to applicable laws, statutes, ordinances, codes, rules and regulations, or lawful orders of public authorities, the Contractor shall assume appropriate responsibility for such Work and shall bear the costs attributable to correction.

§ 3.7.4 Concealed or Unknown Conditions

If the Contractor encounters conditions at the site that are (1) subsurface or otherwise concealed physical conditions that differ materially from those indicated in the Contract Documents or (2) unknown physical conditions of an unusual nature that differ materially from those ordinarily found to exist and generally recognized as inherent in construction activities of the character provided for in the Contract Documents, the Contractor shall promptly provide notice to the Owner and the Architect before conditions are disturbed and in no event later than 14 days after first observance of the conditions. The Architect will promptly investigate such conditions and, if the Architect determines that they differ materially and cause an increase or decrease in the Contractor's cost of, or time required for, performance of any part of the Work, will recommend that an equitable adjustment be made in the Contract Sum or Contract Time, or both. If the Architect determines that the conditions at the site are not materially different from those indicated in the Contract Documents and that no change in the terms of the Contract is justified, the Architect shall promptly notify the Owner and Contractor, stating the reasons. If either party disputes the Architect's determination or recommendation, that party may submit a Claim as provided in Article 15.

§ 3.7.5 If, in the course of the Work, the Contractor encounters human remains or recognizes the existence of burial markers, archaeological sites or wetlands not indicated in the Contract Documents, the Contractor shall immediately suspend any operations that would affect them and shall notify the Owner and Architect. Upon receipt of such notice, the Owner shall promptly take any action necessary to obtain governmental authorization required to resume the operations. The Contractor shall continue to suspend such operations until otherwise instructed by the Owner but shall continue with all other operations that do not affect those remains or features. Requests for adjustments in the Contract Sum and Contract Time arising from the existence of such remains or features may be made as provided in Article 15.

§ 3.8 Allowances

§ 3.8.1 The Contractor shall include in the Contract Sum all allowances stated in the Contract Documents. Items covered by allowances shall be supplied for such amounts and by such persons or entities as the Owner may direct, but the Contractor shall not be required to employ persons or entities to whom the Contractor has reasonable objection.

§ 3.8.2 Unless otherwise provided in the Contract Documents,

- **.1** allowances shall cover the cost to the Contractor of materials and equipment delivered at the site and all required taxes, less applicable trade discounts;
- **.2** Contractor's costs for unloading and handling at the site, labor, installation costs, overhead, profit, and other expenses contemplated for stated allowance amounts shall be included in the Contract Sum but not in the allowances; and
- **.3** whenever costs are more than or less than allowances, the Contract Sum shall be adjusted accordingly by Change Order. The amount of the Change Order shall reflect (1) the difference between actual costs and the allowances under Section 3.8.2.1 and (2) changes in Contractor's costs under Section 3.8.2.2.

§ 3.8.3 Materials and equipment under an allowance shall be selected by the Owner with reasonable promptness.

§ 3.9 Superintendent

§ 3.9.1 The Contractor shall employ a competent superintendent and necessary assistants who shall be in attendance at the Project site during performance of the Work. The superintendent shall represent the Contractor, and communications given to the superintendent shall be as binding as if given to the Contractor.

§ 3.9.2 The Contractor, as soon as practicable after award of the Contract, shall notify the Owner and Architect of the name and qualifications of a proposed superintendent. Within 14 days of receipt of the information, the Architect may notify the Contractor, stating whether the Owner or the Architect (1) has reasonable objection to the proposed superintendent or (2) requires additional time for review. Failure of the Architect to provide notice within the 14-day period shall constitute notice of no reasonable objection.

§ 3.9.3 The Contractor shall not employ a proposed superintendent to whom the Owner or Architect has made reasonable and timely objection. The Contractor shall not change the superintendent without the Owner's consent, which shall not unreasonably be withheld or delayed.

§ 3.10 Contractor's Construction and Submittal Schedules

§ 3.10.1 The Contractor, promptly after being awarded the Contract, shall submit for the Owner's and Architect's information a Contractor's construction schedule for the Work. The schedule shall contain detail appropriate for the Project, including (1) the date of commencement of the Work, interim schedule milestone dates, and the date of Substantial Completion; (2) an apportionment of the Work by construction activity; and (3) the time required for completion of each portion of the Work. The schedule shall provide for the orderly progression of the Work to completion and shall not exceed time limits current under the Contract Documents. The schedule shall be revised at appropriate intervals as required by the conditions of the Work and Project.

§ 3.10.2 The Contractor, promptly after being awarded the Contract and thereafter as necessary to maintain a current submittal schedule, shall submit a submittal schedule for the Architect's approval. The Architect's approval shall not be unreasonably delayed or withheld. The submittal schedule shall (1) be coordinated with the Contractor's construction schedule, and (2) allow the Architect reasonable time to review submittals. If the Contractor fails to submit a submittal schedule, or fails to provide submittals in accordance with the approved submittal schedule, the Contractor shall not be entitled to any increase in Contract Sum or extension of Contract Time based on the time required for review of submittals.

§ 3.10.3 The Contractor shall perform the Work in general accordance with the most recent schedules submitted to the Owner and Architect.

§ 3.11 Documents and Samples at the Site

The Contractor shall make available, at the Project site, the Contract Documents, including Change Orders, Construction Change Directives, and other Modifications, in good order and marked currently to indicate field changes and selections made during construction, and the approved Shop Drawings, Product Data, Samples, and similar required submittals. These shall be in electronic form or paper copy, available to the Architect and Owner, and

delivered to the Architect for submittal to the Owner upon completion of the Work as a record of the Work as constructed.

§ 3.12 Shop Drawings, Product Data and Samples

§ 3.12.1 Shop Drawings are drawings, diagrams, schedules, and other data specially prepared for the Work by the Contractor or a Subcontractor, Sub-subcontractor, manufacturer, supplier, or distributor to illustrate some portion of the Work.

§ 3.12.2 Product Data are illustrations, standard schedules, performance charts, instructions, brochures, diagrams, and other information furnished by the Contractor to illustrate materials or equipment for some portion of the Work.

§ 3.12.3 Samples are physical examples that illustrate materials, equipment, or workmanship, and establish standards by which the Work will be judged.

§ 3.12.4 Shop Drawings, Product Data, Samples, and similar submittals are not Contract Documents. Their purpose is to demonstrate how the Contractor proposes to conform to the information given and the design concept expressed in the Contract Documents for those portions of the Work for which the Contract Documents require submittals. Review by the Architect is subject to the limitations of Section 4.2.7. Informational submittals upon which the Architect is not expected to take responsive action may be so identified in the Contract Documents. Submittals that are not required by the Contract Documents may be returned by the Architect without action.

§ 3.12.5 The Contractor shall review for compliance with the Contract Documents, approve, and submit to the Architect, Shop Drawings, Product Data, Samples, and similar submittals required by the Contract Documents, in accordance with the submittal schedule approved by the Architect or, in the absence of an approved submittal schedule, with reasonable promptness and in such sequence as to cause no delay in the Work or in the activities of the Owner or of Separate Contractors.

§ 3.12.6 By submitting Shop Drawings, Product Data, Samples, and similar submittals, the Contractor represents to the Owner and Architect that the Contractor has (1) reviewed and approved them, (2) determined and verified materials, field measurements and field construction criteria related thereto, or will do so, and (3) checked and coordinated the information contained within such submittals with the requirements of the Work and of the Contract Documents.

§ 3.12.7 The Contractor shall perform no portion of the Work for which the Contract Documents require submittal and review of Shop Drawings, Product Data, Samples, or similar submittals, until the respective submittal has been approved by the Architect.

§ 3.12.8 The Work shall be in accordance with approved submittals except that the Contractor shall not be relieved of responsibility for deviations from the requirements of the Contract Documents by the Architect's approval of Shop Drawings, Product Data, Samples, or similar submittals, unless the Contractor has specifically notified the Architect of such deviation at the time of submittal and (1) the Architect has given written approval to the specific deviation as a minor change in the Work, or (2) a Change Order or Construction Change Directive has been issued authorizing the deviation. The Contractor shall not be relieved of responsibility for errors or omissions in Shop Drawings, Product Data, Samples, or similar submittals, by the Architect's approval thereof.

§ 3.12.9 The Contractor shall direct specific attention, in writing or on resubmitted Shop Drawings, Product Data, Samples, or similar submittals, to revisions other than those requested by the Architect on previous submittals. In the absence of such notice, the Architect's approval of a resubmission shall not apply to such revisions.

§ 3.12.10 The Contractor shall not be required to provide professional services that constitute the practice of architecture or engineering unless such services are specifically required by the Contract Documents for a portion of the Work or unless the Contractor needs to provide such services in order to carry out the Contractor's responsibilities for construction means, methods, techniques, sequences, and procedures. The Contractor shall not be required to provide professional services in violation of applicable law.

§ 3.12.10.1 If professional design services or certifications by a design professional related to systems, materials, or equipment are specifically required of the Contractor by the Contract Documents, the Owner and the Architect will

specify all performance and design criteria that such services must satisfy. The Contractor shall be entitled to rely upon the adequacy and accuracy of the performance and design criteria provided in the Contract Documents. The Contractor shall cause such services or certifications to be provided by an appropriately licensed design professional, whose signature and seal shall appear on all drawings, calculations, specifications, certifications, Shop Drawings, and other submittals prepared by such professional. Shop Drawings, and other submittals related to the Work, designed or certified by such professional, if prepared by others, shall bear such professional's written approval when submitted to the Architect. The Owner and the Architect shall be entitled to rely upon the adequacy and accuracy of the services, certifications, and approvals performed or provided by such design professionals, provided the Owner and Architect have specified to the Contractor the performance and design criteria that such services must satisfy. Pursuant to this Section 3.12.10, the Architect will review and approve or take other appropriate action on submittals only for the limited purpose of checking for conformance with information given and the design concept expressed in the Contract Documents.

§ 3.12.10.2 If the Contract Documents require the Contractor's design professional to certify that the Work has been performed in accordance with the design criteria, the Contractor shall furnish such certifications to the Architect at the time and in the form specified by the Architect.

§ 3.13 Use of Site

The Contractor shall confine operations at the site to areas permitted by applicable laws, statutes, ordinances, codes, rules and regulations, lawful orders of public authorities, and the Contract Documents and shall not unreasonably encumber the site with materials or equipment.

§ 3.14 Cutting and Patching

§ 3.14.1 The Contractor shall be responsible for cutting, fitting, or patching required to complete the Work or to make its parts fit together properly. All areas requiring cutting, fitting, or patching shall be restored to the condition existing prior to the cutting, fitting, or patching, unless otherwise required by the Contract Documents.

§ 3.14.2 The Contractor shall not damage or endanger a portion of the Work or fully or partially completed construction of the Owner or Separate Contractors by cutting, patching, or otherwise altering such construction, or by excavation. The Contractor shall not cut or otherwise alter construction by the Owner or a Separate Contractor except with written consent of the Owner and of the Separate Contractor. Consent shall not be unreasonably withheld. The Contractor shall not unreasonably withhold, from the Owner or a Separate Contractor, its consent to cutting or otherwise altering the Work.

§ 3.15 Cleaning Up

§ 3.15.1 The Contractor shall keep the premises and surrounding area free from accumulation of waste materials and rubbish caused by operations under the Contract. At completion of the Work, the Contractor shall remove waste materials, rubbish, the Contractor's tools, construction equipment, machinery, and surplus materials from and about the Project.

§ 3.15.2 If the Contractor fails to clean up as provided in the Contract Documents, the Owner may do so and the Owner shall be entitled to reimbursement from the Contractor.

§ 3.16 Access to Work

The Contractor shall provide the Owner and Architect with access to the Work in preparation and progress wherever located.

§ 3.17 Royalties, Patents and Copyrights

The Contractor shall pay all royalties and license fees. The Contractor shall defend suits or claims for infringement of copyrights and patent rights and shall hold the Owner and Architect harmless from loss on account thereof, but shall not be responsible for defense or loss when a particular design, process, or product of a particular manufacturer or manufacturers is required by the Contract Documents, or where the copyright violations are contained in Drawings, Specifications, or other documents prepared by the Owner or Architect. However, if an infringement of a copyright or patent is discovered by, or made known to, the Contractor, the Contractor shall be responsible for the loss unless the information is promptly furnished to the Architect.

§ 3.18 Indemnification

§ 3.18.1 To the fullest extent permitted by law, the Contractor shall indemnify and hold harmless the Owner**, the City of Central Falls, the City of Central Falls School District, the Rhode Island Department of Education, the Rhode Island Health and Educational Building Corporation**, Architect, Architect's consultants, and agents and employees of any of them from and against claims, damages, losses, and expenses, including but not limited to attorneys' fees, arising out of or resulting from performance of the Work, provided that such claim, damage, loss, or expense is attributable to bodily injury, sickness, disease or death, or to injury to or destruction of tangible property (other than the Work itself), but only to the extent caused by the negligent acts or omissions of the Contractor, a Subcontractor, anyone directly or indirectly employed by them, or anyone for whose acts they may be liable, regardless of whether or not such claim, damage, loss, or expense is caused in part by a party indemnified hereunder. Such obligation shall not be construed to negate, abridge, or reduce other rights or obligations of indemnity that would otherwise exist as to a party or person described in this Section 3.18.

§ 3.18.2 ~~In claims against any person or entity indemnified under this Section 3.18 by an employee of the Contractor, a Subcontractor, anyone directly or indirectly employed by them, or anyone for whose acts they may be liable, the indemnification obligation under Section 3.18.1 shall not be limited by a limitation on amount or type of damages, compensation, or benefits payable by or for the Contractor or a Subcontractor under workers' compensation acts, disability benefit acts, or other employee benefit acts.~~**[[RESERVED]].**

ARTICLE 4 ARCHITECT

§ 4.1 General

§ 4.1.1 The Architect is the person or entity retained by the Owner pursuant to Section 2.3.2 and identified as such in the Agreement.

§ 4.1.2 Duties, responsibilities, and limitations of authority of the Architect as set forth in the Contract Documents shall not be restricted, modified, or extended without written consent of the Owner, Contractor, and Architect. Consent shall not be unreasonably withheld.

§ 4.2 Administration of the Contract

§ 4.2.1 The Architect will provide administration of the Contract as described in the Contract Documents and will be an Owner's representative during construction until the date the Architect issues the final Certificate for Payment. The Architect will have authority to act on behalf of the Owner only to the extent provided in the Contract Documents.

§ 4.2.2 The Architect will visit the site at intervals appropriate to the stage of construction, or as otherwise agreed with the Owner, to become generally familiar with the progress and quality of the portion of the Work completed, and to determine in general if the Work observed is being performed in a manner indicating that the Work, when fully completed, will be in accordance with the Contract Documents. However, the Architect will not be required to make exhaustive or continuous on-site inspections to check the quality or quantity of the Work. The Architect will not have control over, charge of, or responsibility for the construction means, methods, techniques, sequences or procedures, or for the safety precautions and programs in connection with the Work, since these are solely the Contractor's rights and responsibilities under the Contract Documents.

§ 4.2.3 On the basis of the site visits, the Architect will keep the Owner reasonably informed about the progress and quality of the portion of the Work completed, and promptly report to the Owner (1) known deviations from the Contract Documents, (2) known deviations from the most recent construction schedule submitted by the Contractor, and (3) defects and deficiencies observed in the Work. The Architect will not be responsible for the Contractor's failure to perform the Work in accordance with the requirements of the Contract Documents. The Architect will not have control over or charge of, and will not be responsible for acts or omissions of, the Contractor, Subcontractors, or their agents or employees, or any other persons or entities performing portions of the Work.

§ 4.2.4 Communications

The Owner and Contractor shall include the Architect in all communications that relate to or affect the Architect's services or professional responsibilities. The Owner shall promptly notify the Architect of the substance of any direct communications between the Owner and the Contractor otherwise relating to the Project. Communications by and with the Architect's consultants shall be through the Architect. Communications by and with Subcontractors and suppliers shall be through the Contractor. Communications by and with Separate Contractors shall be through the Owner. The Contract Documents may specify other communication protocols.

§ 4.2.5 Based on the Architect's evaluations of the Contractor's Applications for Payment, the Architect will review and certify the amounts due the Contractor and will issue Certificates for Payment in such amounts.

§ 4.2.6 The Architect has authority to reject Work that does not conform to the Contract Documents. Whenever the Architect considers it necessary or advisable, the Architect will have authority to require inspection or testing of the Work in accordance with Sections 13.4.2 and 13.4.3, whether or not the Work is fabricated, installed or completed. However, neither this authority of the Architect nor a decision made in good faith either to exercise or not to exercise such authority shall give rise to a duty or responsibility of the Architect to the Contractor, Subcontractors, suppliers, their agents or employees, or other persons or entities performing portions of the Work.

§ 4.2.7 The Architect will review and approve, or take other appropriate action upon, the Contractor's submittals such as Shop Drawings, Product Data, and Samples, but only for the limited purpose of checking for conformance with information given and the design concept expressed in the Contract Documents. The Architect's action will be taken in accordance with the submittal schedule approved by the Architect or, in the absence of an approved submittal schedule, with reasonable promptness while allowing sufficient time in the Architect's professional judgment to permit adequate review. Review of such submittals is not conducted for the purpose of determining the accuracy and completeness of other details such as dimensions and quantities, or for substantiating instructions for installation or performance of equipment or systems, all of which remain the responsibility of the Contractor as required by the Contract Documents. The Architect's review of the Contractor's submittals shall not relieve the Contractor of the obligations under Sections 3.3, 3.5, and 3.12. The Architect's review shall not constitute approval of safety precautions or of any construction means, methods, techniques, sequences, or procedures. The Architect's approval of a specific item shall not indicate approval of an assembly of which the item is a component.

§ 4.2.8 The Architect will prepare Change Orders and Construction Change Directives, and may order minor changes in the Work as provided in Section 7.4. The Architect will investigate and make determinations and recommendations regarding concealed and unknown conditions as provided in Section 3.7.4.

§ 4.2.9 The Architect will conduct inspections to determine the date or dates of Substantial Completion and the date of final completion; issue Certificates of Substantial Completion pursuant to Section 9.8; receive and forward to the Owner, for the Owner's review and records, written warranties and related documents required by the Contract and assembled by the Contractor pursuant to Section 9.10; and issue a final Certificate for Payment pursuant to Section 9.10.

§ 4.2.10 If the Owner and Architect agree, the Architect will provide one or more Project representatives to assist in carrying out the Architect's responsibilities at the site. The Owner shall notify the Contractor of any change in the duties, responsibilities and limitations of authority of the Project representatives.

§ 4.2.11 The Architect will interpret and decide matters concerning performance under, and requirements of, the Contract Documents on written request of either the Owner or Contractor. The Architect's response to such requests will be made in writing within any time limits agreed upon or otherwise with reasonable promptness.

§ 4.2.12 Interpretations and decisions of the Architect will be consistent with the intent of, and reasonably inferable from, the Contract Documents and will be in writing or in the form of drawings. When making such interpretations and decisions, the Architect will endeavor to secure faithful performance by both Owner and Contractor, will not show partiality to either, and will not be liable for results of interpretations or decisions rendered in good faith.

§ 4.2.13 The Architect's decisions on matters relating to aesthetic effect will be final if consistent with the intent expressed in the Contract Documents.

§ 4.2.14 The Architect will review and respond to requests for information about the Contract Documents. The Architect's response to such requests will be made in writing within any time limits agreed upon or otherwise with reasonable promptness. If appropriate, the Architect will prepare and issue supplemental Drawings and Specifications in response to the requests for information.

ARTICLE 5 SUBCONTRACTORS

§ 5.1 Definitions

§ 5.1.1 A Subcontractor is a person or entity who has a direct contract with the Contractor to perform a portion of the Work at the site. The term "Subcontractor" is referred to throughout the Contract Documents as if singular in number and means a Subcontractor or an authorized representative of the Subcontractor. The term "Subcontractor" does not include a Separate Contractor or the subcontractors of a Separate Contractor.

§ 5.1.2 A Sub-subcontractor is a person or entity who has a direct or indirect contract with a Subcontractor to perform a portion of the Work at the site. The term "Sub-subcontractor" is referred to throughout the Contract Documents as if singular in number and means a Sub-subcontractor or an authorized representative of the Sub-subcontractor.

§ 5.2 Award of Subcontracts and Other Contracts for Portions of the Work

§ 5.2.1 Unless otherwise stated in the Contract Documents, the Contractor, as soon as practicable after award of the Contract, shall notify the Owner and Architect of the persons or entities proposed for each principal portion of the Work, including those who are to furnish materials or equipment fabricated to a special design. Within 14 days of receipt of the information, the Architect may notify the Contractor whether the Owner or the Architect (1) has reasonable objection to any such proposed person or entity or (2) requires additional time for review. Failure of the Architect to provide notice within the 14-day period shall constitute notice of no reasonable objection.

§ 5.2.2 The Contractor shall not contract with a proposed person or entity to whom the Owner or Architect has made reasonable and timely objection. The Contractor shall not be required to contract with anyone to whom the Contractor has made reasonable objection.

§ 5.2.3 If the Owner or Architect has reasonable objection to a person or entity proposed by the Contractor, the Contractor shall propose another to whom the Owner or Architect has no reasonable objection. If the proposed but rejected Subcontractor was reasonably capable of performing the Work, the Contract Sum and Contract Time shall be increased or decreased by the difference, if any, occasioned by such change, and an appropriate Change Order shall be issued before commencement of the substitute Subcontractor's Work. However, no increase in the Contract Sum or Contract Time shall be allowed for such change unless the Contractor has acted promptly and responsively in submitting names as required.

§ 5.2.4 The Contractor shall not substitute a Subcontractor, person, or entity for one previously selected if the Owner or Architect makes reasonable objection to such substitution.

§ 5.2.5 The Contractor shall ensure that twenty-five percent (25%) of the Contract Price shall be designated to subcontract awards to minority and women owned business enterprises in accordance with the Central Falls Code of Ordinances Article III, Division 2, Section 2.83. In no event shall the minority and women-owned business enterprise participation be lower than fifteen percent (15%) of the Contract Price, of which seven and one half percent (7.5%) shall consist of minority-owned business enterprises and seven and one half percent (7.5%) shall consist of women-owned business enterprises pursuant to Rhode Island General Laws § 37-14.1-6.

All minority and women owned business enterprises participating in the Project shall be registered and certified with the State of Rhode Island Division of Equity, Diversity, and Inclusion.

§ 5.3 Subcontractual Relations

By appropriate written agreement, the Contractor shall require each Subcontractor, to the extent of the Work to be performed by the Subcontractor, to be bound to the Contractor by terms of the Contract Documents, and to assume toward the Contractor all the obligations and responsibilities, including the responsibility for safety of the Subcontractor's Work that the Contractor, by these Contract Documents, assumes toward the Owner and Architect. Each subcontract agreement shall preserve and protect the rights of the Owner and Architect under the Contract Documents with respect to the Work to be performed by the Subcontractor so that subcontracting thereof will not prejudice such rights, and shall allow to the Subcontractor, unless specifically provided otherwise in the subcontract agreement, the benefit of all rights, remedies, and redress against the Contractor that the Contractor, by the Contract Documents, has against the Owner. Where appropriate, the Contractor shall require each Subcontractor to enter into similar agreements with Sub-subcontractors. The Contractor shall make available to each proposed Subcontractor, prior to the execution of the subcontract agreement, copies of the Contract Documents to which the Subcontractor will be bound, and, upon written request of the Subcontractor, identify to the Subcontractor terms and conditions of the

proposed subcontract agreement that may be at variance with the Contract Documents. Subcontractors will similarly make copies of applicable portions of such documents available to their respective proposed Sub-subcontractors.

§ 5.4 Contingent Assignment of Subcontracts

§ 5.4.1 Each subcontract agreement for a portion of the Work is assigned by the Contractor to the Owner, provided that

.1 assignment is effective only after termination of the Contract by the Owner for cause pursuant to Section 14.2 and only for those subcontract agreements that the Owner accepts by notifying the Subcontractor and Contractor; and

.2 assignment is subject to the prior rights of the surety, if any, obligated under bond relating to the Contract.

When the Owner accepts the assignment of a subcontract agreement, the Owner assumes the Contractor's rights and obligations under the subcontract.

§ 5.4.2 Upon such assignment, if the Work has been suspended for more than 30 days, the Subcontractor's compensation shall be equitably adjusted for increases in cost resulting from the suspension.

§ 5.4.3 Upon assignment to the Owner under this Section 5.4, the Owner may further assign the subcontract to a successor contractor or other entity. If the Owner assigns the subcontract to a successor contractor or other entity, the Owner shall nevertheless remain legally responsible for all of the successor contractor's obligations under the subcontract.

ARTICLE 6 CONSTRUCTION BY OWNER OR BY SEPARATE CONTRACTORS

§ 6.1 Owner's Right to Perform Construction and to Award Separate Contracts

§ 6.1.1 The term "Separate Contractor(s)" shall mean other contractors retained by the Owner under separate agreements. The Owner reserves the right to perform construction or operations related to the Project with the Owner's own forces, and with Separate Contractors retained under Conditions of the Contract substantially similar to those of this Contract, including those provisions of the Conditions of the Contract related to insurance and waiver of subrogation.

§ 6.1.2 When separate contracts are awarded for different portions of the Project or other construction or operations on the site, the term "Contractor" in the Contract Documents in each case shall mean the Contractor who executes each separate Owner-Contractor Agreement.

§ 6.1.3 The Owner shall provide for coordination of the activities of the Owner's own forces and of each Separate Contractor with the Work of the Contractor, who shall cooperate with them. The Contractor shall participate with any Separate Contractors and the Owner in reviewing their construction schedules. The Contractor shall make any revisions to its construction schedule deemed necessary after a joint review and mutual agreement. The construction schedules shall then constitute the schedules to be used by the Contractor, Separate Contractors, and the Owner until subsequently revised.

§ 6.1.4 Unless otherwise provided in the Contract Documents, when the Owner performs construction or operations related to the Project with the Owner's own forces or with Separate Contractors, the Owner or its Separate Contractors shall have the same obligations and rights that the Contractor has under the Conditions of the Contract, including, without excluding others, those stated in Article 3, this Article 6, and Articles 10, 11, and 12.

§ 6.2 Mutual Responsibility

§ 6.2.1 The Contractor shall afford the Owner and Separate Contractors reasonable opportunity for introduction and storage of their materials and equipment and performance of their activities, and shall connect and coordinate the Contractor's construction and operations with theirs as required by the Contract Documents.

§ 6.2.2 If part of the Contractor's Work depends for proper execution or results upon construction or operations by the Owner or a Separate Contractor, the Contractor shall, prior to proceeding with that portion of the Work, promptly notify the Architect of apparent discrepancies or defects in the construction or operations by the Owner or Separate Contractor that would render it unsuitable for proper execution and results of the Contractor's Work. Failure of the Contractor to notify the Architect of apparent discrepancies or defects prior to proceeding with the Work shall constitute an acknowledgment that the Owner's or Separate Contractor's completed or partially completed

construction is fit and proper to receive the Contractor's Work. The Contractor shall not be responsible for discrepancies or defects in the construction or operations by the Owner or Separate Contractor that are not apparent.

§ 6.2.3 The Contractor shall reimburse the Owner for costs the Owner incurs that are payable to a Separate Contractor because of the Contractor's delays, improperly timed activities or defective construction. The Owner shall be responsible to the Contractor for costs the Contractor incurs because of a Separate Contractor's delays, improperly timed activities, damage to the Work or defective construction.

§ 6.2.4 The Contractor shall promptly remedy damage that the Contractor wrongfully causes to completed or partially completed construction or to property of the Owner or Separate Contractor as provided in Section 10.2.5.

§ 6.2.5 The Owner and each Separate Contractor shall have the same responsibilities for cutting and patching as are described for the Contractor in Section 3.14.

§ 6.3 Owner's Right to Clean Up

If a dispute arises among the Contractor, Separate Contractors, and the Owner as to the responsibility under their respective contracts for maintaining the premises and surrounding area free from waste materials and rubbish, the Owner may clean up and the Architect will allocate the cost among those responsible.

ARTICLE 7 CHANGES IN THE WORK

§ 7.1 General

§ 7.1.1 Changes in the Work may be accomplished after execution of the Contract, and without invalidating the Contract, by Change Order, Construction Change Directive or order for a minor change in the Work, subject to the limitations stated in this Article 7 and elsewhere in the Contract Documents.

§ 7.1.2 A Change Order shall be based upon agreement among the Owner, Contractor, and Architect. A Construction Change Directive requires agreement by the Owner and Architect and may or may not be agreed to by the Contractor. An order for a minor change in the Work may be issued by the Architect alone.

§ 7.1.3 Changes in the Work shall be performed under applicable provisions of the Contract Documents. The Contractor shall proceed promptly with changes in the Work, unless otherwise provided in the Change Order, Construction Change Directive, or order for a minor change in the Work.

§ 7.2 Change Orders

§ 7.2.1 A Change Order is a written instrument prepared by the Architect and signed by the Owner**, the City of Central Falls, the City of Central Falls School District, the Rhode Island Department of Education, the Rhode Island Health and Educational Building Corporation**, Contractor, and Architect stating their agreement upon all of the following:

- **.1** The change in the Work;
- **.2** The amount of the adjustment, if any, in the Contract Sum; and
- **.3** The extent of the adjustment, if any, in the Contract Time.

§ 7.3 Construction Change Directives

§ 7.3.1 A Construction Change Directive is a written order prepared by the Architect and signed by the Owner and Architect, directing a change in the Work prior to agreement on adjustment, if any, in the Contract Sum or Contract Time, or both. The Owner may by Construction Change Directive, without invalidating the Contract, order changes in the Work within the general scope of the Contract consisting of additions, deletions, or other revisions, the Contract Sum and Contract Time being adjusted accordingly.

§ 7.3.2 A Construction Change Directive shall be used in the absence of total agreement on the terms of a Change Order.

§ 7.3.3 If the Construction Change Directive provides for an adjustment to the Contract Sum, the adjustment shall be based on one of the following methods:

- **.1** Mutual acceptance of a lump sum properly itemized and supported by sufficient substantiating data to permit evaluation;
- **.2** Unit prices stated in the Contract Documents or subsequently agreed upon;

.3 Cost to be determined in a manner agreed upon by the parties and a mutually acceptable fixed or percentage fee; or

.4 As provided in Section 7.3.4.

§ 7.3.4 If the Contractor does not respond promptly or disagrees with the method for adjustment in the Contract Sum, the Architect shall determine the adjustment on the basis of reasonable expenditures and savings of those performing the Work attributable to the change, including, in case of an increase in the Contract Sum, an amount for overhead and profit as set forth in the Agreement, or if no such amount is set forth in the Agreement, a reasonable amount. In such case, and also under Section 7.3.3.3, the Contractor shall keep and present, in such form as the Architect may prescribe, an itemized accounting together with appropriate supporting data. Unless otherwise provided in the Contract Documents, costs for the purposes of this Section 7.3.4 shall be limited to the following:

.1 Costs of labor, including applicable payroll taxes, fringe benefits required by agreement or custom, workers' compensation insurance, and other employee costs approved by the Architect;

.2 Costs of materials, supplies, and equipment, including cost of transportation, whether incorporated or consumed;

.3 Rental costs of machinery and equipment, exclusive of hand tools, whether rented from the Contractor or others;

.4 Costs of premiums for all bonds and insurance, permit fees, and sales, use, or similar taxes, directly related to the change; and

.5 Costs of supervision and field office personnel directly attributable to the change.

§ 7.3.5 If the Contractor disagrees with the adjustment in the Contract Time, the Contractor may make a Claim in accordance with applicable provisions of Article 15.

§ 7.3.6 Upon receipt of a Construction Change Directive, the Contractor shall promptly proceed with the change in the Work involved and advise the Architect of the Contractor's agreement or disagreement with the method, if any, provided in the Construction Change Directive for determining the proposed adjustment in the Contract Sum or Contract Time.

§ 7.3.7 A Construction Change Directive signed by the Contractor indicates the Contractor's agreement therewith, including adjustment in Contract Sum and Contract Time or the method for determining them. Such agreement shall be effective immediately and shall be recorded as a Change Order.

§ 7.3.8 The amount of credit to be allowed by the Contractor to the Owner for a deletion or change that results in a net decrease in the Contract Sum shall be actual net cost as confirmed by the Architect. When both additions and credits covering related Work or substitutions are involved in a change, the allowance for overhead and profit shall be figured on the basis of net increase, if any, with respect to that change.

§ 7.3.9 Pending final determination of the total cost of a Construction Change Directive to the Owner, the Contractor may request payment for Work completed under the Construction Change Directive in Applications for Payment. The Architect will make an interim determination for purposes of monthly certification for payment for those costs and certify for payment the amount that the Architect determines, in the Architect's professional judgment, to be reasonably justified. The Architect's interim determination of cost shall adjust the Contract Sum on the same basis as a Change Order, subject to the right of either party to disagree and assert a Claim in accordance with Article 15.

§ 7.3.10 When the Owner and Contractor agree with a determination made by the Architect concerning the adjustments in the Contract Sum and Contract Time, or otherwise reach agreement upon the adjustments, such agreement shall be effective immediately and the Architect will prepare a Change Order. Change Orders may be issued for all or any part of a Construction Change Directive.

§ 7.4 Minor Changes in the Work

The Architect may order minor changes in the Work that are consistent with the intent of the Contract Documents and do not involve an adjustment in the Contract Sum or an extension of the Contract Time. The Architect's order for minor changes shall be in writing. If the Contractor believes that the proposed minor change in the Work will affect the Contract Sum or Contract Time, the Contractor shall notify the Architect and shall not proceed to implement the change in the Work. If the Contractor performs the Work set forth in the Architect's order for a minor change without

prior notice to the Architect that such change will affect the Contract Sum or Contract Time, the Contractor waives any adjustment to the Contract Sum or extension of the Contract Time.

ARTICLE 8 TIME

§ 8.1 Definitions

§ 8.1.1 Unless otherwise provided, Contract Time is the period of time, including authorized adjustments, allotted in the Contract Documents for Substantial Completion of the Work.

§ 8.1.2 The date of commencement of the Work is the date established in the Agreement.

§ 8.1.3 The date of Substantial Completion is the date certified by the Architect in accordance with Section 9.8.

§ 8.1.4 The term "day" as used in the Contract Documents shall mean calendar day unless otherwise specifically defined.

§ 8.2 Progress and Completion

§ 8.2.1 Time limits stated in the Contract Documents are of the essence of the Contract. By executing the Agreement, the Contractor confirms that the Contract Time is a reasonable period for performing the Work.

§ 8.2.2 The Contractor shall not knowingly, except by agreement or instruction of the Owner in writing, commence the Work prior to the effective date of insurance required to be furnished by the Contractor and Owner.

§ 8.2.3 The Contractor shall proceed expeditiously with adequate forces and shall achieve Substantial Completion within the Contract Time.

§ 8.3 Delays and Extensions of Time

§ 8.3.1 If the Contractor is delayed at any time in the commencement or progress of the Work by (1) an act or neglect of the Owner or Architect, of an employee of either, or of a Separate Contractor; (2) by changes ordered in the Work; (3) by labor disputes, fire, unusual delay in deliveries, unavoidable casualties, adverse weather conditions documented in accordance with Section 15.1.6.2, or other causes beyond the Contractor's control; (4) by delay authorized by the Owner pending mediation and binding dispute resolution; or (5) by other causes that the Contractor asserts, and the Architect determines, justify delay, then the Contract Time shall be extended for such reasonable time as the Architect may determine.

§ 8.3.2 Claims relating to time shall be made in accordance with applicable provisions of Article 15.

§ 8.3.3 This Section 8.3 does not preclude recovery of damages for delay by either party under other provisions of the Contract Documents.

ARTICLE 9 PAYMENTS AND COMPLETION

§ 9.1 Contract Sum

§ 9.1.1 The Contract Sum is stated in the Agreement and, including authorized adjustments, is the total amount payable by the Owner to the Contractor for performance of the Work under the Contract Documents.

§ 9.1.2 If unit prices are stated in the Contract Documents or subsequently agreed upon, and if quantities originally contemplated are materially changed so that application of such unit prices to the actual quantities causes substantial inequity to the Owner or Contractor, the applicable unit prices shall be equitably adjusted.

§ 9.2 Schedule of Values

Where the Contract is based on a stipulated sum or Guaranteed Maximum Price, the Contractor shall submit a schedule of values to the Architect before the first Application for Payment, allocating the entire Contract Sum to the various portions of the Work. The schedule of values shall be prepared in the form, and supported by the data to substantiate its accuracy, required by the Architect. This schedule, unless objected to by the Architect, shall be used as a basis for reviewing the Contractor's Applications for Payment. Any changes to the schedule of values shall be submitted to the Architect and supported by such data to substantiate its accuracy as the Architect may require, and unless objected to by the Architect, shall be used as a basis for reviewing the Contractor's subsequent Applications for Payment.

§ 9.3 Applications for Payment

§ 9.3.1 At least ~~ten~~ **fifteen (15)** days before the date established for each progress payment, the Contractor shall submit to the Architect an itemized Application for Payment prepared in accordance with the schedule of values, if required under Section 9.2, for completed portions of the Work. The application shall be notarized, if required, and supported by all data substantiating the Contractor's right to payment that the Owner or Architect require, such as copies of requisitions, and releases and waivers of liens from Subcontractors and suppliers, and shall reflect retainage if provided for in the Contract Documents.

§ 9.3.1.1 As provided in Section 7.3.9, such applications may include requests for payment on account of changes in the Work that have been properly authorized by Construction Change Directives, or by interim determinations of the Architect, but not yet included in Change Orders.

§ 9.3.1.2 Applications for Payment shall not include requests for payment for portions of the Work for which the Contractor does not intend to pay a Subcontractor or supplier, unless such Work has been performed by others whom the Contractor intends to pay.

§ 9.3.2 Unless otherwise provided in the Contract Documents, payments shall be made on account of materials and equipment delivered and suitably stored at the site for subsequent incorporation in the Work. If approved in advance by the Owner, payment may similarly be made for materials and equipment suitably stored off the site at a location agreed upon in writing. Payment for materials and equipment stored on or off the site shall be conditioned upon compliance by the Contractor with procedures satisfactory to the Owner to establish the Owner's title to such materials and equipment or otherwise protect the Owner's interest, and shall include the costs of applicable insurance, storage, and transportation to the site, for such materials and equipment stored off the site.

§ 9.3.3 The Contractor warrants that title to all Work covered by an Application for Payment will pass to the Owner no later than the time of payment. The Contractor further warrants that upon submittal of an Application for Payment all Work for which Certificates for Payment have been previously issued and payments received from the Owner shall, to the best of the Contractor's knowledge, information, and belief, be free and clear of liens, claims, security interests, or encumbrances, in favor of the Contractor, Subcontractors, suppliers, or other persons or entities that provided labor, materials, and equipment relating to the Work.

§ 9.4 Certificates for Payment

§ 9.4.1 The Architect will, within seven days after receipt of the Contractor's Application for Payment, either (1) issue to the Owner a Certificate for Payment in the full amount of the Application for Payment, with a copy to the Contractor; or (2) issue to the Owner a Certificate for Payment for such amount as the Architect determines is properly due, and notify the Contractor and Owner of the Architect's reasons for withholding certification in part as provided in Section 9.5.1; or (3) withhold certification of the entire Application for Payment, and notify the Contractor and Owner of the Architect's reason for withholding certification in whole as provided in Section 9.5.1.

§ 9.4.2 The issuance of a Certificate for Payment will constitute a representation by the Architect to the Owner, based on the Architect's evaluation of the Work and the data in the Application for Payment, that, to the best of the Architect's knowledge, information, and belief, the Work has progressed to the point indicated, the quality of the Work is in accordance with the Contract Documents, and that the Contractor is entitled to payment in the amount certified. The foregoing representations are subject to an evaluation of the Work for conformance with the Contract Documents upon Substantial Completion, to results of subsequent tests and inspections, to correction of minor deviations from the Contract Documents prior to completion, and to specific qualifications expressed by the Architect. However, the issuance of a Certificate for Payment will not be a representation that the Architect has (1) made exhaustive or continuous on-site inspections to check the quality or quantity of the Work; (2) reviewed construction means, methods, techniques, sequences, or procedures; (3) reviewed copies of requisitions received from Subcontractors and suppliers and other data requested by the Owner to substantiate the Contractor's right to payment; or (4) made examination to ascertain how or for what purpose the Contractor has used money previously paid on account of the Contract Sum.

§ 9.5 Decisions to Withhold Certification

§ 9.5.1 The Architect may withhold a Certificate for Payment in whole or in part, to the extent reasonably necessary to protect the Owner, if in the Architect's opinion the representations to the Owner required by Section 9.4.2 cannot be

made. If the Architect is unable to certify payment in the amount of the Application, the Architect will notify the Contractor and Owner as provided in Section 9.4.1. If the Contractor and Architect cannot agree on a revised amount, the Architect will promptly issue a Certificate for Payment for the amount for which the Architect is able to make such representations to the Owner. The Architect may also withhold a Certificate for Payment or, because of subsequently discovered evidence, may nullify the whole or a part of a Certificate for Payment previously issued, to such extent as may be necessary in the Architect's opinion to protect the Owner from loss for which the Contractor is responsible, including loss resulting from acts and omissions described in Section 3.3.2, because of

- **.1** defective Work not remedied;
- **.2** third party claims filed or reasonable evidence indicating probable filing of such claims, unless security acceptable to the Owner is provided by the Contractor;
- **.3** failure of the Contractor to make payments properly to Subcontractors or suppliers for labor, materials or equipment;
- **.4** reasonable evidence that the Work cannot be completed for the unpaid balance of the Contract Sum;
- **.5** damage to the Owner or a Separate Contractor;
- **.6** reasonable evidence that the Work will not be completed within the Contract Time, and that the unpaid balance would not be adequate to cover actual or liquidated damages for the anticipated delay; or
- **.7** repeated failure to carry out the Work in accordance with the Contract Documents.

§ 9.5.2 When either party disputes the Architect's decision regarding a Certificate for Payment under Section 9.5.1, in whole or in part, that party may submit a Claim in accordance with Article 15.

§ 9.5.3 When the reasons for withholding certification are removed, certification will be made for amounts previously withheld.

§ 9.5.4 If the Architect withholds certification for payment under Section 9.5.1.3, the Owner may, at its sole option, issue joint checks to the Contractor and to any Subcontractor or supplier to whom the Contractor failed to make payment for Work properly performed or material or equipment suitably delivered. If the Owner makes payments by joint check, the Owner shall notify the Architect and the Contractor shall reflect such payment on its next Application for Payment.

§ 9.6 Progress Payments

§ 9.6.1 After the Architect has issued a Certificate for Payment, the Owner shall make payment in the manner and within the time provided in the Contract Documents, and shall so notify the Architect.

§ 9.6.2 The Contractor shall pay each Subcontractor, no later than seven days after receipt of payment from the Owner, the amount to which the Subcontractor is entitled, reflecting percentages actually retained from payments to the Contractor on account of the Subcontractor's portion of the Work. The Contractor shall, by appropriate agreement with each Subcontractor, require each Subcontractor to make payments to Sub-subcontractors in a similar manner.

§ 9.6.3 The Architect will, on request, furnish to a Subcontractor, if practicable, information regarding percentages of completion or amounts applied for by the Contractor and action taken thereon by the Architect and Owner on account of portions of the Work done by such Subcontractor.

§ 9.6.4 The Owner has the right to request written evidence from the Contractor that the Contractor has properly paid Subcontractors and suppliers amounts paid by the Owner to the Contractor for subcontracted Work. If the Contractor fails to furnish such evidence within seven days, the Owner shall have the right to contact Subcontractors and suppliers to ascertain whether they have been properly paid. Neither the Owner nor Architect shall have an obligation to pay, or to see to the payment of money to, a Subcontractor or supplier, except as may otherwise be required by law.

§ 9.6.5 The Contractor's payments to suppliers shall be treated in a manner similar to that provided in Sections 9.6.2, 9.6.3 and 9.6.4.

§ 9.6.6 A Certificate for Payment, a progress payment, or partial or entire use or occupancy of the Project by the Owner shall not constitute acceptance of Work not in accordance with the Contract Documents.

§ 9.6.7 Unless the Contractor provides the Owner with a payment bond in the full penal sum of the Contract Sum, payments received by the Contractor for Work properly performed by Subcontractors or provided by suppliers shall be

held by the Contractor for those Subcontractors or suppliers who performed Work or furnished materials, or both, under contract with the Contractor for which payment was made by the Owner. Nothing contained herein shall require money to be placed in a separate account and not commingled with money of the Contractor, create any fiduciary liability or tort liability on the part of the Contractor for breach of trust, or entitle any person or entity to an award of punitive damages against the Contractor for breach of the requirements of this provision.

§ 9.6.8 Provided the Owner has fulfilled its payment obligations under the Contract Documents, the Contractor shall defend and indemnify the Owner from all loss, liability, damage or expense, including reasonable attorney's fees and litigation expenses, arising out of any lien claim or other claim for payment by any Subcontractor or supplier of any tier. Upon receipt of notice of a lien claim or other claim for payment, the Owner shall notify the Contractor. If approved by the applicable court, when required, the Contractor may substitute a surety bond for the property against which the lien or other claim for payment has been asserted.

§ 9.7 Failure of Payment

If the Architect does not issue a Certificate for Payment, through no fault of the Contractor, within seven days after receipt of the Contractor's Application for Payment, or if the Owner does not pay the Contractor within seven days after the date established in the Contract Documents, the amount certified by the Architect or awarded by binding dispute resolution, then the Contractor may, upon seven additional days' notice to the Owner and Architect, stop the Work until payment of the amount owing has been received. The Contract Time shall be extended appropriately and the Contract Sum shall be increased by the amount of the Contractor's reasonable costs of shutdown, delay and start-up, plus interest as provided for in the Contract Documents.

§ 9.8 Substantial Completion

§ 9.8.1 Substantial Completion is the stage in the progress of the Work when the Work or designated portion thereof is sufficiently complete in accordance with the Contract Documents so that the Owner can occupy or utilize the Work for its intended use.

§ 9.8.2 When the Contractor considers that the Work, or a portion thereof which the Owner agrees to accept separately, is substantially complete, the Contractor shall prepare and submit to the Architect a comprehensive list of items to be completed or corrected prior to final payment. Failure to include an item on such list does not alter the responsibility of the Contractor to complete all Work in accordance with the Contract Documents.

§ 9.8.3 Upon receipt of the Contractor's list, the Architect will make an inspection to determine whether the Work or designated portion thereof is substantially complete. If the Architect's inspection discloses any item, whether or not included on the Contractor's list, which is not sufficiently complete in accordance with the Contract Documents so that the Owner can occupy or utilize the Work or designated portion thereof for its intended use, the Contractor shall, before issuance of the Certificate of Substantial Completion, complete or correct such item upon notification by the Architect. In such case, the Contractor shall then submit a request for another inspection by the Architect to determine Substantial Completion.

§ 9.8.4 When the Work or designated portion thereof is substantially complete, the Architect will prepare a Certificate of Substantial Completion that shall establish the date of Substantial Completion; establish responsibilities of the Owner and Contractor for security, maintenance, heat, utilities, damage to the Work and insurance; and fix the time within which the Contractor shall finish all items on the list accompanying the Certificate. Warranties required by the Contract Documents shall commence on the date of Substantial Completion of the Work or designated portion thereof unless otherwise provided in the Certificate of Substantial Completion.

§ 9.8.5 The Certificate of Substantial Completion shall be submitted to the Owner and Contractor for their written acceptance of responsibilities assigned to them in the Certificate. Upon such acceptance, and consent of surety if any, the Owner shall make payment of retainage applying to the Work or designated portion thereof. Such payment shall be adjusted for Work that is incomplete or not in accordance with the requirements of the Contract Documents.

§ 9.9 Partial Occupancy or Use

§ 9.9.1 The Owner may occupy or use any completed or partially completed portion of the Work at any stage when such portion is designated by separate agreement with the Contractor, provided such occupancy or use is consented to by the insurer and authorized by public authorities having jurisdiction over the Project. Such partial occupancy or use may commence whether or not the portion is substantially complete, provided the Owner and Contractor have

accepted in writing the responsibilities assigned to each of them for payments, retainage, if any, security, maintenance, heat, utilities, damage to the Work and insurance, and have agreed in writing concerning the period for correction of the Work and commencement of warranties required by the Contract Documents. When the Contractor considers a portion substantially complete, the Contractor shall prepare and submit a list to the Architect as provided under Section 9.8.2. Consent of the Contractor to partial occupancy or use shall not be unreasonably withheld. The stage of the progress of the Work shall be determined by written agreement between the Owner and Contractor or, if no agreement is reached, by decision of the Architect.

§ 9.9.2 Immediately prior to such partial occupancy or use, the Owner, Contractor, and Architect shall jointly inspect the area to be occupied or portion of the Work to be used in order to determine and record the condition of the Work.

§ 9.9.3 Unless otherwise agreed upon, partial occupancy or use of a portion or portions of the Work shall not constitute acceptance of Work not complying with the requirements of the Contract Documents.

§ 9.10 Final Completion and Final Payment

§ 9.10.1 Upon receipt of the Contractor's notice that the Work is ready for final inspection and acceptance and upon receipt of a final Application for Payment, the Architect will promptly make such inspection. When the Architect finds the Work acceptable under the Contract Documents and the Contract fully performed, the Architect will promptly issue a final Certificate for Payment stating that to the best of the Architect's knowledge, information and belief, and on the basis of the Architect's on-site visits and inspections, the Work has been completed in accordance with the Contract Documents and that the entire balance found to be due the Contractor and noted in the final Certificate is due and payable. The Architect's final Certificate for Payment will constitute a further representation that conditions listed in Section 9.10.2 as precedent to the Contractor's being entitled to final payment have been fulfilled.

§ 9.10.2 Neither final payment nor any remaining retained percentage shall become due until the Contractor submits to the Architect (1) an affidavit that payrolls, bills for materials and equipment, and other indebtedness connected with the Work for which the Owner or the Owner's property might be responsible or encumbered (less amounts withheld by Owner) have been paid or otherwise satisfied, (2) a certificate evidencing that insurance required by the Contract Documents to remain in force after final payment is currently in effect, (3) a written statement that the Contractor knows of no reason that the insurance will not be renewable to cover the period required by the Contract Documents, (4) consent of surety, if any, to final payment, (5) documentation of any special warranties, such as manufacturers' warranties or specific Subcontractor warranties, and (6) if required by the Owner, other data establishing payment or satisfaction of obligations, such as receipts and releases and waivers of liens, claims, security interests, or encumbrances arising out of the Contract, to the extent and in such form as may be designated by the Owner. If a Subcontractor refuses to furnish a release or waiver required by the Owner, the Contractor may furnish a bond satisfactory to the Owner to indemnify the Owner against such lien, claim, security interest, or encumbrance. If a lien, claim, security interest, or encumbrance remains unsatisfied after payments are made, the Contractor shall refund to the Owner all money that the Owner may be compelled to pay in discharging the lien, claim, security interest, or encumbrance, including all costs and reasonable attorneys' fees.

§ 9.10.3 If, after Substantial Completion of the Work, final completion thereof is materially delayed through no fault of the Contractor or by issuance of Change Orders affecting final completion, and the Architect so confirms, the Owner shall, upon application by the Contractor and certification by the Architect, and without terminating the Contract, make payment of the balance due for that portion of the Work fully completed, corrected, and accepted. If the remaining balance for Work not fully completed or corrected is less than retainage stipulated in the Contract Documents, and if bonds have been furnished, the written consent of the surety to payment of the balance due for that portion of the Work fully completed and accepted shall be submitted by the Contractor to the Architect prior to certification of such payment. Such payment shall be made under terms and conditions governing final payment, except that it shall not constitute a waiver of Claims.

§ 9.10.4 The making of final payment shall constitute a waiver of Claims by the Owner except those arising from

- **.1** liens, Claims, security interests, or encumbrances arising out of the Contract and unsettled;
- **.2** failure of the Work to comply with the requirements of the Contract Documents;
- **.3** terms of special warranties required by the Contract Documents; or
- **.4** audits performed by the Owner, if permitted by the Contract Documents, after final payment.

§ 9.10.5 Acceptance of final payment by the Contractor, a Subcontractor, or a supplier, shall constitute a waiver of claims by that payee except those previously made in writing and identified by that payee as unsettled at the time of final Application for Payment.

ARTICLE 10 PROTECTION OF PERSONS AND PROPERTY

§ 10.1 Safety Precautions and Programs

The Contractor shall be responsible for initiating, maintaining, and supervising all safety precautions and programs in connection with the performance of the Contract.

§ 10.2 Safety of Persons and Property

§ 10.2.1 The Contractor shall take reasonable precautions for safety of, and shall provide reasonable protection to prevent damage, injury, or loss to

- **.1** employees on the Work and other persons who may be affected thereby;
- **.2** the Work and materials and equipment to be incorporated therein, whether in storage on or off the site, under care, custody, or control of the Contractor, a Subcontractor, or a Sub-subcontractor; and
- **.3** other property at the site or adjacent thereto, such as trees, shrubs, lawns, walks, pavements, roadways, structures, and utilities not designated for removal, relocation, or replacement in the course of construction.

§ 10.2.2 The Contractor shall comply with, and give notices required by applicable laws, statutes, ordinances, codes, rules and regulations, and lawful orders of public authorities, bearing on safety of persons or property or their protection from damage, injury, or loss.

§ 10.2.3 The Contractor shall implement, erect, and maintain, as required by existing conditions and performance of the Contract, reasonable safeguards for safety and protection, including posting danger signs and other warnings against hazards; promulgating safety regulations; and notifying the owners and users of adjacent sites and utilities of the safeguards.

§ 10.2.4 When use or storage of explosives or other hazardous materials or equipment, or unusual methods are necessary for execution of the Work, the Contractor shall exercise utmost care and carry on such activities under supervision of properly qualified personnel.

§ 10.2.5 The Contractor shall promptly remedy damage and loss (other than damage or loss insured under property insurance required by the Contract Documents) to property referred to in Sections 10.2.1.2 and 10.2.1.3 caused in whole or in part by the Contractor, a Subcontractor, a Sub-subcontractor, or anyone directly or indirectly employed by any of them, or by anyone for whose acts they may be liable and for which the Contractor is responsible under Sections 10.2.1.2 and 10.2.1.3. The Contractor may make a Claim for the cost to remedy the damage or loss to the extent such damage or loss is attributable to acts or omissions of the Owner or Architect or anyone directly or indirectly employed by either of them, or by anyone for whose acts either of them may be liable, and not attributable to the fault or negligence of the Contractor. The foregoing obligations of the Contractor are in addition to the Contractor's obligations under Section 3.18.

§ 10.2.6 The Contractor shall designate a responsible member of the Contractor's organization at the site whose duty shall be the prevention of accidents. This person shall be the Contractor's superintendent unless otherwise designated by the Contractor in writing to the Owner and Architect.

§ 10.2.7 The Contractor shall not permit any part of the construction or site to be loaded so as to cause damage or create an unsafe condition.

§ 10.2.8 Injury or Damage to Person or Property

If either party suffers injury or damage to person or property because of an act or omission of the other party, or of others for whose acts such party is legally responsible, notice of the injury or damage, whether or not insured, shall be given to the other party within a reasonable time not exceeding 21 days after discovery. The notice shall provide sufficient detail to enable the other party to investigate the matter.

§ 10.3 Hazardous Materials and Substances

§ 10.3.1 The Contractor is responsible for compliance with any requirements included in the Contract Documents regarding hazardous materials or substances. If the Contractor encounters a hazardous material or substance not addressed in the Contract Documents and if reasonable precautions will be inadequate to prevent foreseeable bodily injury or death to persons resulting from a material or substance, including but not limited to asbestos or polychlorinated biphenyl (PCB), encountered on the site by the Contractor, the Contractor shall, upon recognizing the condition, immediately stop Work in the affected area and notify the Owner and Architect of the condition.

§ 10.3.2 Upon receipt of the Contractor's notice, the Owner shall obtain the services of a licensed laboratory to verify the presence or absence of the material or substance reported by the Contractor and, in the event such material or substance is found to be present, to cause it to be rendered harmless. Unless otherwise required by the Contract Documents, the Owner shall furnish in writing to the Contractor and Architect the names and qualifications of persons or entities who are to perform tests verifying the presence or absence of the material or substance or who are to perform the task of removal or safe containment of the material or substance. The Contractor and the Architect will promptly reply to the Owner in writing stating whether or not either has reasonable objection to the persons or entities proposed by the Owner. If either the Contractor or Architect has an objection to a person or entity proposed by the Owner, the Owner shall propose another to whom the Contractor and the Architect have no reasonable objection. When the material or substance has been rendered harmless, Work in the affected area shall resume upon written agreement of the Owner and Contractor. By Change Order, the Contract Time shall be extended appropriately and the Contract Sum shall be increased by the amount of the Contractor's reasonable additional costs of shutdown, delay, and start-up.

§ 10.3.3 To the fullest extent permitted by law, the Owner shall indemnify and hold harmless the Contractor, Subcontractors, Architect, Architect's consultants, and agents and employees of any of them from and against claims, damages, losses, and expenses, including but not limited to attorneys' fees, arising out of or resulting from performance of the Work in the affected area if in fact the material or substance presents the risk of bodily injury or death as described in Section 10.3.1 and has not been rendered harmless, provided that such claim, damage, loss, or expense is attributable to bodily injury, sickness, disease or death, or to injury to or destruction of tangible property (other than the Work itself), except to the extent that such damage, loss, or expense is due to the fault or negligence of the party seeking indemnity.

§ 10.3.4 The Owner shall not be responsible under this Section 10.3 for hazardous materials or substances the Contractor brings to the site unless such materials or substances are required by the Contract Documents. The Owner shall be responsible for hazardous materials or substances required by the Contract Documents, except to the extent of the Contractor's fault or negligence in the use and handling of such materials or substances.

§ 10.3.5 The Contractor shall reimburse the Owner for the cost and expense the Owner incurs (1) for remediation of hazardous materials or substances the Contractor brings to the site and negligently handles, or (2) where the Contractor fails to perform its obligations under Section 10.3.1, except to the extent that the cost and expense are due to the Owner's fault or negligence.

§ 10.3.6 If, without negligence on the part of the Contractor, the Contractor is held liable by a government agency for the cost of remediation of a hazardous material or substance solely by reason of performing Work as required by the Contract Documents, the Owner shall reimburse the Contractor for all cost and expense thereby incurred.

§ 10.4 Emergencies

In an emergency affecting safety of persons or property, the Contractor shall act, at the Contractor's discretion, to prevent threatened damage, injury, or loss. Additional compensation or extension of time claimed by the Contractor on account of an emergency shall be determined as provided in Article 15 and Article 7.

ARTICLE 11 INSURANCE AND BONDS

§ 11.1 Contractor's Insurance and Bonds

§ 11.1.1 The Contractor shall purchase and maintain insurance of the types and limits of liability, containing the endorsements, and subject to the terms and conditions, as described in the Agreement or elsewhere in the Contract Documents. The Contractor shall purchase and maintain the required insurance from an insurance company or insurance companies lawfully authorized to issue insurance in the jurisdiction where the Project is located. The

Owner, Architect, and Architect's consultants shall be named as additional insureds under the Contractor's commercial general liability policy or as otherwise described in the Contract Documents.

§ 11.1.2 The Contractor shall provide surety bonds of the types, for such penal sums, and subject to such terms and conditions as required by the Contract Documents. The Contractor shall purchase and maintain the required bonds from a company or companies lawfully authorized to issue surety bonds in the jurisdiction where the Project is located.

§ 11.1.3 Upon the request of any person or entity appearing to be a potential beneficiary of bonds covering payment of obligations arising under the Contract, the Contractor shall promptly furnish a copy of the bonds or shall authorize a copy to be furnished.

§ 11.1.4 Notice of Cancellation or Expiration of Contractor's Required Insurance. Within three (3) business days of the date the Contractor becomes aware of an impending or actual cancellation or expiration of any insurance required by the Contract Documents, the Contractor shall provide notice to the Owner of such impending or actual cancellation or expiration. Upon receipt of notice from the Contractor, the Owner shall, unless the lapse in coverage arises from an act or omission of the Owner, have the right to stop the Work until the lapse in coverage has been cured by the procurement of replacement coverage by the Contractor. The furnishing of notice by the Contractor shall not relieve the Contractor of any contractual obligation to provide any required coverage. **In all circumstances the Contractor's notice of any potential/actual policy cancellation must be furnished to the Owner thirty (30) days prior to the effective date of the cancellation.**

§ 11.2 Owner's Insurance

§ 11.2.1 The Owner shall purchase and maintain insurance of the types and limits of liability, containing the endorsements, and subject to the terms and conditions, as described in the Agreement or elsewhere in the Contract Documents. The Owner shall purchase and maintain the required insurance from an insurance company or insurance companies lawfully authorized to issue insurance in the jurisdiction where the Project is located.

In addition to, and as set forth in AIA A101-Exhibit A, the Contractor shall purchase and maintain, from an insurance company or insurance companies lawfully authorized to issue insurance in the jurisdiction where the Project is located, property insurance written on a builder's risk "all-risks" completed value or equivalent policy form and sufficient to cover the total value of the entire Project on a replacement cost basis. The builder's risk insurance shall be maintained until Substantial Completion and thereafter as provided in Section A.2.3.1.3, unless otherwise provided in the Contract Documents or otherwise agreed in writing by the parties to this Agreement. This insurance shall include the interests of the Owner, Contractor, Subcontractors, and Sub-subcontractors in the Project as insureds. This insurance shall include the interests of mortgagees as loss payees.

§ 11.2.2 Failure to Purchase Required Property Insurance. If the Owner fails to purchase and maintain the required property insurance, with all of the coverages and in the amounts described in the Agreement or elsewhere in the Contract Documents, the Owner shall inform the Contractor in writing prior to commencement of the Work. Upon receipt of notice from the Owner, the Contractor may delay commencement of the Work and may obtain insurance that will protect the interests of the Contractor, Subcontractors, and Sub-Subcontractors in the Work. When the failure to provide coverage has been cured or resolved, the Contract Sum and Contract Time shall be equitably adjusted. In the event the Owner fails to procure coverage, the Owner waives all rights against the Contractor, Subcontractors, and Sub-subcontractors to the extent the loss to the Owner would have been covered by the insurance to have been procured by the Owner. The cost of the insurance shall be charged to the Owner by a Change Order. If the Owner does not provide written notice, and the Contractor is damaged by the failure or neglect of the Owner to purchase or maintain the required insurance, the Owner shall reimburse the Contractor for all reasonable costs and damages attributable thereto.

§ 11.2.3 Notice of Cancellation or Expiration of Owner's Required Property Insurance. Within three (3) business days of the date the Owner becomes aware of an impending or actual cancellation or expiration of any property insurance required by the Contract Documents, the Owner shall provide notice to the Contractor of such impending or actual cancellation or expiration. Unless the lapse in coverage arises from an act or omission of the Contractor: (1) the Contractor, upon receipt of notice from the Owner, shall have the right to stop the Work until the lapse in coverage has been cured by the procurement of replacement coverage by either the Owner or the Contractor; (2) the Contract Time and Contract Sum shall be equitably adjusted; and (3) the Owner waives all rights against the Contractor,

Subcontractors, and Sub-subcontractors to the extent any loss to the Owner would have been covered by the insurance had it not expired or been cancelled. If the Contractor purchases replacement coverage, the cost of the insurance shall be charged to the Owner by an appropriate Change Order. The furnishing of notice by the Owner shall not relieve the Owner of any contractual obligation to provide required insurance.

§ 11.3 Waivers of Subrogation

§ 11.3.1 The ~~Owner and~~ Contractor waive**s** all rights against (1) ~~each other and any of their subcontractors, sub-subcontractors, agents, and employees, each of the other~~**the Owner**; (2) the Architect and Architect's consultants; and (3) Separate Contractors, if any, and any of their subcontractors, sub-subcontractors, agents, and employees, for damages caused by fire, or other causes of loss, to the extent those losses are covered by property insurance required by the Agreement or other property insurance applicable to the Project, except such rights as they have to proceeds of such insurance. The ~~Owner or~~ Contractor~~, as appropriate,~~ shall require similar written waivers in favor of the individuals and entities identified above from ~~the Architect, Architect's consultants,~~ Separate Contractors, subcontractors, and sub-subcontractors. The policies of insurance purchased and maintained by each person or entity agreeing to waive claims pursuant to this section 11.3.1 shall not prohibit this waiver of subrogation. This waiver of subrogation shall be effective as to a person or entity (1) even though that person or entity would otherwise have a duty of indemnification, contractual or otherwise, (2) even though that person or entity did not pay the insurance premium directly or indirectly, or (3) whether or not the person or entity had an insurable interest in the damaged property.

§ 11.3.2 The Owner(s) explicitly do not waive their rights of subrogation for any liability of the Contractor that may be covered under the Property or Liability Policies that the Owner(s) may have with the Rhode Island Interlocal Risk Management Trust. ~~If during the Project construction period the Owner insures properties, real or personal or both, at or adjacent to the site by property insurance under policies separate from those insuring the Project, or if after final payment property insurance is to be provided on the completed Project through a policy or policies other than those insuring the Project during the construction period, to the extent permissible by such policies, the Owner waives all rights in accordance with the terms of Section 11.3.1 for damages caused by fire or other causes of loss covered by this separate property insurance.~~**[[RESERVED]]**

§ 11.4 ~~Loss of Use, Business Interruption, and Delay in Completion Insurance~~

~~The Owner, at the Owner's option, may purchase and maintain insurance that will protect the Owner against loss of use of the Owner's property, or the inability to conduct normal operations, due to fire or other causes of loss. The Owner waives all rights of action against the Contractor and Architect for loss of use of the Owner's property, due to fire or other hazards however caused.~~**[[RESERVED]]**

§11.5 Adjustment and Settlement of Insured Loss

§ 11.5.1 A loss insured under the property insurance required by the Agreement shall be adjusted by the Owner as fiduciary and made payable to the Owner as fiduciary for the insureds, as their interests may appear, subject to requirements of any applicable mortgagee clause and of Section 11.5.2. The Owner shall pay the Architect and Contractor their just shares of insurance proceeds received by the Owner, and by appropriate agreements the Architect and Contractor shall make payments to their consultants and Subcontractors in similar manner.

§ 11.5.2 Prior to settlement of an insured loss, the Owner shall notify the Contractor of the terms of the proposed settlement as well as the proposed allocation of the insurance proceeds. The Contractor shall have 14 days from receipt of notice to object to the proposed settlement or allocation of the proceeds. If the Contractor does not object, the Owner shall settle the loss and the Contractor shall be bound by the settlement and allocation. Upon receipt, the Owner shall deposit the insurance proceeds in a separate account and make the appropriate distributions. Thereafter, if no other agreement is made or the Owner does not terminate the Contract for convenience, the Owner and Contractor shall execute a Change Order for reconstruction of the damaged or destroyed Work in the amount allocated for that purpose. If the Contractor timely objects to either the terms of the proposed settlement or the allocation of the proceeds, the Owner may proceed to settle the insured loss, and any dispute between the Owner and Contractor arising out of the settlement or allocation of the proceeds shall be resolved pursuant to Article 15. Pending resolution of any dispute, the Owner may issue a Construction Change Directive for the reconstruction of the damaged or destroyed Work.

ARTICLE 12 UNCOVERING AND CORRECTION OF WORK

§ 12.1 Uncovering of Work

§ 12.1.1 If a portion of the Work is covered contrary to the Architect's request or to requirements specifically expressed in the Contract Documents, it must, if requested in writing by the Architect, be uncovered for the Architect's examination and be replaced at the Contractor's expense without change in the Contract Time.

§ 12.1.2 If a portion of the Work has been covered that the Architect has not specifically requested to examine prior to its being covered, the Architect may request to see such Work and it shall be uncovered by the Contractor. If such Work is in accordance with the Contract Documents, the Contractor shall be entitled to an equitable adjustment to the Contract Sum and Contract Time as may be appropriate. If such Work is not in accordance with the Contract Documents, the costs of uncovering the Work, and the cost of correction, shall be at the Contractor's expense.

§ 12.2 Correction of Work

§ 12.2.1 Before Substantial Completion

The Contractor shall promptly correct Work rejected by the Architect or failing to conform to the requirements of the Contract Documents, discovered before Substantial Completion and whether or not fabricated, installed or completed. Costs of correcting such rejected Work, including additional testing and inspections, the cost of uncovering and replacement, and compensation for the Architect's services and expenses made necessary thereby, shall be at the Contractor's expense.

§ 12.2.2 After Substantial Completion

§ 12.2.2.1 In addition to the Contractor's obligations under Section 3.5, if, within one year after the date of Substantial Completion of the Work or designated portion thereof or after the date for commencement of warranties established under Section 9.9.1, or by terms of any applicable special warranty required by the Contract Documents, any of the Work is found to be not in accordance with the requirements of the Contract Documents, the Contractor shall correct it promptly after receipt of notice from the Owner to do so, unless the Owner has previously given the Contractor a written acceptance of such condition. The Owner shall give such notice promptly after discovery of the condition. During the one-year period for correction of Work, if the Owner fails to notify the Contractor and give the Contractor an opportunity to make the correction, the Owner waives the rights to require correction by the Contractor and to make a claim for breach of warranty. If the Contractor fails to correct nonconforming Work within a reasonable time during that period after receipt of notice from the Owner or Architect, the Owner may correct it in accordance with Section 2.5.

§ 12.2.2.2 The one-year period for correction of Work shall be extended with respect to portions of Work first performed after Substantial Completion by the period of time between Substantial Completion and the actual completion of that portion of the Work.

§ 12.2.2.3 The one-year period for correction of Work shall not be extended by corrective Work performed by the Contractor pursuant to this Section 12.2.

§ 12.2.3 The Contractor shall remove from the site portions of the Work that are not in accordance with the requirements of the Contract Documents and are neither corrected by the Contractor nor accepted by the Owner.

§ 12.2.4 The Contractor shall bear the cost of correcting destroyed or damaged construction of the Owner or Separate Contractors, whether completed or partially completed, caused by the Contractor's correction or removal of Work that is not in accordance with the requirements of the Contract Documents.

§ 12.2.5 Nothing contained in this Section 12.2 shall be construed to establish a period of limitation with respect to other obligations the Contractor has under the Contract Documents. Establishment of the one-year period for correction of Work as described in Section 12.2.2 relates only to the specific obligation of the Contractor to correct the Work, and has no relationship to the time within which the obligation to comply with the Contract Documents may be sought to be enforced, nor to the time within which proceedings may be commenced to establish the Contractor's liability with respect to the Contractor's obligations other than specifically to correct the Work.

§ 12.3 Acceptance of Nonconforming Work

If the Owner prefers to accept Work that is not in accordance with the requirements of the Contract Documents, the Owner may do so instead of requiring its removal and correction, in which case the Contract Sum will be reduced as appropriate and equitable. Such adjustment shall be effected whether or not final payment has been made.

ARTICLE 13 MISCELLANEOUS PROVISIONS

§ 13.1 Governing Law

The Contract shall be governed by the law of the place where the Project is located, excluding that jurisdiction's choice of law rules. **In addition to a certification of compliance with all local laws/ordinances, the Contractor must also certify compliance with R.I.G.L. § 37-2.1-3 governing the purchase of steel and steel products manufactured within the United States.** If the parties have selected arbitration as the method of binding dispute resolution, the ~~Federal Arbitration Act~~ **Rhode Island Public Works Arbitration Act (R.I.G.L. §§ 37-16-1 *et seq*.)** shall govern Section 15.4.

§ 13.2 Successors and Assigns

§ 13.2.1 The Owner and Contractor respectively bind themselves, their partners, successors, assigns, and legal representatives to covenants, agreements, and obligations contained in the Contract Documents. Except as provided in Section 13.2.2, neither party to the Contract shall assign the Contract as a whole without written consent of the other. If either party attempts to make an assignment without such consent, that party shall nevertheless remain legally responsible for all obligations under the Contract.

§ 13.2.2 The Owner may, without consent of the Contractor, assign the Contract to a lender providing construction financing for the Project, if the lender assumes the Owner's rights and obligations under the Contract Documents. The Contractor shall execute all consents reasonably required to facilitate the assignment.

§ 13.3 Rights and Remedies

§ 13.3.1 Duties and obligations imposed by the Contract Documents and rights and remedies available thereunder shall be in addition to and not a limitation of duties, obligations, rights, and remedies otherwise imposed or available by law.

§ 13.3.2 No action or failure to act by the Owner, Architect, or Contractor shall constitute a waiver of a right or duty afforded them under the Contract, nor shall such action or failure to act constitute approval of or acquiescence in a breach thereunder, except as may be specifically agreed upon in writing.

§ 13.4 Tests and Inspections

§ 13.4.1 Tests, inspections, and approvals of portions of the Work shall be made as required by the Contract Documents and by applicable laws, statutes, ordinances, codes, rules, and regulations or lawful orders of public authorities. Unless otherwise provided, the Contractor shall make arrangements for such tests, inspections, and approvals with an independent testing laboratory or entity acceptable to the Owner, or with the appropriate public authority, and shall bear all related costs of tests, inspections, and approvals. The Contractor shall give the Architect timely notice of when and where tests and inspections are to be made so that the Architect may be present for such procedures. The Owner shall bear costs of tests, inspections, or approvals that do not become requirements until after bids are received or negotiations concluded. The Owner shall directly arrange and pay for tests, inspections, or approvals where building codes or applicable laws or regulations so require.

§ 13.4.2 If the Architect, Owner, or public authorities having jurisdiction determine that portions of the Work require additional testing, inspection, or approval not included under Section 13.4.1, the Architect will, upon written authorization from the Owner, instruct the Contractor to make arrangements for such additional testing, inspection, or approval, by an entity acceptable to the Owner, and the Contractor shall give timely notice to the Architect of when and where tests and inspections are to be made so that the Architect may be present for such procedures. Such costs, except as provided in Section 13.4.3, shall be at the Owner's expense.

§ 13.4.3 If procedures for testing, inspection, or approval under Sections 13.4.1 and 13.4.2 reveal failure of the portions of the Work to comply with requirements established by the Contract Documents, all costs made necessary by such failure, including those of repeated procedures and compensation for the Architect's services and expenses, shall be at the Contractor's expense.

§ 13.4.4 Required certificates of testing, inspection, or approval shall, unless otherwise required by the Contract Documents, be secured by the Contractor and promptly delivered to the Architect.

§ 13.4.5 If the Architect is to observe tests, inspections, or approvals required by the Contract Documents, the Architect will do so promptly and, where practicable, at the normal place of testing.

§ 13.4.6 Tests or inspections conducted pursuant to the Contract Documents shall be made promptly to avoid unreasonable delay in the Work.

§ 13.5 Interest

Payments due and unpaid under the Contract Documents shall bear interest from the date payment is due at the rate the parties agree upon in writing or, in the absence thereof, at the legal rate prevailing from time to time at the place where the Project is located.

ARTICLE 14 TERMINATION OR SUSPENSION OF THE CONTRACT

§ 14.1 Termination by the Contractor

§ 14.1.1 The Contractor may terminate the Contract if the Work is stopped for a period of 30 consecutive days through no act or fault of the Contractor, a Subcontractor, a Sub-subcontractor, their agents or employees, or any other persons or entities performing portions of the Work, for any of the following reasons:

- **.1** Issuance of an order of a court or other public authority having jurisdiction that requires all Work to be stopped;
- **.2** An act of government, such as a declaration of national emergency, that requires all Work to be stopped;
- **.3** Because the Architect has not issued a Certificate for Payment and has not notified the Contractor of the reason for withholding certification as provided in Section 9.4.1, or because the Owner has not made payment on a Certificate for Payment within the time stated in the Contract Documents; or
- **.4** The Owner has failed to furnish to the Contractor reasonable evidence as required by Section 2.2.

§ 14.1.2 The Contractor may terminate the Contract if, through no act or fault of the Contractor, a Subcontractor, a Sub-subcontractor, their agents or employees, or any other persons or entities performing portions of the Work, repeated suspensions, delays, or interruptions of the entire Work by the Owner as described in Section 14.3, constitute in the aggregate more than 100 percent of the total number of days scheduled for completion, or 120 days in any 365-day period, whichever is less.

§ 14.1.3 If one of the reasons described in Section 14.1.1 or 14.1.2 exists, the Contractor may, upon seven days' notice to the Owner and Architect, terminate the Contract and recover from the Owner payment for Work executed, as well as reasonable overhead and profit on Work not executed, and costs incurred by reason of such termination.

§ 14.1.4 If the Work is stopped for a period of 60 consecutive days through no act or fault of the Contractor, a Subcontractor, a Sub-subcontractor, or their agents or employees or any other persons or entities performing portions of the Work because the Owner has repeatedly failed to fulfill the Owner's obligations under the Contract Documents with respect to matters important to the progress of the Work, the Contractor may, upon seven additional days' notice to the Owner and the Architect, terminate the Contract and recover from the Owner as provided in Section 14.1.3.

§ 14.2 Termination by the Owner for Cause

§ 14.2.1 The Owner may terminate the Contract if the Contractor

- **.1** repeatedly refuses or fails to supply enough properly skilled workers or proper materials;
- **.2** fails to make payment to Subcontractors or suppliers in accordance with the respective agreements between the Contractor and the Subcontractors or suppliers;
- **.3** repeatedly disregards applicable laws, statutes, ordinances, codes, rules and regulations, or lawful orders of a public authority; or
- **.4** otherwise is guilty of substantial breach of a provision of the Contract Documents.

§ 14.2.2 When any of the reasons described in Section 14.2.1 exist, and upon certification by the Architect that sufficient cause exists to justify such action, the Owner may, without prejudice to any other rights or remedies of the Owner and after giving the Contractor and the Contractor's surety, if any, seven days' notice, terminate employment of the Contractor and may, subject to any prior rights of the surety:

.1 Exclude the Contractor from the site and take possession of all materials, equipment, tools, and construction equipment and machinery thereon owned by the Contractor;
.2 Accept assignment of subcontracts pursuant to Section 5.4; and
.3 Finish the Work by whatever reasonable method the Owner may deem expedient. Upon written request of the Contractor, the Owner shall furnish to the Contractor a detailed accounting of the costs incurred by the Owner in finishing the Work.

§ 14.2.3 When the Owner terminates the Contract for one of the reasons stated in Section 14.2.1, the Contractor shall not be entitled to receive further payment until the Work is finished.

§ 14.2.4 If the unpaid balance of the Contract Sum exceeds costs of finishing the Work, including compensation for the Architect's services and expenses made necessary thereby, and other damages incurred by the Owner and not expressly waived, such excess shall be paid to the Contractor. If such costs and damages exceed the unpaid balance, the Contractor shall pay the difference to the Owner. The amount to be paid to the Contractor or Owner, as the case may be, shall be certified by the Initial Decision Maker, upon application, and this obligation for payment shall survive termination of the Contract.

§ 14.3 Suspension by the Owner for Convenience

§ 14.3.1 The Owner may, without cause, order the Contractor in writing to suspend, delay or interrupt the Work, in whole or in part for such period of time as the Owner may determine.

§ 14.3.2 The Contract Sum and Contract Time shall be adjusted for increases in the cost and time caused by suspension, delay, or interruption under Section 14.3.1. Adjustment of the Contract Sum shall include profit. No adjustment shall be made to the extent

.1 that performance is, was, or would have been, so suspended, delayed, or interrupted, by another cause for which the Contractor is responsible; or
.2 that an equitable adjustment is made or denied under another provision of the Contract.

§ 14.4 Termination by the Owner for Convenience

§ 14.4.1 The Owner may, at any time, terminate the Contract for the Owner's convenience and without cause.

§ 14.4.2 Upon receipt of notice from the Owner of such termination for the Owner's convenience, the Contractor shall

.1 cease operations as directed by the Owner in the notice;
.2 take actions necessary, or that the Owner may direct, for the protection and preservation of the Work; and
.3 except for Work directed to be performed prior to the effective date of termination stated in the notice, terminate all existing subcontracts and purchase orders and enter into no further subcontracts and purchase orders.

§ 14.4.3 In case of such termination for the Owner's convenience, the Owner shall pay the Contractor for Work properly executed; costs incurred by reason of the termination, including costs attributable to termination of Subcontracts; and the termination fee, if any, set forth in the Agreement.

ARTICLE 15 CLAIMS AND DISPUTES

§ 15.1 Claims

§ 15.1.1 Definition

A Claim is a demand or assertion by one of the parties seeking, as a matter of right, payment of money, a change in the Contract Time, or other relief with respect to the terms of the Contract. The term "Claim" also includes other disputes and matters in question between the Owner and Contractor arising out of or relating to the Contract. The responsibility to substantiate Claims shall rest with the party making the Claim. This Section 15.1.1 does not require the Owner to file a Claim in order to impose liquidated damages in accordance with the Contract Documents.

§ 15.1.2 Time Limits on Claims

The Owner and Contractor shall commence all Claims and causes of action against the other and arising out of or related to the Contract, whether in contract, tort, breach of warranty or otherwise, in accordance with the requirements of the binding dispute resolution method selected in the Agreement and within the period specified by applicable law,

but in any case not more than 10 years after the date of Substantial Completion of the Work. The Owner and Contractor waive all Claims and causes of action not commenced in accordance with this Section 15.1.2.

§ 15.1.3 Notice of Claims

§ 15.1.3.1 Claims by either the Owner or Contractor, where the condition giving rise to the Claim is first discovered prior to expiration of the period for correction of the Work set forth in Section 12.2.2, shall be initiated by notice to the other party and to the Initial Decision Maker with a copy sent to the Architect, if the Architect is not serving as the Initial Decision Maker. Claims by either party under this Section 15.1.3.1 shall be initiated within 21 days after occurrence of the event giving rise to such Claim or within 21 days after the claimant first recognizes the condition giving rise to the Claim, whichever is later.

§ 15.1.3.2 Claims by either the Owner or Contractor, where the condition giving rise to the Claim is first discovered after expiration of the period for correction of the Work set forth in Section 12.2.2, shall be initiated by notice to the other party. In such event, no decision by the Initial Decision Maker is required.

§ 15.1.4 Continuing Contract Performance

§ 15.1.4.1 Pending final resolution of a Claim, except as otherwise agreed in writing or as provided in Section 9.7 and Article 14, the Contractor shall proceed diligently with performance of the Contract and the Owner shall continue to make payments in accordance with the Contract Documents.

§ 15.1.4.2 The Contract Sum and Contract Time shall be adjusted in accordance with the Initial Decision Maker's decision, subject to the right of either party to proceed in accordance with this Article 15. The Architect will issue Certificates for Payment in accordance with the decision of the Initial Decision Maker.

§ 15.1.5 Claims for Additional Cost

If the Contractor wishes to make a Claim for an increase in the Contract Sum, notice as provided in Section 15.1.3 shall be given before proceeding to execute the portion of the Work that is the subject of the Claim. Prior notice is not required for Claims relating to an emergency endangering life or property arising under Section 10.4.

§ 15.1.6 Claims for Additional Time

§ 15.1.6.1 If the Contractor wishes to make a Claim for an increase in the Contract Time, notice as provided in Section 15.1.3 shall be given. The Contractor's Claim shall include an estimate of cost and of probable effect of delay on progress of the Work. In the case of a continuing delay, only one Claim is necessary.

§ 15.1.6.2 If adverse weather conditions are the basis for a Claim for additional time, such Claim shall be documented by data substantiating that weather conditions were abnormal for the period of time, could not have been reasonably anticipated, and had an adverse effect on the scheduled construction.

§ 15.1.7 Waiver of Claims for Consequential Damages

The Contractor ~~and Owner~~ waive**s** Claims against ~~each other~~**the Owner** for consequential damages arising out of or relating to this Contract. This ~~mutual~~ waiver includes

.1 ~~damages incurred by the Owner for rental expenses, for losses of use, income, profit, financing, business and reputation, and for loss of management or employee productivity or of the services of such persons; and~~

.2 damages incurred by the Contractor for principal office expenses including the compensation of personnel stationed there, for losses of financing, business and reputation, and for loss of profit, except anticipated profit arising directly from the Work.

This ~~mutual~~ waiver is applicable, without limitation, to all consequential damages due to ~~either party's~~**the Owner's** termination in accordance with Article 14. Nothing contained in this Section 15.1.7 shall be deemed to preclude assessment of liquidated damages, when applicable, in accordance with the requirements of the Contract Documents.

§ 15.2 Initial Decision

§ 15.2.1 Claims, excluding those where the condition giving rise to the Claim is first discovered after expiration of the period for correction of the Work set forth in Section 12.2.2 or arising under Sections 10.3, 10.4, and 11.5, shall be referred to the Initial Decision Maker for initial decision. The Architect will serve as the Initial Decision Maker, unless otherwise indicated in the Agreement. Except for those Claims excluded by this Section 15.2.1, an initial decision

shall be required as a condition precedent to mediation of any Claim. If an initial decision has not been rendered within 30 days after the Claim has been referred to the Initial Decision Maker, the party asserting the Claim may demand mediation and binding dispute resolution without a decision having been rendered. Unless the Initial Decision Maker and all affected parties agree, the Initial Decision Maker will not decide disputes between the Contractor and persons or entities other than the Owner.

§ 15.2.2 The Initial Decision Maker will review Claims and within ten days of the receipt of a Claim take one or more of the following actions: (1) request additional supporting data from the claimant or a response with supporting data from the other party, (2) reject the Claim in whole or in part, (3) approve the Claim, (4) suggest a compromise, or (5) advise the parties that the Initial Decision Maker is unable to resolve the Claim if the Initial Decision Maker lacks sufficient information to evaluate the merits of the Claim or if the Initial Decision Maker concludes that, in the Initial Decision Maker's sole discretion, it would be inappropriate for the Initial Decision Maker to resolve the Claim.

§ 15.2.3 In evaluating Claims, the Initial Decision Maker may, but shall not be obligated to, consult with or seek information from either party or from persons with special knowledge or expertise who may assist the Initial Decision Maker in rendering a decision. The Initial Decision Maker may request the Owner to authorize retention of such persons at the Owner's expense.

§ 15.2.4 If the Initial Decision Maker requests a party to provide a response to a Claim or to furnish additional supporting data, such party shall respond, within ten days after receipt of the request, and shall either (1) provide a response on the requested supporting data, (2) advise the Initial Decision Maker when the response or supporting data will be furnished, or (3) advise the Initial Decision Maker that no supporting data will be furnished. Upon receipt of the response or supporting data, if any, the Initial Decision Maker will either reject or approve the Claim in whole or in part.

§ 15.2.5 The Initial Decision Maker will render an initial decision approving or rejecting the Claim, or indicating that the Initial Decision Maker is unable to resolve the Claim. This initial decision shall (1) be in writing; (2) state the reasons therefor; and (3) notify the parties and the Architect, if the Architect is not serving as the Initial Decision Maker, of any change in the Contract Sum or Contract Time or both. The initial decision shall be final and binding on the parties but subject to mediation and, if the parties fail to resolve their dispute through mediation, to binding dispute resolution.

§ 15.2.6 Either party may file for mediation of an initial decision at any time, subject to the terms of Section 15.2.6.1.

§ 15.2.6.1 Either party may, within 30 days from the date of receipt of an initial decision, demand in writing that the other party file for mediation. If such a demand is made and the party receiving the demand fails to file for mediation within 30 days after receipt thereof, then both parties waive their rights to mediate or pursue binding dispute resolution proceedings with respect to the initial decision.

§ 15.2.7 In the event of a Claim against the Contractor, the Owner may, but is not obligated to, notify the surety, if any, of the nature and amount of the Claim. If the Claim relates to a possibility of a Contractor's default, the Owner may, but is not obligated to, notify the surety and request the surety's assistance in resolving the controversy.

§ 15.2.8 If a Claim relates to or is the subject of a mechanic's lien, the party asserting such Claim may proceed in accordance with applicable law to comply with the lien notice or filing deadlines.

§ 15.3 Mediation

§ 15.3.1 Claims, disputes, or other matters in controversy arising out of or related to the Contract, except those waived as provided for in Sections 9.10.4, 9.10.5, and 15.1.7, shall be subject to mediation as a condition precedent to binding dispute resolution.

§ 15.3.2 The parties shall endeavor to resolve their Claims by mediation which, unless the parties mutually agree otherwise, shall be administered by the American Arbitration Association in accordance with its Construction Industry Mediation Procedures in effect on the date of the Agreement. A request for mediation shall be made in writing, delivered to the other party to the Contract, and filed with the person or entity administering the mediation. The request may be made concurrently with the filing of binding dispute resolution proceedings but, in such event, mediation shall proceed in advance of binding dispute resolution proceedings, which shall be stayed pending mediation for a period of

60 days from the date of filing, unless stayed for a longer period by agreement of the parties or court order. If an arbitration is stayed pursuant to this Section 15.3.2, the parties may nonetheless proceed to the selection of the arbitrator(s) and agree upon a schedule for later proceedings.

§ 15.3.3 Either party may, within 30 days from the date that mediation has been concluded without resolution of the dispute or 60 days after mediation has been demanded without resolution of the dispute, demand in writing that the other party file for binding dispute resolution. If such a demand is made and the party receiving the demand fails to file for binding dispute resolution within 60 days after receipt thereof, then both parties waive their rights to binding dispute resolution proceedings with respect to the initial decision.

§ 15.3.4 The parties shall share the mediator's fee and any filing fees equally. The mediation shall be held in the place where the Project is located, unless another location is mutually agreed upon. Agreements reached in mediation shall be enforceable as settlement agreements in any court having jurisdiction thereof.

§ 15.4 Arbitration

§ 15.4.1 If the parties have selected arbitration as the method for binding dispute resolution in the Agreement, any Claim subject to, but not resolved by, mediation shall be subject to arbitration which ~~, unless the parties mutually agree otherwise,~~ shall be administered ~~by the American Arbitration Association~~ in accordance with ~~its~~ **the Rhode Island Public Works Arbitration Act** ~~Construction Industry Arbitration Rules~~ in effect on the date of the Agreement. The Arbitration shall be conducted in the place where the Project is located, unless another location is mutually agreed upon. A demand for arbitration shall be made in writing, delivered to the other party to the Contract, and filed with the person or entity administering the arbitration. The party filing a notice of demand for arbitration must assert in the demand all Claims then known to that party on which arbitration is permitted to be demanded.

§ 15.4.1.1 A demand for arbitration shall be made no earlier than concurrently with the filing of a request for mediation, but in no event shall it be made after the date when the institution of legal or equitable proceedings based on the Claim would be barred by the applicable statute of limitations. For statute of limitations purposes, receipt of a written demand for arbitration by the person or entity administering the arbitration shall constitute the institution of legal or equitable proceedings based on the Claim.

§ 15.4.2 The award rendered by the arbitrator or arbitrators shall be final, and judgment may be entered upon it in accordance with applicable law in any court having jurisdiction thereof.

§ 15.4.3 The foregoing agreement to arbitrate and other agreements to arbitrate with an additional person or entity duly consented to by parties to the Agreement, shall be specifically enforceable under applicable law in any court having jurisdiction thereof.

§ 15.4.4 Consolidation or Joinder

§ 15.4.4.1 Subject to the ~~rules of the American Arbitration Association or other applicable arbitration rules~~**Rhode Island Public Works Arbitration Act**, either party may consolidate an arbitration conducted under this Agreement with any other arbitration to which it is a party provided that (1) the arbitration agreement governing the other arbitration permits consolidation, (2) the arbitrations to be consolidated substantially involve common questions of law or fact, and (3) the arbitrations employ materially similar procedural rules and methods for selecting arbitrator(s).

§ 15.4.4.2 Subject to the ~~rules of the American Arbitration Association or other applicable arbitration rules~~**Rhode Island Public Works Arbitration Act**, either party may include by joinder persons or entities substantially involved in a common question of law or fact whose presence is required if complete relief is to be accorded in arbitration, provided that the party sought to be joined consents in writing to such joinder. Consent to arbitration involving an additional person or entity shall not constitute consent to arbitration of any claim, dispute or other matter in question not described in the written consent.

§ 15.4.4.3 The Owner and Contractor grant to any person or entity made a party to an arbitration conducted under this Section 15.4, whether by joinder or consolidation, the same rights of joinder and consolidation as those of the Owner and Contractor under this Agreement.

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INSURANCE REQUIREMENTS

A. The Insurance required by Subparagraph 11.1.2 of the General Conditions, AIA Form A201, 2017 edition, shall be written for not less than the following amounts, or greater if required by law

.1 Workers Compensation:

State:		Statutory
limits		
Federal:		Statutory
limits		
Employer's liability:		
Accident, each occurrence:	$	1,000,000
Disease, policy limit	$	500,000
Disease, each employee:	$	100,000

.2 Comprehensive General Liability (including Premises Operations; Independent Contractor's Protection; Products and Completed Operations; Broad Form Property Damage):

Include Central Falls and Central Falls School District as additional insureds; include ongoing/completed operations per Project Aggregate endorsement.

General Aggregate:	$	2,000,000
Products and Completed Operations:	$	1,000,000
Personal & Advanced Injury:	$	2,000,000
Each Occurrence:	$	1,000,000
Fire Damage (any one fire):	$	50,000
Medical Expenses (any one person):	$	5,000

* Products and Completed Operations to be maintained for one year after final payment.

.3 Contractual Liability:

Bodily Injury:		
Each Occurrence:	$	1,000,000
Property Damage:		
Each Occurrence:	$	500,000
Annual Aggregate:	$	2,500,000

.4 Umbrella Excess Liability, over primary insurance

Aggregate:	$	5,000,000
Retention:	$	10,000

.5 Personal Injury, with Employment Exclusion deleted:

Annual Aggregate:	$	5,000,000

.6 Comprehensive Automobile Liability (any auto):

Combined Single Limit:	$	1,000,000

Include Central Falls and Central Falls School District as additional insureds.

End of Document

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PREVAILING WAGE REQUIREMENTS

Prevailing Wage refers to the requirements of the Rhode Island General Law 37-13 and the general prevailing rate of pay for regular, holiday, and overtime wages to be paid to each craftsmen, mechanic, teamster, laborer, or other type of worker performing work on public works projects when state or municipal funds are used in excess of $1,000. Contractors are required to obtain current applicable Davis Bacon Wage Determination rate schedule downloaded from the United States Department of Labor, System for Award Management (SAM), https://sam.gov/content/home. The prevailing wage rates to be applied are those that are effective as of the date of the awarding of the contract to the General Contractor. Contractors must also adjust employees' hourly wage rates (if applicable) every July 1st, in accordance with any updated Davis Bacon Wage Determination rates.

Updates to the Davis-Bacon Wage Determination rate schedule may be found online at the United States Department of Labor, US System for Award Management (SAM).

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MUNICIPAL CONTRACT ADDENDUM

RHODE ISLAND DEPARTMENT OF LABOR AND TRAINING

PREVAILING WAGE REQUIREMENTS
(37-13-1 ET SEQ.)

The prevailing wage requirements are generally set forth in RIGL 37-13-1 et seq. These requirements refer to the prevailing rate of pay for regular, holiday, and overtime wages to be paid to each craftsmen, mechanic, teamster, laborer, or other type of worker performing work on public works projects when state or municipal funds exceed one thousand dollars ($1,000).

All Prevailing Wage Contractors and Subcontractors are required to:

1. Submit to the Awarding Authority a list of the contractor's subcontractors for any part or all of the prevailing wage work in accordance with RIGL § 37-13-4;

2. Pay all prevailing wage employees at least once per week and in accordance with RIGL §37-13-7;

3. Post the prevailing wage rate scale and the Department of Labor and Training's prevailing wage poster in a prominent and easily accessible place on the work site in accordance with RIGL §37-13-11; posters may be downloaded at https://dlt.ri.gov/requiredposters/ or obtained from the Department of Labor and Training, Center General Complex, 1511 Pontiac Avenue, Cranston, Rhode Island;

4. Access the Department of Labor and Training website, at https://dlt.ri.gov on or before July 1st of each year, until such time as the contract is completed, to ascertain the current prevailing wage rates and the amount of payment or contributions for each covered prevailing wage employee and make any necessary adjustments to the covered employee's prevailing wage rates effective July 1st of each year in compliance with RIGL §37-13-8;

5. Attach a copy of this CONTRACT ADDENDUM and its attachments as a binding obligation to any and all contracts between the contractor and any subcontractors and their assignees for prevailing wage work performed pursuant to this contract;

6. Provide for the payment of overtime for prevailing wage employees who work in excess of eight (8) hours in any one day or forty (40) hours in any one week as provided by RIGL §37-13-10;

7. Maintain accurate prevailing wage employee payroll records on a Rhode Island Certified Weekly Payroll form available for download at https://dlt.ri.gov/wrs/prevailingwage/ as required by RIGL §37-13-13, and make those records available to the Department of Labor and Training upon request;

8. Furnish the fully executed RI Certified Weekly Payroll Form to the awarding authority on a monthly basis for all work completed in the preceding month.

9. For general or primary contracts one million dollars ($1,000,000) or more, shall maintain on the work site a fully executed RI Certified Prevailing Wage Daily Log listing the contractor's employees employed each day on the public works site; the RI Certified Prevailing Wage Daily Log shall be available for inspection on the public works site at all times; this rule shall not apply to road, highway, or bridge public works projects. Where applicable, furnish both the Rhode Island Certified Prevailing Wage Daily Log together with the Rhode Island Weekly Certified Payroll to the awarding authority.

10. Any violation of RIGL 37-13-13 of Certified Weekly Payroll Forms and Daily Logs will result in the department imposing a penalty on the contractor of a minimum of one hundred dollars ($100) for each calendar day of noncompliance.

11. Assure that all covered prevailing wage employees on construction projects with a total project cost of one hundred thousand dollars ($100,000) or more has a OSHA ten (10) hour construction safety certification in compliance with RIGL § 37-23-1;

12. Assure that all prevailing wage employees who perform work which requires a Rhode Island trade license possess the appropriate Rhode Island trade license in compliance with Rhode Island law; and

13. Comply with all applicable provisions of RIGL §37-13-1, et. seq;

Any questions or concerns regarding this CONTRACT ADDENDUM should be addressed to the contractor or subcontractor's attorney. Additional Prevailing Wage information may be obtained from the Department of Labor and Training at https://dlt.ri.gov/wrs/prevailingwage/.

CERTIFICATION

I hereby certify that I have reviewed this CONTRACT ADDENDUM and understand my obligations as stated above.

By: _____

Title: _____

Subscribed and sworn before me this ____ day of _____, 20__.

_____
Notary Public
My commission expires: _____

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STATEMENT OF COMPLIANCE

I _____ do hereby state:

(print name of signatory party) ***(title)***

(1) That I pay or supervise the payment of the persons employed by _____ on the

(contractor or subcontractor)

_____: that during the payroll period commencing on the _____ day of _____, 20___, and ending

(project)

the _____ day of _____, 20____, all persons employed on said project have been paid the full weekly wages earned, that no rebates have been or will be made either directly or indirectly to or on behalf of said _____

(contractor or subcontractor)

from the full weekly wages earned by any person and that no deductions have been made either directly or indirectly from the full wages earned by any person, other than permissible deductions as defined in Rhode Island General Law Chapter 28-14.

(2) That any payrolls otherwise under this contract required to be submitted for the above period are correct and complete; that the wage rates for laborers or mechanics contained therein are not less than the applicable wage rates contained in the appropriate wage determination for the project; that the classifications set forth therein for each laborer or mechanic conform with the work they performed.

(3) That the apprentices employed in the above period are duly registered in a bona fide apprenticeship program registered with the Rhode Island State Apprenticeship Council.

(4) That:

(a) WHERE FRINGE BENEFITS ARE PAID TO APPROVED PLANS, FUNDS OR PROGRAMS

In addition to the basic hourly wage rates paid to each laborer or mechanic listed in the above referenced payroll, payments of fringe benefits as listed in the contract have been or will be made when due, to appropriate programs for the benefit of such employees.

Fringe Benefits Explanation: Bona fide fringe benefits are those paid to approved plans, funds or programs except those required by Federal or State Law.

Please specify the type of benefits provided:

1.) Medical or hospital care _____

2.) Pension or Retirement _____

3.) Life Insurance _____

4.) Disability_____

5.) Vacation, sick, holiday_____

6.) Other (please specify) _____

(b) WHERE FRINGE BENEFITS ARE PAID IN CASH

Each laborer or mechanic listed in the above referenced payroll has been paid as indicated on the payroll, an amount not less than the sum of the applicable basic hourly wage rate plus the amount of the required fringe benefits as listed in the rate schedule.

(5) In accordance with Chapter 37-13-13, it is mandatory that contractors use these forms for all Rhode Island Department of Labor requests for certified copies of payroll. Failure to submit information on these forms will constitute non-compliance by the responding contractor. These forms must be signed by the owner or an officer of the corporation, certifying that this is a true and exact copy of their payroll records.

PLEASE PRINT *Name and title of owner or officer of the corporation*

SIGNATURE **DATE**

The willful falsification of any of the above statements may subject the contractor or subcontractor to a $100 per day fine and be deemed guilty of a misdemeanor.

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RI Department of Labor and Training - Division of Workforce Regulation & Safety
Professional Regulation Unit/Prevailing Wage Section
1511 Pontiac Avenue Building 70, P.O. Box 20247 Cranston, RI 02920-0943

Rhode Island Certified Weekly Payroll

Contractor: ______________________ **Subcontractor:** ______________________

Address: ______________________ **Address:** ______________________

City/Town: __________ **State:** ______ **Zip:** ______ **City/Town:** __________ **State:** ______ **Zip:** ______

Phone #: __________ **Email:** __________ **Phone #:** __________ **Email:** __________

For Week Ending: __________ **Project/ Location:** __________ **Wage Decision #:** __________ **Decision Date:** __________

****NOTE:** If an employee works more than one trade, please list each classification on separate lines with the corresponding hours they performed that trade and hourly rate paid.

Name, Address and Phone Number of Employee	Work Classification	Date:	S	M	T	W	T	F	S	Total Hrs	Hourly Rate (List all Rates)	Hourly Fringe Benefit	Weekly Gross	Weekly Deductions						Weekly Net
	Apprentice %		Hours Worked Each Day											Social Security	Medi-care	Withheld Federal	Withheld State	RI TDI	*Other	
		P.S.																		
		P.O.																		
		A.P.S.																		
		A.P.O.																		
		R.H.																		
		R.O.																		
		P.S.																		
		P.O.																		
		A.P.S.																		
		A.P.O.																		
		R.H.																		
		R.O.																		
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		R.H.																		
		R.O.																		
		P.S.																		
		P.O.																		
		A.P.S.																		
		A.P.O.																		
		R.H.																		
		R.O.																		

Legend: P.S.=Prevailing Wage Standard Hours P.O.=Prevailing Wage Overtime Hours R.H.=Regular Hours R.O.=Regular Overtime Hours APS= Additional PW Standard Hours APO=Additional PW Overtime Hours

List all PW Projects in APS/APO: ______________________

***Deductions listed in "Other" column:** ______________________

STATEMENT OF COMPLIANCE

I, _____ do hereby state:
(print name and title of signatory party)

(1) That I pay or supervise the payment of the persons employed by: _____
(contractor or subcontractor)

on the _____, that during the payroll period commencing on
(project)

_____ day of _____, 20 _____, and ending on the _____ day of _____, 20 _____
(day) *(month)* *(year)* *(day)* *(month)* *(year)*

all persons employed on said project have been paid the full weekly wages earned, that no rebates have been or will be made either directly or indirectly to or on behalf of said _____ from the full weekly wages earned by any person and that no deductions have been
(contractor or subcontractor)

made either directly or indirectly from the full wages earned by any person, other than permissible deductions as defined in Rhode Island General Law Chapter 28-14.

(2) That any payrolls otherwise under this contract required to be submitted for the above period are correct and complete; that the wage rates for laborers or mechanics contained therein are not less than the applicable wage rates contained in the appropriate wage determination for the project; that the classifications set forth therein for each laborer or mechanic conform with the work they performed.

(3) That the apprentices employed in the above period are duly registered in a bona fide apprenticeship program registered with the Rhode Island State Apprenticeship Council.

(4) That:

(a) WHERE FRINGE BENEFITS ARE PAID TO APPROVED PLANS, FUNDS OR PROGRAMS

In addition to the basic hourly wage rates paid to each laborer or mechanic listed in the above referenced payroll, payments of fringe benefits as listed in the contract have been or will be made when due, to appropriate programs for the benefit of such employees.

Fringe Benefits Explanation: Bona fide fringe benefits are those paid to approved plans, funds or programs except those required by Federal or State Law.

Please specify the type of benefits provided:

1.) Medical or hospital care: _____

2.) Pension or Retirement: _____

3.) Life Insurance: _____

4.) Disability: _____

5.) Vacation, sick, holiday: _____

6.) Other (please specify): _____

(b) WHERE FRINGE BENEFITS ARE PAID IN CASH

Each laborer or mechanic listed in the above referenced payroll has been paid as indicated on the payroll, an amount not less than the sum of the applicable basic hourly wage rate plus the amount of the required fringe benefits as listed in the rate schedule.

(5) In accordance with Chapter 37-13-13, it is mandatory that contractors use these forms for all Rhode Island Department of Labor requests for certified copies of payroll. Failure to submit information on these forms will constitute non-compliance by the responding contractor. These forms must be signed by the owner or an officer of the corporation, certifying that this is a true and exact copy of their payroll records.

SIGNATURE OF OWNER OR OFFICER OF CORPORATION	PRINT NAME & TITLE	DATE

My signature hereon constitutes my affirmation that the information contained herein is true and accurate regarding the number of employees participating in the prevailing wage program, the prevailing wage standard hours each employee worked, prevailing wage overtime hours, regular hours and overtime hours for each employee as well as the gross wages for each employee. I have confirmed and attest that all the information contained in this document is correct and I understand and acknowledge by my signature that if I provide any inaccurate information on this form, I may be subject to civil penalties and/or referral to the Rhode Island Attorney General for criminal prosecution.

RI Department of Labor and Training
Division of Workforce Regulation & Safety
Professional Regulation Unit/Prevailing Wage Section
1511 Pontiac Avenue Building 70, P.O. Box 20247 Cranston, RI 02920-0943

Rhode Island Certified Prevailing Wage Daily Log

Project Name:_____ Contractor: _____

Project Location:_____ Address: _____

Date: _____ City/Town: _____ State _____ Zip _____

Employee Name (Print)	Job Title/ Classification	Time		Employee Signature
		In	Out	

I _____ hereby certify that the information in this form is complete and correct.
(print name and title)

Any contractor who knowingly maintains a false or fraudulent daily log maybe penalized by the Department of Labor and Training up to $500 for each calendar day of noncompliance.

_____ _____
Contractor/Officer's Signature Date

***Each** contractor working on this project must complete a Daily Log for their employees **only**.*

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State of Rhode Island
DEPARTMENT OF LABOR AND TRAINING
Division of Workforce Regulation and Safety
Professional Regulation Unit-Prevailing Wage Section
1511 Pontiac Avenue- Building #70
Cranston, RI 02920
(401) 462-8580, Option #7

PW APPRENTICESHIP REQUIREMENT COMPLAINT FORM

(*Note: Only for those state awarded projects valued at one million dollars or more)

COMPLAINANT INFORMATION (please print)**:**

Complainant Name: _____

Address: _____ Tel. #: ( )_____

City/Town: _____ State: _____ Zip Code: _____

PROJECT INFORMATION (please print):

Project in Question: _____

Address: _____ City/Town: _____

Type of Project: _____ Awarding Authority: _____

General Contractor: _____

CONTRACTOR INFORMATION (please print):

Contractor's Name: _____ Work Performed:_____

Address: _____

City/Town: _____State: ____ Zip: _____Tel. #: ( ) _____

*** The following evidence must be provided from the Awarding Authority to support claim:**

☐ **Verification of Funding Source** ☐ **Verification of Project Cost**

☐ **Documentation of Specific Work Performed by Contractor**

☐ **Copy of General Contract and Approved Sub-contractor List**

Additional Comments: _____

I hereby attest that the information provided is true and accurate to the best of my knowledge.

Complainant's Signature: _____ Date: _____

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Section 01 10 00

SUMMARY

PART 1 - GENERAL

1.1 SUMMARY

A. Project description.

B. Project's environmental goals.

C. Hazardous materials.

D. Definitions – Owner, Owner's Project Manager, Architect.

E. Work by Owner.

F. Work sequence.

G. Work restrictions.

H. Specification Formats and Conventions.

1.2 PROJECT DESCRIPTION

A. Work covered by Contract Documents:

1. Work includes construction of the new 123,844 gross square foot Central Falls High School building located at 10 Higginson Avenue, Central Falls, Rhode Island. The site is comprised of approximately 6.5 acres of land within the scope of work. The new Central Falls high School will serve grades 9 through 12.

   The new building will be located on the site of the existing football field, International Meat Market, baseball/ softball fields and basketball courts. Prior to commencement of new construction, abatement and demolition of the existing structures will take place.

   Exterior work will include the completion of related site improvements, underground utilities, parking and on-site service and fire access roadways, and multi-use athletic field. The scope of site work includes ground improvement, erosion control, roadways, pedestrian sidewalks, drainage improvements, retaining walls, earthwork, utility services, landscaping, site amenities, fencing, and athletic features. This Project has been designated as a Northeast Collaborative for High Performance Schools (or "NE-CHPS") Project integrating into the construction the Owner's environmental operational mission. The Work of this Contract includes the construction process and special documentation, materials utilized, and the resulting building must meet the specified sustainability requirements.

B. Building Permits: The building permit fee, municipal electrical and plumbing permit fees for the project has been waived by the City of Central Falls. The General Contractor shall receive the building, electrical and plumbing permits prior to performing any work on the Project. Additional Municipal permits require application and full payment. All permits required by State Agencies or other public agencies will require application and full payment of fees. Each Bidder shall take this into account in calculating his or her bid for work.

1. The General Contractor and subcontractors are responsible for all other permits, fees, inspections, and licenses, as may be required by State and local authorities.

1.3 HAZARDOUS MATERIALS

A. Hazardous materials will be abated as part of this Contract. Upon discovery of any additional abatement work General Contractor is to notify Owner immediately.

1. General Contractor shall coordinate and sequence its work with abatement work where required.

1.4 PROJECT ENVIRONMENTAL GOALS

A. Overview of the environmental requirements for the Project: The Owner has established the environmental goal to construct a "green" building integrating the Owner’s environmental operational mission into the Project.

1. The Owner’s environmental goals for the Project includes participation in, and verification by, the *Northeast CHPS Criteria for New Construction and Renovations, Version 4.0* (NE-CHPS), a regional program of Collaborative for High Performance Schools, developed by Northeast Energy Efficiency Partnerships (NEEP).

B. Cooperative effort: The specifications are not intended to limit alternative means of achieving the Owner’s environmental project objectives. Recommendations, and input from the General Contractor and subcontractors for improving implementation of the Owner’s environmental project objectives are strongly encouraged.

C. General Contractor’s participation: The General Contractor shall provide all administrative and procedural requirements necessary for the Owner to achieve its environmental goals in the construction of this Project.

1. The General Contractor shall incorporate into the construction specific “green” products which comply with the Owner’s environmental goals and objectives. Additionally the General Contractor is required to utilize “green” products which are part of the building process but not included in the final construction, (for example, cleaners, shipping containers and similar supplementary items).

2. The General Contractor is advised that special consideration and modification of the General Contractor’s means and methods may be additionally required to achieve the Owner’s environmental goals which are beyond the requirements of the Contract Documents.

3. The General Contractor shall designate a trained and qualified representative responsible for instructing workers and overseeing the Owner's environmental goals for this Project.
4. The General Contractor shall maximize environmentally-benign construction techniques, including:
    a. Provide a waste and recycling program for handling and disposal of solid waste.
    b. Maximize use and recycling of reusable delivery packaging.
    c. Reduce the use of municipally supplied potable water.
    d. Protect soil against erosion and topsoil depletion.
    e. Minimize noise generation during construction.

D. Objectives: Major components of the Owner's environmental goals include construction utilizing "green products", pollution prevention during the construction process, and maintenance of healthy Indoor Air Quality (IAQ).

1. Green products and sustainable materials are required for incorporation into the Project: utilization of recycled materials and materials with high recycled content, use of designated sustainable managed products, and energy efficient equipment and fixtures. Green products and sustainable materials include:
    a. Products with low embodied energy (production, manufacturing, and transportation).
    b. Products that maximize recycled content in materials products, and systems.
    c. Products easy to maintain, repair, and that can be cleaned using non-toxic substances.
    d. Products will not negatively affect healthy indoor air quality.
    e. Wood and agrifiber products that are certified to be sustainably harvested by the Forest Stewardship Council (FSC), or National Wood Forest Association (NWFA) Responsible Procurement Program.
    f. Reusable and recyclable packaging.
2. Pollution prevention as achieved through recycle and reuse of materials, waste handling procedures, and limiting harmful pollutants emitted into the air, soil, and waterways. Pollution prevention efforts include, but are not limited to:
    a. Providing additional temporary facilities and controls.
    b. Minimizing the release of carbon dioxide (CO 2) from fuels burned on site or fuels burned off site to supply electricity to the building.
    c. Avoiding the release of ozone-depleting compounds, such as HCFCs from refrigerants or foam insulation materials.
3. Enhancement, restoration, and protection of the natural environment of the site.

4. Water resource protection: Conserve and use water efficiently, limit on-site fresh water usage to the greatest extent possible, control water distribution systems and waste, minimize use of imported or mined water. Capture and utilize rainwater to the greatest extent permitted by Law. Utilize water-conserving appliances and equipment.
5. Air Quality is achieved by compliance with the limitation of indoor air concentrations of certain pollutants, at or below the established maximum allowable concentrations. Healthy air quality goals shall be maintained during construction, and through building commissioning.
6. Use construction practices that achieve the most efficient use of resources and materials.
7. Energy Efficiency (Operations Throughout Project Life): Materials and systems are intended to maximize energy efficiency for operation of Project throughout service life (substantial completion to ultimate disposition).

1.5 DEFINITIONS - OWNER, OWNER'S PROJECT MANAGER, AND ARCHITECT

A. Wherever the term "Owner" is used in this specification, it refers to:

City of Central Falls and Central Falls School District
Central Falls City Hall
580 Broad Street
Central Falls, Rhode Island 02863

1. The terms "Owner" and "Awarding Authority" as used in the Project Manual have the same meaning and are interchangeable in Contract Documents. Both terms refer to the same entity.
2. Important Tax Note: OWNER is exempt from certain taxes. It is therefore required that the General Contractor and all subcontractors purchasing taxable goods or services make known to suppliers that tax-exempt status of the Owner, in order that such taxes will not be applied to the goods under Contract.
    a. Federal Excise Taxes as applied to articles which are taxable under Chapter 32 of the Internal Revenue Code of 1954, as amended. The Owner's Excise Tax Exemption Certificate Number is applicable.
    b. Sales and Use Tax imposed by the State of Rhode Island and Providence Plantations: The Owner has been assigned Exemption Certificate Number, with respect to leases, rental, or purchase of "tangible personal property", including building materials and supplies, subject to the Rhode Island Sales and Use Tax Act, Chapter 18, Title 44 of the General Laws 1956, as amended. This exemption does not apply to any equipment leased or rented by the Contractor for his own use on the construction of the Project.
    c. Sales and Use Tax imposed by the states where the Owner does not have exemption status: The Owner may choose to apply for tax exemption status in other states where major building materials and supplies are being purchased. In the event that the Owner obtains exemption status after bids are received, the General Contractor shall

adjust the Stipulated Sum by change order, for the amount equal to the scheduled taxes that where included in the General Contractors Bid.

d. Fines and Penalties: Contractor and subcontractors are fully responsible for payment of all penalties and fines accessed by authorities having jurisdiction for improper and illegal use of Owner's tax exemption certificate number.

3. All papers required to be delivered to the Owner shall, unless otherwise specified in writing to the contrary, be delivered to the office of the Architect:

B. Wherever the term "Owner's Project Manager" is used in the Contract Documents, it refers to:

Peregrine Group LLC
Rumford Center, Building No. 3
20 Newman Avenue, Suite 1005
Rumford, Rhode Island 02916

CGA Project Management, LLC
P.O. Box 3147
187 Plymouth Avenue
Fall River, Massachusetts, 02722

C. Wherever the term "Architect", "Designer", or "Architect/Engineer", is used in the Contract Documents, it refers to:

Ai3 Architects, LLC
111 Speen Street, Suite 300
Framingham, Massachusetts 01701

1.6 WORK BY OWNER

A. Related work under separate agreements: The Owner will award a separate contract which will commence prior to or during the work of this Contract; which in general includes:

1. Testing Laboratory Services.

B. Owner Furnished and Installed (OFI) Products: The General Contractor has coordinating responsibility for the following work, provided by others under separate agreement(s) with the Owner:

1. Furnishings and equipment, artwork, loose casegoods and similar items.

1.7 USE OF SITE

A. Use of and access to site may be subject to special requirements of the Owner, as directed.

1. Prior to beginning the Work of this Contract, the General Contractor shall meet with the Owner and the Architect to determine procedures regarding access and use of the site, locations and access to staging and storage areas, tree protection, temporary barriers and fencing, and any special site

conditions or restrictions regarding the use of the site areas surrounding the construction.

2. Hours of construction, 7:30 AM to 5:00 PM local time, Monday to Friday. Provisions for working hours other than those specified, must be pre-arranged with the Owner.

3. Use of Owner's receiving/shipping areas and loading dock: General Contractor is responsible to deliver and receive all materials and equipment. General Contractor is not permitted to have supplies or equipment shipped directly to them in care of the Owner.

4. Security: Owner access must be permitted at all times in all construction areas, for purposes of security.

B. Confine operations to areas within Contract limits indicated on the Drawings. Portions of the site and building beyond areas in which construction operations are indicated are not to be disturbed.

1. Use of on-site areas outside of the contract limits for workers parking or storage of materials must be pre-arranged with Owner. Schedule deliveries to minimize requirements for storage of materials.

1.8 ACCESS TO SITE

A. Keep all public roads and walks, and access drive to facility clear of debris caused by this Work during building operations.

1.9 PROJECT MANUAL FORMATS AND CONVENTIONS

A. Project Manual Format: The Project Manual is organized into Divisions and subdivided into Sections and Documents using Construction Specification Institute (CSI) publication "MasterFormat" numbering system, current edition.

1. Section Identification: Six/Eight digit Section numbers are utilized and cross-referenced throughout the Contract Documents. Sections in the Project Manual are in numeric sequence; however, the sequence is incomplete because only those Section numbers which are applicable to this Project are used.

2. Division One of the Project Manual governs procedural and administrative requirements of the Work. Division One requirements are applicable to all Sections and Documents in the Project Manual.

B. Specification Content: The Specifications use certain conventions for the style of language and the intended meaning of certain terms, words, and phrases when used in particular situations. These conventions are as follows:

1. Abbreviated Language: Language used in the Specifications and other Contract Documents is abbreviated. Words and meanings shall be interpreted as appropriate. Words implied, but not stated, shall be inferred as the sense requires. Singular words shall be interpreted as plural, and plural words shall be interpreted as singular as applicable to the context of the Contract Documents.

2. Imperative mood and streamlined language is generally used in the Specifications. Requirements expressed in the imperative mood are to be performed by General Contractor. Occasionally, the indicative or subjunctive mood may be used in the Section Text for clarity to describe responsibilities that must be fulfilled indirectly by General Contractor or by others when so noted.

    a. The words "shall," "shall be," or "shall comply with," depending on the context, are implied where a colon (:) is used within a sentence or phrase.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

End of Section

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Section 01 14 00

WORK RESTRICTIONS

PART 1 - GENERAL

1.1 SUMMARY

A. Site access restrictions.

B. Coordination of work with adjacent school occupancy.

C. Worker conduct, appearance and Work Rules.

D. Worker Identification Badges, and Background Criminal Record Disqualification Rules.

1.2 WORK FORCE REQUIREMENTS

A. Work force requirements:

1. The General Contractor acknowledges the stringent requirements of the Owner with respect to the dates of Substantial Completion for various Portions of the Work, and recognizes that the construction schedule may require that work proceed on an accelerated basis. The General Contractor further acknowledges that requirements related to items such as safety, service to Owner occupied areas, or General Contractor access to Owner occupied areas may mandate that some operations be performed only after “normal school hours” or other occupancy hours. The General Contractor therefore agrees that the Work of his own forces and of his Subcontractors, including all subcontractors, shall be performed on an overtime and/or double-shift basis if and to the extent necessary in order that the construction schedule be met.
2. Neither overtime nor double-shift work shall be grounds for any claims for compensation to the General Contractor or to any subcontractor. If the nature of overtime of double-shift work requires that the Owner provide personnel to operate the facility at times when they would not normally be present, such personnel costs shall be borne or reimbursed by the General Contractor.
3. The General Contractor, subcontractors shall have access to and from the site through the designated gate(s), refer to Drawings. All other gate access to the site will require approval of the OPM or their site representative.
    a. No vehicles (except fire, police and rescue) may enter or exit the construction sites from other gates unless authorized by the Owner.
    b. Prior to 7:00 AM any vehicle which arrives at the school during the “Closed Gate” time must move to a location acceptable to the Owner. Idling/parking on designated streets is not permitted at any time. No vehicles will be allowed to idle or wait on the project site, or any other nearby street. The General Contractor shall be responsible for enforcing this requirement.

4. Winter Conditions: The Owner and General Contractor recognize that time is of the essence for completion of this Contract and agree to continue work throughout the winter months without delay or additional claim for costs to do so.
5. Municipal Authority: The General Contractor shall comply with all local ordinances, including those with respect to work start, finish, and weekend work, including but not limited to any Central Falls noise regulations.
6. None of the requirements herein shall be construed as relieving the General Contractor of his responsibility to conduct his operations in conformance with local ordinances or requirements established by the State of Rhode Island.

1.3 USE OF SITE

A. Use of, and access to, site will be subject to special requirements of the Owner, as directed.

1. Prior to beginning the Work of this Contract, the General Contractor shall meet with the Owner and the Architect to determine procedures regarding access and use of the site, locations and access to staging and storage areas, tree protection, temporary barriers and fencing, and any special site conditions or restrictions regarding the use of the site areas surrounding the construction.
2. Security: Owner access must be permitted at all times in all construction areas, for purposes of security.

B. Confine operations to areas within Contract limits indicated on the Drawings. Portions of the site and building beyond areas in which construction operations are indicated are not to be disturbed.

1. Use of on-site areas outside of the contract limits will not be permitted. Schedule deliveries to the site to minimize requirements for storage of materials.
2. The General Contractor, and subcontractors and their personnel are not permitted to use the School’s cafeteria.

C. Keep all public roads and walks, and access drive to facility clear of debris caused by this Work during building operations.

1.4 SITE ACCESS RESTRICTIONS

A. Access to the site is restricted to established routes for safety of public and surrounding neighborhoods.

1.5 COORDINATION OF WORK WITH ADJACENT SCHOOL OCCUPANCY

A. The Owner may occupy outside site areas, parking areas and access roads during construction. Notify the Owner of work which will affect the use of these areas; coordinate work schedule with Owner. The General Contractor shall consult with

the Owner's Project Manager on the best ways to provide access, and on changes to access areas, as the work progresses, to perform the Work.

1. Take all measures to insure the safety of the general public. The General Contractor must take every reasonable precaution and employ all necessary measures including extra cleaning, special supervisory personnel, and additional temporary barriers and signage to facilitate the clean, quiet, safe, and continual operation of adjacent facilities and areas being used by the Owner.
2. Suspension of Work: The Owner retains the right to temporarily suspend work at any time when the noise or disturbance created by construction proves disruptive to Owner's activities or which exceed the limits of any Central Falls noise ordinances. The Owner may request of the General Contractor to utilize other means and methods, if practical, and acceptable to the Architect, which are less disruptive.

B. Interruption of services: Any major work entailing disruption to heating, lighting, life safety system utility connections or other similar major disruption to the adjacent school must be closely coordinated with the Owner and local public safety officials, and temporary services, safety precautions, or connections provided. Do not shut down any service without approval of the Owner.

1. Provide 1 week notification for any possible disruption of service to Owner, Owner's Project Manager and Architect provide notification for connecting, disconnecting, turning on or turning off any service which may affect Owner's operations of the existing facility.
2. Provide 72 hour (3 work days) notice to the Central Falls Fire Department of disruptions in electrical services, fire alarm services and emergency power services.
3. Any action either planned or unplanned, by the General Contractor, or subcontractors which impairs the operation of anyone or the activation of the fire alarm detection and or suppression system shall cause notification of the appropriate party. In case of unplanned, accidental, impairment, the General Contractor will immediately notify the Owner. The General Contractor should be prepared to provide assistance to correct the problem at its own expense.

1.6 WORKER CONDUCT, APPEARANCE AND WORK RULES

A. The conduct and appearance of each worker at the job site is of paramount importance. The Owner reserves the right to require any worker to be banished from the Site.

B. Access Restriction to existing high school: Construction Workers are prohibited to enter the existing high school without prior authorization from Owner.

C. Privacy: Conduct all work of the Contract with the maximum effort to maintain the privacy of the Owner's operations, staff, and students. Do not allow workers to peer into areas of the adjacent residential properties which is visible from the work area. Invasion of privacy is a major infraction of the work rules.

D. General Conduct and Demeanor: All construction workers shall treat all other workers, Owner staff, student and the public with respect and courtesy.

E. Physical Appearance: Require each worker to dress appropriately in a clean, neat, and professional manner.

1. Sleeved shirts and long pants are required minimum clothing. Short sleeved shirts may not be rolled up. Shirts may not be rolled up at the waist. Pants may not be rolled up past the top of the boots or shoes worn. Anyone not in compliance is subject to immediate dismissal.

F. Entertainment Devices (including, but not limited to radios, CD players, MP3 players and televisions): The use of all entertainment devices, including personal devices with headphones or earphones, is strictly prohibited at all times.

1. Control the volume of communication radios and loudspeakers to avoid creating a nuisance.

G. Smoking: Smoking is strictly prohibited on-site.

H. Alcoholic Beverages: Alcoholic beverages are strictly prohibited on-site.

I. Language: Foul and rude language is strictly prohibited.

J. Physical Actions: Running, horseplay, fighting, and other unprofessional conduct is prohibited. Fighting is a major infraction of the work rules.

K. Stealing: Stealing of any materials, objects, furnishings, equipment, fixtures, supplies, clothing, or other items will not be tolerated and is a major infraction of the work rules.

L. Sexual Harassment: All forms of physical and verbal sexual harassment will not be tolerated and is a major infraction of the work rules. Sexual harassment includes, without limitation: touching, taunting, whistling, sexually explicit stories, jokes, drawings, photos and similar representations, exhibitionism and all other sexually oriented offensive behavior.

M. Warnings and Dismissal:

1. For minor infractions of the rules, the Owner may issue a warning. Only one warning will be allowed per worker. A second infraction will result in immediate dismissal of the worker from the Site.

2. For major infractions of the rules, the worker shall be dismissed immediately without warning and is subject to possible criminal prosecution.

N. Notification of Workers: Clearly notify and educate each worker about these Work Rules and the requirements for worker conduct and appearance.

1. Recommendation: The Owner recommends that the General Contractor notify each worker of the work rules in writing and obtain a signed acknowledgment of the worker’s understanding of the work rules as a condition of employment on this project.

1.7 WORKER IDENTIFICATION BADGES, AND BACKGROUND CRIMINAL RECORD DISQUALIFICATION RULES

A. For Work occurring when Students are Present: Pursuant to Rhode Island General Laws 16-2-18.1 Central Falls School District will require criminal offender record information (referred to as “BCI check”) from the Bureau of Criminal Identification and Investigation, relating to any worker who is scheduled to work on any portions of the construction site and school district property. General Contractor is required to pay required fees and obtain a Background Criminal Record for all employees, subcontractors, and vendors on site, through the Rhode Island Bureau of Criminal Identification and Investigation (BCI) Reporting.. The General Contractor, and subcontractors shall make every effort to provide the Owner’s Project Manager (OPM) with a list of the proper paperwork at least two weeks before any workmen who they anticipate will be on site. All approved workers on the project shall wear visible identification badges at all times.

1. Identification Badges: The General Contractor is responsible for issuing badges to authorized personnel as reviewed by the OPM and School District. The General Contractor shall be responsible for enforcing this requirement with their staff and all subcontractors and vendors. Workers failing to display their I.D. badges will be removed from the site. The Owner reserves the right to stop work if there has been a failure to comply with this paragraph, in which event the General Contractor, subcontractors, and vendors shall have no claim for damages, delay or time extensions against the Owner.

B. Disqualification Standards:

1. Any worker shall be automatically disqualified from working on a Project if any of the following are applicable:
    a. Worker knowingly provides inaccurate information in his/her application.
    b. Worker refuses to complete the screening process.
    c. Worker SSN and legal name do not match.
2. No Worker who is not automatically disqualified shall be otherwise disqualified until the Contractor or Consultant has first considered:
    a. The nature of the crime and it relationship to the job (including the job's duties and the project's QSCP category);
    b. Any compelling mitigating circumstances such as strong evidence of rehabilitation and/or a lengthy period of time since the conviction with no subsequent convictions.
3. Subject to the considerations outlined in suparagraph 2 above, a Worker may be disqualified from working on a Qualifying School Construction Project for prior criminal convictions pursuant to the guidance outlined in Attachment A which follows this Section
4. Decisions to disqualify a Worker from a Project must be made on a case-by-case basis in accordance with state and federal law including EEOC Enforcement Guidance on the Consideration of Arrest and Conviction Records in Employment Decisions.

PART 2 - PRODUCTS (Not Used)

PART 3 – EXECUTION

3.1 ATTACHMENTS: ATTACHMENT A - WORKER BCI DISQUALIFICATION MATRIX

End of Section

SECTION 01 14 00
ATTACHMENT A
WORKER BCI DISQUALIFICATION MATRIX

Background Check Worker Disqualification Matrix for
Qualifying Central Falls School Construction Projects

Criminal Background Check Criteria	Category 1 (Unoccupied Site)	Category 2 (Adjacently Occupied Site)	Category 3 (Occupied Site)
Sex Offenses: Examples include but are not limited to: child molestation, rape, sexual assault, sexual battery, prostitution, solicitation, indecent exposure, lewd or lascivious act, etc.	Qualified	Disqualified	Disqualified
Non-Violent Felony Offenses: two or more within the past 7 years. Examples include but are not limited to: theft, larceny, embezzlement, fraud, endangerment, trafficking/sale/distribution of narcotics, etc.	Qualified	Qualified	Disqualified
Non Violent Drug Offenses: two or more in the past 7 years including but not limited to possession and use.	Qualified	Qualified	Qualified
Misdemeanor Violence Offenses: no more than three within the past 15 years. Examples include but are not limited to: simple assault, battery, domestic violence, hit & run, etc.	Qualified	Qualified	Disqualified
Five or more misdemeanor and/or felony offenses in the past 15 years.	Qualified	Qualified	Disqualified

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Section 01 23 00

ALTERNATES

PART 1 - GENERAL

1.1 SUMMARY

A. This Section consists of:

1. Submission procedures for scheduled Alternates.
2. Documentation of changes to Contract Sum and Contract Time.

B. The description of Alternates herein below and through the Specifications are intended to set the intent and to describe the major work only. Such descriptions are not to be taken as limiting the work required under any of the alternates, and all work required to carry out the intent of each of the accepted Alternates shall be done without cost additional to that agreed upon as the alternate price. Review all Construction Documents to determine full scope and description of each alternate.

1.2 REQUIREMENTS

A. Submit Alternates with full description of the proposed alternate and the affect on adjacent or related components.

B. Alternates quoted on Bid Forms will be reviewed and accepted or rejected at the Owner's option. Accepted alternates will be identified in the Owner-Contractor Agreement.

C. Coordinate related work and modify surrounding work to integrate the Work of each Alternate.

1.3 SELECTION AND AWARD OF ALTERNATES

A. Indicate variation of Bid Price for Alternates described below and list where provided for Bid Form or any supplement to it, which requests a difference in Contract Price by adding to or deducting from the base bid price.

B. The lowest responsible and eligible bid will be determined on the basis of the base bid, adjusted by such alternate or alternates as may be included in the award of the Contract in the sole discretion of the Awarding Authority.

1.4 SCHEDULE OF ALTERNATES

A. ALTERNATE 1 - Theatrical Equipment:

1. Base Bid: Include Audio Visual infrastructure ONLY for Theatrical Equipment in the Auditorium/Stage, Chorus Room 322 and Band Room 324.
2. Alternate number 1: Provide and install all Theatrical equipment for the Auditorium/Stage, Chorus Room 322 and Band Room 324.

B. ALTERNATE 2 – Outdoor Furniture:

1. Base Bid: Provide and install outdoor furniture at sidewalks near the athletic fields and at the main entry along Higginson Avenue. Provide and install receptacles and bike racks.
2. Alternate number 2: Provide and install additional outdoor furniture near Stair 1, plaza at the top of the exterior stepped seating by the vestibule into Student Commons and at the Roof Terrace.

C. ALTERNATE 3 – Outdoor Classroom:

1. Base Bid: Provide and install plantings located at the Stormwater Management Area in the median of the bus/service drive loop.
2. Alternate number 3: Provide and install all scope of work identified as part of the Outdoor Classroom within the median of the bus/service drive loop, including outdoor classroom and outdoor furniture.

D. ALTERNATE 4 – Resilient Tile Flooring:

1. Base bid: Provide and install Vinyl Composition Tile (VCT) under Section 09 65 19.
2. Alternate number 4: Provide and install Luxury Vinyl Tile Flooring (LVT) under Section 09 65 19.

E. ALTERNATE 5 - Freight Farm Unit:

1. Base bid: Provide and install concrete pad and utilities for inclusion of a future portable Freight Farm unit.
2. Alternate number 5: Provide and install the Freight Farm unit.

F. ALTERNATE 6 – Throwing Events:

1. Base bid: The throwing event area shall be graded and restored with loam and seed. This shall include compliance with capping requirements set for in the Remedial Action Work Plan (RAWP).
2. Alternate number 6: Furnish and install track throwing events as follows: Javelin - field layout and synthetic track surface runway. Shot Put - throw ring, stone dust field, and toe board. Dual Pad Discus/Hammer - field layout, throw ring, cage, and pad. Additional bituminous concrete walkway to meet and match from basketball courts to Discus/Hammer cage.

G. ALTERNATE 7 – Classroom Lighting:

1. Base Bid: Provide and install direct/indirect 2x4 light fixtures in the following classrooms: 101, 102, 103, 104, 105, 109, 110, 111, 113, 201, 202, 203, 204, 205, 209, 210,211, 212, 301, 302, 303, 304, 305, 309, 311, 312, 315, 316, 401, 402, 403, 404, 405, 410, 411, 412, 413, and 414.
2. Alternate number 7: Provide and install linear pendant indirect fixtures in the following classrooms: 101, 102, 103, 104, 105, 109, 110, 111, 113, 201, 202,

203, 204, 205, 209, 210,211, 212, 301, 302, 303, 304, 305, 309, 311, 312, 315, 316, 401, 402, 403, 404, 405, 410, 411, 412, 413, and 414.

H. ALTERNATE 8 – Classroom Doc Cameras:

1. Base Bid: No document cameras to be provided
2. Alternate number 8: Provide and install document cameras in the following classrooms: 101, 102, 103, 104, 105, 109, 110, 111, 113, 201, 202, 203, 204, 205, 209, 210, 211, 212, 301, 302, 303, 304, 305, 309, 310, 311, 312, 315, 316, 322, 324, 401, 402, 403, 404, 405, 410, 411, 412, 413, 414, and 415.

I. ALTERNATE 9 – Sports Lighting

1. Base Bid: Remove three of the existing six sports lighters and replace with new including 1500MZ lamps at two existing poles nearest the new basketball courts (total six 1500MZ lamps).
2. Alternate number 9: Remove three of the existing six sports lighters and replace with new including 1500MZ lamps at four existing poles (total twelve 1500MZ lamps). Remove five of the existing ten sports lighters and replace with new including 1500MZ lamps at two existing poles (total ten 1500MZ lamps).

J. ALTERNATE 10 - Trees

1. Base bid: Provide and install all scope of work related to site preparation for all trees and plantings noted on the drawings.
2. Alternate number 10: Provide and install trees as noted on the drawings.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

End of Section

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Section 01 25 13

PRODUCT SUBSTITUTION PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

A. Product options.
   1. Product selections.
   2. Additional selection requirements for NE CHPS Credit products.
   3. Visual matching.

B. Product substitution procedures.

C. Owner’s proprietary products.

1.2 RELATED REQUIREMENTS

A. Section 01 60 00 - PRODUCT REQUIREMENTS: Basic product requirements

1.3 PRODUCT OPTIONS

A. Product selections: Comply with the following for selection of products:
   1. Products specified by reference standards or by description only: Provide any acceptable product meeting those standards or description.
   2. Products specified by performance requirements only: Provide any acceptable product which has been tested to show compliance with specified requirements, including indicated performances.
   3. Products specified by naming one or more manufacturers: Provide products of manufacturers named, or submit a request for substitution for any manufacturer or product not named in accordance with Rhode Island Regulation 220-RICR-30-00-5.

B. Visual matching: Where Specifications require matching a sample, the Architect's decision on whether a proposed product matches is final. Where no product matches and complies with other requirements, comply with provisions for "substitutions" for selection of a matching product in another category.

1.4 PRODUCT SUBSTITUTION

A. Products specified by reference standards or by description only: Any product meeting those standards or description.

B. Pursuant to Rhode Island Regulation 220-RICR-30-00-5, where products or materials are prescribed by manufacturer name, trade name or catalog reference, the word “or approved equal” shall be implied. The Architect will evaluate the proposed “equal” item on the following criteria:
   1. The submitted “equal” item is at least equal in quality, durability, appearance, strength and design,

2. The submitted “equal” item is at least equal in function for the purpose intended by the design of the Work
3. The submitted “equal” item conforms substantially to the detailed requirements for the items as indicated by the specifications.
4. The submitted “equal” item fully conforms to the NE CHPS Credit requirements for Project Certification.

C. The Architect's evaluation and decision on whether a proposed product is equal to that specified, based on the above evaluation requirements. The General Contractor retains the right to appeal the Architect’s determination of equality through regulated statutory provisions.

1. The Architect and Owner reserve the right to reject proposed substitutions where data for VOCs is not provided or where emissions of individual VOCs are higher than for specified materials.

D. Owner’s proprietary products: Under provisions of 220-RICR-30-00-9 the Owner has determined that specific products shall be proprietary for ‘sound reasons in the public interest’. This determination has been made by the City of Central Falls Chief Purchasing Officer, and has been recorded in writing for public record.

1. Owner’s proprietary products are listed under Section 01 60 00 and in respective individual Specification Sections.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

End of Section

Section 01 26 13

REQUESTS FOR INTERPRETATION

PART 1 – GENERAL

1.1 SUMMARY

A. Administrative requirements for Requests For Information (RFI's).

1.2 DEFINITIONS

A. Requests For Information (RFI):

1. A document submitted by the General Contractor to the Architect requesting clarification of a portion of the Contract Documents, hereinafter referred to as RFI.
2. A properly prepared RFI shall include a detailed written statement that indicates the specific Drawings or Specification in need of clarification and the nature of the clarification requested.
    a. Drawings shall be identified by drawing number and location on the drawing sheet.
    b. Specifications shall be identified by Section number, page and paragraph.
    c. The General Contractor shall provide suggestions or alternate solutions to the RFI if such suggestions are known or should be known.

B. Improper RFI's:

1. RFI's that are not properly prepared, as required above.

    Improper RFI's will be processed by the Architect at the Architect's standard hourly rate and Architect will charge the General Contractor, and such costs will be deducted from monies due the General Contractor. The General Contractor will be notified by the Architect through the General Contractor of the "back charge" amounts.

C. Frivolous RFI's:

1. RFI's that request information that is clearly shown on the Contract Documents.
2. Frivolous RFI's will be returned unanswered.

1.3 GENERAL CONTRACTOR'S REQUESTS FOR INFORMATION

A. When the General Contractor is unable to determine from the Contract Documents, the material, process or system to be installed, the General Contractor shall submit an RFI to the Architect requesting a clarification of the indeterminate item.

1. When possible, such clarification shall be requested at the next appropriate project meeting, with the response entered into the meeting minutes. When clarification at the meeting is not possible, either because of the urgency of

the need, or the complexity of the item the General Contractor shall prepare and submit an RFI to the Architect.

B. Individual Contractors and each subcontractor shall endeavor to keep the number of RFI's to a minimum. In the event that the process becomes unwieldy, in the opinion of the Architect, because of the number and frequency of RFI's submitted, the Architect may require the General Contractor to abandon the process and submit future requests as submittals, substitutions, or requests for change.

C. RFI's shall be submitted on a form acceptable to the Architect. Forms shall be completely filled in, and if prepared by hand, shall be fully legible after photocopying or electronic transmission in PDF format. Each page of attachments to RFI's shall bear the RFI number in the lower right corner.

D. RFI's shall be originated by the General Contractor, individual contractors, or subcontractors as appropriate. General Contractor shall endeavor to address and resolve subcontractor's RFI's to the extent possible for issues which are obviously covered by the Contract Documents, before forwarding to the Architect for processing.

1. RFI's from contractors, subcontractors or material suppliers shall be submitted through, reviewed by, and signed by the General Contractor prior to submittal to the Architect.
2. RFI's shall be processed and sent to the Architect from the General Contractor only. RFI's received by the Architect or the Architect's consultants from other parties shall not be accepted and will be returned unanswered.

E. Each subcontractor shall carefully study the Contract Documents to assure that the requested information is not available therein. RFI's which request information available in the Contract Documents will be deemed either "improper" or "frivolous" as noted above.

F. In cases where RFI's are issued to request clarification of coordination issues, for example pipe and duct routing, clearances, specific locations of work shown diagrammatically, and similar items, the General Contractor shall fully lay out a suggested solution using drawings or sketches drawn to scale, and submit same with the RFI. RFI's, which fail to include a suggested solution, will be returned unanswered with a requirement that the General Contractor submit a complete request.

G. RFI's used for the following purposes will be returned without review:

1. To request approval of submittals.
2. To request approval of substitutions.
3. To request coordination information already indicated in the Contract Documents.
4. To request changes which entail adjustments in the Contract Time or the Contract Sum (additional cost or credit).
5. To request different methods of performing work than those drawn and specified.
6. To request interpretation of Architect/Engineer's actions on submittals.

7. Incomplete RFI's or RFI's with numerous errors.

H. In the event the General Contractor believes that a clarification by the Architect results in additional cost or time, General Contractor shall not proceed with the Work indicated by the RFI without a written authorization from the Architect. RFI's shall not automatically justify a cost increase in the Work or a change in the Schedule.

1. Answered RFI's shall not be construed as approval to perform extra work.
2. Unanswered RFI's will be returned with a stamp or notation: Not Reviewed.

I. General Contractor will prepare and maintain a log of RFI's and provide updated copies at the weekly Construction Progress Meetings showing outstanding RFI's.

J. RFI Response: The Architect will endeavor to respond in a timely fashion to RFI's, however, the following minimum time periods are required. RFI's which are received by the Architect after 1PM local time shall be considered received on the following working day.

1. RFI's which require only Architect's Response: General Contractor shall allow up to Three (3) full work days review and response time,
2. RFI's which require Architect's and an Engineering or Consultant Response: General Contractor shall allow up to Four (4) full work days review and response time.

1.4 ARCHITECT'S RESPONSE TO RFI'S

A. Architect will respond to RFI's on one of the following forms:

1. Properly prepared RFI's:
   a. Response on the RFI form.
   b. Architect's Supplemental Instruction.
   c. Request for Proposal.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

End of Section

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Section 01 29 00

PAYMENT PROCEDURES

PART 1 - GENERAL

1.1 SUMARY

A. Schedule of Values.

B. Applications for payment.

1. Procedures for application for payment.
2. Initial application for payment.
3. Monthly application for payment.
4. Application for payment at substantial completion.
5. Final payment application.

C. Payment for stored materials.

D. Change procedures.

1.2 COORDINATION

A. Coordinate the Schedule of Values and Applications for Payment with the General Contractor's Construction Schedule, List of Subcontracts, and Submittal Schedule.

1. Related Requirements:

a. Section 01 32 00 – CONSTRUCTION PROGRESS DOCUMENTATION: General Contractor's Construction Schedule.

b. Section 01 33 00 - SUBMITTAL PROCEDURES: General Contractor's Construction Submittal Schedule.

1.3 SCHEDULE OF VALUES

A. Coordinate preparation of the Schedule of Values with preparation of the General Contractor's Construction Schedule.

1. Schedule of values shall be used only as basis for General Contractor's application for payment.
2. Include as one line item on the schedule of values the dollar value of specified shop drawings; manufacturer’s technical literature, specifications, illustrations, and product data; calculations; physical samples; test reports; maintenance data; certifications; schedules; and other submittals specified in individual Sections of the Project Manual.
3. Breakdown schedule of values into separate line items for each Specification Section, each line item having a value of not more than $25,000.

a. Additionally provide break-out of the following specific items as individual line items:
   1) Mock-ups.
   2) Submittals.
   3) Extra stock.
   4) Cost for General Contractor's 1 year basic service contract, and all contracted service contracts.
   5) As-built updates to list of required submittals for payment.

4. Break-out General Contractor's 1 year warranty for each product item.

B. Correlate line items in the Schedule of Values with other required administrative schedules and forms, including:

1. General Contractor's construction schedule.
2. Application for Payment form.
   a. List of subcontractors.
   b. List of products.
   c. List of principal suppliers and fabricators.
   d. Schedule of submittals.

C. Submit typewritten schedule of values to the Architect at least 10 days prior to submitting first application for payment.

D. Sub-Schedules: Where the Work is separated into phases that require separately phased payments, provide sub-schedules showing values correlated with each phase of payment.

E. Identification: Include the following Project identification on the Schedule of Values:

1. Project name and location.
2. Name of the Architect.
3. Project number.
4. General Contractor's name and address.
5. Date of submittal.

F. Arrange the Schedule of Values in a tabular form with separate columns to indicate the following for each item listed:

1. Generic name.
2. Related Specification Section.
3. Name of subcontractor.
4. Name of manufacturer or fabricator.
5. Name of supplier.

6. Change Orders (numbers) that have affected value.
7. Dollar value.
8. Percentage of Contract Sum to the nearest one-hundredth percent, adjusted to total 100 percent.

G. Provide a breakdown of the Contract Sum in sufficient detail to facilitate continued evaluation of Applications for Payment and progress reports. Break principal subcontract amounts down into several line items.

1. Upon request by Architect, submit data that will substantiate values given.

H. Round amounts off to the nearest whole dollar; the total shall equal the Contract Sum.

I. For each part of the Work where an Application for Payment may include materials or equipment, purchased or fabricated and stored, but not yet installed, provide separate line items on the Schedule of Values for initial cost of the materials, for each subsequent stage of completion, and for total installed value of that part of the Work.

J. Unit Cost Allowances: Show line item value of unit cost allowances as a product of unit cost times measured quantity as estimated from the best indication in the Contract Documents.

K. Margins of Cost: Show line items for indirect costs, and margins on actual costs, only to the extent that such items will be listed individually in Applications for Payment. Each item in the Schedule of Values and Applications for Payment shall be complete including its total cost and proportionate share of general overhead and profit margin.

L. At the General Contractor's option, temporary facilities and other major cost items that are not direct cost of actual work-in-place may be shown as separate line items in the Schedule of Values or distributed as general overhead expense.

M. Schedule Updating: Update and resubmit the Schedule of Values when Change Orders or Construction Change Directives result in a change in the Contract Sum.

N. Payment requisitions shall summarize subtotals for each CSI division corresponding to divisions in the contract specifications.

1. All line items on the payment requisitions must account to a MSBA payment code that correlates to a CSI division number. Indicate MSBA payment code on requisition at each CSI number.

1.4 PROCEDURES FOR APPLICATIONS FOR PAYMENT

A. Each Application for Payment shall be consistent with previous applications and payments as certified by the Architect and paid for by the Owner.

1. The initial Application for Payment, the Application for Payment at time of Substantial Completion, and the final Application for Payment involve additional requirements.

B. Payment Application Times: Each progress payment date is as indicated in the Agreement. The period of construction Work covered by each Application or Payment is the period indicated in the Agreement.

C. Payment Application Forms: Use AIA Document G 702 and Continuation Sheets G 703 as the form for Application for Payment.

D. Application Preparation: Complete every entry on the form, including notarization and execution by person authorized to sign legal documents on behalf of the Owner. Incomplete applications will be returned without action.

1. Entries shall match data on the Schedule of Values and General Contractor's Construction Schedule. Use updated schedules if revisions have been made.
2. Include amounts of Change Orders and Construction Change Directives issued prior to the last day of the construction period covered by the application.
3. Monthly Applications for Payment shall include a separate summary of the invoiced costs by division. The General Contractor shall fill in the amounts which shall tie the subtotals for each division in the requisition itself.

E. Transmittal: Submit 3 executed copies of each Application for Payment to the Architect by means ensuring receipt within 24 hours.

F. Transmit each copy with a transmittal form listing attachments, and recording appropriate information related to the application in a manner acceptable to the Architect.

1.5 INITIAL APPLICATION FOR PAYMENT

A. Administrative actions and submittals that must precede or coincide with submittal of the first Application for Payment include the following:

1. List of subcontractors.
2. List of principal suppliers and fabricators.
3. Identification of MBE/WBE subcontractor and vendor participation and value of MBE/WBE contracts.
4. Schedule of Values.
5. General Contractor's Construction Schedule (preliminary if not final).
6. Schedule of principal products.
7. Schedule of unit prices.
8. Submittal Schedule (preliminary if not final).
9. List of General Contractor's staff assignments.

10. List of General Contractor's principal consultants.
11. Copies of building permits.
12. Copies of authorizations and licenses from governing authorities for performance of the Work.
13. Initial progress report.
14. Report of pre-construction meeting.
15. Data needed to acquire Owner's insurance.
16. Data needed to acquire Building Owner's insurance.
17. Initial settlement survey and damage report, if required.

1.6 MONTHLY APPLICATION FOR PAYMENT

A. Administrative actions and submittals that must precede or coincide with submittal of the period Application for payment, include the following:

1. As-built record documents, required documents and submittal records on site.
2. General Contractor’s construction schedule, updated, with corrective action plan as applicable.
3. Weekly up-to-date, accurate, certified submission of payroll records.
4. Pre-installation meeting conducted in accordance with Section 01 31 00, prior to first billing for any activity.
5. Material Status Report.
6. Stored Materials forms.
7. Submittal Schedule and submittal status reports.
8. Monthly Progress report and Notarized Progress report Statement from the General Contractor’s project manager stating that the work is on schedule and that the General Contractor will meet the Substantial Completion date for the Work and the Substantial Completion dates for every portion thereof as established under Construction Phasing Schedule Section.
9. Mechanics Lien Waivers.
10. Construction progress photographs.
11. Quality control reports and procedures in compliance with Section 01 45 00 - QUALITY CONTROL.

1.7 APPLICATION FOR PAYMENT AT SUBSTANTIAL COMPLETION:

A. Following issuance of the Certificate of Substantial Completion, submit an Application for Payment; this application shall reflect any Certificates of Partial Substantial Completion issued previously for Owner occupancy of designated portions of the Work.

B. Administrative actions and submittals that shall proceed or coincide with this application include:

1. Occupancy permits and similar approvals.
2. Warranties (guarantees) and maintenance agreements.
3. Test/adjust/balance records.
4. Maintenance instructions.
5. Meter readings.
6. Start-up performance reports.
7. Change-over information related to Owner's occupancy, use, operation and maintenance.
8. Final cleaning.
9. Application for reduction of retainage, and consent of surety.
10. Mechanics Lien Waivers.
11. Advice on shifting insurance coverage.
12. Final progress photographs.
13. List of incomplete Work, recognized as exceptions to Architect's Certificate of Substantial Completion.

1.8 FINAL PAYMENT APPLICATION

A. Administrative actions and submittals which must precede or coincide with submittal of the final payment Application for Payment include the following:

1. Completion of Project Closeout requirements.
2. Completion of items specified for completion after Substantial Completion.
3. Assurance that unsettled claims will be settled.
    a. Assurance that Work not complete and accepted will be completed without undue delay.
4. Transmittal of required Project construction records to Owner.
5. Certified property survey.
6. Proof that taxes, fees and similar obligations have been paid.
7. Mechanics Lien Waivers for Final Payment.
8. Removal of temporary facilities and services.
9. Removal of surplus materials, rubbish and similar elements.
10. Change of door locks to Owner's access.

1.9 PAYMENT FOR STORED MATERIALS

A. Provide supporting documentation for the value of stored materials. Acceptable form of supporting documentation include a certified and notarized invoice from the manufacturer or supplier which indicates the actual amount due, including discounts to which the General Contractor may be entitled, and the date which the invoice was paid.

B. Provide notice to Architect 48 hours in advance, and provide transportation for Architect and Owner's Representative to the site where materials are stored to permit inspection of the materials.

C. With Application for Payment, submit notarized certificate of title and evidence of insurance for materials stored off-site.

D. With each subsequent Application for Payment, indicate in the appropriate columns the value of stored material which has been taken from off-site location and brought to the project site. Provide supporting documentation.

1.10 CHANGE PROCEDURES

A. The Architect will advise of minor change in the Work not involving adjustment to Contract Sum/Price or Contract Time as authorized under the General and Supplementary Conditions of Contract, by issuing supplemental instructions on AIA Form G710.

B. The Architect may issue a Proposal Request or Notice of Change which includes a detailed description of a proposed change with supplementary or revised Drawings and Specifications, a change in Contract Time for executing the change with a stipulation of any overtime work required and the period of time during which the request price will be considered valid. The General Contractor will prepare and submit an estimate within 10 days.

C. The General Contractor may propose changes by submitting a request for change to the Architect describing the proposed change and its full effect on the Work. Include a statement describing the reason for the change, and the effect on the Contract Sum/Price and Contract Time and full documentation and a statement describing the effect on Work by separate or other contractors. Document any requested substitutions in accordance with Section 01 25 13 - PRODUCT SUBSTITUTION PROCEDURES.

D. Stipulated Sum/Price Change order:

1. Based on Proposal Request or Notice of Change and General Contractors price quotation or General Contractors request for a Change Order approved by the Architect.

E. Unit Price Change Order:

1. For a pre-determined unit prices and quantities, the Change Order will be executed on a fixed unit price basis. For unit costs or quantities of units of

work which are not pre-determined, execute Work under a Construction Change Directive. Changes in Contract Sum/Price or Contract Time will be computed as specified for Time and Material Change Order.

F. Construction Change Directive:

1. Architect may issue a directive on AIA Form G713 Construction Change Directive signed by the Owner instructing the General Contractor to proceed with a change in the Work, for subsequent inclusion in a Change Order. Document will describe changes in the Work and designate method of determining any change in Contract Sum/Price or Contract Time.
2. Promptly execute the change.

G. Time and Material Change Order:

1. Submit itemized account and supporting data after completion of change, within time limits indicated in the Conditions of the Contract. Architect will determine the change allowable in Contract Sum/Price and Contract Time as provided in the Contract Documents.
2. Maintain detailed records of work done on Time and Material basis. Document each quotation for a change in cost or time with sufficient data to allow evaluation of proposed changes and to substantiate changes in the Work.

H. Documentation of change in Contract Sum/Price and Contract Time:

1. Change order Forms: AIA G701 Change Order.
2. Maintain detailed records. Document each quotation for a change in cost or time with sufficient data to allow evaluation of the quotation.
3. On request, provide additional data to support computations:
    a. Quantities of products, labor and equipment.
    b. Taxes, insurance and bonds.
    c. Overhead and profit.
    d. Justification for any change in Contract Time.
    e. Credit for deletions from Contract, similarly document.
4. Support each claim for additional costs and for work done on a time and material basis, with additional information:
    a. Origin and date of claim.
    b. Dates and times work was performed, and by whom.
    c. Time records and wage rates paid.
    d. Invoices and receipts for products, equipment, and subcontracts, similarly documented.

I. Computing Change Order Requests

1. Changes in the Contract price shall be determined according to one of the following methods, or a combination thereof, as determined by the Owner:
    a. Fixed price basis, provided that the fixed price shall be inclusive of items (i) through (vi) in subparagraph (c) (below) and shall be computed in accordance with those provisions;
    b. Estimated lump sum basis, to be adjusted in accordance with Contract unit prices, or other agreed upon unit prices provided that the unit prices shall be inclusive of all costs related to such equitable adjustment;
    c. Time and materials basis, on a not-to-exceed upset amount designated by the Owner to be subsequently adjusted on the basis of actual costs based on the following items (i) through (vi):
        1) The cost at prevailing rates for direct labor, material, and use of equipment (charges for small tools or "tools of the trade" shall not be computed in the amount of a Change Order request);
        2) Plus cost of Workmen's Compensation Insurance, union fringe benefits, federal unemployment taxes, Federal Social Security, and Rhode Island Unemployment Compensation, or, as an alternative the Contractor may elect to use a flat thirty (30) percent of the total labor rate in item (i);
        3) Plus fifteen (15) percent of item (i) for overhead, superintendence and profit and for all General Conditions, which will be paid to the Contractor for Item 1 work, which is the work of the Contractor and all its subcontractors. The Contractor and its subcontractors shall agree upon the distribution of the fifteen (15) percent as a matter of contract between each other;
        4) On Item 2 work, which is the work of subcontractors, ten (10) percent will be allowed to the subcontractor for overhead, superintendence and profit and the Contractor shall receive a five (5) percent markup for overhead, superintendence and profit and for all General Conditions on the cost of the work performed by the subcontractor;
        5) If the net amount of a change is an addition to the Contract price, it shall include the Contractor's overhead, superintendence, and profit. On any change that involves a net credit, no allowances for overhead, superintendence, and profit shall be figured.
        6) Plus actual direct premium cost of payment and performance bonds required of the Contractor and its subcontractors, provided there will be an appropriate credit for bond premiums in the case of a credit Change Order.

J. Execution of Change Orders: Architect will issue Change Orders for signatures of parties as provided in the Conditions of the Contract.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

End of Section

Section 01 31 00

PROJECT MANAGEMENT AND COORDINATION

PART 1 - GENERAL

1.1 SUMMARY

A. Project coordination.

B. Project site administration.

C. Project meetings.

1.2 RELATED REQUIREMENTS

A. Section 01 32 00 - CONSTRUCTION PROGRESS DOCUMENTATION.

B. Section 01 33 00 - SUBMITTAL PROCEDURES.

C. Section 01 78 00 - CLOSEOUT SUBMITTALS: Requirements for Project Record Drawings (As-built drawings).

1.3 ELECTRONIC DOCUMENT MANAGEMENT SERVICE

A. General Contractor is responsible to arrange, furnish and pay for a cloud-based document management service, approved by Owner's Project Manager and Architect. Document management service shall be dedicated for the exchange and storage of files related to this Project.

B. All documents transmitted for purposes of administration of the contract are to be in electronic (PDF, MS Word, or MS Excel) format, as appropriate to the document, and transmitted via an Internet-based submittal service that receives, logs and stores documents, provides electronic stamping and signatures, and notifies addressees via email.

1. Besides submittals for review, information, and closeout, this procedure applies to Requests for Interpretation (RFIs), progress documentation, contract modification documents (e.g., supplementary instructions, change proposals, change orders), applications for payment, field reports and meeting minutes, Contractor's correction punch list, and any other document any participant wishes to make part of the project record.
2. Contractor, subcontractors, Architect, and Owner are required to use this service.
3. It is General Contractor's responsibility to submit all documents in allowable format.
4. Subcontractors, vendors, suppliers, Owner, Architect, and Architect's consultants are to be permitted to use the service at no extra charge.

5. Users of the service need an email address, internet access, and PDF review software that includes ability to mark up and apply electronic stamps (such as Adobe Acrobat, www.adobe.com, or Bluebeam PDF Revu, www.bluebeam.com), unless such software capability is provided by the service provider.
6. Paper document transmittals will NOT be reviewed; emailed electronic documents will NOT be reviewed.
7. All other specified submittal and document transmission procedures apply, except that electronic document requirements do not apply to samples or color selection charts.

C. Cost: The cost of the service is to be paid by General Contractor; include the cost of the service in the Contract Sum.

D. Submittal Service: Use one of the following, or an approved equal:

1. Procore Construction Management Software: https://www.procore.com/
2. Primavera Submittal Exchange Cloud Service: https://www.oracle.com/industries/construction-engineering/submittal-exchange/
3. Newforma Info Exchange: https://www.newforma.com/our-solutions/newforma-info-exchange/
4. Bentley ProjectWise: https://www.bentley.com/software/projectwise/
5. Trimble, Viewpoint: https://www.viewpoint.com/
6. Or similar system approved by Architect and Owner.

E. Training: One, one-hour, web-based training session will be arranged for all participants, with representatives of Architect and Contractor participating; further training is the responsibility of the user of the service.

F. Project Closeout: Architect will determine when to terminate the service for the project and is responsible for obtaining archive copies of files for Owner.

1.4 GENERAL PROJECT COORDINATION

A. Coordination: The General Contractor is fully responsible for coordinating the Work of this Contract including scheduling, submittals, and NE-CHPS certification. Work and other activities included in various Sections to assure efficient and orderly sequence of installation of interdependent construction elements. The General Contractor is responsible for coordinating actual installed location and interface of work, and to make provisions to accommodate items scheduled for later installation.

B. Where installation of one component depends on installation of other components before or after its own installation, schedule activities in the sequence required to obtain efficient installation with the least amount of alterations, or cutting and patching, to completed Work.

1. The General Contractor shall be responsible to uncover work completed in order to install ill-timed work, at no additional cost to the Owner.

C. Where space is limited, coordinate installation of different components to assure maximum accessibility for maintenance, service and repair.

D. Coordinate space requirements and installation of mechanical and electrical work which are indicated diagrammatically on Drawings. Follow routing shown for pipes, ducts, and conduit, as closely as practicable; move routing to avoid architectural conflicts place runs parallel or perpendicular with line of building. Utilize spaces efficiently to maximize accessibility for other installations, for maintenance, and for repairs.

E. Verify that utility requirement characteristics of operating equipment are compatible with building utilities. Coordinate work of various Sections having interdependent responsibilities for installing, connecting to, and placing in service such equipment.

F. In finished areas except as otherwise indicated, conceal pipes, ducts, and wiring within the construction. Coordinate locations of fixtures and outlets with finish elements.

G. Coordinate completion and clean up of Work of separate Sections in preparation for Substantial Completion and Owner’s occupancy.

H. After Owner occupancy of premises, coordinate access to site for correction of defective Work and Work not in accordance with Contract Documents, to minimize disruption of Owner’s activities.

1.5 UTILITIES, MECHANICAL AND ELECTRICAL COORDINATION

A. Coordinate all Work of this Project. Provide full and complete coordination for utilities, mechanical and electrical work in Divisions 11, and 21 through 28, with Work of other Divisions.

1. Each subcontractor shall compare his drawings and specifications with those of other Trades and report any discrepancies between them to the General Contractor. The General Contractor shall obtain from the Architect written instructions for changes necessary in the mechanical or electrical work, to ensure that all work is installed in coordination and cooperation with other Trades installing interrelated work. Before installation, each subcontractor shall make proper provisions to avoid interferences in a manner approved by the Architect. All changes required in the work of each subcontractor caused by his negligence, shall be corrected by him at his own expense, to the Architect's satisfaction.

B. Give all advance notice to public utility companies required by law, and provide proper disposition, subject to Architect’s approval of all existing pipe lines, conduits, sewers, drains, poles, wiring, and other utilities that in any way interfere with the Work, whether or not they are specifically shown on the Drawings.

C. Coordination regarding existing utilities:

1. Notify Owner and appropriate authorities when coming across an unknown utility line(s), and await decision as to how to dispose of same.
2. When an existing utility line must be cut and plugged or capped, moved, or relocated, or has become damaged, notify the Owner and Utility company involved, and assure the protection, support, or moving of utilities to adjust them to the new work.
3. The General Contractor shall be responsible for all damage caused to existing, active utilities located within the limits of this Contract, whether or not such utilities are shown on the Drawings, including resultant damages or injuries to persons or properties.

D. General coordination of piping, ductwork, conduits and equipment:

1. Determine exact routing and location of individual systems prior to fabrication of components or installation.
    a. Piping runs requiring pitch have “right-of-way” over those systems that do not pitch.
    b. System components whose elevations cannot be changed have “right-of-way” over those components whose elevations can be changed.
2. Adjust locations of piping, ductwork, conduits and equipment to accommodate new work with interferences anticipated and as encountered during installation.
    a. Locate piping, conduits and ductwork to be clear of swinging doors, access doors, and clear for unimpeded equipment access.
3. Provide all offsets, transitions and changes of direction for all systems, as may be required to maintain proper clearances for headroom, and as may be required for coordination with other “fixed-in-place” building components (such as structural systems).
    a. Furnish all vents, drains and similar accessories as may be required for offsets, transitions and changes of direction.
4. Provide openings in the work for penetration of mechanical and electrical work.
5. Coordinate final locations of ceiling mounted devices (including air distribution devices, thermostats, heaters, control devices, sprinkler heads and similar work) with reflected ceiling plans. Review locations with Architect and obtain approval of all devices prior to installation.

1.6 2D COORDINATION DOCUMENTS

A. General: Prepare coordination drawings for areas where close coordination is required for installation of products and materials fabricated off-site by separate entities, and where limited space necessitates maximum utilization of space for efficient installation of different components.

1. Coordination Drawings include, but are not necessarily limited to:
    a. Structure.

b. Partition/room layout.

c. Ceiling layout and heights.

d. Light fixtures.

e. Access panels.

f. Sheet metal, heating coils, boxes, grilles, diffusers, and similar items.

g. All heating piping and valves.

h. Smoke and fire dampers.

i. Soil, waste and vent piping.

j. Major water.

k. Rain water drainage piping.

l. Major electrical conduit runs, panelboards, feeder conduit and racks of branch conduit.

m. Above ceiling miscellaneous metal.

n. Sprinkler piping and heads.

o. All equipment, including items in the Contract as well as OFCI and OFI items.

p. Equipment located above finished ceiling requiring access for maintenance and service. In locations where acoustical lay-in ceilings occur, indicate areas in which the required access area may be greater than the suspended grid system.

q. Seismic Restraints.

B. Timing: Prior to fabricating materials or beginning work, supervise and direct the creation of one complete set of coordination drawings showing complete coordination and integration of work, including, but not limited to, structural, architectural, mechanical, plumbing, fire protection, elevators, and electrical disciplines.

C. Intent: Coordination drawings are for the General Contractor's and subcontractor's use during construction and are not to be construed as replacing shop drawings or record drawings. Architect's review of submitted coordination drawings shall not relieve the General Contractor from his overall responsibility for the coordination of the Work of the Contract.

D. Shell Model: General Contractor shall prepare and provide an accurate shell model for the purposes of preparing coordination drawing showing all architectural and structural work. Shell model shall be at appropriate scale; congested areas and sections through vertical shafts shall be at larger scale.

1. A scale of not less than 1/4 inch scale (1/4" = 1'-0"), congested areas and sections through vertical shafts shall be at larger scale.

a. Highlight all fire rated and smoke partitions.

b. Indicate horizontal and vertical dimensions to avoid interference with structural framing, ceilings, partitions, and other services.

c. Indicate elevations relative to finish floor for bottom of ductwork and piping and conduit (6 inches and greater in diameter).

d. Indicate the main paths for the installation of, equipment from mechanical and electrical rooms.

2. Revit Files: Architect's Revit files will be available for download for use by General Contractor and subcontractors. Additionally, each party receiving drawings will be required to sign a use and liability waiver.

E. General Contractor shall grant access to coordination models to the following subcontractors and any other installers whose work might conflict with other work. Each of these subcontractors shall accurately and neatly show actual size and location of respective equipment and work. Each subcontractor shall note apparent conflicts, suggest alternate solutions, and return drawings to the General Contractor.

1. Miscellaneous and ornamental iron subcontractor.
2. Acoustical tile subcontractor.
3. Elevator subcontractor.
4. Plumbing subcontractor.
5. Fire protection subcontractor.
6. Heating ventilating and air conditioning subcontractor.
7. Electrical subcontractor.
8. Control system subcontractors.

F. Review and modify and approve coordination drawings in cooperation with individual installers and subcontractors to assure conflicts are resolved before work in field is begun and to ensure location of work exposed to view is as indicated or approved by Architect.

1. The General Contractor shall submit digitally signed coordination drawings in PDF format to Architect for review.
2. Do not commence work in areas described in the coordination drawings until receipt of Architect's comments.

1.7 GENERAL PROJECT ADMINISTRATION

A. Prepare memoranda for distribution to each party involved outlining required coordination procedures. Include required notices, reports, and attendance at meetings.

B. Prepare similar memoranda for the Owner and separate subcontractors where coordination of their Work is required.

C. Conduct conferences among subcontractors and others concerned with the Work, to establish and maintain coordination and schedules, and to resolve coordination matters in dispute.

D. Administrative Procedures: Coordinate scheduling and timing of administrative procedures with other activities to avoid conflicts and ensure orderly progress. Such activities include:

1. Preparation of schedules.
2. Installation and removal of temporary facilities.
3. Delivery and processing of submittals.
4. Progress meetings.
5. Project Closeout activities.

1.8 SITE MOBILIZATION CONFERENCE

A. Prior to commencement of the Work, schedule a meeting at a meeting room provided by the General Contractor.

B. In addition to the pre-bid conference specified under Section 00 11 16 – INVITATION TO BID, the Architect may, prior to commencement of the Work, schedule a meeting at a meeting room provided by the Owner.

1. Attendance is required by Owner, Owner's Project Manager, Architect, engineering consultants, General Contractors' Project Manager and the Superintendent for each building site, General Contractors' NE-CHPS Representative and other major subcontractors, applicators, installers and suppliers. Other persons are required to attend as the Architect may direct or the General Contractor may wish to have present.
2. Items of Agenda:
    a. Use of premises by Owner, General Contractor and subcontractors.
    b. Owner's requirements and partial occupancy considerations,
    c. Temporary utilities provided by General Contractor.
    d. Barricading and protection of the public, dust barriers.
    e. Survey and building layout.
    f. Wetlands protection.
    g. Potentially difficult areas of work.
    h. Project coordination.
    i. Construction waste management and recycling procedures.
    j. Security and housekeeping procedures.
    k. Construction schedules.
    l. Delivery routes, access to site.

m. Work hours.

n. Work beyond Contract Limit.

o. Procedures for the following:

1) Proposal requests.

2) Architect's Supplemental Instructions

3) Requests for Information.

4) Changes.

5) Submittals.

6) Applications for payment.

p. Procedures for testing and inspection.

q. NE-CHPS certification requirements and procedures.

r. Indoor air quality standards and testing requirements.

s. Quality Control.

t. Sustainability product requirements and procedures.

u. Procedures for maintaining record documents.

v. Requirements for equipment start-up.

w. Inspection and acceptance of equipment put into service during construction period.

1.9 PRE-INSTALLATION/PRE-FABRICATION CONFERENCES

A. When required in individual specification sections and prior to commencing the work of that trade, the General Contractor shall convene a pre-installation conference at the work site, if possible, on the same day as weekly progress meeting.

B. Notify Architect and Owner's Project Manager a minimum of one week in advance of meeting date.

C. Attendance is required by General Contractor's Project Manager and Superintendent, and parties directly affecting, or affected by, work of the Section.

1. General Contractor shall include discussions on waste management goals and requirements in all pre-fabrication meetings conducted with subcontractors, fabricators, and vendors.

2. General Contractor shall include discussions on Owner's NE-CHPS certification environmental/sustainability goals, procedures and requirements in all prefabrication meetings conducted with subcontractors, fabricators, and vendors.

1.10 COORDINATION MEETINGS

A. In addition to other specified meetings and additional meetings. General Contractor shall hold project coordination meetings, at least monthly at regularly schedule times. Hold meetings more frequently when necessary to ensure full coordination of work. Request representation at each meeting by every entity involved in coordination or planning for work of the entire project. Conduct meetings in a similar manner to progress meetings, to resolve coordination problems.

B. Keep minutes of coordination meetings and distribute copies to all attendees, related parties and to Owner, Owner's Project Manager, Architect and its engineering consultants within 3 business days following meeting. Coordination meetings shall continue on an appropriate schedule, even after completion of coordination drawings by General Contractor, to review progress and resolve minor conflicts not identified in the coordination drawings.

C. The following trades shall participate in coordination meetings, preparation of coordination drawings and reviews. Additional trades shall participate as the General Contractor deems necessary for proper coordination of the Work.

1. Concrete work.
2. Masonry.
3. Structural steel, light gage metal framing and metal fabrications.
4. Rough carpentry.
5. Air and vapor barrier work.
6. Finish wall and ceiling construction.
7. Food service equipment
8. Elevators.
9. Fire protection systems
10. Plumbing systems, including roof drainage, waste and vent systems and distribution.
11. Ductwork including appurtenances and equipment
12. HVAC piping
13. HVAC equipment and controls.
14. Electrical lighting, power, communications and signaling, fire detection and related systems.
15. Excavation, site utilities and site improvements.

D. All adjustments necessary to achieve full coordination shall be determined in a timely manner, so as not to delay the work. Include time necessary for consideration by the Architect and the Owner's Project Manager for proposed modifications. No claim for additional compensation for extension of time arising from delays due to failure of General Contractor to identify potential conflicts

requiring coordination in a timely manner or from additional work made necessary by such failure will be valid.

1.11 PROGRESS MEETINGS

A. The General Contractor or its representative will schedule and administer meetings throughout the progress of the Work; make arrangements for meetings, prepare agenda with copies for participants, preside at meetings, record minutes and distribute copies within one week to Architect, Owner and participants of meeting only. The General Contractor is responsible for distribution to subcontractors, vendors, suppliers and others who are affected by decisions made. The Architect is responsible for distribution to consulting engineers not in meeting attendence.

1. Scheduled Frequency of Meetings: Weekly at each construction site.

B. Attendance: Required are General Contractor's Project Manager and Project Superintendent, and each applicator, installer, and supplier whose work is ongoing or scheduled as directed by the Owner, General Contractor, OPM or Architect. Subcontractors, engineering consultants, and other persons are required to attend as the Architect may direct. Other subcontractors, vendors, suppliers shall be present at meetings upon request of General Contractor.

1. Attendee Authority: Subcontractors and supplier representatives present at meetings shall have authority to act for and make commitments for, the entity which they represent.
2. Restricted Attendance: Owner and Architect reserve the right to expel or exclude from any Progress Meeting any person(s) or company representative(s) without statement of reason or excuse.
3. Attendance of Architect’s Consultants: General Contractor shall make an attendance request for specific Architect’s consultants and engineers at least 72 hours in advance of the meeting. Clearly identify in the request all consultant related issues and topics to be discussed at the meeting. The Architect will decide if its consultant or engineer will attend.
4. Attendance of Owner’s Independent Consultants: General Contractor shall make an attendance request for specific Owner’s consultants at least 72 hours in advance of the meeting. Clearly identify in the request all consultant related issues and topics to be discussed at the meeting. The Owner will decide if its consultant will attend.

C. Items of Agenda:

1. Review minutes of previous meetings.
2. Review of Work progress.
3. Field observations, problems, and decisions.
4. Identifications of problems which impede planned progress.
5. Review of submittals schedule and status of submittals.
    a. Review of environmental/sustainability related submittals, schedule and status.

6. Review of off-site fabrication and delivery schedules.
7. Maintenance of progress schedule.
8. Corrective measures to regain projected schedules.
9. Coordination of projected progress.
10. Maintenance of quality and work standards.
11. Progress of Work to be adjusted under coordination requirements, and effect of proposed changes on progress schedule and coordination.
12. Review of construction waste management and recycling performance, material quantities disposed and diverted for recycling.
13. NE-CHPS certification progress report.
14. Other business relating to Work.

1.12 SPECIAL MEETINGS AND BUILDING COMMITTEE MEETINGS

A. Special Project Meetings held by the General Contractor: The General Contractor shall conduct special project meetings throughout the course of the Work. Special Project Meetings are those held in addition to the regularly scheduled progress meetings. The Architect and Owner are not required to attend these meetings.

1. Special meeting issues may include, but are not limited to:
    a. Safety issues.
    b. Labor issues.
    c. Construction waste management and recycling issues.
    d. NE-CHPS certification goals and issues.

B. Environmental Quality Review Meetings: The General Contractor shall conduct special Environment Quality review meetings throughout the course of the Work.

1. Meetings may be held in conjunction with dates of Project Progress Meetings. The General Contractor shall notify both the Owner and Architect at least 7 days in advance of the meeting dates. The General Contractor along with any requested or necessary subcontractors, applicators, vendors or material suppliers shall attend.
2. Meeting shall include the following topics:
    a. Review of construction waste management and recycling.
    b. Review of sustainability / environmental related submittals and update on NE-CHPS Certification progress.
    c. Review of indoor air quality testing.

C. Building Committee Meetings: General Contractor is advised of obligation to attend Building Committee Meetings (held in evenings) as requested by Owner or Architect, at no additional cost to the Contract.

D. Additional Special Meetings requested by the Architect or Owner: The General Contractor along with any requested or necessary subcontractors, applicators, vendors or material suppliers shall attend additional meetings when requested by the Architect or Owner as they deem necessary. Such meetings may be convened on short notice if conditions at the project site so require and attendance is mandatory. The Architect and Owner are not limited as to the number of additional meetings that may be requested or the agenda for such meetings.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

End of Section

Section 01 32 00

CONSTRUCTION PROGRESS DOCUMENTATION

PART 1 - GENERAL

1.1 SUMMARY

A. Survey and layout data.

B. Critical Path Method (CPM) scheduling of the Work.

C. Contract progress reporting.
   1. Construction schedule updates.
   2. Daily construction reports.
   3. Special Reports - Unusual Event Reporting.

D. Work Documentation:
   1. Periodic site observations.
   2. Verification of built tolerances.
   3. Construction progress photographs.

1.2 SURVEY AND LAYOUT DATA

A. Prior to starting any construction work, stake out all limits of cut and fill, the limits of proposed walkways and site improvements. Promptly upon completion of layout work and before any construction work is begun on the site, notify the Architect and Owner's Project Manager, who shall conduct a field inspection of the stakeout. The Architect reserves the right to adjust the location of such layouts as it deems necessary to comply with the intent of the Contract Documents.

1.3 CRITICAL PATH METHOD (CPM) SCHEDULING OF THE WORK

A. Definitions:
   1. Activity: A discrete part of a project that can be identified for planning, scheduling, monitoring, and controlling the construction project. Activities included in a construction schedule consume time and resources.
      a. Critical activities are activities on the critical path. They must start and finish on the planned early start and finish times.
      b. Predecessor activity is an activity that must be completed before a given activity can be started.
   2. CPM: Critical path method, which is a method of planning and scheduling a construction project where activities are arranged based on activity relationships. Network calculations determine when activities can be performed and the critical path of Project.
   3. Critical Path: The longest continuous chain of activities through the network schedule that establishes the minimum overall Project duration and contains no float.

4. Event: The starting or ending point of an activity.
5. Float: The measure of leeway in starting and completing an activity.
    a. Float time is not for the exclusive use or benefit of either Owner or Contractor, but is a jointly owned, expiring Project resource available to both parties as needed to meet schedule milestones and Date of Substantial Completion.
    b. Free float is the amount of time an activity can be delayed without adversely affecting the early start of the following activity.
    c. Total float is the measure of leeway in starting or completing an activity without adversely affecting the planned Project completion date.
6. Fragnet: An amplified portion of the CPM schedule, to study a special sequence or establish a difficult time estimate, showing its predecessors, successors and impacts.
7. Major Area: A story of construction, a separate building, or a similar significant construction element.
8. Milestone: A key or critical point in time for reference or measurement.
9. Network Diagram: A graphic diagram of a network schedule, showing activities and activity relationships.

B. General CPM Requirement: The Contractor shall develop and maintain a Network Diagram to demonstrate fulfillment of the contract requirements and shall utilize the plan for scheduling, coordinating and monitoring the Work (including all activities of subcontractors, equipment vendors and suppliers). A conventional Critical Path Method (CPM) Precedence Diagramming Method (PDM) technique will be utilized to satisfy both time and cost applications.

C. Preliminary CPM Schedule: Submit for Architect’s and Owner’s review Critical Path Method (CPM) construction schedule in triplicate within 45 calendar days after date of commencement stated on Notice to Proceed. Revise and resubmit when required.
1. Before the first progress payment can be approved, the Contractor must have an approved CPM Schedule as described herein. It is the Contractor's responsibility to submit the CPM schedule with sufficient time for review by the Owner and Architect and any re-submittals and corresponding reviews that may be necessary prior to approval of the first requisition.
2. Software: Provide to the Architect one complete and legal copy of all software used to prepare the CPM Progress Schedule. Include documentation and user manuals. Software and CPM provided by the Contractor shall be fully compatible and useable with Microsoft’s “Windows” operating system. Software provided to the Architect will be used solely for “this project only”.
3. Supporting data: Submit the following supporting data in addition to the CPM Network Plots
    a. The proposed number of working days per week.
    b. The holidays to be observed during the life of the contract (by day, month, and year).
    c. The planned number of shifts per day.

d. The number of hours per shift.

e. List the major construction equipment to be used on the site, describing how each piece relates to and will be used in support of the submitted network diagram work activities/events.

D. CPM Progress Schedule shall be as described below:

1. Network Diagram Plots, General: The network diagram shall be an activity or arrow diagram. The diagram shall show relationships between the various activities. Exercise sufficient care to produce a clear, legible and accurate network diagram. Group activities related to specific physical areas of the project, on the network diagram for ease of understanding and simplification. Provide a key plan on each network diagram sheet showing the project area associated with the work activities/events shown on that sheet.

2. Work Activities (not less than 200 lines), as a minimum include:

a. All major, and critical minor portions of the work.

1) Break up the work into activities/events of a duration no longer than 20 work days each, except as to non-construction activities/events (for example: procurement of materials, delivery of equipment, curing times) and any other activities/events for which the Architect may approve the showing of a longer duration.

b. Fabrication and delivery time for each item requiring off site fabrication.

c. Each in-place sample.

d. Temporary facilities and controls.

3. Show not only the activities/events for actual construction work for each trade category of the project, but also trade relationships to indicate the movement of trades from one area, floor, or building, to another area, floor, or building, for at least five trades who are performing major work under this contract.

4. Identify all events on which the work is dependent on actions of Architect and Owner, including:

a. Submittal of shop drawings, equipment schedules, samples, color submission, coordination drawings, templates, fabrication and material delivery times.

b. Architect/Engineer’s review of shop drawings, equipment schedules, samples and templates as defined under Section 01 33 00. Contractor shall additionally schedule and allow for in the CPM Progress Schedule time for Architect’s response to Contractor’ s request for clarifications and interpretations of the Contract Documents. Time required for such activity, up to 10 or more days, is part of the normal construction process and is not a valid reason for extension of Contract Time, nor increase in the Contract Amount.

c. Delivery times of equipment furnished under separate Contracts with Owner, where the Contractor has responsibility for installation or coordination.

d. Interruption of Owner’s existing utilities, delivery of Owner furnished products (OFI and OFCI), rough-in drawings for OFI and OFCI products, project phasing and Owner’s scheduling and use of site requirements.

e. Test, balance and adjust various systems and pieces of equipment, maintenance and operation manuals, instructions and preventive maintenance tasks.

5. Activity Descriptive Information: identify the following for each work activity/event:
   a. Activity/Event ID number. (Uniquely number each activity/event. The network diagram should be generally numbered in sequence; left to right; top to bottom, and omitting numbers ending in 3, 6, and 9.)
   b. Concise description of activity (35 characters or less including spaces preferred).
   c. Work location code, coordinated with key plan.
   d. Performance responsibility or trade code using defined and approved abbreviations.
   e. Nodes that correspond to the activities on the network diagram.
   f. Duration (in work days.)
   g. Early Start (calendar day).
   h. Late Start (calendar day).
   i. Early Finish (calendar day)
   j. Late Finish (calendar day).
   k. Total float time.
   l. Manpower required (average number of men per day).
   m. Work Activity/Event Cost Data (as described below).

E. CPM Submittal Requirements: Submit three copies of Network Plots, and have approved an updated CPM prior to the approval of each progress payment.
   1. Plot format (each submittal): Colored plots (minimum 30 by 40 inches) and a CD-ROM disc.
      a. Electronic info shall be in compressed Primavera, (PDM) format.
   2. Plots and reports required:
      a. Network diagram plots.
         1) Bar chart plot.
         2) Time logic plot.
         3) Critical Path items of work only plot.
         4) Early start and finish plot.
         5) Late start and finish plot.
         6) Individual monthly activity plots for each month for the duration of the entire Contract.
      b. Activity List.
      c. Shop drawing and sample submittal schedule.
   3. Updates: Update and reissue the CPM Progress Schedule in coordination with each application for progress payment. Submission of complete and accurate monthly CPM Progress Schedules is a pre-requisite to the Architect’s

Certificate of Payment. The updated CPM; shall include the items specified herein above, in addition the updated CPM shall show the following:

a. Changes to the Contract and their effect on the schedule and Activity/event costs.

b. Delays in submittals, or deliveries, or work stoppage are encountered which make rescheduling of the work necessary.

c. Revisions to schedule to reflect actual prosecution and progress of the Project. Show current status of activities completed or partially completed. Identify actual start dates and finish dates for each activity.

d. Modifications to the Contractor's plan of action for future activities.

F. Work Activity/Event Cost Data:

1. Provide cost loading for all work activities/events except procurement activities. The cumulative amount of all cost loaded work activities/events (including alternates) shall equal the total contract price. Prorate overhead, profit and general conditions on all work activities/events for the entire project length. The contractor shall generate from this information cash flow curves indicating graphically the total percentage of work activity/event dollar value scheduled to be in place on early finish, late finish. These cash flow curves will be used by the Architect to assist him in determining approval or disapproval of the cost loading.

a. In the event of disapproval, the Contractor shall revise and resubmit.

b. Negative work activity/event cost data will not be acceptable.

2. Provide cost loading for work activities/events related to guarantee period services, and system testing, balancing and adjustment.

G. Special CPM Progress Schedule Meetings: The Owner may require additional special CPM review meetings at any time during the Contract to review the CPM Progress Schedule updates.

H. Responsibility for Project Completion:

1. Whenever it becomes apparent from the current progress review meeting or the updated CPM progress schedule that phasing or contract completion dates will not be met, the Contractor shall execute some or all of the following remedial actions:

a. Increase construction manpower in such quantities and trades as necessary to eliminate the backlog of work.

b. Increase the number of working hours per shift, shifts per working day, working days per week (pending approval of Owner), the amount of construction equipment, or any combination of the foregoing to eliminate the backlog of work.

c. Reschedule the work in conformance with the specification requirements.

2. Prior to proceeding with any of the above actions, the Contractor shall notify and obtain approval from the Owner’s Representative for the proposed schedule changes. If such actions are approved, the CPM revisions shall be incorporated by the Contractor into the network diagram before the next update, at no additional cost to the Owner.

I. Extension of Contract Time: Each time an extension of Contract Time is requested, submit the request with justification and evidence supporting the request and submit a completely revised and updated CPM Project Schedule showing the impact of the proposed extension of Contract Time on the Progress Schedule. Contractor Time may only be adjusted by Change Order issued by the Owner.

1.4 CONTRACT PROGRESS REPORTING

A. Daily construction reports: Prepare a daily construction report, submit duplicate copies to the Architect and Owner's Project Manager at weekly intervals. Record the following information concerning events at the site:

1. List of subcontractors at the site, and approximate count of personnel.
2. Accidents, unusual events, and emergency procedures.
3. Meetings and significant decisions.
4. Stoppages, delays, shortages, losses.
5. Emergency procedures.
6. Orders and requests of governing authorities.
7. Change Orders received, and implemented.
8. Services connected, disconnected.
9. Meter readings and similar recordings.
10. Equipment or system tests and start-ups.
11. Partial Completions/occupancies.
12. Substantial completions authorized.

B. Special Reports:

1. Unusual Event Reporting: When an event of an unusual and significant nature occurs at Project site, whether or not related directly to the Work, prepare and submit a special report. List chain of events, persons participating, response by Contractor's personnel, evaluation of results or effects, and similar pertinent information.

C. Look ahead activity reports: Prepare each week throughout the term of construction a listing of upcoming construction activities. Each weekly report shall include a listing of planned construction activities for the upcoming 2 weeks (14 calendar days). Submit a Look Ahead Activity Report at each job meeting to all participants. If no meeting is planned on a given week, mail the reports directly to both Architect/Engineer and Owner's Project Manager.

1. Maintain a record of all Look Ahead Activity Reports in a 3-ring binder in the Contractor's field office and make available for review by Architect/Engineer and Owner's Project Manager.
2. Unusual Event Reporting: When an event of an unusual and significant nature occurs at Project site, whether or not related directly to the Work, prepare and submit a special report. List chain of events, persons participating, response by Contractor's personnel, evaluation of results or effects, and similar pertinent information.

1.5 WORK DOCUMENTATION - PERIODIC SITE OBSERVATIONS

A. Observe and maintain a record of tests. Record the following:
   1. Specification section number, product(s), and name of subcontractor or installer.
   2. Name of testing agency and name of inspector.
   3. Name of manufacturer's representative present.
   4. Date, time and duration of tests.
   5. Type of test and results.
   6. Retesting required.

B. Observe startup and adjustments; record time and date of equipment start-up and results.

C. Observe equipment demonstrations to Owner; record times and additional information required for operation and maintenance manuals.

D. Assist Architect with final inspections. Prepare list of items to be completed and corrected.

1.6 WORK DOCUMENTATION - CONSTRUCTION PROGRESS PHOTOGRAPHS

A. Furnish digital files of site and construction throughout the progress of Work, produced by an experienced photographer acceptable to Architect.
   1. Submittals:
      a. Thumb drive: 2 copies, monthly and at final project completion.
   2. NE-CHPS compliance photographs, submit within 3 days from date of photograph.
      a. Thumb drive: 2 copies.
   3. Personal Privacy: After Owner occupancy, take special care not to photograph students. All photographs having students in them shall be destroyed by the photographer prior to submittal. The photographer will be required to take additional photographs to obtain the specified submission numbers specified.

B. Views: Take photographs from differing directions indicating the relative progress of the Work. Take photographs monthly on date for Application of Payment, and at final completion.
   1. Prior to start of demolition work and site clearing take one set of interior photographs showing existing conditions.
   2. As a minimum each month during the Work, furnish the following number of views (as appropriate to Work being performed)
      a. Interior views: 6.

C. Additional photograph scope: Take additional photographs documenting protection of ducts, and both on-site stored or installed absorptive materials.
   1. General,
      a. All photographs shall be date imprinted by camera.

b. Furnish not less than 12 photographs per date, from at least 3 different dates as directed by Architect/Engineer.

2. Views: Coordinate photograph views with Construction IAQ Management Plan to highlighting the following six requirements of SMACNA IAQ Guideline for Occupied Buildings under Construction, 1995, Chapter 3.

a. For HVAC Protection, submit photographs demonstrating compliance with protection of HVAC work during construction.

1) Ductwork sealed off with plastic during construction.

2) MERV 8 filters on return ductwork, if unable to close off.

3) HVAC equipment protected from the elements and construction debris.

D. Discs/thumb drives: Identify each disc /drive on the back with the following information:

1. Project identification.

2. Date and time of exposure , and orientation(s) of view.

3. Photographer’s name, address and phone number.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

End of Section

Section 01 33 00

SUBMITTAL PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

A. Submittal coordination.

B. Submittal procedures and grading.

C. Schedule of Submissions.

D. Owner's environmental policy and NE-CHPS credit submittals.

E. Shop drawings, product data and samples.

F. Manufacturer's instructions.

G. Manufacturer's certificates.

H. Emergency addresses.

I. Erosion and sediment control program.

1.2 SUBMITTAL COORDINATION

A. Make submittals in a proper and timely fashion, allowing for administrative procedures, Architect's review, corrections to submissions and resubmittal, if necessary, and fabrication of products without delaying the project. Minimum processing times required by the Architect are as follows:

1. Review for Architect's Office only: Allow a minimum of 10 working days for review and processing. Some submittals may require additional time.

    a. Simultaneous submission of a large number of shop drawings and product data may require longer than 10 working days for review. (In particular submittals for Divisions 3, 5, 6, 21, 22, 23, 25 and 26).

    b. Complex Systems (structural, mechanical, electrical) may require longer than 10 working days for review each time shop drawings, layout drawings, and product data are submitted or resubmitted.

2. Review by Architect and its consultant(s): Allow 10 working days for review and processing of submittals by Architect plus an additional 5 working days for review by each consultant as applicable.

3. Reprocessing of submittals: For submittals requiring resubmittal, re-processing time required shall be the same as first submittal.

4. No extension of Contract Time will be authorized due to failure to transmit submittals sufficiently in advance of scheduled performance of Work.

B. Make submittals of similar items, systems, or those specified in a single specification section together.

C. Make submittals for products which other products are contingent upon, first.

D. The General Contractor is fully responsible for delay in the delivery of materials or progress of work caused by late review of shop drawings due to failure of the General Contractor to submit, revise, or resubmit shop drawings in adequate time to allow the Architect checking and processing of each submission or resubmission.

1.3 SCHEDULE OF SUBMISSIONS

A. Schedule procedure: Immediately after being awarded the Contract, meet with the Architect to discuss the schedule of submissions and then prepare and submit within 14 calendar days for approval a schedule of submissions for the Work. The schedule of submissions shall be related to the entire Project, and shall contain the following:

1. Shop Drawing Schedule (for shop and setting drawings to be provided by the General Contractor).
2. Sample Schedule (for samples to be provided by the General Contractor).
3. With respect to portions of the Work to be performed by Subcontractors, such schedule of submissions for the work of each Subcontractor shall be submitted for approval within 30 calendar days after execution of a subcontract with such Subcontractor.

B. List all submissions required of each trade:

1. Include the Specification Section number, name of subcontractor or vendor, submittal type, item, description, type, quantity and size (where applicable) of each submission.
2. For each submission, provide the following dates, as estimated:
    a. Scheduled date of submission.
    b. Required date of approval. (permit time for appropriate review and resubmissions as may be required).
    c. Estimated date of beginning fabrication or manufacture of product (where applicable).
    d. Required date of submission of product to testing laboratory.
    e. Required date of testing laboratory approval.
    f. Required date for delivery of product to site.
    g. Required date for beginning of installation of product.
    h. Required date for completion of installation (and in-place testing).
    i. Required dates for documentation as indicated in Section 01 78 00 – CLOSEOUT SUBMITTALS.

1) Project record documents.
2) Project record drawings.
3) Required date for operation and maintenance data and preventative maintenance instructions.
4) Materials and finishes manuals.
5) Warranties and bonds.
6) Maintenance contracts.
7) Attic stock, spare parts and maintenance materials. Include a full list of these items to the General Contractor for organization and turnover to the owner at project closeout.

C. For each submittal, schedule to allow adequate time for review by the Architect and its consultants. The Architect will not be responsible for Work performed in shop or field prior to approval. Long-lead items requiring expedited action must be clearly indicated.

1. The schedule shall be reviewed and resubmitted as necessary to conform to approved modifications to the construction Project Schedule, and shall be updated as may be required by the Architect.

D. Posting of submittal schedule: Print and distribute the submittal schedule to Architect, Owner, subcontractors and other parties affected. Post copies in field.

E. Update schedule throughout progress of the Project, coordinated with scheduling changes in the Work, and redistribute monthly in conjunction with submittal of Application for Payment.

1.4 OWNER'S ENVIRONMENTAL POLICY AND NE-CHPS CREDIT SUBMITTALS

A. Schedule: Immediately after being awarded the Contract, meet with the Architect and Owner's Representative to discuss the schedule of environmental policy submissions and then prepare and submit within 14 calendar days for approval a schedule of NE-CHPS credit submissions and submissions related to the Owner's Environmental Policy.

1. The "Schedule of Environmental Submissions" shall be related to the entire Project, including commissioning, and as a minimum contain the following items.

a. Waste Management Plan (as specified under Section 01 74 19).
b. List of NE-CHPS Credit requirements.
c. Affidavit letters.
d. NE-CHPS letter template.
e. NE-CHPS individual credit submissions.
f. NE-CHPS Certification progress report.
g. Construction Indoor Air Quality (IAQ) plan (as specified under Section 01 81 19).

h. Manufacturer’s product information and MSDS sheets.

2. Update schedule throughout progress of the Project, coordinated with scheduling changes in the Work, and redistribute monthly in conjunction with submittal of Application for Payment.

1.5 SUBMITTAL PROCEDURES AND GRADING

A. Prepare and submit to the Architect, all specified and requested submittals including but not limited to the following:

1. Construction Schedule.
2. Schedule of Values.
3. Schedule of shop drawings, product data, and samples.
4. Schedule of Environmental Submissions.

B. Provide space for General Contractor, Architect and engineering consultant review stamps, on the front page of each item's submittal copy. Apply General Contractor's stamp, signed or initialed certifying that review, verification of products required, field dimensions, adjacent construction Work, and coordination of information, is in accordance with the requirements of the Work and the Contract Documents. The Architect's stamp shall contain the following data: (Engineering consultant review stamps may vary in language, but intent of language is similar):

_____ APPROVED
_____ APPROVED AS NOTED
_____ REVISE AND RESUBMIT
_____ NOT APPROVED

1. The Architect will insert the date of action taken and an identification of the person taking the action.
2. Submittal grading:
   a. APPROVED - No corrections, no marks.
   b. APPROVED AS NOTED - Resubmission not required. Minor amount of corrections; all items can be fabricated without further corrections to original submission; checking is complete and all corrections are deemed obvious without ambiguity.
   c. REVISE AND RESUBMIT - Resubmission required. Minor amounts of corrections; checking is not complete; details of items noted by checker are to be clarified further before full review can be given. Correct and resubmit, do not fabricate noted items requiring correction.
   d. REJECTED - Submittal is rejected as not in accord with the Contract Documents, too many corrections, or other justifiable reasons. When returning submission, Architect will state reasons for rejection. Correct and resubmit, do not fabricate.

3. Review/approval neither extends nor alters any contractual obligations of the Architect, Engineer or General Contractor.

C. Identify all variations from Contract Documents, and product or system limitations which may be detrimental to successful performance of the completed work.

D. Coordinate related submittals and schedule submissions to expedite the Project; deliver to Architect at the following address:

Ai3 Architects, LLC
111 Speen Street, Suite 300
Framingham, Massachusetts 01701

Additional submittals may be required to go concurrently to the Architect's consultants and Owner's Project Manager, if required by the Architect and Owner's Project Manager.

E. Transmit submittals to Architect at the above address, with individual transmittal forms for each submission, using AIA Document G810.

1. On transmittal form, identify Project, General Contractor, subcontractor, installer, or supplier, pertinent Drawing sheet and detail number(s), and specification Section number, as appropriate. Transmittals received by the Architect from sources other than the General Contractor will be returned without any action taken.
2. General Contractor shall number submittals sequentially by Specifications Section prior to submittal. Resubmitted items shall retain number and be noted as resubmitted (example 08 31 00.00 R1)

F. General Contractor's review: Review all shop drawings, product data and samples. Include, without limitation, verification of the following:

1. Proper title, original date, drawing number (which shall be changed if resubmitted), revision numbers and dates, designation of project General Contractor, subcontractor and/or supplier.
2. Identification of Shop Drawings, Product Data or Samples by Specification Section and subsection or paragraph where appropriate and identification of Contract Drawings by number and detail.
3. On each submittal, as a minimum, General Contractor shall identify the following:
    a. Errors, inconsistencies, and omissions discovered in the contract documents and field conditions must be reported at once to the Architect.
    b. Any variations from code requirements contained in the contract documents must be reported promptly in writing to both the Architect and owner.
    c. Promptly report to the Architect information that any design, process, or product infringes on a patent.
    d. Names of Subcontractors and Suppliers must be given in writing to the Architect as soon as practicable after award of the Contract, preferably at

the pre-construction meeting. (Note: If objection is made, a change order is possible.) List shall include name(s) of contact person(s), address, telephone and fax number(s).

G. Revise and resubmit submittals, identify all changes made since previous submittal. Distribute copies of reviewed submittals to concerned parties; instruct parties to promptly report any inability to comply with provisions.

1.6 ELECTRONIC DOCUMENT PROCEDURES REQUIREMENTS

A. General:

1. All documents including but not limited to shop drawing and product data submittals, Request for Information, Proposal Requests, Proposed Change Orders, and reports shall be transmitted to Architect and Owners Project Manager in electronic (PDF) format. The General contractor shall utilize a web based service such as Procore Technologies, Submittal Exchange, i Builder or approved equal designed specifically for transmitting submittals between construction team members.
2. The intent of electronic submittals is to expedite the construction process by reducing paperwork, improving information flow, and decreasing turnaround time.
3. The electronic document process is not intended for color samples, color charts, or physical material samples.

B. Procedures for Documents and Submittals:

1. Document Preparation – General Contractor may use any or all of the following options:
   a. subcontractors, subcontractors and suppliers may provide electronic (PDF) documents to General Contractor via a web based service.
   b. subcontractors, subcontractors and suppliers may provide paper documents to General Contractor (subject to approval of the GC) who electronically scans and converts to PDF format.
   c. subcontractors, subcontractors and suppliers may provide paper documents to Scanning Service which electronically scans and converts to PDF format.
2. General Contractor shall review and apply electronic stamp certifying that the submittal complies with the requirements of the Contract Documents including verification of manufacturer / product, dimensions and coordination of information with other parts of the work.
3. General Contractor shall transmit each submittal or document to Architect using web based service.
4. Architect review comments will be made available on the web based service for downloading. General Contractor will receive email notice of completed review.

5. Distribution of reviewed submittals to subcontractors and suppliers is the responsibility of the General Contractor.
6. Submit paper and electronic copies of reviewed submittals or documents at project closeout for record purposes in accordance with Section 01 78 00 – CLOSEOUT SUBMITTALS.

C. Costs:

1. The cost of web based services shall be paid in full by the General Contractor.
2. General Contractor shall provide training for web based service for Architect, OPM and any other entity required to use such service.
3. Internet Service and Equipment Requirements:
   a. Email address and Internet access at General Contractor's main office.
   b. Adobe Acrobat (www.adobe.com), Bluebeam PDF Revu (www.bluebeam.com), or other similar PDF review software for applying electronic stamps and comments.

1.7 SUBMITTAL QUANTITY REQUIREMENTS

A. Furnish Architect with electronic files through the Adobe Acrobat Portable Document Format (PDF) files for each of the following submittal types:

1. Schedules, including, but not limited to:
   a. Construction Schedule.
   b. Schedule of Values.
   c. Schedule of shop drawings, product data, and samples.
   d. Schedule of Environmental Submissions.
2. Shop drawings.
3. Product data, manufacturer's instructions and certificates and similar submissions.
4. Erosion control program.
5. NE-CHPS Certification and Environmental policy (sustainable design) submittals.
6. Waste management reports.
7. Emergency addresses: 1 file to Architect, and 1 file direct to Owner.

B. Furnish Architect with the following quantities of each submittal:

1. Schedules: 1 copy.
2. Product data, manufacturer's instructions and certificates and similar submissions: 1 copy.
3. Shop drawings: 1 copy.
4. Samples: Sets of 3 identical samples of each submission required.

5. Erosion control program: 1 copy.
6. NE-CHPS Certification and Environmental policy (sustainable design) submittals: 1 copy.
7. Emergency addresses: 1 copy to Architect, and 1 copy direct to Owner.

1.8 SHOP DRAWINGS

A. General: Provide accurately prepared, large scale and detailed shop drawings prepared specifically for this Project. Shop drawings shall include fabrication and installation drawings, setting diagrams, schedules, patterns, templates and similar drawings. Standard information prepared without specific reference to Project are not considered shop drawings.

1. Show adjacent conditions and related work. Show accurate field dimensions where appropriate.
2. Identify materials and products shown. Note all conditions that require coordination with other trades and special installation procedures.
3. Show gage and thickness of materials.
4. Indicate welding details and joint types.
5. Show every component of fabricated items, notes regarding manufacturing process coatings and finishes, identifying numbers conforming to the Contract Documents (i.e. stair numbers, door numbers and similar items), dimensions, and appropriate trade names.
6. Show anchorage and fastening details, including type, size and spacing.
7. Review each submittal for conformity with the Contract requirements prior to submittal, certify such review on each shop drawing with General Contractor’s stamp, signature and date. Reference on shop drawings to other sections, installers, suppliers, or trade(s) shall designate the appropriate specification sections, and the term "by others" shall not be used.

B. Size of Format: Not less than 8-1/2 by 11 inches, and no larger than 30 by 42 inches, except for templates, patterns and similar full-size drawings.

C. The Architect's comments and corrections will be made on the electronic submission (PDF) and returned to the General Contractor. If necessary, the General Contractor then shall make the necessary corrections on the original drawings and resubmit the corrected drawings in electronic format (PDF) as specified. Prints of any submittals required for the Architect's own use, and those of engineering consultants, will be made without cost to the General Contractor. The General Contractor is responsible to distribute and furnish (at no additional cost to Owner) all shop documents needed for use by the General Contractor, subcontractors, installers, vendors and suppliers.

D. Drawing submittals returned "APPROVED", or “APPROVED AS NOTED”, as set forth below: General Contractor shall obtain and distribute adequate prints for construction, including one print of each for the Owner's project representative, and

then return the original markup to the subcontractor or supplier from whom he originally received them.

E. Drawing submittals returned "REJECTED" or "REVISE AND RESUBMIT", as set forth below: General Contractor shall first obtain a record print and then forward them to source for correction of original drawings, and resubmission of a new original mark up and prints as above.

F. Each drawing shall have a title block on the right hand side containing one of the following:

Name of project -	**CENTRAL FALLS HIGH SCHOOL**
Architect -	Ai3 Architects, LLC
General Contractor -	
Subcontractor/supplier -	
Date of submission -	

G. Each drawing shall have a clear space on the right hand side for review stamps of both the Architect and General Contractor.

1. The General Contractor's Review and Action Stamp: Provide suitable space on label or title block for General Contractor's review and action stamp. Stamp and sign each submittal to show General Contractor's review and approval prior to transmittal Architect. Submittals not signed and stamped by General Contractor will be returned without action.

   a. Only submittals received from the General Contractor will be considered for review by the Architect. General Contractor shall review each submittal for accuracy and conformance with the requirements of the Contract Documents, and particularly for field measurements and proper fit with adjoining work. Modify submittals to show interface with adjacent work and attachment to Building.

   b. The General Contractor's Review and Action Stamp shall contain the following language or similar:

   APPROVED FOR CONFORMANCE
   WITH THE CONTRACT DOCUMENTS.

   All dimensions and quantities have been reviewed and are accepted by _____
   General Contractor's Name

   All dimensions and field conditions have been or will be verified prior to fabrication of the items described herein.

   c. Submittals received from the General Contractor shall be signed and comply with review requirements. Submittals not certified or improperly certified (stamped but not reviewed) will be returned to the General Contractor without Architect's review. Claims due to the return of uncertified, improperly prepared or inadequately reviewed submittals will be rejected.

1.9 PRODUCT DATA

A. Submit Product data as specified, and as the Architect may additionally prescribe. Product data includes, but is not limited to:

1. Catalog cuts.
2. Complete specifications.
3. Standard color charts.
4. Performance data.
5. Environmental data including, but not limited to:
    a. Chemical composition.
    b. Recycled (pre and post-consumer) content.
    c. Locations of material extraction/harvest and manufacture, with respective distances to site.
    d. VOC content.
    e. Material certifications as applicable to product.
6. Certified laboratory test report data.
7. Health and safety precautions.
8. Illustrated capacities, characteristics, wiring diagrams, controls, and other pertinent information for complete product and product use description.

B. If more than one size or type is shown on any printed sheet, indicate clearly intended item(s).

C. When accepted or not accepted, the Architect will retain three copies. Submit sufficient copies for all other parties. No copies stamped REJECTED or RESUBMIT shall be sent to the job site.

1.10 SAMPLES

A. Submit samples clearly labeled as to its material, type or make, manufacturer, size or gauge, and other pertinent data, accompanied by an appropriate transmittal form. Samples shall show full range of color and texture variation that can be expected.

1. When accepted or not accepted, the Architect will retain one set of samples and return the other to the General Contractor. Samples will not be permitted for use in the project.

1.11 MANUFACTURER’S INSTRUCTIONS

A. When specified in individual specification Sections, submit manufacturer’s printed instructions for delivery, handling, storage, assembly, installation, start-up, adjusting, and finishing.

B. Identify conflicts between manufacturer's instructions and Contract Documents.

1.12 MANUFACTURER'S CERTIFICATES

A. When specified in individual specification Sections, submit manufacturer's certificates and installer certificates to Architect for review.

1. Environmental Product Certificates: Include manufacturer certification indicating product contains maximum recycled content possible without being detrimental to product performance.

B. Indicate material or product conforms to or exceeds specified requirements. Submit supporting reference date, affidavits, and certifications as appropriate.

C. Certificates may be recent or previous test results on material or product, but must be acceptable to Architect.

1.13 SUSTAINABLE DESIGN PRODUCT SUBMITTALS

A. Provide submittals required by NE-CHPS Certification for Project as specified:

1. NE-CHPS Certification submittal are separate and distinct from shop approval submittals and may not be combined as a joint submittal with shop approval submittals.

2. All NE-CHPS Certification submittals shall be accompanied with the NE-CHPS PRODUCT DATA FORM.

1.14 ELECTRONIC SUBMISSIONS TO OWNER

A. The General Contractor shall maintain files of all APPROVED submittals required by this Section throughout the duration of construction and shall provide PDF format files of all documentation, organized by specification section, to the Owner on a set of discs at Substantial Completion. Discs shall be labeled by specification section and shall include an electronic index and a hardcopy index. Index shall include all information provided.

1.15 EMERGENCY ADDRESSES

A. Emergency Contact List: Within 15 days of Notice to Proceed, submit in writing, the name, addresses and telephone numbers (direct work phone, home phone, and cellular phone numbers) of key members of the General Contractor's and Subcontractor's respective organizations. Include contact information for General Contractor's Superintendent and all on-site supervisory personnel (including Subcontractor supervisory personnel), who may be contacted in the event of emergencies at the building site, which may occur during non-working hours.

B. Maintain and update the Emergency Contact List as changes may necessitate. Keep a current version of the list in the emergency key cabinet (Knox Box) as specified under Section 01 50 00 – TEMPORARY FACILITIES AND CONTROLS.

1.16 EROSION CONTROL PROGRAM

A. Submit erosion control program within 30 days after date of Owner-General Contractor Agreement for Architect's review. Revise and resubmit when required.

B. Erosion control program shall indicate proposed methods, materials to be employed, and schedule for effecting erosion and siltation control and preventing erosion damage. Provide sufficient information to fully explain the program; the following are the minimum requirements:

1. Proposed methods for actuating erosion and siltation control including 1 inch equals 40 feet (1”=40’) scale plans indicating location of erosion control devices and siltation basins.
2. List of proposed materials including manufacturer's product data, in accordance with Division 32 - EARTHWORK and Division 33 - EXTERIOR IMPROVEMENTS.
3. Schedule of erosion control program indicating specific dates from implementing programs in each major area of Work.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

End of Section

SECTION 01 35 43
ENVIRONMENTAL PROCEDURES

PART 1 - GENERAL

1.01 GENERAL PROVISIONS

A. General Conditions, Supplementary Conditions and applicable parts of Division 1 form a part of this specification and the Contractor shall consult them in detail for instructions.

B. Examine all Drawings and all other Sections of the Specifications for requirements therein affecting the work of this trade.

1.02 RELATED WORK UNDER OTHER SECTIONS

A. Asbestos Remediation.

1.03 HAZARDOUS MATERIALS PROCEDURE

A. Asbestos:

1. Asbestos Materials Exist On-Site: There are accessible and inaccessible asbestos containing materials (ACM) in the existing Buildings. ACM affected by the Demolition project are included under this contract. The Demolition Contractor shall formally notify each subcontractor that there are ACM existing in the Buildings. Hidden ACM may only be found during Demolition. Refer to items 2 and 3 below.
2. Unknown and inaccessible ACM: During the Demolition work of the Contract, it is possible that previously unknown asbestos materials may be discovered in currently concealed locations.
3. Notification: If the Demolition Contractor discover or encounter any ACM during the performance of the work, the Demolition Contractor shall immediately:
   a. Stop work, notify the Owner and Clerk of the Works about the presence of suspect ACM and request instructions for proper action, and
   b. Take whatever steps and measures are necessary to reduce, control or eliminate the risk of exposure of workers and the public to the ACM.
4. Responsible Person On-Site: The Demolition Contractor shall designate one of its senior on-site employees to be in charge of coordination between the Architect, the C.M at Risk Contractor, and all subcontractors with respect to hazardous materials issues.
5. Responsibility for Hazardous Material Discovery: It is the sole responsibility of the Demolition Contractor and its Subcontractors to undertake whatever measures, methods of procedures are necessary, required or otherwise appropriate to safeguard the health and safety of all workers and members of the public with respect to identification and discovery of previously unknown hazardous materials during the work of the Project.
6. Transite and ACM insulated pipes were assumed to exist underground. The Demolition Contractor and/or site contractor shall excavate around the pipes to expose the pipes at no additional cost to the owner for removal by the asbestos contractor.
7. Indemnification: To the fullest extent permitted by law, the C.M at Risk Contractor and Demolition Contractor shall indemnify and hold harmless the Owner and the Architect and their agents and employees from and against all claims, damages, losses and expenses including, but not limited to, attorneys' fees arising out of or relating to the performance of the Work, including the discovery or identification of any hazardous

materials, provided that any such claim, damage, loss or expense if attributable to bodily injury, sickness, disease or death, or to damage to or destruction of tangible property (other than the Work itself) including the lose of use resulting therefrom; and is caused in whole or in part by any negligent act or omission of the C.M at Risk Contractor and Demolition Contractor, any Subcontractor, anyone directly or indirectly employed by any of them or anyone for whose acts any of them may be liable, regardless of whether or not it is caused in part by a party indemnified hereunder.

B. Lead:

1. The Demolition Contractor shall be made aware that Lead Based Paint exists on painted surfaces.
2. It is the Demolition Contractor responsibility to either test painted surfaces or assume that all existing painted surfaces are coated with Lead Paint. All costs for testing shall be the responsibility of the Demolition Contractor at no additional cost to the Owner.
3. All the work of this Contract shall conform to the standard set by all applicable Federal, State and Local laws, regulations, ordinance, and guidelines in such from in which they exist at the time of the work on the Contract and as may be required by subsequent regulations.
4. The Demolition Contractor is solely responsible for means and methods, and techniques used for demolition and lead control.
5. The Demolition Contractor shall at his own cost and expense comply with all laws, ordinance, rules, and regulations of Federal, State, Regional and Local authorities during demolition, prepping, sanding, cutting, burning, scraping, painting over, grinding and regarding handling, storing, and disposing of lead and lead contaminated waste material.
6. The Demolition Contractor shall submit to the Architect prior to commencing of work the following:
    a. Written respiratory and notification program
    b. Written lead compliance program in accordance with OSHA regulations including:
        1. Training requirement certifications.
        2. Supervisor qualifications.
        3. Written compliance program specific to this project
        4. Respirators fit test records.
        5. Medical surveillance certificates.
7. EPA require demolition debris with lead to be tested in accordance with the Toxicity Characteristic Leaching Procedure (TCLP) to determine the potential for significant amounts of lead to leach out of the waste. If the results are below the standard, the waste may be disposed of in a conventional landfill for demolition debris. If, however, the TCLP results are above the standard, the waste must be disposed of in an approved hazardous waste landfill. The Demolition Contractor shall at own cost and expense perform all required testing of waste by the TCLP. The Demolition Contractor must submit to the Owner copy of tests performed and all waste shipment records prior to disposing of debris. The Owner reserves the right to have own TCLP samples collected to verify results. All disposal costs shall be at the Demolition Contractor responsibility.
8. The following references are cited as current applicable publications. This project is subject to compliance with all regulations including but not limited to:
    a. U. S. Department of Labor, Occupational Safety and Health Administration Title 29 CFR 1910.1025 and 29 CFR Part 1926.62.
    b. U. S Department of Environmental Protection, Resources Conservation and Recovery Act.
    c. RIDOH.

9. All above regulations are applicable to this project. Where there is a conflict between this section and the applicable regulations, the more stringent requirement shall prevail.

C. Other Hazardous Materials:

1. The Demolition Contractor shall be made aware that other hazardous materials are found.
2. The Demolition Contractor shall be responsible for quantifying, removal, and proper disposal of all remaining hazardous materials, including but not limited to batteries and related electrolytic material, PCB's, mercury and Freon inside air conditioners, switches, exit signs, thermostats, and other items.

D. PCB's:

1. The Demolition and Asbestos Contractors shall be made aware that buildings materials (Material) including but not limited to painted surfaces, caulking, glue, roofing, coatings, and other buildings materials are likely to contain >1 ppm of Polychlorinated Biphenyls PCB's.
2. EPA does not require testing and therefore, no testing will be either performed or permitted to be performed by anyone.
3. All of the work of this Contract shall conform to the standard set by all applicable Federal, State and Local laws, regulations, ordinance, and guidelines.
4. The Demolition and Asbestos Contractors are solely responsible for means and methods, and techniques used for demolition and control. The Demolition and Asbestos Contractors shall collect and control PCB's contaminated debris and soil.
5. The Demolition and Asbestos Contractors shall at his own cost and expense comply with all laws, ordinance, rules, and regulations of Federal, State, Regional and Local authorities during prepping, sanding, cutting, burning, scraping, painting over, grinding and regarding handling, storing, and disposing of contaminated waste material and during demolition.

E. Silica Dust:

1. The Demolition Contractor and Asbestos Contractor shall be made aware that buildings materials (Material) may contain Silica.
2. Due to the difficulty associated with exhaustive testing, the Owner has elected to direct the Demolition Contractor and Asbestos Contractor to assume that Silica was found.
3. The Demolition Contractor and Asbestos Contractor shall review and comply with most recent US Department of Labor Final Rule and shall take extra precautions to protect workers and other personnel on site.

PART 2 – PRODUCTS Not Used

PART 3 – EXECUTION Not Used

END OF SECTION

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Section 01 41 00

REGULATORY REQUIREMENTS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section consists of:

1. Applicable codes and regulations.
2. Trade union jurisdictions.
3. Wage rate compliance.

1.2 DEFINITIONS

A. Regulations include laws, ordinances, statutes and lawful orders issued by authorities having jurisdiction, and rules, conventions and agreements within the construction industry that control performance of the Work, whether lawfully imposed by authorities having jurisdiction or not.

1.3 APPLICABLE CODES AND REGULATIONS

A. All work shall be performed in accordance with the latest version, except as indicated otherwise, of all applicable codes including the following:

1. *International Building Code*, 2018 edition, as published by the International Code Council, Inc. (I.C.C.), as revised by *RHODE ISLAND BUILDING CODE*, Regulation RISBC-1, effective February 1, 2022.
2. *International Plumbing Code,* 2018 Edition, as published by the International Code Council, Inc. (I.C.C.), as revised by *RHODE ISLAND PLUMBING CODE*, Regulation RISBC-3.
3. *International Mechanical Code,* 2018 Edition, as published by the International Code Council, Inc. (I.C.C.), as revised by *RHODE ISLAND MECHANICAL CODE*, Regulation RISBC-4.
4. *National Electrical Code (NEC),* 2020 Edition, as published by National Fire Protection Association (NFPA-70) as revised by *RHODE ISLAND ELECTRICAL CODE*, Regulation RISBC-5.
5. Rhode Island State Fire Safety Code; effective July 1, 2021, as amended, which includes as reference NFPA-1 (National Fire Protection Association, Inc., 2018 edition, and NFPA 72 National Fire Alarm and Signaling Code, 2019 edition.
6. ICC/ANSI A117.1, *Accessible and Useable Buildings and Facilities,* 2010 Edition, as published by the International Code Council, Inc. (I.C.C.) and American National Standards Institute (ANSI).
7. *International Energy Conservation Code 2018* Edition, as published by the International Code Council, Inc. (I.C.C.), as revised by *RHODE ISLAND CONSERVATION CODE*, Regulation RISBC-8.
8. State of Rhode Island Elevator Safety Code (260-RICR-30-10-1), effective January 4, 2022, as revised and amended January 6, 2019.

9. “STANDARD SPECIFICATIONS FOR ROAD AND BRIDGE CONSTRUCTION”, (Blue Book) as published by the Rhode Island, Department of Transportation, 2004 Edition, as amended March 2018.
10. City of Central Falls Zoning Bylaws, as amended.
11. United States Occupational Safety and Health Administration (OSHA): Standard Nº. 29-CFR-1926.59 - HAZARD COMMUNICATION STANDARD.
12. United States Department of Justice, Nº 28 CFR Part 36 - AMERICANS WITH DISABILITIES ACT, (Public Law 101-336).

B. Publication Dates: Where the date of issue of a code or regulation is not specified, comply with the standard in effect as of date of Contract Documents, or as otherwise required by authorities having jurisdiction.

1.4 TRADE UNION JURISDICTIONS

A. Maintain current information on jurisdictional matters, regulations, actions and pending actions; and administer/supervise performance of Work in a manner which will minimize possibility of disputes, conflicts, delays, claims or losses.

1.5 WAGE RATE COMPLIANCE

A. The General Contractor is responsible to ensure that the rate per hour to be paid to mechanics, apprentices, teamsters, laborers and other workers employed on the Work shall not be less than the approved wage rates applicable to this project. A legible copy of the approved rates, along with equal opportunity requirements, shall be posted on a weatherproof bulletin board outside the field office and be clearly visible for review by all workers.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

End of Section

200-RICR-20-05-4

TITLE 200 – BOARD OF EDUCATION

CHAPTER 20 – COUNCIL ON ELEMENTARY AND SECONDARY EDUCATION

SUBCHAPTER 05 - GENERAL AND SCHOOL OPERATIONS

PART 4 – School Construction

4.1 AUTHORITY, PURPOSE, AND SCOPE

A. This Part is promulgated by the Rhode Island Board of Education, Council on Elementary and Secondary Education (hereinafter the "Council"). The Council was established by R.I. Gen. Laws § 16-60-1 and have the authority to develop and promulgate these regulations pursuant to R.I. Gen. Laws §§ 16-60-4(9) (iv), 16-7-35 through 16-7-47, 16-7-24, 16-7.1-2(b)(7), and 16-9-4.1. This Part intended to govern the process by which the Council performs its statutory functions of determining the necessity of school construction, establishing standards for design and construction of school buildings, approving projects for school housing aid reimbursement, and ensuring that school districts have adequate asset protection plans in place to maintain their school facilities. Proper exercise of this authority will ensure that approval for school construction will reflect a statewide perspective, establish statewide uniformity in the quality of school building, and meet the needs of school districts. The Council is also authorized to issue such supplemental policies, guidelines, guidance documents, and/or administrative procedures that may assist in the implementation of this Part.

B. The Rhode Island Department of Elementary and Secondary Education (hereinafter "RIDE") has the authority to implement and administer this Part on behalf of the Council, including making recommendations to the Council on project approvals, disbursing school housing aid for approved projects, and monitoring compliance with the conditions of project approval set by the Council and requirements for asset protection and maintenance of facilities as set forth in this Part.

C. This Part applies to all new school construction and school renovations projects where the total cost exceeds five hundred thousand dollars ($500,000). Multi-year capital improvement projects supported by capital reserve funds that exceed five hundred thousand dollars ($500,000) over the life of the multi-year cycle must be approved by the Council and shall be submitted using the approved capital improvement plan format available from RIDE on its website. Capital improvement projects with projected costs of less than five hundred thousand dollars ($500,000) are required to obtain the Commissioner's approval and shall be submitted using the format detailed in the form provided by RIDE.

4.2 Incorporated Materials

A. These regulations hereby adopt and incorporate the National Fire Protection Association (NFPA) Standard 664 “Standards for the Prevention of Fire and Explosion in Wood Processing and Woodworking Facilities” (1998) by reference, not including the extent that the provisions therein are not inconsistent with these regulations.

B. These regulations hereby adopt and incorporate the American National Standards Institute standard number ANSI/IES RP3-00, Guide for Educational Facilities Lighting, (2000) by reference, not including the extent that the provisions therein are not inconsistent with these regulations.

4.3 Definitions

A. For the purposes of this Part, the following terms shall have the meaning set forth, unless the context clearly requires otherwise:

1. "Applicant" means the school district and the superintendent or other chief administrative agent of the district, regional district, or charter school.

2. "Application" means all documents, forms, letters, statements, certifications, plans, studies, drawings, and other data and information required to be submitted within the deadlines and in the format prescribed by these regulations. The Application will include, but not necessarily be limited to, a Design and Educational Program, Educational Facility Master Plan, Facilities Assessment, Feasibility Study, and Design and Construction Cost Projection; copies of the school committee and municipal approval; and any other documents, forms, letters, statements, certifications, plans, studies, drawings, data, or other information as deemed necessary.

3. "Approved project" means a project that has received the Council's approval pursuant to this Part.

4. "Audit" means an examination by the Council and/or its designee of Audit Materials as shall be submitted in a form or manner prescribed by the Council to determine compliance with any provision of this Part.

5. "Audit materials" means all papers, invoices, votes, contracts, agreements, change orders, progress reports, purchase orders, on-site observation of construction materials and methods, financing information, bonding schedules and other documents related to an Approved Project, and any other documents or information that may be requested or required to determine compliance with these regulations.

6. "Council on Elementary and Secondary Education" or "Council" means the public corporation established by R.I. Gen. Laws § 16-60-1, with all of the powers, authorities, and responsibilities accorded to it by the General Laws of Rhode Island.

7. "Capital improvement plan" means a long-range plan, typically five years, which identifies capital needs in a school district and provides a funding schedule and timeline for implementation. The capital improvement plan allows for systematic evaluation of all projects at one time so that a school district can anticipate future needs. The capital improvement plan should not include routine maintenance expenses of the school district but should include required upkeep of the facilities, including but not limited to, roof repairs, heating and ventilation system repairs, or window and door replacement.

8. "Design and educational program" means a comprehensive numerical and written description of a school district's specific educational program for a specified number of students over a specified period of time, in a format prescribed by the Council. It shall include: an itemization of spaces needed to support the educational program, complete to the degree that a designer may use it as the basic document from which to create the design of a school facility; the instructional programs, grade configuration, type of facility, and the spatial relationships for the functions housed at the facility; the number of students and a list of any specialized classrooms or major support areas, non-instructional support areas, or external activity spaces; gross and net square footage of any affected existing facility; the overall security and security measures taken to safeguard the facility and its occupants; the school administrative organization; and the hours of operation that include the instructional day, extracurricular activities, and any public access. The Design and Educational Program shall begin with a thorough, in-depth explanation of curriculum goals and instructional activities that occur within the learning environment of the facility affected by the proposed project. The Design and Educational Program shall comply with all applicable laws and applicable regulations, including but not limited to, those governing curriculum, basic education program, and length of school day and year. The Design and Educational Program for the proposed project shall include an itemization of each functional space and determination of square footage allocations, a calculation of total building square footage, and establish a realistic construction budget. The Council will provide school districts with annual guidance on what constitutes a realistic construction budget by annually determining a maximum per square foot cost in accordance with state, regional, and national construction data.

9. "District", as used in this Part, means school districts, regional school districts, charter schools, and any other public school entity seeking approval of the necessity of school construction and/or requesting to fund

a portion of the cost of school construction, modernization, or addition projects through reimbursement from the school housing aid program.

10. "Educational program space guidelines" means the itemized listing (set forth in§4.6 of this Part) of educational spaces and square footages that comprise a model program for an elementary school, middle school, and high school, or other grade configurations based upon varying levels of enrollment. The gross square footages are inclusive of all spaces to be designed in an Approved Project.

11. "Enrollment projection" means a District's five-year (5) estimate of student population by grade based on local demographics. It must show increases/decreases from year to year shown in actual numbers or percents and demonstrate how this data supports the need for the project. When possible, local enrollment projections should be supported by those from an outside source, such as RIDE or the New England School Development Council (NESDEC).

12. "Fiscal year" means the year beginning July 1st and ending the following June 30th, unless otherwise determined by the Council.

13. "Minority (MBE) and Women (WBE) Business Enterprises" mean a small business concern, owned and controlled by one or more minorities or women certified by the Rhode Island Department of Administration to meet the definition established by R.I. Gen. Laws Chapter 37-14.1.

14. "NE-CHPS" means Version 3.1 of the Northeast Collaborative for High Performance Schools Criteria.

15. "School housing aid" means funds appropriated by the General Assembly in support of completed school construction projects to guarantee adequate school housing for all public school children in the state and prevent the cost of school housing from interfering with the effective operation of the schools. Funds are distributed as promulgated in R.I. Gen. Laws §§ 16-7-35 through 16-7-47.

16. "Proposed project" means any project submitted by an Applicant, but not yet approved by the Council, including construction of a new school facility, addition to an existing school facility, renovation or refurbishment of an existing school facility, purchasing and renovating a building as a school facility, and repair or replacement of any eligible part of a school facility.

4.4 Project Categories and Priorities

In order to ensure effective planning, management, and financial sustainability of an approved project, the following general requirements and standards shall be met in the application for project approval.

4.4.1 General Requirements

A. General requirements are as follows:

1. Districts must ensure that construction will be completed in a timely, cost-effective manner and that buildings will be occupied within the timelines established during the approval process. The approval of a project by the Council and/or the payment of reimbursements by the Council shall not render the Council responsible or liable for the project, or any aspect thereof, except to ensure that the project is in compliance with these regulations. Districts have sole and exclusive responsibility for all aspects of a proposed and/or approved project, from its inception, including engaging all necessary and appropriate personnel for design, construction, and oversight, including a Commissioning Agent as set forth in § 4.10.2 of this Part

2. Approved projects must have a useful life of fifty (50) years for new construction or an addition to an existing school building.

3. Districts are required to have current capital improvement plans on file at RIDE. Only projects included in the capital improvement plan will be eligible for approval.

4. A project that results from lack of maintenance or negligence by the District will not be approved.

5. A District is not eligible to be reimbursed for temporary housing costs incurred because adequate project planning was not performed or local approvals were not obtained in a timely manner.

6. Projects shall be designed to minimize vandalism, and materials and finishes shall be selected to minimize vandalism.

7. Projects shall provide for equality of educational opportunity without discrimination on account of sex, race, color, religion, sexual orientation, national origin, or handicap, and all approved projects shall meet the requirements of the Rhode Island Building Code, R.I. Gen. Laws Chapter 23-27.3. All projects shall comply with the Americans with Disabilities Act, 42 U.S.C.A. § 12101 *et seq*. and all other applicable provisions of federal, state, and local laws relative to the accessibility of programs and facilities to persons with disabilities.

8. Districts shall demonstrate that projects have undergone review in accordance with applicable state law and regulations and, to the extent applicable to the project, by the Rhode Island's State Building Commissioner, Department of Administration, Department of Health, Historical Preservation and Heritage Commission, Commission for Human Rights, Department of Environmental Management, Governor's Commission on Disabilities, and any other department or agency of the state required by law to review such projects.

9. Projects shall have undergone review in accordance with applicable local or District charters, by-laws, ordinances, or regulations, including local conservation, fire prevention, water, sewer, or building code requirements.

10. Districts shall demonstrate that they have identified educational collaborative programs in the school District not currently housed in public school facilities, and have reviewed any such programs to determine if students in such programs can be served more efficiently and effectively if the project is approved, assuming the project is for school use only.

11. Districts must submit an analysis of the impact on the operating budget of implementing the project in such detail and in the format required by the Council. The analysis shall include an estimate of the costs of additional maintenance required of the District, the costs of additional instructional or support staff, additional utility costs, the costs of additional transportation, if any, and the estimated revenue, if any, from the sale or lease of any school facility decommissioned as a result of implementing the project.

12. Districts must provide an analysis of the potential economic and non-economic impact of leveraging cross- District school capacity and demonstrate that the applicant has considered existing District boundaries, facilities, and populations and the operating cost impact in determining the need and siting of proposed projects.

13. Districts shall ensure that all contracts and subcontracts are complied with and are in conformity with all applicable provisions of federal, state, and local laws and regulations.

14. Districts shall submit an analysis of life cycle costs of all projects including initial capital costs, maintenance costs, and utility costs and demonstrate how such costs will be reduced over the life of the building and its systems. Districts shall consider life cycle costs estimates of all feasible energy systems and technologies, including renewable systems, to identify the system with the lowest life cycle cost estimate.

4.4.2 Existing and New Facilities

A. The District shall evaluate and present alternatives to school construction projects including but not limited to new school construction, rehabilitation of

existing schools, additions to existing schools, the use of temporary and mobile facilities, and the rehabilitation or historic preservation of existing non-school buildings.

B. Applicants shall consider these alternatives within the context of each District's comprehensive facilities plan and specifically address issues of school capacity, educational adequacy, capital needs, and life cycle operating costs.

C. RIDE will determine the extent to which an applicant demonstrates the necessity for a school construction project using the following criteria:

1. Construction and operating costs, including those costs not eligible for reimbursement.

2. The effect on student populations.

3. Educational use and space requirements.

4. Proximity to local resources.

5. Opportunity for shared facilities.

6. The impact on transportation routes and costs.

7. Environmental impact.

8. Land acquisition and site preparation, including environmental assessments and remediation requirements, permitting, and zoning requirements.

9. The impact on historic resources and community character.

10. Adherence to smart growth principles pursuant to § 4.6.6 of this Part.

4.4.3 Priority of Projects

A. In the event the General Assembly or State Budget Office imposes funding limits, the Council will consider applications for school construction and renovation projects in accordance with the priorities listed below and in the order of the priorities listed below:

1. Replacement or renovation of a building which is structurally unsound or otherwise in a condition seriously jeopardizing the health and safety of school children, where no alternative exists;

2. Elimination of existing severe overcrowding;

3. Prevention of loss of accreditation;

4. Elimination or prevention of severe overcrowding as documented by current enrollment or by enrollment projections;

5. Creation or alteration of school facilities to provide mandatory instructional programs;

6. Replacement, renovation, or modernization of any school facility to increase energy conservation and decrease energy related costs in the facility;

7. Space requirements due to short term enrollment growth for which no reasonable alternative to school construction exists;

8. Replacement of or addition to obsolete buildings in order to provide a full range of programs consistent with approved state and local requirements; and

9. Creation or alteration of school facilities to provide supportive services and ensure equitable statewide access to adequate school facilities.

4.5 School Construction Standards

4.5.1 High Performance School Design

A. Projects shall meet all applicable federal, state, local, and regional building code requirements. Projects shall reflect cost-effective design, material, and finish decisions consistent with good architectural and engineering practice and high quality construction. Projects shall demonstrate that the current technological needs of students, faculty, and school staff are met.

B. Projects shall comply with all requirements set forth in the Northeast Collaborative for High Performance Schools Protocol version 3.0. (Northeast-CHPS) so that approved projects provide high quality learning environments, conserve natural resources, consume less energy, are easier to maintain, and provide an enhanced school facility.

4.5.2 Minority Business Enterprise (MBE)

A. Districts are required to comply with the requirements of R.I. Gen. Laws Chapter 37-14.1

B. This section of this Part applies to approved projects to the extent that the state law is determined to be applicable and any future determination that § 4.5.2 of this Part is no longer held to be valid does not affect the enforcement in part or in whole of this Part.

4.5.3 Miscellaneous Construction Requirements

A. Applicants are prohibited from utilizing chlorofluorocarbon-based (CFC) refrigerants in any new system for building heating, ventilating, air conditioning, or refrigeration.

B. All new construction and major reconstruction projects shall meet applicable local ordinances for recycling space and provide space within the building that is dedicated to the separation, collection, and storage of materials for recycling, including, at a minimum, paper (white ledger and mixed), cardboard, glass, plastics, aluminum cans, and metals.

C. New construction shall be oriented on the site so that natural daylight for classroom spaces is maximized.

D. Windowless classrooms and occupied instructional spaces which do not have operable windows equal to at least four percent (4%) of the floor space shall be air conditioned, excluding gymnasiums, industrials shops, kitchens, and locker rooms.

E. School facilities shall be designed, constructed, and renovated consistent with state and federal law for radon, lead, asbestos and other contaminants, and subject to the enforcement of such standards by the applicable state or federal agency.

F. Concrete floors in all instructional areas, except industrials shops, shall be covered with a resilient floor covering;

G. The storage of pesticides shall be in a locked metal cabinet and vented to the exterior.

H. Spaces in which power tools and machines in industrials shops generate dust shall have dust collecting equipment. Such equipment shall be either single or multi-use vacuum packs or a central dust collection system. Installed systems shall comply with National Fire Protection Association (NFPA) Standard 664 incorporated at § 4.2(A) of this Part.

I. Instructional spaces shall comply with the American National Standards Institute Guide for Educational Facilities Lighting, incorporated at § 4.2(B) of this Part.

4.6 Site Standards

4.6.1 Site Ownership

A. The applicant shall own the site of an Approved Project or be in the process of acquiring or have a reasonable expectation of owning the site by the end of the Architectural Feasibility Study pursuant to § 4.8.3 of this Part .

B. If the applicant is acquiring a new parcel of land for the project, the applicant shall provide in its Architectural Feasibility Study to RIDE a completed, signed, and sealed description of the plot plan of the land to be acquired showing:

1. Topographical and contour lines.

2. Adjacent properties indicating current land uses, access roads, deed restrictions, easements, protective covenants, right of ways, and environmentally sensitive areas such as waterways and wetlands.

3. The acreage and dimensions of the tract proposed for acquisition.

4. Anticipated footprint of the proposed school.

4.6.2 Responsible School Site Selection

A. Protecting student health is the most important issue during site selection. These requirements are intended to eliminate sites containing pollutants known to be hazardous to student and staff health. A variety of factors, from hazardous materials in the soil to airborne pollutants from nearby sources, will be considered in the site review process.

1. Project sites must be at sufficient distances from facilities that might reasonably be anticipated to emit hazardous air emissions or to handle hazardous or acutely hazardous materials, substances, or waste. Applicants must demonstrate that the health and safety of students and staff are not jeopardized by the location of the site.

2. Project sites must have a minimum separation of five hundred (500) feet from 50-133kV power-lines, seven hundred fifty (750) feet from 220-230kV power-lines, and one thousand five hundred (1,500) feet from 500-550kV power-lines; and one thousand five hundred (1,500) feet from railroad tracks, hazardous pipelines, and major highways.

3. Project sites may not be located in an area with moderate or high radon potential, or in an EPA radon zone, unless the school building project plan incorporates a radon mitigation strategy.

4. Sites shall be free from noxious pollution or contamination, and shall be selected to avoid flood plain, wetlands or other environmentally sensitive areas. A new school site must not be located within a one-mile radius of an active landfill. A landfill, as defined by the RI Department of Environmental Management’s Hazardous Waste regulations, shall mean a disposal facility or part of a facility where hazardous waste is placed in or on land and which is not a land treatment facility, a surface impoundment, an injection well, a waste pile, or a corrective action management unit.

B. In addition, selected sites shall be sensitive to known and unidentified historic resources, including archaeological sites.

4.6.3 Cross District Planning

When choosing a site for school construction projects, applicants shall consider cross Districting issues and possibilities in order to more efficiently and fairly serve the community and student population. Districts will be required to document that this was done as part of the school construction application pursuant to § 4.9.2 of this Part.

4.6.4 Consolidation

A. Applicants must submit an analysis of the option of school consolidation and school District consolidation. This applicant shall provide this analysis in its Architectural Feasibility Study pursuant to § 4.9.3 of this Part. Documentation shall include:

1. Current school capacity and enrollment by school and grade and anticipated five (5) year District growth by grade and school;

2. A map of the District showing the location of the site or sites under consideration and the location of existing school buildings in the District;

3. The attendance area to be served by the proposed school and the number of school-age children who reside within the attendance area and future demographic projections for the District and attendance area;

4. A map of the nearest adjacent District(s) showing their buildings and attendance areas;

5. Other potential non-school buildings evaluated for conversion, include information on age, location, size, nearby community services and buildings, cost, and needed modernization;

6. Information regarding any school buildings abandoned by the District or converted to other use by the community in the last ten years including a map of their location in the District;

7. A comparative analysis of the potential impact of building sites on student transportation and local traffic conditions including traffic impact, public transportation opportunities, times of transit by school transportation, and cost of any changes that would be required to roads or the transportation system; and

8. Documentation must also be provided demonstrating that a licensed professional engineer has examined soil conditions for structural integrity and drainage in order to determine the suitability or lack thereof of

possible sites and identified the existence of soil conditions which may increase site development costs.

4.6.5 Community Resources

A. R.I. Gen. Laws § 16-7-41.1 restricts payment of school housing aid for school facilities which are under the care and control of the school committee and located on school property. Facilities with combined school and municipal uses or facilities that are operated jointly with any other profit or non-profit entity also do not qualify for reimbursement. Nonetheless, it is often necessary to site schools near other existing community resources in order to provide a comprehensive educational program. This is especially true of small and urban Districts where land is at a premium. In this context, the site selected shall be chosen to meet the educational needs of the students who will be housed in the building, maximize the use of any available community resources, and minimize any possible adverse educational, social, environmental, or economic impact upon the community.

B. Consideration should be given to locating facilities in areas that are already served by existing or planned water, sewer, and other public infrastructure. When possible, the site selected should be in close proximity to other community resources such as libraries, museums, parks, natural resources, nature study areas, community centers, and businesses, so as to enhance the Design and Educational Program.

C. Sites should be located to efficiently and safely serve intended school populations and provide sufficient space for needed parking, bus turnarounds, delivery areas, required setbacks, and planned aesthetics.

4.6.6 Smart Growth Planning

The site shall incorporate “smart growth” concepts where feasible with relation to educational facilities and the impact of suburban sprawl in developing and planning for new construction. Smart growth schools involve the community in school facility planning, make use of existing resources, such as historic school buildings, are located within neighborhoods and fit into the scale and design of the neighborhood, and are usually small in size. The National Trust for Historic Preservation’s publication Historic Neighborhood Schools in the Age of Sprawl: Why Johnny Can’t Walk to School made recommendations as to how Districts could avoid suburban sprawl.

4.6.7 Transportation Impact

A. Whenever possible, sites shall be located close to public transportation. In order to reduce automobile-related pollution and conserve energy, designs shall incorporate the use of public transportation and carpooling by minimizing parking, creating bike facilities, providing safe walking/biking access, and other appropriate design elements.

B. Additionally, applicants shall consider the proximity of other services in the community, such as supermarkets, commercial office buildings, grocery stores, day cares, cleaners, fitness centers, hair care, hardware, laundry, medical/dental services, senior care facilities, public parks, pharmacies, post offices, banks, libraries, and community centers.

4.6.8 Storm Water Pollution Prevention

The District must submit a Storm Water Pollution Prevention plan addressing erosion and sediment control that complies with the National Pollution Discharge Elimination System Construction General Permit issued by the U.S. Environmental Protection Agency. Exception: If land disturbance is less than one hundred thousand (100,000) square feet for the entire project as a whole, then the project is exempt from this prerequisite. However, all projects involving the protection of wetlands must meet this requirement.

4.6.9 Site and Building Layout

A. All proposed projects must:

1. Orient the building(s) to take advantage of maximum natural day lighting and plot shadow patterns from surrounding buildings and place buildings to optimize solar gain (for urban-infill sites).

2. Consider prevailing winds when determining the site and building layout. For example, consider how the shape of the building itself can create wind-sheltered spaces and consider prevailing winds when designing parking lots and driveways to help blow exhaust fumes away from the school.

3. Maximize use of existing land formations and vegetation to provide shelter from extreme weather or to deflect unwanted noise.

4. Plant or protect existing deciduous trees to block summer sun and allow winter solar gain. Plant or protect existing coniferous trees to block winter wind.

5. Minimize importation of non-native soils and exportation of native soils. Optimize Cut & Fill (ideally 1:1) during clearing and excavation.

6. Create physical connections to existing bike paths, natural features, or adjacent buildings and neighborhoods.

7. Design parking lots and driveways to limit student proximity to bus emissions. Design bus loading and unloading areas such that buses need not be lined up head to tail. Do not design bus loading and unloading areas such that bus exhaust is in proximity to any of the school’s air intake vents.

8. Site the building to maximize opportunities for on-site renewable energy generation. For example, preserve or ensure availability of space for wood chip storage facilities for biomass heating, wind turbines (if wind resources are adequate), or other renewable energy sources.

9. Facilitate use of public transportation by locating the school within a one-mile radius of a public bus route.

4.7 Space Standards

4.7.1 General Provisions

A. School facilities shall afford space for general instruction, specialized instruction, administration and student services, the adequacy of which shall be pursuant to the requirements of this section. In addition, school facilities shall afford accommodations for approved vocational and special education programs. General design and construction space requirements are as follows:

1. Instructional rooms with windows shall have no exterior obstructing wall within twenty (20) feet of the major window wall;

2. The minimum dimension of any instructional space or specialized instructional space shall be ten (10) square feet of floor area;

3. Ceiling heights reported in the design and construction plans shall meet the following requirements:

a. The ceiling height of an academic classroom or other instructional space containing more than three hundred (300) square feet in area shall average nine feet six inches (9’-6”), and no part of the ceiling or other obstruction shall be lower than eight (8) feet;

b. Instructional spaces of less than three hundred (300) square feet and areas of larger spaces devoted to clothing alcoves, storage or work space shall have a minimum ceiling height of eight feet;

c. Large group spaces shall have minimum ceiling heights as follows:

(1) Gymnasium --22 feet

(2) Music Room (Vocal or Instrumental) -- 12 feet, The minimum height from overall highest riser to ceiling shall be eight feet

(3) Cafeteria --12 feet

(4) Industrial Arts and Vocational Shop --12 feet

(5) Library/Media Center – 9½ feet;

d. Corridors and all other administrative spaces shall have a minimum ceiling height of eight (8) feet; and

4. A health unit shall be provided and shall include a nurse's area, a waiting area, an examination area, a rest area with privacy, drinking water and toilet facilities sized and arranged so that physically disabled persons requiring assistance will be able to receive such aid.

4.7.2 Space Allowance Guidelines

A. All projects must meet Educational Program Space Guidelines that provide the basis for gross square foot per pupil allowances. The standards and any associated guidelines provide by RIDE shall define prototype school design and space recommendations for each specified program activity eligible for housing aid. Projects that exceed gross square foot per student allocations will be reimbursed only up to the limits provided herein. These standards are reflective of realistic, future-oriented, and contemporary educational program goals and are based on the summation of square foot allocations for each itemized educational space.

Table 1: Gross Square Feet (GSF) per Student - Elementary Schools

Projected Enrollment	GSF per Student	Projected Enrollment	GSF per Student
Less than 300	180	450-459	163
300-309	180	460-469	161
310-319	179	470-479	160
320-329	178	480-489	159
330-339	177	490-499	158
340-349	175	500-509	157
350-359	174	510-519	156
360-369	173	520-529	154
370-379	172	530-539	153

380-389	171	540-549	152
390-399	170	550-559	151
400-409	168	560-569	150
410-419	167	570-579	149
420-429	166	580-589	147
430-439	165	590-599	146
440-449	164	600 and greater	145

Table 2: Gross Square Feet per Student – Middle and Junior High Schools

Projected Enrollment	**GSF per Student**	**Projected Enrollment**	**GSF per Student**
Less than 400	190	580-589	175
400-409	190	590-599	174
410-419	189	600-609	173
420-429	188	610-619	172
430-439	187	620-629	171
440-449	187	630-639	170
450-459	186	640-649	169
460-469	185	650-659	169
470-479	184	660-669	168
480-489	183	670-679	167

490-499	182	680-689	166
500-509	181	690-699	165
510-519	181	700-709	164
520-529	180	710-719	163
530-539	179	720-729	163
540-549	178	730-739	162
550-559	177	740-749	161
560-569	176	750 and greater	160
570-579	175		

Table 3: Gross Square Feet per Student – Academic High Schools

Projected Enrollment	**GSF per Student**	**Projected Enrollment**	**GSF per Student**
Less than 600	205	800-809	195
600-609	205	810-819	195
610-619	205	820-829	194
620-629	204	830-839	194
630-639	204	840-849	193
640-649	203	850-859	193
650-659	203	860-869	192
660-669	202	870-879	192

670-679	202	880-889	191
680-689	201	890-899	191
690-699	201	900-909	190
700-709	200	910-919	190
710-719	200	920-929	189
720-729	199	930-939	189
730-739	199	940-949	188
740-749	198	950-959	188
750-759	198	960-969	187
760-769	197	970-979	187
770-779	197	980-989	186
790-799	196	1000 and greater	185

B. Vocational Technical Schools and the Vocational Education space components of comprehensive high schools shall not exceed two hundred twenty-five (225) gross square feet per pupil and any additional programmatic requirements may be considered on a case by case basis.

4.7.3 Space Allowance by Program Activity

A. The following space allowance guidelines shall be used to plan new educational facilities. Square footage designed above these criteria is ineligible for reimbursement funding.

ELEMENTARY SCHOOLS		
Type of Space	**300 Students**	**600 Students**
Pre-Kindergarten & Kindergarten (including toilet)	1200 square feet each	1200 square feet each

Core Classrooms	950 square feet each	950 square feet each
Art (including storage and workroom)	1150 square feet	2300 square feet
Music (including practice and ensemble)	1350 square feet	2700 square feet
Special Education: Self-contained classroom (including toilet) Small Group/Resource Room	 950 square feet 500 square feet	 950 square feet 500 square feet
Media Center/Library	2020 square feet	3310 square feet
Gymnasium (including storage and office)	6300 square feet	6300 square feet
Food Prep/Kitchen	1600 square feet	1900 square feet
Cafeteria	15 square feet per student accommodating ½ planned enrollment	15 square feet per student accommodating ½ planned enrollment
Stage	1000 square feet	1000 square feet
Chair/Table Equipment Storage	200 square feet	300 square feet
Staff Lunch Room	200 square feet	300 square feet
General Office	1500 square feet	1600 square feet
Nurse/Health	510 square feet	510 square feet
Guidance	185 square feet	185 square feet
Teachers Workroom/Lounge (including toilet)	300 square feet	450 square feet

Custodian/Maintenance	1500 square feet	1600 square feet
General Storage (Books)	400 square feet	600 square feet

JUNIOR HIGH/MIDDLE SCHOOLS		
Type of Space	**400 Students**	**750 Students**
Core Classrooms	950 square feet each	950 square feet each
Science	1200 square feet each	1200 square feet each
Art (including storage and workroom)	1350 square feet	2550 square feet
Music (including practice and ensemble)	1700 square feet	1700 square feet
Tech Classroom (e.g. drafting, business)	1200 square feet	2400 square feet
Tech Shop (e.g. consumer, wood)	2000 square feet	4000 square feet
Special Education: Self-contained classroom (including toilet) Small Group/Resource Room	 950 square feet 500 square feet	 950 square feet 500 square feet
Media Center/Library	2680 square feet	4700 square feet
Gymnasium (including storage and office)	6150 square feet	6150 square feet
Food Prep/Kitchen	1700 square feet	2050 square feet
Cafeteria	15 square feet accommodating 2/3 planned enrollment	15 square feet accommodating 2/3 planned enrollment

Stage	1600 square feet	1600 square feet
Chair/Table Equipment Storage	200 square feet	300 square feet
Staff Lunch Room	200 square feet	300 square feet
General Office	1920 square feet	2170 square feet
Nurse's Office/Health	510 square feet	510 square feet
Guidance	450 square feet	750 square feet
Teachers Workroom/Lounge (including toilet)	300 square feet	450 square feet
Custodian/Maintenance	1375 square feet	1400 square feet
General Storage (Books)	400 square feet	600 square feet

HIGH SCHOOLS		
Type of Space	**600 Students**	**1000 Students**
Core Classrooms	950 square feet each	950 square feet each
Science	1200 square feet each	1200 square feet each
Art (including storage and workroom)	1350 square feet	2700 square feet
Music (including practice and ensemble)	2125 square feet	2275 square feet
Tech Classroom (e.g. drafting, business)	2400 square feet	4800 square feet
Tech Shop (e.g. consumer, wood)	4000 square feet	8000 square feet

Special Education: Self-contained classroom (including toilet) Small Group/Resource Room	 950 square feet 500 square feet	 950 square feet 500 square feet
Media Center/Library	3650 square feet	6150 square feet
Gymnasium (including storage and office)	10000 square feet	10000 square feet
Ancillary PE Space (including PE alternatives, storage, lockers, offices, and locker rooms)	7000 square feet	10300 square feet
Food Prep/Kitchen	1900 square feet	2300 square feet
Cafeteria	15 square feet per student accommodating 1/3 planned enrollment	15 square feet per student accommodating 1/3 planned enrollment
Auditorium	2/3 enrollment at 10 square feet per student (750 seats maximum)	2/3 enrollment at 10 square feet per student (750 seats maximum)
Stage Auditorium Storage, dressing rooms, controls	2800 square feet	2800 square feet
Staff Lunch Room	400 square feet	500 square feet
General Office	2020 square feet	2270 square feet
Nurse’s Office/Health	710 square feet	910 square feet
Guidance	1050 square feet	1500 square feet
Teachers Workroom/Lounge (including toilet)	300 square feet	450 square feet

Custodian/Maintenance	1475 square feet	1575 square feet
General Storage (Books)	400 square feet	600 square feet

4.7.4 Special Education Spaces

A. Spaces for special education classes/programs may receive special consideration for additional space at the discretion of RIDE, if the District documents and certifies a greater need in the Design and Educational Program. The gross square feet per student defined herein includes an assumption that eight percent (8%) of the total planned enrollment will be enrolled in self-contained special education programs.

B. The Council shall approve requests for additional space eligible for housing aid reimbursement if the District demonstrates that:

1. School facility needs related to the required programs cannot be addressed within the existing facilities and that all other spaces are consistent with the space allowance guidelines;

2. Such spaces are necessary to comply with federal or state laws concerning educating students with disabilities to the greatest extent possible in the same building or classes with their non-disabled peers and the additional or inconsistent spaces will:

    a. Allow for the return of students with disabilities from out of District facilities;

    b. Permit the retention of students with disabilities who would otherwise be placed in out of District facilities;

    c. Provide space for regional programs in a host school building that houses both disabled and non-disabled students; or

    d. Provide space for the coordination of regional programs by a county special services District, educational services commission, jointure commission or other agency authorized by law to provide regional special education services, in a school facility that houses both disabled and non- disabled students

4.7.5 Space Allowance Exception

The applicant may make reasonable departures from the guidelines shown above only with a prior written determination of the Council that special circumstances exist and that such departures are consistent with the intent of this

Part to provide adequate, safe, cost-effective, and programmatically sound school facilities.

4.8 Cost Standards

4.8.1 Cost Guidelines

A. Districts shall include in their application a complete and detailed breakdown of the estimated costs associated with the project, prepared by a professional construction cost estimator. Cost estimates should be in the format provided in the annual guidance. This format will be an elemental classification framework developed through industry and government consensus. Construction cost estimates must be carried forward to the proposed bid date and include project management and design fees. Project information collected by RIDE will be stored in a database to provide a means for preparing annual cost guidance.

B. Project management and design fees, as a percentage of total construction costs, shall not exceed twenty percent (20%) of the general construction costs. Where projects mix new and retrofit construction, costs shall be clearly separated for new construction, new additions, gut rehabilitation, and space modernization.

4.8.2 Additional Facilities

The provisions of this section shall not be deemed to preclude an applicant from including in an Approved Project, in addition to the Design and Educational Program as approved by the Council, such additional facilities as said District might desire. Any and all costs related to said additional facilities, including but not limited to, the design, construction and implementation of said additional facilities, shall be the sole responsibility of the eligible District.

4.8.3 Ineligible Costs

A. The cost of project elements that exceed or diverge from the project scope of an approved project, including items noted below, are categorically ineligible to receive school housing aid. School housing aid is not paid on furnishings, fittings, and equipment unless the project involves new construction.

B. Categorically ineligible costs shall include, but not be limited to:

1. Any costs for an Approved Project in excess of the final approved amount for Housing Aid.

2. Financing costs incurred by an Applicant if the bond is not issued through the Rhode Island Health, Education, and Building Corporation (RIHEBC).

3. The cost of legal services.

4. The provision of any direct or indirect municipal services shall be ineligible costs, except the provision of public safety services as required by law, or services which RIDE determines are necessary for the completion of the project.

5. All costs associated with the operation and routine maintenance of a school facility.

6. Costs associated with site remediation costs, unless a District demonstrates that there are no available sites that do not require remediation or that it is less costly to remediate the selected site rather than purchase other property. In addition, the District will have to document its efforts to obtain other sources of public and private funds to assist with the remediation of the site. The Council expect that municipalities will secure federal funding or judgments against those responsible for the contamination.

7. Any costs determined to be ineligible by the Council during the course of the enforcement of the regulations and compliance with the memorandum of agreement process. The Council reserve the right to disallow any costs associated with any change order that deviates from the scope of the project.

8. Other ineligible costs: swimming pools, skating rinks, field houses, District administrative office space that is not incorporated into a school building, indoor tennis courts, and outdoor field surface materials on existing fields. In addition, Districts building new or an addition to existing elementary schools will be reimbursed only for a multi-purpose room for auditorium and cafeteria purposes. Furthermore, athletic facilities requests will be considered only if the District demonstrates that the facility will be used predominantly by the school population. This demonstration shall include an analysis of needed physical education and sports activities based on the student population to be served by the proposed new facility. The District shall also include an inventory of community athletic/recreation facilities to ensure that school housing aid is not being paid for community resources.

4.9 Application and Approval Procedures

4.9.1 Necessity of Construction Overview

A. The process and requirements of the revised Necessity of Construction approval process allow the Council to:

1. better project and allocate school housing aid;

2. give school Districts adequate planning time prior to a final bond-approval commitment; and

3. provide greater accountability over individual school District project costs and content through a structured review process.

B. The Necessity of School Construction approval process is a two-stage process as outlined below. Stage 1 of the process requires Districts to include a statement of interest, project justification, facilities analysis, District asset protection plan, capital improvement plan, and community demographics. Upon the preliminary determination by RIDE that the project meets the criteria for the Stage 1 of the necessity of school construction process, the application proceeds to Stage 2. Stage 2 of the process requires Districts to complete a feasibility study, cost projections, design plans, and site work.

4.9.2 Necessity of School Construction - Stage 1

A. The project approval process begins with informing RIDE of the District's intent to modernize, modernize and build an addition, or construct a new school building. The intent is confirmed once the Necessity of School Construction Application packet has been completed by the District, submitted to RIDE, and accepted by RIDE in writing. The Stage 1 Necessity of School Construction Application shall include the following:

1. Statement of Interest/Project Justification

a. Districts must submit a letter from the School Committee to RIDE signed by the Superintendent, School Committee Chair, and a representative of the municipality in which the District is located (Town Council, Mayor, etc.) indicating the intent of the District to request school housing aid funds and clearly justifying why the proposed project is necessary.

b. When submitting a Statement of Interest, the District must clearly demonstrate why the project is deemed necessary to the District's educational mission and the building deficiencies that this project will remediate such as: not meeting student enrollment needs, class size above appropriate limits, reduced ability or inability to offer ancillary services, and/or learning environments and classroom sizes that are inadequate for student learning or student programs.

c. The District must indicate whether the building will be a major renovation of a current building, a major renovation with an addition, or construction of a new building. In the case of new construction, the District must clearly demonstrate why new construction is necessary as opposed to renovating existing facilities. With renovation projects, the Facility Analysis must clearly indicate that the condition of the affected facility is poor. The

application, through the Facility Analysis, should note the reason for the renovations, such as the need to rectify building code compliance issues, safety and/or health concerns, or security issues. When renovations to or closing of an historic building are proposed, the justification should identify historic tax credits or other potential costs if the building were put to commercial use.

d. The District must indicate how the current condition of existing facilities has been addressed through the Asset Protection plan below and link this information to the need for new construction or a major renovation project.

e. If the District is applying for High Performance Green School Status and the additional two to four percent (2-4%) reimbursement for energy efficiency pursuant to § 4.13.2 of this Part, this must be stated in the Necessity of Construction Application.

2. School Building Committee members

a. The District must submit names and backgrounds of the members of the school building committee that shall be formed in accordance with the provisions of the District's local charter and/or by-laws.

b. The school building committee must, at a minimum consist of eight (8) people, including the superintendent of schools, at least one member of the school committee, the local official responsible for building maintenance, a representative of the office or body authorized by law to construct school buildings in the municipality, the school principal from the subject school, a member who has knowledge of the educational mission and function of the facility, a local budget official or member of the local finance committee, and at least one member of the community with architectural, engineering and/or construction experience to provide input relative to the effect of the project on the community and to examine building design and construction plans for reasonableness.

3. District Asset Protection Plan

a. The District must submit the District's Asset Protection Plans for the three (3) years prior to the Application documenting spending on preventive maintenance, renovation, and adaptation of the building to be modernized or replaced with notes explaining actions taken by the District to ensure protection of its physical assets. Particular attention must be given to projects receiving Housing Aid reimbursement in previous years.

b. A review of a District's past investment in maintenance and ongoing maintenance activities will indicate to the Council whether the

District has effectively maintained existing buildings in accordance with its asset protection plans, such that approval of the proposed project by the Council is justified.

4. Capital Improvement Plan

   a. The District must submit the municipality or District's most recently submitted Capital Improvement Plan showing how the proposed building modernization or construction project has been anticipated in District planning or a written explanation of the reason that the project has been moved up in the planning sequence or added to the Plan.

   b. If the District does not have a current five-year Capital Improvement Plan on file with RIDE, the District must complete and submit such Plan. Districts submitting new plans or amendments to existing plans will be notified in writing if the Commissioner of Education accepted the plan prior to Stage 2 of the approval process

5. Facility Analysis of Existing Buildings

   a. A facility analysis must be submitted. The Facility Analysis should list any deficiencies in the District's existing buildings. The Facility Analysis must be conducted by a licensed engineer and must include:

      (1) Inspection and analysis of the building envelope (roof, walls, glazing, foundation, floor/slab)

      (2) Inspection and analysis of the structural elements of the facility

      (3) Inspection and analysis of all mechanical systems, including condition, age, energy efficiency, levels of ventilation, and compliance with American Society of Heating, Refrigerating, and Air Conditioning Engineers (ASHRAE) standards

      (4) Inspection and analysis of the lighting system, including condition, age, energy efficiency and lighting levels

      (5) Inspection and analysis of all controls including lighting controls and sensors, energy management systems, emergency shutoffs

      (6) Inspection and analysis of all fire, safety and security systems including emergency plans

(7) Analysis of the energy use (electric and heating and/or cooling) of the facility for at least the last two years, a survey of the facility systems, and recommendations for improving energy efficiency. The use of Energy Star Portfolio Manager or ComCheck software systems to benchmark the facility against other buildings or the Rhode Island Building Energy Code is highly encouraged.

6. District and Community Demographics

a. Districts must submit enrollment projections for the next five years for each grade with a brief analysis (increases/decreases from year to year shown in actual numbers or percents) of how the data supports the need for the project. When possible, local enrollment projections should be supported by those from an outside source, such as RIDE or the New England School Development Council (NESDEC).

b. The District must submit community data including actual and projected population, housing statistics, birth rates, or immigration estimates, and an analysis of how the data supports the need for the project.

7. Cross Districting

a. Districts must provide an analysis for the potential economic and non-economic impact of cross-Districting, which shall demonstrate that the District has considered District boundaries, other existing facilities, and population trends in determining the need and site of proposed projects.

8. Approval of Funding for Architectural Feasibility Study

a. The District must submit an agreement to fund an Architectural Feasibility Study, to include initial energy modeling of energy efficiency or renewable energy technologies, signed by the school District authority or municipal authority. No application will be considered unless there has been an approval by the authority that authorizes funding of an Architectural Feasibility Study.

b. The Stage 1 application is reviewed by RIDE and either approved, returned to the District for further information, or disapproved.

c. Plan Review options:

(1) Approval: RIDE approves the Application and schedules and conducts a conference with the School Building Committee and RIDE at which questions about the Application may be

asked and answered and the school construction regulations and feasibility study requirements are discussed. If a project is approved, a written timeline will be established for how the project will proceed.

(2) Further information needed: RIDE returns the Application with requests to provide timely answers to questions, clarification of prescribed issues or request supplemental information. This step may also include a Plan Review where the concerns are addressed at the scheduled conference.

(3) Disapproval: RIDE returns the Application and notes the reasons for disapproval. The District may request a meeting with RIDE to review the Application and the decision.

d. Once RIDE has approved the Stage 1 Necessity Application, the District has one year in which to complete Stage 2 of the application. This is the critical step in project design since Stage 2 will include the projected total cost of construction of the project as well as the rationale for the project to be presented to voters, if a bond issue is required. If Districts do not submit Stage 2 within one year of the preliminary approval, the approval will expire and Districts will have to start at Stage 1 again.

4.9.3 Necessity of School Construction: Stage 2

A. The following Stage 2 Necessity of School Construction items are submitted within one year of the preliminary approval and must include the following:

1. Architectural Feasibility Study

a. The Architectural Feasibility Study must include the following items:

(1) Design and Educational Program as defined in § 4.3 of this Part.

(2) The site selected in the case of new construction along with a comparison of the costs and feasibility of modernization/addition and new construction.

(3) Cost comparison between this project and other alternatives reviewed. If the project involves new construction, the cost analysis must show clearly and fully that the proposed new construction is the best available alternative to meet the projected need based upon educational programs to be housed, total cost effectiveness (including life cycle cost analysis using twenty years as the lifetime), and the public interest. A consideration of indirect costs associated with the

project, such as new sewers, roads, transportation or utilities, must be included. If there are surplus buildings, include benefits or costs to the public, such as re- sale value or demolition costs. If the project includes the renovation of an existing building, the Facility Analysis must clearly demonstrate that the building is structurally sound or can be made so reasonably.

(4) Documentation of compliance with Site Standards as referenced in these Regulations and NE-CHPS.

(5) Consideration of school District or school facility consolidation pursuant to § 4.6.4 of this Part.

(6) Analysis of historic implications and comments from the RI Historical Preservation and Heritage Commission, if applicable.

(7) Traffic/Transportation Impact Plan pursuant to Section § 4.6.7 of this Part.

(8) Preliminary energy analysis or modeling pursuant to NE-CHPS.

(9) Feasibility of using renewable energy technologies pursuant to NE-CHPS.

2. Architect's Design Plans

a. Districts must submit three sets of architect's schematic design plans to RIDE for Plan Review.

3. Design and Construction Cost Projection

a. Cost projections must consider the effects of initial capital costs versus maintenance costs over the life of the building with the goal of reducing operation and maintenance costs. Districts must demonstrate the incorporation of life cycle cost analysis in the selection of mechanical systems, equipment, and materials.

b. The projection shall include a detailed breakdown of the costs associated with this project. This cost analysis should include not only the estimated costs of construction escalated for inflation at the anticipated bid date but also the project management and design fees. Refer to § 4.8 of this Part. Project management and design fees as a percentage of total construction costs shall not exceed twenty percent (20%) of the general construction costs, as determined by RIDE.

c. Basic architectural services shall consist of the following phases, schematic design, design development, construction documents, bidding, and construction administration and include the following: architectural drawings, mechanical, electrical, plumbing, fire protection, structural, site development, basic environmental permitting, graphics, lighting design, acoustics, data and communication, educational consultants, any specialty consultants for laboratory, library/media center and kitchen space, code consultants, accessibility, and other services established by RIDE. Additional architectural services may include: geotechnical consultants, asbestos consulting, wetlands flagging, and other additional services as determined by RIDE.

d. Cost projections must be broken down between new space (i.e. addition) and space improvements (i.e. renovation). If a District is building an addition onto a school as well as conducting major renovations, the soft costs shall be pro rated between the two aspects of the project. By separating the costs, RIDE is able to compare the cost of the new construction versus renovation. RIDE provides cost guidelines as prescribed in § 4.8 of this Part. The cost comparison should also include an evaluation of the potential for the use of historic tax credits for historic buildings that are being reused or surplused.

4. Financing plan

a. Districts must consider the impact on the operating budget of implementing the project in such detail and format as required by the Council, including but not limited to, an estimate of the costs of additional maintenance required of the District, the costs of additional instructional or support staff, additional utility costs, the costs of additional transportation, if any, and the estimated revenue, if any, from the sale or lease of any school facility decommissioned as a result of implementing the project.

5. Site Purchase Plan (if required)

a. Districts must detail information about the location, cost, and acquisition plan for any new site. The site must meet all site standards included in these regulations. The District has sole responsibility for identifying and acquiring control of the site.

6. Local Support, Approval by the Council, and Memorandum of Agreement

a. Districts must submit documentation of community support for the project, including City/Town Council and School Committee

approvals. Please include a timeline for when the project will be submitted to voters for approval, if applicable.

b. Upon receipt of the Stage 2 Application, RIDE conducts a project feasibility review followed by a Plan Review meeting with the school building committee, design team, commissioning agent and other applicable parties. After the Plan Review, if the application has received preliminary approval by RIDE, the project will be sent to the Council for final approval. If the project is approved, a Memorandum of Agreement will be entered into with the District that sets forth the dollar authorization for the project (budget agreement), the scope of the project, and any contingencies that the District must comply with. Districts will be required to agree to any contingencies noted in the Memorandum of Agreement. A standing contingency is that Districts will be expected to warn and conduct the vote for public approval for funding within six (6) months of the Council approval. If the voters do not approve the project within that time frame, the approval will expire and Districts will have to start at Stage 1 again. The District will submit a signed copy of the Memorandum of Agreement to RIDE within ten (10) days of receipt. The Superintendent, or other chief administrative officer of the District, as well as all members of the School Committee must sign the agreement.

c. Finally, there will be ongoing design document review and approval process by RIDE that occurs, at a minimum, at the following three stages of project implementation;

(1) Completion of Schematic Design

(2) Completion of Design Development

(3) Sixty Percent (60%) completion of Construction documents

4.10 Design and Review Process

4.10.1 Design Review

A. RIDE will conduct an architectural and technical peer review of each Approved Project at the completion of schematic design, design development, and construction document phases, or at such other times determined by RIDE. Such a review will ensure that the designs comply with the approved Design and Educational Program approved by the Council and these regulations. In the event that the school project involves historic buildings or Districts, the RI Historical Preservation and Heritage Commission may require an ongoing review through construction.

B. Districts are responsible for submitting all required documentation to RIDE upon completion of each design phase and attending Plan Review meetings as scheduled by RIDE. At the Plan Review meetings, the design team and building committee are expected to answer all questions posed by RIDE and, upon successful conclusion of the review, may move to the next phase of design.

C. Listed below is the required documentation for each phase of the design process:

1. Schematic Design:

a. The purpose of the documentation submitted during the Schematic Design is to document the continuing development of the school construction project and its major components and to project a project budget. The documentation should also demonstrate compliance with the Northeast-CHPS.

(1) Site plan and Landscape plan @ 1/16” = 1’-0”

(2) Floor plans @ 1/16” = 1’-0” showing all partitions and door swings Color Rendering

(3) Exterior elevations @ 1/16” = 1’-0” Typical building wall sections Single line engineering diagrams Outline specifications

(4) City Planning Board submission

(5) Civil engineering drawings (scale as required) Confirm Project schedule

(6) Site engineering calculations Construction Cost Estimates Project Report

(7) LEED™ Checklist Form Project Review Meeting

(8) Educational Specifications and Schematic submission to DOE

2. Design Development and Construction Documents:

a. Design Development is intended to further develop the school facilities project design with greater detail.

(1) Construction drawings for all trades that show the scope of work for the Project as defined in the detailed deliverables description

(2) Specifications with general conditions and all technical sections Construction Cost Estimate

(3) Legal/regulatory approvals completed as required Confirm Project schedule

(4) Project Report

(5) LEED™ Checklist Form

(6) Project Review Meeting

D. The cost of project elements that exceed or diverge from approved project scope may be declared ineligible for school housing aid reimbursement. The District may retain such elements only by accepting sole financial responsibility for non-conforming elements in writing in a format prescribed by RIDE, prior to inclusion of such elements in any designs.

4.10.2 Commissioning Agent Services

A. The District shall procure the services of an independent engineering Commissioning Agent. Commissioning is the process of ensuring that systems are designed, installed, functionally tested, and capable of being operated and maintained to perform in conformity with the design intent of a project. The Commissioning Agent must be secured prior to the design phase of the project. The Commissioning Agent must be independent, and be procured separately from the contract for the District's construction services. The Commissioning Agent will be responsible, in part, for the local reporting required to implement state enforcement of the regulations for the project during the design, construction, and operational acceptance process to ensure compliance with the regulations during integrated design. During schematic design and design development, the Commissioning Agent will verify that all standards have been met through meetings with the design team and review of plans submitted by the design team. The Commissioning Agent will continue to monitor compliance with these regulations through the development of construction documents and through the construction process to ensure that all building systems, mechanical and lighting equipment, and all specifications are in compliance with regulations, included in and consistent with all plans, construction documents, and cost estimates. The Commissioning Agent will submit reports certifying compliance with all standards and regulations to RIDE and the District representative. The Commissioning Agent should work closely with the District's project manager, also referred to as clerk of the works.

B. The Commissioning Agent must:

1. Bring the owner's needs and project requirements to the forefront at each phase of the project to ensure that the finished project will meet expectations;

2. Improve the building's overall performance by optimizing energy-efficient design features and directly addressing issues like equipment performance testing and system integration; and

3. Verify that building staff members are well-trained and possess the documentation they need to operate and maintain the building's systems and equipment after turnover.

4.10.3 Architectural, Engineering, and Other Services

A. Architectural, engineering, project management, construction management, financial, and other professional services shall be procured by the Districts for all projects.

B. The Facility Analysis must include an analysis of the energy use (electric and heating and/or cooling) of the facility for at least the last two years, a survey of the facility systems, and recommendations for improving energy efficiency. The use of Energy Star Portfolio Manager or ComCheck software systems to benchmark the facility against other buildings or the Rhode Island Building Energy Code is highly encouraged.

4.10.3 Timelines

The District must meet the timelines established in the Memorandum of Agreement. If the District does not meet said timelines, RIDE reserves the right to rescind project approval and the District may reapply for the Project in a subsequent fiscal year.

4.10.4 Construction Bidding Documents

The District shall maintain bidding information and tabulation sheets and shall provide them and any other documentation upon request by RIDE.

4.10.5 Project Files

A. The District shall maintain a project file that shall include, but not be limited to, the following documents:

1. All documents related to the project approval process, including project siting, land acquisition, real estate documents (deeds, leases, title report including searches for easements, mortgages, judgments, liens, unpaid taxes, water and sewer, or property description by metes and bounds) surveys, school board resolutions, referendum ballot questions or municipal debt ordinances, and all public notices.

2. All documents related to the financing of the project including:

a. Selection and payment of professionals, such as bond counsel and other attorneys, underwriters, financial and investment advisors, trustees, official printers, and bond insurers;

b. Structuring of the financing, such as the method(s) of borrowing considered, complete financing estimates and cash flows, all number runs including escrow sufficiency, if applicable, and yield calculations, the rationale for the plan of financing (resulting in the issuance of obligations under terms most advantageous to the District), long-range plans or models, computerized models, private uses, and costs of issuance; and

c. Issues of debt, such as general, series and supplemental bond resolutions, trust indentures, trust agreement, preliminary official statement, all disclosure materials, Official Notice of Sale or Purchase Contract, arbitrage certificate, tax regulatory agreement, IRS Form 8083, as appropriate, Disclosure Agreement, and TEFRA Notice, if applicable

3. All documents related to the bidding process, evaluation of bids, award, and execution of contracts, the specifications, request for proposal ("RFP") or other invitations to bidders, the advertisements or public notices of the opportunity to bid, logs of the bids received and the bids opened, bid evaluation worksheets, notices of contract award, and the executed construction contract documents;

4. All documents related to the construction of school facilities, including the documents required to be kept by the construction contract documents, specifications, change orders, alternate submissions, approvals or rejections, unit prices, product data, time of performance schedules, construction photographs, quality control management reports, value engineering information, up-to-date project accounting system, intermediate and final audits, "as builts" or other drawings documenting the actual facilities built and fixtures installed, close-out documentation on forms provided by RIDE, related correspondence, vouchers, and certifications;

5. All payroll certifications filed with the District by all contractors and subcontractors; and

6. All documents a District is legally required to make, maintain, or keep on file as part of a construction project.

B. The documents above shall be maintained in a readily accessible place for review and inspection by the RIDE and any other related agencies for the duration of the school facilities project and three years thereafter or, if litigation

concerning any aspect of the school facilities project is instituted, until completion of all litigation, whichever is later.

4.11 Enforcement of Regulations and Compliance with the Memorandum of Agreement

A. During design, RIDE will review schematic design and design development documents as indicated in § 4.9.3 of this Part. During construction, RIDE may visit the construction site to determine that the project is being built as approved. RIDE will review periodic construction progress reports. RIDE will review construction documents at the 60% completion stage and review change orders exceeding 10% of the original approval to determine that the project is proceeding as approved and in compliance with these regulations. The cost of change orders, which result in elements that diverge from or exceed the provisions of the Design and Educational Program and/or the Memorandum of Agreement, may be deemed ineligible for reimbursement. RIDE may inspect the completed facility, in operation, to ensure the project has been completed and is operating consistent with project approval by the Council and pursuant to the terms of the Memorandum of Agreement. RIDE or its representative reserves the right to conduct an Audit. Audit Materials, as defined in § 4.3 of this Part, shall be provided as requested.

B. In order to determine the eligible costs of an Approved Project, Districts will submit fiscal records to RIDE as prescribed by the Council to ensure that only eligible costs are included in the school housing aid reimbursement. Districts shall cooperate with RIDE or its designee, if any, in the conduct of a fiscal review. Such cooperation shall include, but not be limited to, scheduling, provision of adequate work space, requests for documents, access to personnel with knowledge of the Approved Project, access to Approved Project-related materials stored electronically, or any other requirement for the thorough and expeditious conduct of the review.

C. Except as provided herein, the cost of an audit shall be borne by RIDE. If RIDE determines that the District has not reasonably cooperated in the conduct of a review, is responsible for any delay in the review, or is determined to be making frivolous or non-meritorious appeals, RIDE may, in its sole discretion, deduct all or a portion of the cost of conducting the fiscal review from the District’s school housing aid reimbursement.

D. Applicants shall maintain all records related to an Application and an Approved Project pursuant to the requirements established in § 4.10 of this Part.

4.12 Asset Protection and Maintenance of Facilities

4.12.1 Asset Protection Plans and Building Maintenance

A. Each school District shall develop, implement, and maintain a comprehensive asset protection plan for every school building, not just buildings for which school housing aid is sought or received. The plan must include a full analysis of the building's current condition, the need for repairs if any, the costs associated with the repairs, and the nature and cost of annual maintenance for each building. The asset protection plan must be submitted to RIDE annually and will be reviewed by a certified licensed professional to determine that the plan is adequate. The plans must address regularly scheduled preventive maintenance to prevent premature failure and to maximize the useful life of a facility. If the plan submitted by the District is determined to be inadequate, Districts will be notified by RIDE and required to submit a revised plan within thirty (30) days. Districts must submit annual updates to these plans to RIDE that list all maintenance performed and expenditures pursuant to the plan for the previous year.

B. The asset protection plan and annual expenditures pursuant thereto must meet the following minimum requirements:

1. All facilities and structures shall be maintained in a safe, sound, and energy efficient condition. All service equipment, means of egress, devices, and safeguards which are required by the state building code in a building or structure, when erected, altered, or repaired, shall be maintained in good working order;

2. For each facility, the plan shall itemize anticipated annual expenditures for required maintenance;

3. Capital maintenance expenditures shall be itemized and be consistent with the District's approval capital improvement plan; and

4. The plan shall itemize costs for the replacement of all approved temporary facilities in the District with permanent structures.

C. RIDE will not approve a school construction application for a District that does not have a budget for that fiscal year which provides for full funding of its asset protection plan. RIDE will also not approve a school construction application for any District that has not spent at least fifty percent (50%) of its asset protection budget pursuant to its asset protection plan in each of the previous three years prior to application.

D. If a District receiving school housing aid fails to maintain compliance with the asset protection requirements of these regulations or any guidelines, policies or procedures established by the Council, the District may be prohibited from receiving school housing aid for at least one year and prior to reinstatement of school housing aid payments shall be subject to a review by RIDE to determine that the District is in compliance with these regulations.

4.12.2 Certified Educational Facilities Manager

A. No person shall be employed by a District to supervise buildings and grounds unless the candidate meets one of the following criteria:

1. Has completed a minimum of two (2) years' experience in the field of buildings and grounds supervision; or

2. Has been certified an educational facilities manager through an industry accepted certification offered at a regionally accredited institution of higher education or an approved postsecondary institution located within or outside Rhode Island; or

3. Has a college degree in a field related to facilities management.

B. When a vacancy occurs in a position in which the duties of a supervisor of buildings and grounds are performed, the District may select, for a period not to exceed six months from the date of the vacancy, a person who does not meet the requirements noted above to perform on an interim basis the duties of a supervisor of buildings and grounds.

4.13 Housing Aid Reimbursement and Incentive

4.13.1 General

RIDE shall annually award school housing aid within the amounts and at such times as authorized by R.I. Gen. Laws §§ 16-7- 35 through 16-7-47. State funding shall be awarded to completed projects according to statutes and regulations governing school housing aid. No payment of school housing aid for an Approved Project shall be made before the completion of the project and submission of the forms as prescribed by the Regents. School housing aid will be paid on interest only for bonds issued through the RIHEBC.

4.13.2 Energy and Water Efficiency Incentive

A. Additional reimbursement funds are available to approved new construction projects that demonstrate energy and water efficiency cost reduction beyond the minimum school construction threshold requirements as defined in the Northeast-CHPS.

B. Districts are eligible for two percent (2%) additional reimbursement funds for projects that achieve energy efficiency thirty percent (30%) above the RI Building Energy Code; 3% additional reimbursement for energy efficiency forty percent (40%) above the RI Building Energy Code; and four percent (4%) additional reimbursement for energy efficiency fifty percent (50%) above the RI Building Energy Code.

C. Compliance with increased energy efficiency levels is demonstrated through submission of results of energy modeling and analysis reports during the Necessity for School Construction application process as prescribed in § 4.9.2 of

this Part and Plan Review upon completion of schematic design, design development, and construction documents as outlined in these regulations. The submission must be reviewed and certified by a licensed professional engineer and approved by RIDE.

D. Energy efficiency performance must be documented each year through the submission of yearly reports that include: monthly utility bills, summary of energy consumption for the previous year, and energy consumption compared to the baseline design. The District may submit benchmark energy software programs (such as ENERGY STAR Portfolio Manager) to demonstrate compliance.

E. Buildings that are not able to maintain energy efficiency over time must meet with RIDE officials to review the materials and explain any discrepancies. Should non-compliance persist, RIDE may reduce any further reimbursement by the percent of the incentive.

4.14 Program Integrity

Where RIDE determines that false or intentionally misleading information or documentation was submitted by an applicant in support of any effort to obtain acceptance of an application, approval for a Project, reconsideration of an appeal, granting of waiver or any other action or forbearance by RIDE, or a District commits any other act affecting the integrity of the Program, RIDE may permanently revoke any and all payments due to a District, RIDE may take steps to recover any previous payments made to a District and/or said District shall be prohibited from receiving school housing aid for a period of time to be determined by RIDE.

4.15 Closing Schools

A. A District must notify RIDE in writing six months prior to the sale, lease, demolition, or other removal from service of any school facility in the District's jurisdiction. The notification must include the District's plan for accommodating any displaced school programs or services and a plan for accommodating District students within remaining school buildings as a result of this sale, lease or removal from service.

B. Where a building that has received school construction payments from RIDE for a building that has not remained in service for fifty (50) years, RIDE may recapture at its discretion a portion of the housing aid reimbursement.

C. In the event of a proposed closure, a District shall inform neighboring Districts of the proposed action in the event that the second District may wish to acquire the building for its own use.

4.16 Waiver

Any request for a waiver of any of the provisions of these regulations shall be made to RIDE's Commissioner.

Section 01 41 17

UTILITIES NOTIFICATION

PART 1 – GENERAL

1.1 GENERAL PROVISIONS

A. Comply with all regulations and laws concerning excavation, demolition, or explosive work and be advised of utility notification requirements under Rhode Island statue: Chapter 39-1.2, Section 1.

1.2 ADMINISTRATIVE AUTHORITY

A. Notification of utilities within the State of Rhode Island is performed through the Utilities Underground Plant Damage Prevention System, commonly referred to as “Dig Safe”:

1.3 REGULATORY REQUIREMENTS

A. Contractors must notify “Dig Safe” by telephone prior to performing any of the following operations which may occur within 100 feet of underground utilities.
   1. All earth moving operations including, but not limited to: digging, trenching, boring, site demolition, excavation, backfilling, grading, or explosive work.
   2. All demolition operations including, but not limited to: wrecking, razing, rending, moving or removing a structure.

B. Said notification must be made at least 48 hours (excluding weekends and holidays) prior to the Work described above, but not more than 30 calendar days before commencement of the contemplated Work. Notification shall occur between 6:00 AM to 6:00 PM local time from Monday to Friday, except in cases of emergency.
   1. The toll free phone number is: **811**.
   2. Provide the following information:
      a. Municipality.
      b. Location of work.
      c. Intersecting street.
      d. Type of work.
      e. Starting date and time of work.
      f. Name and title of caller.
      g. Phone number of caller.
      h. Best time for “Dig Safe” to return calls.
      i. Company name of General Contractor or Construction Manager.
      j. Company name of sub-contractor performing subgrade work.

C. Member utilities of the Utilities Underground Plant Damage Prevention System are required to respond to the notice within 48 hours from the time said notice is received by designating at the locus the location of pipes, mains, wires, or conduits.

1. Locations of underground utilities will be marked by spray paint or stakes. Marks will be color coded with additional descriptions of letters and arrows as required. Group identification colors, prescribed under the law are as follows:

a. Electrical power distribution and transmission: Safety Red.

b. Stand and municipal electrical system: Safety Red.

c. Gas distribution and transmission: High Visibility Safety Yellow.

d. Dangerous materials, product line: High Visibility Safety Yellow.

e. Telephone and telegraph systems: Safety Alert Orange.

f. Water systems: Safety Precaution Blue.

D. Do not commence work until “Dig Safe” has been properly notified and has responded as described above.

E. Subsequently notify “Dig Safe” of unanticipated additional blasting required after the initial notification to “Dig Safe” has been made. Do not perform the additional blasting work in less than 4 hours following the subsequent notification.

1.4 PROTECTION

A. The Contractor is fully responsible for protection of the utility location markings, wherever these occur, on or off-site.

B. Perform Work in such a manner, and with reasonable precautions taken to avoid damage to utilities under the surface in said areas of work. Immediately notify any known or suspected damage to underground utilities to the owner of such utilities.

PART 2 - PRODUCTS (not used)

PART 3 - EXECUTION (not used)

End of Section

Section 01 42 00
REFERENCES

PART 1 - GENERAL

1.1 SUMMARY

A. Abbreviations and Acronyms.

B. Definitions

C. Reference Standards.

1.2 ABBREVIATIONS AND ACRONYMS

A. The following list of common abbreviations are referenced in individual specification sections. This list is provided for convenience to the Contractor and is not intended to define all abbreviations use in the Contract Documents.

1. Abbreviations for contract and specifications.

CHPS	Collaborative for High Performance Schools (NE-CHPS)
EPA	United States Environmental Protection Agency
HVAC	Heating, ventilating, and air conditioning
IAQ	Indoor Air Quality
IEQ	Indoor Environmental Quality
NE-CHPS	Northeast Collaborative for High Performance Schools Criteria
NIC	Not in Contract
OFCI	Owner Furnished, Contractor Installed
OFI or OFOI	Owner Furnished and Installed (Owner Furnished, Owner Installed)
OPM	Owner's Project Managers (as defined in Section 01 10 00)
SDS	Safety Data Sheet (formerly MSDS)
VOC	Volatile Organic Compounds

B. Abbreviations for measurements and quantities.

C	Celsius
cm	Centimeter
F	Fahrenheit
Hrs	Hours
Kg	Kilogram
L	Liter
M	meter
m^2 or SM	square meter
m^3 or CM	cubic meter
mm	Millimeter

Mths	Months
psi	Pounds per square inch
t	ton

1.3 DEFINITIONS

A. Definitions of contracting parties (Owner, Owner's Project Manager, General Contractor, and Architect): Refer to Section 01 10 00 – PROJECT SUMMARY.

B. Definitions for terms utilized in the Contract Documents:

1. "As necessary," "as directed," "when directed," "satisfactory," "good and sufficient," "approved," or other general qualifying terms are used on the Drawings: These terms are deemed to be followed by the words, "in the opinion of the Architect," or "by the Architect," as the case may be."
2. "Addenda": written or graphic instruments issued prior to the execution of the Contract which modify or interpret the Bidding Documents, including the Drawings and Specifications, by additions, deletions, clarifications or corrections.
3. "Approval," "approved, "approved equal," "or equal," or "other approved" means as approved by the Architect."
4. The terms "Contractor", "General Contractor", and "Construction Manager" as used in the Project Manual have the same meaning and are interchangeable in Contract Documents. These terms refer to the same entity, defined in Section 01 10 00 – SUMMARY.
5. The term "Day": is defined as the following:
   a. The term "calendar day" is a full 24 hour period, starting from 12 AM (midnight), and includes all weekends and legal holidays.
   b. The term "working day" shall mean any calendar day except Saturdays, Sundays, and legal holidays at the place of the building.
   c. Where the term "day" is used without the adjective of "calendar" or "working", it shall mean "calendar day".
6. The terms "Architect", and "Architect/Engineer" as used in the Project Manual have the same meaning and are interchangeable in Contract Documents. These terms refer to the same entity.
7. "Furnish and Install" or "Provide": items identified shall be furnished and installed under this Contract. The term "Furnish", when used separately, shall mean that the items referred to shall be furnished, only. Similarly the term "install", when used separately, shall mean that the items referred to shall be installed, only.
8. "Knowledge," "recognize" and "discover," their respective derivatives and similar terms in the Contract Documents, as used in reference to the Contractor, shall be interpreted to mean that which the Contractor knows (or should know), recognizes (or should recognize) and discovers (or should discover) in exercising the care, skill and diligence required by the Contract Documents. Analogously, the expression "reasonably inferable" and similar terms in the Contract Documents shall be interpreted to mean reasonably

inferable by a Contractor familiar with the Project and exercising the care, skill and diligence required of the contractor by the Contract Documents.

9. “Not in Contract” or “N.I.C.”: equipment, furnishings, or other materials not included as a part of this Contract.
10. “Product”: materials, systems and equipment.

1.4 SUSTAINABILITY REQUIREMENTS

A. Sustainability Requirements: The following sustainability requirements are hereby made a part of this Project by reference thereto:
   1. High Performance Schools Exchange, Northeast Energy Efficiency Partnerships NE-CHPS, (referred to herein as “NE-CHPS”).
   2. Link: https://neep.org/ne-chps-40

1.5 REFERENCE STANDARDS

A. For products or workmanship specified by association, trade, or Federal Standards, comply with requirements of the standard, except when more rigid requirements are specified or are required by applicable codes.

B. Conform to reference standard by DATE OF ISSUE for Contract Documents, current on date of Owner-Contractor Agreement.

C. Should specified reference standards conflict with Contract Documents, request clarification from Architect before proceeding.

D. The contractual relationship to the parties to the Contract shall not be altered from the Contract Documents by mention or inference otherwise in any reference document.

E. Schedule of References
   1. Listed below are abbreviations for the names and titles of trade association names, federal government agencies and similar organizations which are referenced in the individual specification sections. The addresses and URL’s (Uniform Resource Locators) provided are for the Contractor’s convenience and are believed to be current and accurate, however addresses and URL’s frequently change, and no assurance is made on their accuracy:

AA	Aluminum Association 900 19th Street N.W., Suite 300 Washington, DC 20006 www.aluminum.com
ABAA	Air Barrier Association of America 1600 Boston-Providence Highway Walpole, MA 02081 www.airbarrier.org
AAMA	Fenestration & Glazing Industry Alliance (FGIA) (formerly American Architectural Manufacturer’s Association) 1900 . Golf Road, Suite 1250, Schaumburg, IL 60173 https://fgiaonline.org
AATCC	American Association of Textile Chemists and Colorists PO Box 12215, 1 Davis Drive, Research Triangle Park, NC 27709-2215 www.aatcc.org

ACI	American Concrete Institute, International 38800 Country Club Drive, Farmington Hills, Michigan 48331 www.aci-int.org
ACPA	American Concrete Pipe Association 222 West Las Colinas Boulevard, Suite 641, Irving TX www.concrete-pipe.org
ADC	Air Diffusion Council 104 S. Michigan Ave, Suite 1500, Chicago, IL 60603 www.flexibleduct.org
AFPA	American Forest & Paper Association (Formerly NFPA National Forest Products Association) 1111 19th St. N.W., Suite 800, Washington, DC 20036 www.afandpa.org
AGA	American Gas Association Inc. 1515 Wilson Blvd. Arlington, VA 22209-2469 www.agagas.com
AGAI	American Galvanizers Association Inc. 12200 E.Lliff Ave, Suite 204, Aurora, CO 80014-1252 www.galvanizeit.org
AIA	American Institute of Architects 1735 New York Avenue, N.W., Washington, DC 20006-5292 www.aia.org
AIHA	American Industrial Hygiene Association 2700 Prosperity Ave, Suite 250, Fairfax VA 22031 www.aiha.org
AISC	American Institute of Steel Construction 1 E. Wacher Dr., Suite 3100, Chicago,IL 60601-2001 www.aisc.org
AMCA	Air Movement and Control Association 30 W. University Drive, Arlington Heights, IL 60004-1893 www.amca.org
ANSI	American National Standards Institute 11 W. 42nd Street, 13 Floor, New York, NY 10036 www.ansi.org
APA	APA - The Engineered Wood Association (formerly APA - American Plywood Association) P.O. Box 11700, Tacoma, WA 98411-0070 www.apawood.org
ARI	Air-Conditioning and Refrigeration Institute 4301 N. Fairfax Dr., Suite 425, Arlington, VA 22203 www.ari.org
ASCA	Architectural Spray Coaters Association 230 West Wells Street, Suite 311, Milwaukee WI 53203 www.aecinfo.com
ASCE	American Society of Civil Engineers 1015 15th St. N.W., Washington, DC 20005 www.asce.org
ASHRAE	American Society of Heating, Refrigerating, and Air-Conditioning Engineers 1791 Tullie Circle NE, Atlanta GA.30329 www.ashrae.org

ASME	American Society of Mechanical Engineers 345 East 47th Street, New York, NY 10017-2392 www.asme.org
ASTM	ASTM International (*formerly American Society for Testing and Materials*) 100 Barr Harbor Drive, West Conshohocken, PA 19428*2959 www.astm,.org
AWCI	Association of the Wall and Ceiling Industry 513 West Broad Street, Falls Church, VA 22046 www.awci.org
AWI	Architectural Woodwork Institute 46179 Westlake Drive, Suite 120, Potomac Falls, VA 20165 www.awinet.org
AWMAC	Architectural Woodwork Manufacturers Association of Canada Unit 02A 4803 Centre St. NW, Calgary, Alberta, Canada www.awmac.com
AWPA	American Wood Preservers' Association P.O. Box 286, Woodstock, MD 21163-0286 www.awpa.com
AWPI	American Wood Preservers' Institution 1945 Old Gallows Rd., Suite 150, Vienna, VA 22182 www.oas.org
AWS	American Welding Society 550 LeJeune Road, N.W., Miami, FL 33126 www.aws.org
AWWA	American Water Works Association 6666 W. Quincy Ave., Denver, CO 80235 www.awwa.org
BHMA	Builders Hardware Manufacturers Association, Inc. 355 Lexington Ave., 17 Floor New York, NY 10017 www.buildershardware.com
BIA	Brick Industry Association 11490 Commerce Park Drive, Reston, VA 22091-1525 www.bia.org
CSA	Canadian Standards Assoc. International, Forest Products Group Sussex Centre, Suite 402, 90 Burnhamthorpe Road West, Mississauga, Ontario, Canada www.csa.ca
CDA	Copper Development Association 260 Madison Ave., 16th Floor, New York, NY 10016 www.copper.org
CISCA	Ceilings & Interior Systems Construction Association 579 W. North Ave., Suite 301, Elmhurst, IL 60126 www.cisca.org
CRI	Carpet and Rug Institute 310 Holiday Ave, Dalton, GA 30720 ww.carpet-rug.com
CRSI	Concrete Reinforcing Steel Institute 933 N. Plum Grove Road, Schaumburg, IL 60173-4758 www.crsi.org

CPSC	Consumer Product Safety Commission 5401 Westbard Ave., Bethesda, MD 20816-1469 www.cpsc.gov
CSDA	Concrete Sawing and Drilling Association 100 Second Ave S., Ste 402N, St. Petersburg, FL 33701 www.csda.org
CTIOA	Ceramic Tile Institute of America 12061 W.Jefferson BLVD, Culver City, CA 90230-6219 www.ctioa.org
DHI	Door and Hardware Institute 14170 Newbrook Dr., Chantilly, VA 22021-2223 www.dhi.org
FGIA	Fenestration & Glazing Industry Alliance (formerly American Architectural Manufacturer's Association) 1900 . Golf Road, Suite 1250, Schaumburg, IL 60173 https://fgiaonline.org
FM	Factory Mutual Engineering & Research Corp. 1151 Boston-Providence Turnpike Norwood, MA 02062 www.fmglobal.com
FSC	Forest Stewardship Council (United States Chapter) 1155 30th Street NW, Suite 300, Washington, DC 20007 www.c-f-c.com
GA	Gypsum Association 6525 Belcrest Road, Suite 480, Hyattsville, MD 20782 www.gypsum.org
GANA	Glass Association of North America 2945 S.W. Wanamaker Dr., Suite A, Topeka, KS 66612-5321 www.glass.org
GICC	Glazing Industry Code Committee 3310 Harrison St., Topeka, KS 66611-2279 www.glazingcodes.net
HPVA	Hardwood Plywood & Veneer Association 1825 Michael Faraday Drive Reston, Virginia 20190 www.hpva.org
IGCC	Insulating Glass Certification Council 3933 US Route 11, PO Box 2040, Cortland, NY 13045 www.igcc.org
IGMA	Fenestration & Glazing Industry Alliance (FGIA) (formerly Insulating Glass Manufacturers Alliance) 1900 . Golf Road, Suite 1250, Schaumburg, IL 60173 https://fgiaonline.org
IPA	Industrial Perforators Association 710 N. Plankinton Ave., Suit 622 Milwaukee, WI 53203 www.iperf.org
ILI	Indiana Limestone Institute of America, Inc. Stone City Bank Building, Suite 400, Bedford, IN 47421 www.iliai.com
ISO	International Standards Organization Geneva, Switzerland. www.iso.org

IPCI	International Polished Concrete Institute Norris TN www.ipcionline.org
KCMA	Kitchen Cabinet Manufacturers Association 1899 Preston White Drive, Reston VA 20191 www.kcma.org
LSGA	Laminators Safety Glass Association 3310 Harrison Street, Topeka KS 66611-2279 www.glass.org
MCAA	Mason Contractors Association of America 1910 S. Highland Ave. Suite 101, Lombard, IL 60148 www.masoncontractors.org
MFMA	Maple Flooring Manufacturers Association 60 Revere Drive, Suite 500, Northbrook, IL 60062 www.maplefloor.org
MIA	Marble Institute of America, Inc. 33505 State Street, Farmington, MI 48335 www.marble-institute.com
MIL	Military Specifications and Standards Naval Publications and Forms Center 5801 Tabor Avenue, Philadelphia, PA 19120 www.milspec.com
MSS	Manufacturers Standardization Society 127 Park St. NE., Vienna, VA 22180 http://msshq.org/
NAAMM	National Association of Architectural Metal Manufacturers 8 South Michigan Avenue, Suite 1000, Chicago, IL 60603 www.naamm.org
NCMA	National Concrete Masonry Association 2302 Horse Pen Road, Herndon, VA 20171-3499 www.ncma.org
NEBB	National Environmental Balancing Bureau 8575 Government Circle, Gaithersburg, MD 20877-4121 www.nebb.org
NEMA	National Electrical Manufacturers' Association 1300 N. 17th St., Suite 1846, Rosslyn, VA 22209 www.nema.org
NFPA	National Fire Protection Association 1 Battery March Park, PO Box 9101, Quincy, MA 02269 www.nfpa.org
NFRC	National Fenestration Rating Council 6305 Ivy Lane, Greenbelt MD 20770 www.nfrc.org
NOFMA	National Oak Flooring Manufacturers Association, Inc. PO Box 3009, Memphis, TN 38173-0009 www.nofma.org
NPCA	National Precast Concrete Association 1320 City Center Drive, Suite 200, Carmel, IN. 46032 www.precast.org/npca

NRCA	National Roofing Contractors Association 10255 W. Higgins Road, Suite 600, Rosemont, IL 60018-5607 www.nrca.net
NSF	NSF International 789 N. Dixboro Road, PO Box 130140. Ann Arbor, MI 48105 www.nsf.org *(formerly National Sanitation Foundation)*
NSPI	National Spa and Pool Institute 2111 Eisenhower Avenue, Alexandria VA 22314 www.nspi.org
NTMA	National Terrazzo and Mosaic Association 110 E. Market St., Suite 200A, Leesburg, VA 20176 www.ntma.com
PCA	Portland Cement Association 5420 Old Orchard Road, Skokie, IL 60077-1083 www.cement.org
PCI	Precast / Prestressed Concrete Institute 8770 W. Bryn Mawr Ave., Suite 1150, Chicago, IL 60631 www.pci.org
PEI	Porcelain Enamel Institute 4004 Hillsboro Pike, Suite 224B, Nashville, TN 37215 www.porcelainenamel.com
PS	Product Standard U. S. Department of Commerce www.omg.org
SDI	Steel Deck Institute P.O. Box 25, Fox River Grove, IL 60021-0025 www.sdi.org
SDI	Steel Door Institute 30200 Detroit Road, Cleveland, OH 44145-1967 www.steeldoor.org
SEI	Structural Engineering Institute of the American Society of Civil Engineers 1801 Alexander Bell Drive Reston VA 20191 www.seinstitute.org
SGCC	Safety Glass Certification Council RMS, P.O. Box 9 Henderson Harbor, NY 13651 www.sgcc.org
SIGMA	Sealed Insulating Glass Manufacturers Association 401 N. Michigan Ave., Suite 2400, Chicago, IL 60611 www.glasschange.com
SJI	Steel Joist Institute 3127 10th Ave. N., Myrtle Beach, SC 29577 www.steeljoist.org
SMACNA	Sheet Metal and Air Conditioning Contractors' National Association 4201 Lafayette Center Dr., Chantilly, VA 22022-1209 www.smacnapa.org
SPIB	Southern Pine Inspection Bureau 4709 Scenic Highway, Pensacola, FL 32504-9094 www.spib.org

SSMA	Steel Stud Manufacturer's Association 8 South Michigan Avenue, Chicago IL 60603 www.ssma.com
SSPC	The Society for Protective Coatings 40 24th Street, 6th Floor, Pittsburgh PA 15222-4623 www.sspc.org
SWRI	Sealant, Waterproofing & Restoration Institute 2841 Main Street, Suite 585, Kansas City, MO 64108 www.swrionline.org
TCNA	Tile Council of North America, Inc. 100 Clemson Research Blvd., Anderson, SC 29625 www.tileusa.com *(formerly TCA, Tile Council of America)*
TMS	The Masonry Society 3970 Broadway, Suite 201D, Boulder CO 80304 www.masonrysociety.org
UL	Underwriters' Laboratories, Inc. 333 Pfingston Road, Northbrook, IL 60602 www.ul.com
UNI	Uni-Bell PVC Pipe Association 201 E. John Carpenter Freeway, Suite 750, Irving, TX. www.uni-bell.org
WDMA	Window & Door Manufacturers Association (formerly National Wood Window & Door Association, NWWDA) 205 E. Touhy Avenue, Suite G-54, Des Plaines, IL 60018 www.nwwda.org
WI	Woodwork Institute PO Box 980247 West Sacramento, CA 95798 www.woodworkinstitute.com

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

End of Section

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Section 01 43 39

MOCK-UPS

PART 1 - GENERAL

1.1 SUMMARY

A. Mockup requirements. Mock-ups are required at each site/building for, but not limited to the following:

1. In-place exterior wall section sample panel.
2. Typical classroom Teaching Wall mock up.

B. All mock-ups specified herein, under other Sections of the Specifications, and shown on drawings will be reviewed and approved by the Architect and Owner. Unaccepted mock-ups shall be replaced or reconstructed in part or in total and the extent of the replacement or reconstruction shall be at the discretion of the Architect and Owner. The General Contractor shall carry forth mock-up replacement or reconstruction until Architect's acceptance is obtained. Mock-up costs, including as many replacements or reconstruction as necessary to gain Architect's acceptance, shall be included in the Contract Cost and Schedule.

1.2 RELATED REQUIREMENTS

A. Section 01 45 00 - Quality Control.

B. Section 03 30 00 - Cast-in-Place Concrete.

C. Section 03 45 00 – Precast Architectural Concrete.

D. Section 04 20 00 - Unit Masonry.

E. Section 05 12 00 - Structural Steel Framing.

F. Section 05 40 00 - Cold-Formed Metal Framing.

G. Section 05 50 00 – Metal Fabrications.

H. Section 06 10 00 - Rough Carpentry.

I. Section 07 21 00 - Thermal Insulation.

J. Section 07 27 13 - Modified Sheet Air Barriers.

K. Section 07 46 46 – Fiber Cement Siding.

L. Section 07 54 19 – Polyvinyl Chloride (PVC) Roofing

M. Section 07 62 00 - Sheet Metal Flashing and Trim.

N. Section 07 71 00 - Roof Specialties.

O. Section 07 92 00 - Joint Sealants.

P. Section 08 11 13 – HOLLOW METAL DOORS AND FRAMES.

Q. Section 08 43 13 - ALUMINUM-FRAMED STOREFRONTS.

R. Section 08 44 13 - GLAZED ALUMINUM CURTAIN WALLS

S. Section 08 51 13 - ALUMINUM WINDOWS.

T. Section 09 91 00 – PAINTING.

U. Division 26 - ELECTRICAL.

V. Division 27 - COMMUNICATIONS

1.3 SUBMITTALS

A. Submit the following under provisions of Section 01 33 00 - SUBMITTAL PROCEDURES:

1. Submit shop drawing of mockup indicating sizes, finishes and method of construction and installation of each component

1.4 GENERAL

A. Where requested by Architect, or as specified in individual specification sections, assemble and erect specified items, with specified attachment and anchorage devices, flashings, seals, and finishes. Remove mock-up assemblies prior to date of Final Inspection, or as directed.

B. Mock-ups, when approved by the Architect, will be used as datum for comparison with the remainder of the Work for the purposes of acceptance or rejection. Maintain mockup throughout construction period until Substantial Completion or as otherwise directed by Architect.

1. Finishes, colors and textures of components shall be as specified for each component and shall be selected by the Architect.

C. Demolish and remove from site prior to requesting inspection for certification of Substantial Completion, all Mock-ups which are not permitted to remain as part of the finished work.

1.5 COORDINATION

A. Coordinate work of trades and schedule elements to expedite the fabricating, furnishing, and installation of multiple component mock-ups specified herein, in other Sections of the Specifications, and as shown in the Contract Documents.

PART 2 - PRODUCTS

2.1 EXTERIOR WALL SECTION MOCK-UP

A. Mock-up: Provide complete construction of a selected area of exterior wall in place, using all specified products and as noted below and approved by the Architect. Mock-up shall be a minimum 16 feet high by 28 feet wide and shall be constructed so as to be incorporated into the building once accepted by the Architect. Mock-up

shall be completed by each Trade contractor and subcontractor responsible for each portion of the contracted work represented on the mock-up panel.

1. General description: Mockup unit shall include exterior cold formed metal framing construction, with structural steel, sheathing as well as surface bonded stone veneer, rainscreen attachment system, wood faced panel assemblies and thermal insulation. Mockup shall include all components specified and indicated which are typical to the exterior wall construction and additional components specified herein.
    a. Provide concealed various wood blocking, edgings, nailers, curbs, and cants required for receipt of various finishes and surfacing materials.
    b. Include into mockup assembly all flashing, joint sealers, and all finish trim and accessories necessary to show typical completed construction.
2. Finishes, colors and textures of components shall be as specified for each component and shall be selected by the Architect.
    a. Provide storefront assemblies with specified insulated glazing.

B. Components to be included in the mockup include, but are not limited to:

1. Section 03 30 00 – CAST-IN-PLACE CONCRETE: Permanent concrete foundations and slabs as required to support building construction.
2. Section 04 20 00 - UNIT MASONRY.
    a. Provide type of masonry and colored mortar specified, installed over gypsum sheathing with specified anchorage devices.
    b. Install precast concrete elements in mock-up furnished under Section 03 45 00 – PRECAST ARCHITECTURAL CONCRETE.
    c. Install stone veneer elements in mock-up furnished under Section 04 72 14 - SURFACE BONDED STONE VENEER.
3. Section 05 12 00 – STRUCTURAL STEEL FRAMING: Permanent structural steel framing as required to support building construction.
4. Section 05 40 00 – COLD-FORMED METAL FRAMING: Permanent cold-formed metal framing as required to support building construction.
5. Section 05 50 00 – METAL FABRICATIONS.
    a. Provide galvanized steel lintels for openings in the mockup panel.
6. Section 06 10 00 – ROUGH CARPENTRY:
    a. Provide wood blocking at typical locations as part of mockup.
7. Section 06 16 00 - SHEATHING:
    a. Exterior gypsum sheathing to receive air barrier.
8. Section 07 27 13 - MODIFIED SHEET AIR BARRIERS:
    a. Provide air barrier over sheathing and masonry backup including typical flashing conditions and transitional tie-ins to windows, storefront and curtain wall.
9. Section 07 46 46 – FIBER CEMENT SIDING:
    a. Provide typical composite exterior wall cladding and trim elements as part of mock up panel showing interface with adjacent materials.

10. Section 07 54 19 – POLYVINYL CHLORIDE (PVC) ROOFING:
    a. Provide standard roof construction with interfacing conditions including roof edge.
11. Section 07 62 00 - SHEET METAL FLASHING AND TRIM:
    a. Provide typical metal flashing built into masonry construction.
12. Section 07 71 00 - ROOF SPECIALTIES:
    a. Provide typical roof edge built into masonry and roof construction.
13. Section 07 92 00 - JOINT SEALERS:
    a. Provide joint sealant at perimeter of all components. Colors shall be selected by the Architect.
14. Section 08 11 13 – HOLLOW METAL DOORS AND FRAMES:
    a. Provide exterior door construction in mock up construction.
15. Section 08 43 13 - ALUMINUM-FRAMED STOREFRONTS: Provide fixed glass type storefront assembly and door, matching indicated profiles and dimensions exactly.
    a. Fabricate with removable stop for installation of glass.
    b. Storefront to be enamel shop finished to match selected PVDF finish specified for aluminum windows, matching color and sheen.
16. Section 08 44 13 - GLAZED ALUMINUM CURTAIN WALLS: Provide aluminum curtain wall matching indicated profiles and dimensions exactly.
    a. Fabricate with removable stop for installation of glass.
    b. Curtain wall to be enamel shop finished to match selected PVDF finish specified for aluminum storefront, matching color and sheen.
17. Section 09 91 00 - PAINTING: Provide specified shop and field applied finishes to mock up construction.
    a. Fabricate with removable stop for installation of glass.

2.2 CLASSROOM TEACHING WALL MOCK UP

A. Construct and install one full-size in place mock-up of an entire Teaching Wall assembly complete with finishes.

B. Teaching Wall mock-up shall include the following:
1. All necessary conduit and back boxes at ceilings and walls to terminal connections at whiteboard locations and teacher station for all electrical, technology and communication equipment. Include blocking for equipment mounting.
2. Tackboards as indicated on Drawings.
3. Casework furnished and installed under Section 06 40 00 – ARCHITECTURAL WOODWORK.
4. All gypsum board construction including reveals. Taped sanded and painted.

PART 3 - EXECUTION

3.1 PREPARATION

A. Construct mock-ups at locations indicated or, if not indicated, at locations directed by the Architect.

B. Construct mockup in time to make product and/or assembly modifications without delaying production work.

3.2 INSTALLATION

A. Construct mockup to duplicate actual job conditions.

1. Locate at an area on site as directed by the Architect.
2. Provide foundations, bases, supports and braces adequate to make mockup stable and safe.

B. Provide weather protection for materials in mockups that are not exposed to weather in intended service.

3.3 REMOVAL

A. Retain mock-ups during construction as a standard for judging completed work until time designated by the Architect and the Owner,

1. Accepted mock-ups (which are specifically identified by the Architect to become part of the work) may be incorporated into the work provided they are not damaged during subsequent construction.

End of Section

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Section 01 45 00
QUALITY CONTROL

PART 1 - GENERAL

1.1 SUMMARY

A. General quality assurance and control of installation.

B. Site safety, worker safety and training.

C. General Contractor’s quality control (QC) program

D. Source quality control.

E. Field samples and mock-ups.

F. Manufacturer’s field services and quality control.

G. Field quality control, Owner’s right for confirmation.

1.2 RELATED REQUIREMENTS

A. Section 01 43 39 - MOCK-UPS.

B. Section 01 45 29 - TESTING LABORATORY SERVICES.

1.3 GENERAL QUALITY ASSURANCE AND CONTROL OF INSTALLATION

A. Monitor quality control over suppliers, manufacturers, products, services, site conditions, and workmanship, to produce Work of specified quality.

B. Comply fully with manufacturers' instructions, including performance of each step in sequence. Notify Architect when manufacturers' instructions conflict with the provisions and requirements of the Contract Documents; obtain clarification before proceeding with the work affected by the conflict.

C. Comply with specified standards as a minimum quality for the Work except when more stringent tolerances, codes, or specified requirements indicate high standards or more precise workmanship.

D. Perform work by persons qualified to produce workmanship of specified quality.

E. Secure products in place with positive anchorage devices designed and sized to withstand stresses, vibration, physical distortion or disfigurement.

1.4 SITE SAFETY, WORKER SAFETY AND TRAINING

A. General: The General Contractor (and subcontractors) shall, at all times, exercise reasonable precautions for the safety of all persons. All rules, regulations, and laws concerning safety that are in effect at the work site, and in particular, all applicable regulations of the Occupational Safety and Health Administration

(OSHA) of the U.S. Government, in addition to specified requirements shall be complied with in all respects.

1. General Contractor's responsibility for safety shall apply continuously twenty four (24) hours per Day during the term of this Contract and is not limited to normal working hours.

B. General Contractor’s safety program: Prior to commencement of the Work, the General Contractor shall develop and implement a Safety and Health Plan to comply with the Occupational Safety and Health Administration (OSHA) standards for the Construction Industry and all other applicable Federal, State, local laws and regulations. General Contractors Safety and Health Plan, and included health and safety procedures and policies, shall be submitted to the Architect and Owner’s Representative within fifteen (15) Days after the date of Notice to Proceed and in no event later than commencement of the Work, whichever occurs first.

1. Perform pre planning to ensure access is provided to Fire Department for all areas of the work site throughout the duration of the Contract. The General Contractor shall provide the Fire Department site access maps, updated regularly, to reflect changes in the layout of the work site and shall notify the Fire Department when each update is made
2. Post and maintain, at prominent locations throughout the Project site, emergency telephone numbers and shall insure that all personnel on site are continuously aware of this information.
3. Ensure safe access to the Work for the Owner, Architect, Architect’s consultants, their designated representatives, and all others charged with inspection, testing and monitoring of the Work, and visitors to the site. The General Contractor shall furnish site visitors with safety equipment, test equipment, safety apparel and instructions that are required to insure their safety on site, and in the performance of their duties related to the Work of this Contract

C. All employees to be employed at the worksite will have successfully completed a course in construction safety and health approved by the United States Occupational Safety and Health Administration (OSHA) that is at least 10 hours in duration. The OSHA training and certification course shall occur at the time each employee begins work. Furnish documentation to Owner and Architect, for each employee documenting successful completion of the OHSA safety training and certification course. Submit with the first certified payroll report.

1.5 GENERAL CONTRACTOR’S QUALITY CONTROL PROGRAM

A. Procedures: General Contractor and each subcontractor shall include all labor, materials, equipment, services and incidental items necessary to implement quality control procedures to the extent necessary to demonstrate and maintain compliance with the Contract Documents.

B. Quality Control Plan: Within 20 days after Notice to Proceed, the General Contractor shall submit a Quality Control (QC) Plan to the Owner’s Representative and Architect for approval. The plan shall address the following, as a minimum:

1. The General Contractor’s commitment to quality and implementing and managing the QC program.

2. Identification of the General Contractor's onsite QC Manager, with name, qualifications, duties and responsibilities. The QC Manager shall have the authority to direct the removal and replacement of non-conforming work. The QC Manager shall be present for all QC meetings, inspections and tests during the project.
3. Procedures for addressing and commenting QC with General Contractor's staff, all subcontractors and suppliers, and Owner, Architect and Owner's representative.
4. Procedures for review of submittals and submittal status, and documentation of same.
5. Procedures for pre-installation meetings and documentation of same.
6. Procedures for inspections of deliveries and documentation of same.
7. Procedures for benchmark inspections, defined as initial installations, and documentation of same.
8. Procedures for mockup inspections and documentation of same.
9. Procedures for equipment in place, inspections and documentation of same.
10. Procedures for inspections prior to closures of concealment and documentation of same.
11. Procedures for start-up and commissioning and documentation of same.
12. Procedures for turnover and documentation of same.
13. Procedures for identifying, recording, tracking correcting and reporting items requiring rework, using a Rolling Completion list chronological item number, phase area, date listed, description, party responsible for correction, date notified, and date corrected.
14. Procedures for testing and documentation of same.
15. Procedures for corrective action on Architect's Field Reports and Testing Agency reports and documentation of same.

C. Procedures for reporting on all of the above on a monthly basis as a condition precedent to review of the General Contractor's application for payment.

1.6 SOURCE QUALITY CONTROL

A. Manufacturer Qualifications: A firm experienced in manufacturing products or systems similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.

B. Fabricator Qualifications: A firm experienced in producing products similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.

C. Product Labeling: Attach label from agency approved by authority having jurisdiction for products, assemblies, and systems required to be labeled by applicable code(s).

1. Label Information: Include manufacturer's or fabricator's identification, approved agency identification, and the following information, as applicable, on each label.
   a. Model number.
   b. Serial number.
   c. Performance characteristics.

1.7 FIELD SAMPLES

A. Install field samples demonstrating quality level for the Work, at the site by individual specifications Sections for review and acceptance by Architect. Remove field samples prior to date of Final Inspection, or as directed.

1.8 MOCK-UPS

A. Comply with requirements of Section 01 43 39 - MOCK-UPS.

B. Where requested by Architect, or as specified in individual specification sections, assemble and erect specified items, with specified attachment and anchorage devices, flashings, seals, and finishes. Remove mock-up assemblies prior to date of Final Inspection, or as directed.

C. Mock-ups, when approved by the Architect, will be used as datum for comparison with the remainder of the Work for the purposes of acceptance or rejection.

D. Demolish and remove from site prior to requesting inspection for certification of Substantial Completion, all Mock-ups which are not permitted to remain as part of the finished work.

1.9 MANUFACTURER'S FIELD SERVICES AND REPORTS

A. When called for by individual Specification Sections, provide at no additional cost to the Owner, manufacturers' or product suppliers' qualified staff personnel, to observe site conditions, start-up of equipment, adjusting and balancing of equipment, conditions of surfaces and installation, quality of workmanship, and as specified under the various Sections.
   1. Individuals shall report all observations, site decisions, and instructions given to applicators or installers. Immediately notify Architect of any circumstances which are supplemental, or contrary to, manufacturer's written instructions.
   2. Submit full report within 30 calendar days from observed site conditions to Architect for review.

1.10 FIELD QUALITY CONTROL

A. The Owner reserves the right to take samples and perform, at random, tests of approved materials delivered to the job site to verify compliance of actual materials with specifications.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

End of Section

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Section 01 45 23
STRUCTURAL TESTS AND SPECIAL INSTRUCTIONS

PART 1 - GENERAL

1.1 GENERAL PROVISIONS

A. The Latest Rhode Island State Building Code, under which this project is designed and will be built, requires the structural engineer of record (SER) to provide a program of structural tests and special inspections for this project in accordance with Chapter 17, 2018 International Building Code. The SER is the structural engineer who is in responsible charge of the preparation of the structural drawings and structural specifications for this project and whose Rhode Island professional engineering seal appears on said structural drawings.

B. The SER has prepared a document entitled Statement of Special Inspection, which has been or will be submitted to the building official who has jurisdiction over this project, with the application for a building permit.

C. The program of structural tests and inspections shall not relieve the Contractor or its subcontractors of their responsibilities and obligations for quality control of the work, their other obligations of supervising the work, for any design work which is included in their scope of services, and for full compliance with the requirement of the Contract Documents. Furthermore, the detection of, or failure to detect, deficiencies or defects in the Work during the testing and inspection conducted pursuant to the program shall not relieve the Contractor or its subcontractor of their responsibility to correct all deficiencies or defects, whether detects or undetected, in all parts of the Work, and to otherwise comply with all requirements of the Contract Documents.

D. The program of structural tests and inspection does not apply to the Contractor's equipment, temporary structures used by the Contractor to construct the project, the Contractor's means, methods, and procedures, and job site safety.

E. The structural testing and special inspection required by this Section is in addition to the inspections required by the Building Officials. Special inspection is not a substitute for inspection by a local municipal building inspector. Specially inspected work which is installed or covered without the approval of the Engineer or local municipal building inspector is subject to removal or exposure.

F. The Owner shall employ the Special Inspectors or approved Testing Agencies.

G. Special Inspector shall be an independently established and recognized agency regularly engaged in conducting tests or furnishing professional and inspection services and shall be approved by the Building Official and/or SER. The agency shall disclose all possible conflicts of interest so that objectivity can be confirmed. The agency shall have adequate equipment to perform all required tests. Personnel performing special inspection activities shall have qualifications according to the requirements for special inspector as noted below.

H. Special Inspectors as selected and approved by the Building Official and SER shall:

1. Be a qualified person, who shall have the minimum qualifications indicated in the *Statement of Special Inspection,* and demonstrate competence, to the

satisfaction of the Building Official and SER, for inspection of the particular type of construction or operation requiring special inspection.

2. Be under the supervision of a professional engineer registered in the state in which work is under construction.
3. Observe the work assigned for conformance with the approved Drawings and Specifications and shall keep records of inspections or tests. The work inspected or tested shall be clearly identified, deficiencies noted, and resolutions stated.
4. Furnish inspection reports to the Architect, SER, Construction Manager/General Contractor, Owner/Owner's Representative, and Building Official. Reports shall indicate that work inspected was done in conformance with approved construction documents. Discrepancies shall be brought to the immediate attention of the Contractor for correction, then, if uncorrected, the attention of the Building Official and SER prior to completion of that phase of work.
5. Submit a final signed report stating the work was in conformance with the approved Drawings and Specifications and the applicable workmanship provisions of the governing state code.

I. Special Inspector shall review this specification and Chapter 17 of the Inspection Building Code. In the event of conflict with this specification and the Building Code, the Code shall govern.

1.2 CONTRACTOR'S RESPONSIBILITIES

A. Where the document *Statement of Special Inspections* indicates that a structural component or system is subject to structural tests and inspections by Chapter 17, 2018 International Building Code and that the SER for the project has not been retained to design said component or system or to prepare a performance specification for said component system, and the Architect has not otherwise provided for the structural design of said component or system, the Contractor shall retain, or require others under his direction to retain, a professional engineer registered in Rhode Island to design said component or system and to provide the required program of structural tests and inspections for said component or system.

B. The Contractor shall provide free and safe access to the Work for the SER and all other individuals who are observing the work or performing structural tests or inspections. The Contractor shall provide all ladders, scaffolding, staging, and up-to-date safety equipment, all in good and safe working order, and qualified personnel to handle and erect them, as may be required for safe access.

C. Retesting: The Contractor is responsible for retesting where results of inspections, tests, or other quality-control services prove unsatisfactory and indicate noncompliance with Contract Document requirements, regardless of whether the original test was the Contractor's responsibility.

1. The cost of retesting construction, revised or replaced by the Contractor, is the Contractor's responsibility where required tests performed on original construction indicated noncompliance with Contract Document requirements.

End of Section

Statement of Special Inspections

Project: *Central Falls High School*

Location: *Central Falls, Rhode Island*

Owner: *City of Central Falls*

Design Professional in Responsible Charge: *Pare Corporation*

This *Statement of Special Inspections* is submitted as a condition for permit issuance in accordance with the Special Inspection and Structural Testing requirements of the Building Code. It includes a schedule of Special Inspection services applicable to this project as well as the name of the Special Inspection Coordinator and the identity of other approved agencies to be retained for conducting these inspections and tests. This *Statement of Special Inspections* encompasses the following disciplines:

☒ Structural ☐ Mechanical/Electrical/Plumbing

☐ Architectural ☐ Other: _____

The Special Inspection Coordinator shall keep records of all inspections and shall furnish inspection reports to the Building Official and the Registered Design Professional in Responsible Charge. Discovered discrepancies shall be brought to the immediate attention of the Contractor for correction. If such discrepancies are not corrected, the discrepancies shall be brought to the attention of the Building Official and the Registered Design Professional in Responsible Charge. The Special Inspection program does not relieve the Contractor of his or her responsibilities.

Interim reports shall be submitted to the Building Official and the Registered Design Professional in Responsible Charge.

A *Final Report of Special Inspections* documenting completion of all required Special Inspections, testing and correction of any discrepancies noted in the inspections shall be submitted prior to issuance of a Certificate of Use and Occupancy.

Job site safety and means and methods of construction are solely the responsibility of the Contractor.

Interim Report Frequency: *Monthly* or ☐ per attached schedule.

Prepared by:

Michael G. Mitchell, P.E. Pare Corporation

(type or print name)

Signature Date

Design Professional Seal

Owner's Authorization:

Signature Date

Building Official's Acceptance:

Signature Date

Schedule of Inspection and Testing Agencies

This Statement of Special Inspections / Quality Assurance Plan includes the following building systems:

- ☒ Soils and Foundations
- ☒ Cast-in-Place Concrete
- ☐ Precast Concrete
- ☒ Masonry
- ☒ Structural Steel
- ☐ Cold-Formed Steel Framing
- ☐ Spray Fire Resistant Material
- ☐ Wood Construction
- ☐ Exterior Insulation and Finish System
- ☐ Mechanical & Electrical Systems
- ☐ Architectural Systems
- ☐ Special Cases

Special Inspection Agencies	Firm	Address, Telephone, e-mail
1. **Special Inspection Coordinator**	*To Be Determined*	
2. SER – Structural Engineer of Record	*Pare Corporation*	*8 Blackstone Valley Place* *Lincoln, RI* *(401)-334-4100*
3. GE – Geotechnical Engineer	*Lahlaf Geotechnical Consulting, Inc.*	*100 Chelmsford Road* *Suite 2* *Billerica, MA* *(978) 330-5912*
4. OIAF – Owner's Inspection Agency (Field)	*To Be Determined*	
5. OIAP – Owner's Inspection Agency (Plant)	*To Be Determined*	
6. ARCH – Architect of Record	*Ai3 Architects, LLC*	*526 Boston Post Road* *Wayland, MA 01778* *(508) 358-0790*

Note: The inspectors and testing agencies shall be engaged by the Owner or the Owner's Agent, and not by the Contractor or Subcontractor whose work is to be inspected or tested. Any conflict of interest must be disclosed to the Building Official, prior to commencing work.

Quality Assurance Plan

Quality Assurance for Seismic Resistance

Seismic Design Category	*C*
Quality Assurance Plan Required (Y/N)	*No*

Description of seismic force resisting system and designated seismic systems:
(Not Required per IBC 2018 Section 1705.12.1.1, Exception 1)

Quality Assurance for Wind Requirements

Nominal Design Wind Speed, V_{asd} (3 sec. gust)	*103*
Wind Exposure Category	*C*
Quality Assurance Plan Required (Y/N)	*No*

Description of wind force resisting system and designated wind resisting components:
(Not Required per IBC 2018 Section 1705.11, V_{asd} is less than 110 mph in Exposure C)

Qualifications of Inspectors and Testing Technicians

The qualifications of all personnel performing Special Inspection and Testing activities are subject to the approval of the Building Official. The credentials of all Inspectors and Testing technicians shall be provided if requested.

Key for Minimum Qualifications of Inspection Agents:

When the Registered Design Professional in Responsible Charge deems it appropriate that the firm* performing a stipulated test or inspection have a specific certification or license as indicated below, such designation shall appear below the *Agency Number* on the Schedule.

PE/SE*	Structural Engineer – under the supervision of, or a licensed SE or PE specializing in the design of building structures
PE/GE*	Geotechnical Engineer – under the supervision of, or a licensed PE specializing in soil mechanics and foundations
EIT	Engineer-In-Training – a graduate engineer who has passed the Fundamentals of Engineering examination

American Concrete Institute (ACI) Certification

ACI-CFTT	Concrete Field Testing Technician – Grade 1
ACI-CCI	Concrete Construction Inspector
ACI-LTT	Laboratory Testing Technician – Grade 1&2
ACI-STT	Strength Testing Technician

American Welding Society (AWS) Certification

AWS-CWI	Certified Welding Inspector
AWS/AISC-SSI	Certified Structural Steel Inspector

American Society of Non-Destructive Testing (ASNT) Certification

ASNT	Non-Destructive Testing Technician – Level II or III.

International Code Council (ICC) Certification

ICC-SMSI	Structural Masonry Special Inspector
ICC-SWSI	Structural Steel and Welding Special Inspector
ICC-SFSI	Spray-Applied Fireproofing Special Inspector
ICC-PCSI	Prestressed Concrete Special Inspector
ICC-RCSI	Reinforced Concrete Special Inspector

National Institute for Certification in Engineering Technologies (NICET)

NICET-CT	Concrete Technician – Levels I, II, III & IV
NICET-ST	Soils Technician - Levels I, II, III & IV
NICET-GET	Geotechnical Engineering Technician - Levels I, II, III & IV

* denoted edits made by Pare Corporation

Other

_____ _____

Soils and Foundations

Item	Agency # (Qualif.)	Scope
1. Shallow Foundations (periodic)	*GE* *(PE/GE)*	*Inspect soils below footings for adequate bearing capacity and consistency with construction documents, specifications, and geotechnical report.* *Inspect removal of unsuitable material and preparation of foundation and slab subgrade.*
2. Testing of Structural Fill (periodic)	*GE* *OIAF* *(PE/GE)*	*Perform sieve tests (ASTM D6913 & D1140) and modified Proctor tests (ASTM D1557) of each source of fill material for conformance to the specifications. (OIAF)*
3. Placement of Structural Fill (continuous)	*GE* *OIAF* *(PE/GE)*	*Inspect placement, lift thickness, and compaction of Structural Fill (OIAF).*
4. Density of Structural Fill (continuous)	*SER* *GE* *OIAF* *(PE/GE)*	*Perform field density tests of the in-place fill in accordance with the construction documents and specifications (GE, OIAF).* *Review test reports for conformance to the construction documents (SER, GE)*

Cast-in-Place Concrete

Item	Agency # (Qualif.)	Scope
1. Mix Design (periodic)	*SER* *OIAF* *(ACI-CCI ICC-RCSI)*	*Review mix designs for all classes of concrete for conformance to specifications Proportioning of materials shall be in accordance with ACI318. (SER)* *Review concrete batch tickets and verify compliance with approved mix design. Verify that water added at the site does not exceed that allowed by the mix design. (OIAF)* *Review OIAF reports (SER).*
2. Material Certification (periodic)	*SER*	*Review material certificates of compliance or other acceptable documentation for all materials used in the concrete mix designs for conformance with the construction documents.*
3. Reinforcement Installation (periodic)	*SER* *OIAF* *(ACI-CCI ICC-RCSI)*	*Inspect size, spacing, cover, positioning and grade of reinforcing steel. Verify that reinforcing bars are free of form oil or other deleterious materials. Inspect bar laps and mechanical splices. Verify that bars are adequately tied and supported on chairs or bolsters. (SER, OIAF)*
4. Formwork Geometry (periodic)	*OIAF*	*Inspect formwork for general conformance with the construction documents. Review formwork to insure the finished concrete size and shape for conformance to the construction documents.*
5. Anchor Rods (periodic)	*SER* *OIAF*	*Inspect size, length, positioning and embedment of anchor rods. Inspect concrete placement and consolidation around anchors. (OIAF)* *Review OIAF reports (SER).*
6. Concrete Placement (continuous)	*SER* *OIAF* *(ACI-CCI ICC-RCSI)*	*Review ready mix truck delivery tickets for proper class of concrete and required admixtures. Inspect placement of concrete. Verify conformance to specifications including cold-weather and hot-weather placement procedures. Verify that concrete conveyance and depositing avoids segregation or contamination. Verify that concrete is properly consolidated. (OIAF)* *Review OIAF reports (SER).*
7. Sampling and Testing of Concrete (continuous)	*SER* *OIAF* *(ACI-CFTT ACI-STT)*	*Test concrete compressive strength (ASTM C31 & C39), slump (ASTM C143), air-content (ASTM C231 or C173), lightweight concrete unit weight (ASTM C567), and temperature (ASTM C1064) for conformance with construction documents. (OIAF)* *Review concrete test reports for conformance with the*
8. Curing and Protection (periodic)	*PE* *OIAF* *(ACI-CCI ICC-RCSI)*	*Inspect curing, cold weather protection and hot weather protection procedures (OIAF).* *Review OIAF reports (SER).*
9. Post-installed anchors in hardened concrete (periodic) (sustained tension loads, continuous)	*SER* *OIAF* *(ACI-CCI ICC-RCSI)*	*Inspect in accordance with manufacturer's published installation instructions (MPII) and relevant evaluation report (ICC-ES ESR). Verify anchors installed in accordance with manufacturer's requirements including hole-cleaning procedures. Verify anchor size, placement, embedment depths, spacing, and edge distances meet construction document requirements. (OIAF)* *Review OIAF reports. (SER)*

Masonry

Required Inspection Level: ☒ **B** ☐ **C**

Item	Agency # (Qualif.)	Scope
1. Material Certification	*ARCH SER*	*Review all material submittals and certificates for each type of structural masonry unit, mortar, grout and admixtures for conformance to construction documents.*
2. Mixing of Mortar and Grout (periodic)	*OIAF (ICC-SMSI)*	*Inspect proportioning, mixing and retempering of mortar and grout. Conduct sufficient number of periodic field review of mortar and grout proportioning, mixing and consistency for conformance with ACI 530.1 and the construction documents.*
3. Installation of Masonry (periodic)	*SER OIAF (ICC-SMSI)*	*Inspect size, layout, bonding and placement of masonry units. Inspection mortar application and grouting procedures for conformance with the construction documents (OIAF).* *Review all reports for conformance with the construction documents (SER).*
4. Mortar Joints (periodic)	*ARCH OIAF (ICC-SMSI)*	*Inspect construction of mortar joints including tooling and filling of head joints.*
5. Reinforcement Installation (size, type, condition - periodic) (placement, welding – continuous)	*SER (ICC-SMSI AWS-CWI)*	*Inspect size, quantity, condition, placement, positioning and lapping of reinforcing steel for approved shop drawings and construction documents. Inspect welding of reinforcing steel and inspect welder's certifications.(OIAF)* *Review OIAF test reports. (SER)*
6. Grouting Operations (continuous)	*OIAF (ICC-SMSI)*	*Inspect placement and consolidation of grout. Verify grout space is clean. Inspect masonry clean-outs for high-lift grouting.*
7. Weather Protection (periodic)	*SER OIAF (ICC-SMSI)*	*Inspect cold weather protection and hot weather protection procedures. Verify that wall cavities are protected against precipitation.*
8. Evaluation of Masonry Strength (Structural bearing walls only) Compliance with approved frequency (periodic) Preparation of specimens (continuous)	*SER OIAF (ICC-SMSI)*	*Sample and test the masonry mortar and grout, brick, concrete masonry units, and the concrete prism at the approved frequency for conformance with the construction documents (OIAF).* *Test compressive strength of mortar and grout cube samples (ASTM C780). (OIAF)* *Test compressive strength of masonry prisms (ASTM C1314). (OIAF)* *Review test reports for conformance with the specifications (SER).*
9. Anchors and Ties (size, type, condition - periodic) (installation – continuous)	*SER OIAF (ICC-SMSI)*	*Inspect size, location, spacing and embedment of dowels, anchors and ties.* *Inspect anchorage of masonry to structural members, foundation walls, or other construction, and installation of embedded items for conformance with construction documents.*
10. Veneer Installation and attachment to Back-up structure.	*ARCH OIAF*	*Observe the installation of the brick veneer, including loose lintels, acccessories, and attachments to the back-up structure for conformance with the construction documents, the approved shop drawings, and the approved sample panels and mock-ups.*

Structural Steel

Item	Agency # (Qualif.)	Scope
1. Fabricator Certification/ Quality Control Procedures	*SER* *OIAP* *(AWS/AISC -SSI ICC-SWSI)*	*Review each shop fabrication including fabricator's and welder's certificates and quality control procedures including steel joists and steel deck. Verify whether Fabricator holds a current AISC Category I or II certification, or is a member of the Structural Steel Fabricators. (OIAP).* *Review OIAP reports. (SER)*
2. Material Certification (periodic)	*SER* *OIAF* *(AWS/AISC -SSI ICC-SWSI)*	*Review certified mill test reports for structural steel including steel joists and steel deck. (SER)* *Verify identification markings on wide-flange shapes, high-strength bolts, nuts and welding electrodes. (OIAF)*
3. Bolting (Bearing Type - periodic) (Slip-Critical Type – continuous for turn of the nut or calibrated wrench method)	*SER* *OIAF* *(AWS/AISC -SSI ICC-SWSI)*	*Inspect installation and tightening of high-strength bolts. Verify bolt size and grade and that splines have separated from tension control bolts. Verify proper tightening sequence. Continuous inspection of bolts in slip-critical connections. (OIAF)* *Review reports (SER).*
4. Welding (continuous except periodic for single pass fillet welds < 5/16" or floor and deck welds)	*SER* *OIAF* *(AWS-CWI ASNT)*	*Visually inspect all welds in accordance with construction documents and approved shop drawings. Inspect pre-heat, post-heat and surface preparation between passes. Verify size and length of fillet welds. (OIAF)* *Continuous inspection of ultrasonic testing of all full-penetration welds. (OIAF)* *Review all reports. (SER)*
5. Shear Connectors (periodic)	*PE* *OIAF* *(AWS-AISC-SSI ICC-SWSI*	*Inspect size, number, positioning and welding of shear connectors. Inspect suds for full 360 degree flash. Ring test all shear connectors with a 3 lb hammer. Bend test all questionable studs to 15 degrees (OIAF)* *Review test reports for conformance. (SER).*
6. Structural Framing, Details, and Assemblies (periodic)	*SER* *OIAF* *(PE/SE)*	*Visually inspect steel frame for compliance with structural drawings, approved erection and shop drawings, AISC Code of Standard Practice including bracing, member configuration and connection details. (OIAF)* *Inspect for size, grade of steel, camber, and installation. (OIAF)* *Review test reports for conformance with approved shop drawings and construction documents. (SER)*
7. Steel Deck Installation	*SER* *OIAF* *(AWS-CWI)*	*Inspect placement, laps, support fasteners and side-lap fastening of metal roof and floor deck as per approved shop drawings (OIAF).* *Review OIAF reports (SER).*

Final Report of Special Inspections

Project:

Location:

Owner:

Owner's Address:

Architect of Record:

Structural Engineer of Record:

To the best of my information, knowledge and belief, the Special Inspections required for this project, and itemized in the *Statement of Special Inspections* submitted for permit, have been performed and all discovered discrepancies have been reported and resolved other than the following:

Comments:

(Attach continuation sheets if required to complete the description of corrections.)

Interim reports submitted prior to this final report form a basis for and are to be considered an integral part of this final report.

Respectfully submitted,
Special Inspector Coordinator

(Type or print name)

Signature Date

Licensed Professional Seal

Final Report of Special Inspections

Agent's Final Report

Project:

Agent:

Special Inspector:

To the best of my information, knowledge and belief, the Special Inspections or testing required for this project, and designated for this Agent in the *Statement of Special Inspections* submitted for permit, have been performed and all discovered discrepancies have been reported and resolved other than the following:

Comments:

(Attach continuation sheets if required to complete the description of corrections.)

Interim reports submitted prior to this final report form a basis for and are to be considered an integral part of this final report.

Respectfully submitted,
Testing Agency

(Type or print name)

Signature Date

Licensed Professional Seal or Certification

Section 01 45 29

TESTING LABORATORY SERVICES

PART 1 - GENERAL

1.1 SUMMARY

A. This Section consists of the following:
1. Quality assurance.
2. Laboratory responsibilities.
3. Laboratory reports.
4. Limits on testing laboratory authority.
5. General Contractor responsibilities.
6. General Contractor submittals.
7. Schedule of inspections and tests.
8. Concrete in situ relative humidity, calcium chloride and acidity/alkalinity testing.

1.2 RELATED REQUIREMENTS

A. Section 01 81 19 - Construction Indoor Air Quality

B. Section 01 91 13 - General Commissioning Requirements

C. Section 01 91 19 - Building Enclosure Commissioning Requirements

D. Section 03 30 00 - Cast-in-Place Concrete.

E. Section 04 20 00 - Unit Masonry.

F. Section 05 12 00 - Structural Steel Framing.

G. Section 05 31 00 - Steel Decking.

H. Section 07 81 00 – Applied Fireproofing.

I. Section 07 84 00 – Firestopping.

J. Section 07 92 00 - Joint Sealants.

K. Section 08 43 13 - Aluminum-Framed Storefronts.

L. Section 08 44 13 - Glazed Aluminum Curtain Wall.

M. Section 08 43 15 - Bullet Resistant Aluminum Storefront Framing System

N. Section 08 44 26 - Structural Glass Curtain Wall

O. Section 08 51 13 - Aluminum Windows

P. Section 32 13 13 – SITE CONCRETE.

Q. Division 21 – FIRE SUPPRESSION.

R. Division 22 – PLUMBING.

S. Division 23 – HEATING, VENTILATING AND AIR CONDITIONING.

T. Division 26 – ELECTRICAL.

U. Division 27 – COMMUNICATIONS.

V. Division 28 – ELECTRONIC SAFETY AND SECURITY.

W. Division 31 – EARTHWORK.

X. Division 32 – EXTERIOR IMPROVEMENTS.

Y. Division 33 – UTILITIES.

1.3 REFERENCES

A. Comply with applicable requirements of the following standards and those others referenced in this Section, under the provisions of Section 01 42 00 - REFERENCES. Where these standards conflict with other specified requirements, the most restrictive requirements shall govern.

1. ANSI/ASTM D 3740 - Standard Practice for Minimum Requirements for Agencies Engaged in the. Testing and/or Inspection of Soil and Rock.
2. ANSI/ASTM E 329 - Standard Specification for Agencies Engaged in the Testing and/or Inspection of Materials Used in Construction.
3. ASTM F 1869 – Standard Test Method for Measuring Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride.
4. ASTM F 2170 – Standard Test Method for Determining Relative Humidity in Concrete Floor Slabs Using In-Situ Probes.
5. ASTM F 710 – Standard Practice for Preparing Concrete Floors and Other Monolithic Floors to Receive Resilient Flooring.

1.4 QUALITY ASSURANCE

A. Comply with requirements of ANSI/ASTM D 3740 and ANSI/ASTM E 329.

B. Laboratory: Authorized to operate in state in which Project is located.

C. Laboratory staff: Maintain a full time specialist on staff to review services. Provide registered Engineer on staff for all review of services related to structural testing.

D. Testing Equipment: Calibrated at reasonable intervals with devices of an accuracy traceable to either the National Bureau of Standards (NBS) Standards or accepted values of natural physical constraints.

1.5 LABORATORY RESPONSIBILITIES

A. Cooperate with Architect and General Contractor in performance of services; provide qualified personnel promptly on notice.
   1. Attend preconstruction conferences and progress meetings, as requested.

B. Acquaint Owner’s Project Manager, Architect, and General Contractor's superintendent with testing procedures and with all special conditions encountered at the site.

C. Perform specified Inspection, sampling, and testing of products and construction methods in accordance with specified standards as specified in individual technical specification sections:
   1. Comply with specified standards, ASTM, ANSI, and other recognized authorities.
   2. Conduct and interpret the tests and state in each report whether the test specimens comply with the requirements, and specifically state any deviations therefrom.
   3. Obtain General Contractor's written acknowledgment of each inspection, sampling, and test made. Test samples of mixes submitted by General Contractor.
   4. Ascertain compliance of materials and mixes with requirements of Contract Documents.

D. Promptly notify Architect and General Contractor of irregularities, deficiencies, or non-conformance of Work or Products which are observed during performance of services.

E. Promptly submit written report of each test and inspection; one copy each to Architect, Owner’s Project Manager, General Contractor, and one copy to Project Record Documents File.

F. Perform additional inspections and tests required by Architect/Engineer.

1.6 LABORATORY REPORTS

A. After each test, promptly distribute directly from the testing laboratory, copies of laboratory report to:
   1. Owner’s Project Manager.
   2. Architect's office.
   3. Consulting engineer's office.
   4. General Contractor's office.
   5. Municipal Inspectional Services Department, if required.

B. Include in report the following information:
   1. Date issued.
   2. Project title and number.
   3. Testing laboratory name, address, and telephone number.

4. Name and signature of laboratory inspector.
5. Date and time of sampling.
6. Record of temperature and weather conditions (as appropriate to test).
7. Identification of product and Specifications Section.
8. Location of sample or test in the Project.
9. Type of inspection or test.
10. Results of tests and compliance with Contract Documents.
11. Interpretation of test results, when requested by Architect.
12. Observations regarding compliance with Contract Documents.

1.7 LIMITS ON TESTING LABORATORY AUTHORITY

A. Laboratory may not release, revoke, alter, or enlarge on requirements of Contract Documents.

B. Laboratory may not approve or accept any portion of Work.

C. Laboratory may not assume any duties for General Contractor.

D. Laboratory has no authority to stop the Work.

1.8 GENERAL CONTRACTOR RESPONSIBILITIES

A. Coordinate and cooperate with laboratory personnel, provide access to Work.
1. Monitor each inspection, sampling, and test.
2. Provide Laboratory or Agency with written acknowledgment of each Inspection, sampling, and test.
3. Within 24 hours notify Architect and Owner’s Project Manager in writing of reasons for not acknowledging Laboratory results.

B. Secure and deliver to the Laboratory or designated location, adequate quantities of representational samples of materials proposed to be used and which require testing, along with proposed mix designs.

C. Furnish incidental labor and facilities:
1. To provide access to Work to be tested.
2. To obtain and handle samples at the Project site or at the source of the Product to be tested.
3. To facilitate inspections and tests.
4. For storage and curing of test samples.

D. Furnish verification of materials and equipment compliance with Contract Documents.

E. Notify Architect/Engineer and laboratory 24 hours prior to expected time for operations requiring inspection and testing services.

F. Identify materials to be tested or inspected by Testing Laboratory or Agency.

G. After determination of need for testing or inspecting by Owner's Project Manager, notify Laboratory sufficiently in advance, minimum five days, of operations to allow for its assignment of personnel and scheduling of tests.

1. When tests or inspections cannot be performed after such notice, reimburse Owner for laboratory personnel and travel expenses incurred due to General Contractors negligence.

H. Make arrangements with laboratory and pay for additional samples and tests required for the following conditions:

1. Initial testing indicates Work does not comply with Contract Documents.
2. General Contractor requested testing for additional testing and laboratory services beyond specified requirements.

1.9 CONDUCT OF INSPECTIONS AND TESTS

A. The General Contractor shall notify the Owner's Project Manager, Architect, and Testing Laboratory a minimum of 72 hours before the performance of work to permit the proper conduct of Owner-authorized inspections and tests.

B. Representatives of Testing Laboratory will inspect the manufacture, assembly, and placement of materials as required and as authorized by the Owner, and report their findings to the Architect, Owner's Project Manager, and General Contractor.

C. Work shall be checked as it progresses, but failure to detect any defective work or materials shall in no way prevent later rejection when such defect is discovered nor shall it obligate the Owner to accept such work.

1.10 SCHEDULE OF TESTING AND LABORATORIES BY OWNER

A. General: Except as otherwise specified, Owner will appoint, employ, and pay services of independent firm(s) to perform inspection and testing and other services specified herein, in individual specification Sections, and as additionally required by the Architect.

1. Installer responsible for engaging testing agent for any re-testing. All units experiencing failure are required to be re-tested.
2. Retesting required includes original test area plus two additional test areas.
3. Refer to Section 01 91 19 - BUILDING ENCLOSURE COMMISSIONING REQUIREMENTS for additional testing criteria for building envelope systems.

B. General Construction Tests: Requirements for testing, observations, and inspections are described in individual specification sections; the schedule provided below is not intended to completely describe all of the inspection and testing Work required for this Contract, and is only furnished as a guide.

1. Section 03 30 00 - CAST-IN-PLACE CONCRETE:
   a. Testing of cement mix and aggregates.
   b. Concrete test cylinders.
2. Section 04 20 00 - UNIT MASONRY:

a. One day per week observation of masonry installation, grout, mortar and prism testing.

b. Three cylinders tested for compressive strength at 10 days; ASTM C 91 tests.

3. Section 05 12 00 - STRUCTURAL STEEL FRAMING: Testing of welds of field and shop fabricated components. Testing of bolting.

   a. Bolt torque testing.

   b. Welding X-ray and ultrasonic tests as specified.

   c. Coating thickness of primer coats.

4. Section 05 31 00 - STEEL DECKING: Periodic inspection of steel decking installation prior to concrete placement.

5. Section 07 27 13 – Modified Sheet Air Barrier: Performance testing of in-place work:

   a. Test mock-up for air and water infiltration in accordance with ASTM E1186 (air leakage location) or ASTM E 783 (air leakage quantification), and ASTM E1105 (water penetration).

   b. Adhesion Testing: Test mock-up of fluid-applied and sheet applied materials for adhesion in accordance with AABA 0002-2019, or in accordance with ASTM D903.

6. Section 07 81 00 – APPLIED FIREPROOFING: Testing and certification of adhesion, density and thickness of installation.

7. Section 07 84 00 - FIRESTOPPING: Certification of method and type of application for opening and rating required. Verification installation is in compliance with FM and UL criteria.

8. Section 07 92 00 - JOINT SEALANTS: Perform adhesion tests in accordance with manufacturer's instructions and ASTM C1193, Method A, Field-Applied Sealant Joint Hand-Pull Tab.

9. Section 08 51 13 - ALUMINUM WINDOWS: In-place testing of specified limits of air infiltration and water resistance according to ASTM E 783 Standard Test Method for Field Measurement of Air Leakage Through Installed Exterior Windows and Doors, and ASTM E 1105 – Standard Test Method for Field Determination of Water Penetration of Installed Exterior Windows, Skylights, Doors, and Curtain Walls, by Uniform Cyclic Static Air Pressure Difference. The AAMA 1/3 reduction of design pressure for testing under ASTM E1105 will not be permitted.

10. Section 08 43 13 - ALUMINUM-FRAMED STOREFRONTS: In-place testing of specified limits of air infiltration and water resistance according to ASTM E 783 Standard Test Method for Field Measurement of Air Leakage Through Installed Exterior Windows and Doors, and ASTM E 1105 – Standard Test Method for Field Determination of Water Penetration of Installed Exterior Windows, Skylights, Doors, and Curtain Walls, by Uniform Cyclic Static Air Pressure Difference. The AAMA 1/3 reduction of design pressure for testing under ASTM E1105 will not be permitted.

11. Section 08 44 13 - GLAZED ALUMINUM CURTAIN WALL: In-place testing of specified limits of air infiltration and water resistance according to ASTM E

783 Standard Test Method for Field Measurement of Air Leakage Through Installed Exterior Windows and Doors, and ASTM E 1105 – Standard Test Method for Field Determination of Water Penetration of Installed Exterior Windows, Skylights, Doors, and Curtain Walls, by Uniform Cyclic Static Air Pressure Difference. The AAMA 1/3 reduction of design pressure for testing under ASTM E1105 will not be permitted.

12. Section 08 43 15 - Bullet Resistant Aluminum Storefront Framing System: In-place testing of specified limits of air infiltration and water resistance according to ASTM E 783 Standard Test Method for Field Measurement of Air Leakage Through Installed Exterior Windows and Doors, and ASTM E 1105 – Standard Test Method for Field Determination of Water Penetration of Installed Exterior Windows, Skylights, Doors, and Curtain Walls, by Uniform Cyclic Static Air Pressure Difference. The AAMA 1/3 reduction of design pressure for testing under ASTM E1105 will not be permitted.
13. Section 08 44 26 - Structural Glass Curtain Wall: In-place testing of specified limits of air infiltration and water resistance according to ASTM E 783 Standard Test Method for Field Measurement of Air Leakage Through Installed Exterior Windows and Doors, and ASTM E 1105 – Standard Test Method for Field Determination of Water Penetration of Installed Exterior Windows, Skylights, Doors, and Curtain Walls, by Uniform Cyclic Static Air Pressure Difference. The AAMA 1/3 reduction of design pressure for testing under ASTM E1105 will not be permitted.
14. Section 32 13 13 – SITE CONCRETE: Concrete test cylinders
15. Division 31, 32, 33 - EARTHWORK, EXTERIOR IMPROVEMENTS, UTILITIES sections: Continuous observations basis during the installation of the foundation, footings, structural slab, and during backfilling and grading of the site. Testing bearing surfaces prior to the installation of the backfill and foundations. Sampling and compaction testing of fill materials.
    a. Chemical testing of fill materials.
    b. Proctor tests for compaction.

C. Special Tests and Inspections: Owner will engage a testing agency to conduct special tests and inspections required by authorities having jurisdiction as the responsibility of Owner.

1. Testing agency will notify Architect, and General Contractor promptly of irregularities and deficiencies observed in the Work during performance of its services.
2. Testing agency will submit a certified written report of each test, inspection, and similar quality-control service to Architect with copy to General Contractor and to authorities having jurisdiction.
3. Testing agency will submit a final report of special tests and inspections at Substantial Completion, which includes a list of unresolved deficiencies.
4. Testing agency will interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from the Contract Documents.
5. Testing agency will retest and re-inspect corrected work.

1.11 SCHEDULE OF TESTING AND LABORATORIES BY GENERAL CONTRACTOR

A. General Contractor shall employ and pay for services of an approved independent testing laboratory to perform inspection and testing specified under this Article and as additionally in individual specification sections

1. Submit to Architect/Engineer a minimum of three independent testing laboratories for each type of testing specified by individual specification sections and those required by the referenced applicable codes, regulations and standards.
2. Employment of testing laboratory shall in no way relieve General Contractor of obligation to perform work in accordance with requirements of Contract Documents.

B. Earthwork: Lab tests to determine suitability of all fill materials shall be paid for by General Contractor.

1. Owner reserves the right to retain and pay for his own testing for checking purposes

C. Concrete Paving and General Concrete Work: Concrete mix design testing shall be paid for by General Contractor. Owner reserves the right to retain and pay for his own testing for checking purposes.

D. Moisture content testing of interior and exterior wood prior to application of field painted coatings.

E. Local Authority Inspections: The General Contractor is also responsible for coordinating and cooperating with local requirements for inspections by local Authorities.

1.12 SCHEDULE OF TESTING AND LABORATORIES BY SUBCONTRACTORS OR TRADE CONTRACTORS

A. Respective Trade contractors and subcontractors shall employ and pay for services of an approved independent testing laboratory to perform inspection and testing specified under this Article and as additionally in individual specification sections

1. Submit to Architect a minimum of three independent testing laboratories for each type of testing specified by individual specification sections and those required by the referenced applicable codes, regulations and standards.
2. Employment of testing laboratory shall in no way relieve General Contractor of obligation to perform work in accordance with requirements of Contract Documents

B. Waterproofing, Dampproofing and Caulking Trade Contract: Testing required in Section 07 92 00 - JOINT SEALANTS including chemical analysis, adhesive strength, compatibility with adjacent materials and elasticity.

C. Site Civil Subcontract: Perform pressure, leakage and chlorination testing as specified in Division 33 - UTILITIES.

D. Wood Flooring Subcontract(s) (Sections 09 64 29, 09 64 53, and 09 64 66): Moisture Vapor Emission and acidity/alkalinity (pH)Testing of concrete slabs and floors:

1. Wood flooring subcontractors will employ and pay for services of an independent testing laboratory to perform moisture vapor emission, and pH tests on concrete slabs. The testing shall be witnessed by the General Contractor, Wood Flooring Subcontractor(s) and Owner's Project Manager.
    a. Moisture Vapor Emission and pH Testing on all concrete slabs over-which a carpeted floor (broadloom or tile) is required.
2. Requirements: As specified Section 09 05 60 - COMMON WORK RESULTS FOR FLOORING.
    a. Submit test data to the General Contractor, Architect and Owner's Project Manager.
    b. Provide additional testing in the event test results indicate higher moisture content than recommended by the flooring material and coating material manufacturers for the installation of their products. Perform such additional testing, at no additional cost to the Owner, after procedures have been performed to reduce moisture content to ratings acceptable to the various flooring manufacturers and their adhesive manufacturers.

E. Resilient Flooring Subcontract(s) (Sections 09 65 16, 09 65 19, 09 65 23, and 09 65 36): Moisture Vapor Emission and acidity/alkalinity (pH)Testing of concrete slabs and floors:

1. Resilient flooring subcontractors will employ and pay for services of an independent testing laboratory to perform moisture vapor emission, and pH tests on concrete slabs. The testing shall be witnessed by the General Contractor, Resilient Flooring Subcontractor(s) and Owner's Project Manager.
    a. Moisture Vapor Emission and pH Testing on all concrete slabs over-which a carpeted floor (broadloom or tile) is required.
2. Requirements: As specified Section 09 05 60 - COMMON WORK RESULTS FOR FLOORING.
    a. Submit test data to the General Contractor, Architect and Owner's Project Manager.

F. Resinous Flooring Subcontract (Section 09 67 23): Moisture Vapor Emission and acidity/alkalinity (pH)Testing of concrete slabs and floors:

1. Resinous Flooring subcontractors will employ and pay for services of an independent testing laboratory to perform moisture vapor emission, and pH tests on concrete slabs. The testing shall be witnessed by the General Contractor, Resinous Flooring Subcontractor and Owner's Project Manager.
    a. Moisture Vapor Emission and pH Testing on all concrete slabs over-which a carpeted floor (broadloom or tile) is required.
2. Requirements: As specified Section 09 05 60 - COMMON WORK RESULTS FOR FLOORING.
    a. Submit test data to the General Contractor, Architect and Owner's Project Manager.

G. Carpeting Subcontract(s) (Sections 09 68 00, 09 68 13, and 12 48 13): Moisture Vapor Emission and acidity/alkalinity (pH)Testing of concrete slabs and floors:

1. Carpeting subcontractor will employ and pay for services of an independent testing laboratory to perform moisture vapor emission, and pH tests on concrete slabs. The testing shall be witnessed by the General Contractor, Carpeting Subcontractor and Owner's Project Manager.
    a. Moisture Vapor Emission and pH Testing on all concrete slabs over-which a carpeted floor (broadloom or tile) is required.
2. Requirements: As specified Section 09 05 60 - COMMON WORK RESULTS FOR FLOORING.
    a. Submit test data to the General Contractor, Architect and Owner's Project Manager.
    b. Provide additional testing in the event test results indicate higher moisture content than recommended by the flooring material and coating material manufacturers for the installation of their products. Perform such additional testing, at no additional cost to the Owner, after procedures have been performed to reduce moisture content to ratings acceptable to the various flooring manufacturers and their adhesive manufacturers.

H. Plumbing Trade Contract: At least the following tests shall be performed. Conform to requirements specified in individual Division 22 Specification Sections. The test shall be performed and paid for by the Trade contractor and witnessed by the General Contractor, Owner's Project Manager and authorities having jurisdiction:

1. Water supply piping hydrostatic pressure test.
2. Sanitary piping test before fixture installation: Cap pipes and fill to highest point in system.
3. Plumbing fixture operation.

I. Fire Suppression Trade Contract: At least the following tests shall be performed. Conform to requirements specified in individual Division 21 Specification Sections. The test shall be performed and paid for by the Trade contractor and witnessed by the General Contractor, Owner's Project Manager and authorities having jurisdiction:

1. Fire protection system flushed and pressure tested.

J. Heating, Ventilation and Air Conditioning Trade Contract: All HVAC work shall be tested by an independent testing and balancing agency, approved by Owner. Conform to requirements specified in individual Division 23 Specification Sections. The tests shall be performed and paid for by the Trade contractor and witnessed by the General Contractor, Owner's Project Manager and authorities having jurisdiction. Adjustments shall be made by the Trade contractors directed by the Owner's Project Manager. At least the following tests shall be performed:

1. Piping hydrostatic tests.
2. Air and water balancing.
3. Thermostat control monitoring and testing.
4. Boiler efficiency testing.

5. Energy Management System operation.

K. Electrical Trade Contract: At least the following tests shall be performed. Conform to requirements specified in individual Division 26 Specification Sections. The tests shall be performed and paid for by the Trade contractor and witnessed by the General Contractor, Owner's Project Manager and authorities having jurisdiction:

1. Polarity tests.
2. Operation of all circuits.
3. Testing of emergency system.
4. Security systems.
5. Generation system.
6. Grounding systems.
7. Voice/Video/Data networking testing.

L. Electrical Trade Contract: Conform to requirements specified in individual Division 26 Specification Sections. At least the following tests shall be performed and paid for by the Trade contractor:

1. Operation of every component of entire system.

M. Electrical Trade Contract: At least the following tests will be performed. Conform to requirements specified in individual Division 26 Specification Sections. The test shall be performed and paid for by the Trade contractor and witnessed by the General Contractor, and Owner's Project Manager:

1. All smoke and heat detectors.
2. Proper operation as required by authorities having jurisdiction.

N. Where no testing requirements are described but the Owner's Project Manager or Architect decides that testing is required, testing will be performed under current pertinent standards for testing.

1.13 FOLLOW-UP AND CORRECTIVE ACTION

A. The General Contractor and the Owner's Project Manager will note the test record on the Testing Log to acknowledge test procedures and results. If follow-up or corrective action is needed, the General Contractor shall submit to the Owner's Project Manager two written copies of proposed follow-up or corrective plans and obtain the Owner's Project Manager's written approval before proceeding.

1. Cost of Testing: If tests indicate that materials or work do not comply with requirements, the General Contractor shall pay for all retesting, and shall remove and replace non-complying work at no additional cost to the Owner.

PART 2 - PRODUCTS (Not Used)

PART 3 – EXECUTION (Not Used)

End of Section

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Section 01 50 00

TEMPORARY FACILITIES AND CONTROLS

PART 1 - GENERAL

1.1 SUMMARY

A. General requirements for temporary facilities and controls.

B. Temporary utilities.

C. Construction facilities.

D. Temporary construction.

E. Construction aids.

F. Vehicular access and parking.

G. Temporary barriers and enclosures.

H. Site and environment controls.

1. Noise control procedures.

I. Fire prevention measures.

J. Security measures.

K. Project identification and temporary signage.

L. Removal of temporary utilities, controls, and facilities.

1.2 RELATED REQUIREMENTS

A. Section 31 23 19 – Dewatering and Drainage.

B. Section 31 25 00 – EROSION CONTROL.

1.3 GENERAL REQUIREMENTS

A. The General Contractor shall provide and maintain all temporary facilities, controls, and construction aids as specified herein, until they are replaced by permanent work, or until Project Substantial Completion, as appropriate.

1. Additional temporary facilities and controls which may be specified under individual sections are the responsibility of the respective Trade contractors.
2. Temporary facilities removed from the Project shall remain the property of the General Contractor, except as otherwise specified.

B. Except where specifically noted otherwise, cost or use charges for temporary facilities, utility services, controls, and construction aids and similar items specified in this Section or as required to perform the Work, are not chargeable to the Owner,

Owner's Project Manager, or Architect, and will not be accepted as a basis of claims for a Change Order.

C. Establish and initiate use of each temporary facility at time first reasonably required for proper performance of the Work. Terminate use and remove facilities at earliest reasonable time when they are no longer needed, as approved by the Owner's Project Manager and Architect, or when permanent facilities have, with authorized use, replaced the temporary facilities.

1. Locate temporary facilities where they will serve Project adequately and result in minimum interference with performance of the Work.

1.4 SUBMITTALS

A. Submit the following under provisions of Section 01 33 00 - SUBMITTAL PROCEDURES:

1. Reports of tests, inspections, meter readings and similar procedures performed on temporary utilities.
2. Schedule showing implementation and termination of each temporary utility within 15 days of commencement of the Work.
3. Shop drawings:
   a. Temporary signage.
   b. Site Plan: Show temporary facilities, utility hookups, staging areas, and parking areas for construction personnel.

1.5 REFERENCES

A. Comply with applicable requirements of the following standards and those others referenced in this Section, under the provisions of Section 01 42 00 - REFERENCES. Where these standards conflict with other specified requirements, the most restrictive requirements shall govern.

1. ANSI A 10 - Safety Requirements for Construction and Demolition.
2. NFPA 70 - National Electrical Code.
3. NFPA 241 - Building Construction and Demolition Operations.

1.6 TEMPORARY WEATHER PROTECTION

A. Weather Protection Standards:

1. Definition of Weather Protection: "Weather Protection" means temporary protection of work which may be adversely affected by moisture, cold, heat, and wind by the use of temporary covers, enclosures, and heat. Maintain at least the minimum temperatures specific. Comply with specific requirements which are specified within individual Specification Sections.
   a. Temperature at the working surface shall be at least forty degrees Fahrenheit (40 degrees F). This provision does not supersede any specific greater requirements for methods of construction for curing of materials.
2. General Contractor's Responsibilities:

a. The General Contractor shall furnish and install all “weather protection” Both (exterior and interior) during the time period from November 1 to March 31 (inclusive). The General Contractor is responsible to ensure that protection is provided for the building INTERIOR and all materials and equipment from weather at all times (year round).

b. At completion of work, the General Contractor shall remove temporary weather protection; clean and restore all surfaces to original (‘as installed/new’) condition.

3. Trade contractors Responsibilities: Individual Trade contractors are responsible for all tarpaulins and similar protective measures necessary to cover scaffolding for inclement weather conditions during NON-WINTER months. NON-WINTER period is from April 1 to October 31 (inclusive).

4. Proposed Plan: The General Contractor shall within 30 calendar days after Award of Contract, submit three copies of a typewritten proposed plan for “Weather Protection” and obtain the Architect’s and Owner’s written approval.

5. Reporting Requirements:

a. Within thirty calendar days after Contract award, the General Contractor shall submit in writing to the Owner for approval, three copies of its proposed plan for weather protection.

b. The General Contractor shall furnish and install accurate Fahrenheit digital recording thermometers and hygrometers, at places designated by the Owner to determine whether the required temperature and humidity is being maintained.

6. Weather protection materials, equipment, and the installation thereof, shall comply with all the safety rules and regulations including provisions for adequate ventilation and fire protection devices.

7. Use of Permanent Heating System(s): The General Contractor may choose, if the Owner approves, to use the permanent heating system for temporary heat after the building is enclosed and the system has been tested and is ready to operate.

a. The General Contractor shall thoroughly clean and restore to original (‘as installed/new’) condition, acceptable to the Owner, all portions of the permanent heating system that are used for heating during construction.

b. Use of the permanent heating system for weather protection shall not affect any heating system guarantee that may be due to the Owner; such guarantee shall begin to run only when the Owner accepts the building.

B. Additional weather protection requirements: The General Contractor is responsible to ensure that the protection is provided by for the building interior and all materials and equipment from weather at all times (year round).

1. Temporary coverings shall be attended as necessary to insure effectiveness and to prevent displacement.

2. General Contractor shall repair or replace all elements of the building damaged by failure to properly protect them from the weather to the satisfaction of the Architect at no additional cost to the Owner.

1.7 TEMPORARY UTILITIES, GENERAL

A. General temporary utility installation:

1. Engage the local utility companies to install temporary service or connect to existing service, if permitted and approved by Owner. All costs of connecting to public utility lines, and furnishing of utilities during construction shall be without additional cost to the Owner.
2. Provide adequate capacity at each stage of construction.
3. Prior to temporary utility availability, provide 'trucked-in' services.
4. Obtain and pay for required permits and licenses required from authorities prior to commencing installation of temporary services. Arrange for authorities having jurisdiction to inspect and test each temporary utility before use.

1.8 TEMPORARY UTILITIES, ELECTRICITY

A. Temporary electricity: The General Contractor will pay for all electrical energy required for temporary light and power. The Electrical Trade contractor is required to provide temporary feeders of sufficient capacity from the utilities power lines, at the point coordinated with the local utility, to provide for the electric light and power requirements for the Project while under construction. Additional requirements are specified under Division 26 - ELECTRICAL, and as follows:

B. Temporary electricity: The Electric Trade contractor shall be responsible for installation and maintenance of all temporary power as defined above and further specified as follows.

1. The General Contractor will pay for all electrical energy used on the Project from the beginning of construction operations to the Date of Substantial Completion of the Work. The Owner will pay for all electrical energy drawn from normal metered building supply used on the Project after the Date of Substantial Completion of the Work. The General Contractor shall install a separate meter for recording the Construction Electricity.
2. Temporary electricity used for construction will be required between the hours of 7:00 a.m. and 5:30 p.m. and during additional work hours as determined by the General Contractor. No additional charge shall be made by the Electrical Subcontractor for switching the system on and off to meet this time requirement.
    a. Protective night lighting is required at all times (24 hours a day, seven days a week) and shall be on separate switching from temporary electricity service used for construction.
3. Responsibility of compliance with local, state and national codes for installation of the Construction Electric service shall be borne by the Electrical Subcontractor.
4. Replacement lamps shall be provided by the Electrical Subcontractor during the Construction Electric period. All lamps in permanent fixtures which have been used during the Interim Electric period shall be replaced with new lamps by the Electrical Subcontractor at his expense just prior to the Date of Substantial Completion.

5. The following Construction Electricity shall be included by the Electrical Subcontractor in his subcontract price. This schedule will not necessarily provide for all requirements of the General Contractors or all Subcontractors. The General Contractor or any Subcontractor having requirements for power, lighting, or service other than those provided herein, shall make the necessary arrangements to obtain such power, lighting, or service at his own expense.
    a. The Electrical Subcontractor shall obtain all necessary permits and shall connect to public utility line as a source for temporary electrical power, shall furnish and install the temporary electrical power and lighting systems, and shall pay for all labor, materials, and equipment required therefor. All such temporary electrical work shall meet the requirements of the Rhode Island Electrical Code and OSHA.
    b. The Electrical Subcontractor shall furnish and install a feeder, or feeders, of sufficient capacity for the requirements of each floor.
        1) Provide sufficient additional wiring outlets and lamps shall be installed to insure proper lighting in stairwells, corridors and passage areas.
        2) Temporary power, in addition to the lighting requirements (specified herein), shall be provided throughout the building for electrically operated tools, based on a minimum of 0.50 watts per sq. ft.
    c. All necessary cables, load centers, switches and accessories required for the temporary light and power installation shall be provided and installed by the Electrical Subcontractor.
    d. The Electrical Subcontractor shall furnish and install all lamps, both initial and replacement until the date of Substantial Completion.
    e. Temporary light and power requirements herein required is for the use of all trades working at the site.
    f. All Contractors and subcontractors shall, individually, furnish any extension cords and lamps therefor, sockets, motors and accessories required for their work.
    g. The General Contractor, and other subcontractors, shall reimburse the Electrical Subcontractor for the following:
        1) Any temporary wiring of a special nature, other than that specified above, required for their work.
        2) Any temporary wiring of construction offices and buildings used by them.
        3) Any temporary wiring for protective night lighting.
6. All temporary wiring, service equipment, and accessories thereto shall be removed by the Electrical Subcontractor when directed by the General Contractor.
7. The provisions of the Rhode Island Electric Code shall be strictly complied with respect to Article 305 of said code, and the following precautions shall be taken:
    a. Open conductors shall be fastened at ceiling height at minimum of 10 R. intervals. Conductors may not be laid on the floor, and receptacles or fixed equipment circuits shall contain a separate equipment grounding

conductor run as open wiring. Receptacles shall be of the grounding type. Branch circuits, unless installed in a complete metallic conductor and receptacles electrically connected to the grounding conductor. No bare conductors nor earth returns shall be used for wiring of any temporary circuits. Grounding circuits shall never be interrupted.

b. All 15 ampere and 20 ampere receptacle outlets on single phase circuits which are used for construction purposes shall have approved ground-fault circuit protection for personnel, as required by Article 210 of the Rhode Island Electrical Code.

C. Interim Electricity: The Electrical subcontractor shall be responsible for interim electricity as defined above and further specified as follows.

1. The permanent electric power and lighting system in a given area shall be completely installed as designed before the system may be used in such area.
2. At the termination of the use of the permanent electrical light and power system for interim electric, all panelboards shall be inspected and cleaned, and all permanent lighting fixtures which have been used shall be thoroughly cleaned and provided with new lamps, bulbs, fluorescent tubes to provide like new performance.

1.9 TEMPORARY UTILITIES, LIGHTING

A. Temporary lighting: The Electrical Trade contractor shall provide lighting with local switching to fulfill security requirements and provide illumination for construction operations and traffic conditions. Maintain lighting and provide routine repairs. Permanent building lighting may be utilized during construction.

1. Temporary lighting shall be based on the following requirements:
   a. Rooms or spaces under 250 sq. ft.: Two (2) 100 watt lamps.
   b. Rooms or spaces over 250 sq. ft. and under 500 sq. ft.: Four (4) 100 watt lamps.
   c. Rooms or spaces 500 square feet and over: Two (2) 200 watt lamps for spaces 500 square feet to 1000 square feet and two (2) 200 watt lamps for every 1000 square feet or fraction thereof after.
2. Permanent building lighting may be utilized. Immediately prior to the Architect’s inspection for substantial completion. The Electrical Trade contractor is required to replace all used lamps which are broken or have burned out.

B. Protective night lighting is required at all times (24 hours a day, seven days a week). General Contractor is required to arrange for adequate outdoor lighting to illuminate staging’s, stockpiles, trenches, dangerous projections, excavations and similar conditions and as additionally required to protect the safety of workmen, other personnel, and the public and as an aid in the protection against theft and vandalism.

1. Provide shielding of night lighting to restrict extent of lighting to project site. Shield lighting from illuminating abutter’s properties.

1.10 TEMPORARY UTILITIES, TELEPHONE/INTERNET

A. Temporary telephone service: Provide telephone service at time of project mobilization, and pay all costs for installation, maintenance, and removal. Maintain specified service for duration of work, until Owner's occupancy precludes need for General Contractor to continue service. The General Contractor shall pay service charges for local calls; toll charges shall be paid by party who places call. Service and equipment required includes the following:

1. For General Contractor's Field Office.

a. Provide two direct lines dedicated for use by the General Contractor, Trade contractors, and personnel engaged in construction.

b. One answering machine having remote message retrieval separate incoming and outgoing tape cassettes, time and date message stamp and call monitoring.

c. Cellular (mobile) phone service for General Contractor's Superintendent, continuously maintained until Project Substantial Completion.

B. Temporary internet service: Provide internet service at time of project mobilization, and pay all costs for installation, maintenance, and removal. The General Contractor shall pay for, and maintain service until Owner's occupancy precludes need for General Contractor to maintain service.

1. For Owner's Project Manager's Field Office, General Contractor shall provide and maintain internet access consisting of digital signal 1 (T1), digital subscriber line (DSL), cable or, Fiber-Optic Service (FiOS) services, (dial-up modem service is not acceptable). Internet service shall include e-mail account allowing a minimum of 5mb attachments to ensure exchange of all construction related e-mail to the Architects/Owner's Project Manager's Field Office. Provide and install one 802.11 b/g/n wireless access point, configured with WPA2 security, to include a 4 port switch and the WPS (Wi-Fi protected setup) disabled.

2. For General Contractor's Field Office, General Contractor shall provide and maintain internet and email service. Internet service shall include e-mail account allowing a minimum of 5mb attachments to ensure exchange of all construction related e-mail to General Contractor's field office.

1.11 TEMPORARY UTILITIES, WATER

A. Temporary water: The General Contractor shall provide and maintain water service and distribution piping of sizes and pressures adequate for construction, including water meter and hose bib(s) at location(s) to be determined by General Contractor so that water is available throughout the construction by the use of hoses.

1. Exercise measures to conserve water.

B. Protect piping and fittings against freezing.

1.12 TEMPORARY UTILITIES, FUEL OIL

A. Provide all fuel oil for temporary heating systems at no additional cost to the Owner.

1.13 TEMPORARY HEATING AND COOLING

A. Temporary heat: Provide heat for curing or drying of completed installations or protection of installed construction from adverse effects of low temperatures or high humidity. Provide vented self-contained liquid propane gas or fuel oil heaters with individual space thermostatic control, UL approved and acceptable to local fire department. Use of gasoline-burning space heaters, open flame, or salamander type units is prohibited.

1. Vent heaters directly to outside air, in areas where concrete is less than 15 days old.
2. In enclosed building interior areas, maintain a minimum ambient temperature of 50 degrees Fahrenheit; provide higher temperatures where required by individual specification sections. General Contractor is required to provide enclosures necessary to maintain specified temporary heat.

1.14 TEMPORARY VENTILATION AND HUMIDITY CONTROL

A. General:

1. Humidity Control: Monitor and regulate relative humidity as required for the installation of all interior products. Relative humidity shall be maintained within the limits set by manufacturers of all interior materials and equipment. Refer to individual specification sections in Divisions 6, 8, 9, 10, 11 and 12 for additional environmental requirements.
    a. General Contractor shall enclose interior work areas, protect from weather, and maintain specified temperature and humidity prior to commencement of construction activities relating to interior finishes.
2. Ventilate enclosed areas to assist cure of materials, to dissipate humidity, and to prevent accumulation of dust, fumes, vapors, or gases. Extend and supplement equipment with temporary fan units as required to maintain clean air for construction operations.
    a. During construction, General Contractor shall meet or exceed the minimum requirements of the SMACNA IAQ Guideline for Occupied Buildings under Construction - 1995.

B. Monitor Humidity: Provide Hygrometers to measure temperature and relative humidity in each construction area. Provide quantity of one hygrometer per 2000 square feet of gross area.

1. Provide dehumidifier(s), as required to maintain humidity of enclosed areas below 70 percent. Humidity level shall be maintained in all areas where interior finish work is being performed, and all areas where interior finishes has been completed.
2. Provide fans as specified herein, and as required to eliminate significant variation in humidity levels within enclosed spaces.

C. Temporary Construction Ventilation: General Contractor shall maintain sufficient temporary ventilation of areas where materials are being used that emit VOC’s and maintain ventilation continuously during installation and until emissions dissipate after installation. If continuous ventilation is not possible via the building’s HVAC

system(s) then General Contractor shall supply ventilation via open windows and temporary fans, sufficient to provide no less than three air changes per hour.

1. Vent all areas directly to outside. Areas shall not be vented to other enclosed areas.
2. During dust producing activities (e.g. drywall installation and finishing) General Contractor shall turn off ventilation system and protect openings in supply and return HVAC system from dust infiltration. Provide temporary ventilation as required.
3. Dissipation of VOC's: The period after installation shall be sufficient to dissipate odors and elevated concentrations of VOCs. A minimum time period of 72 hours is required except where longer periods of time are specified under individual specification sections.

D. Preconditioning: Prior to installation, General Contractor shall allow products which have odors and VOC emissions to off-gas in dry, well-ventilated space outside of building for 14 calendar days, in order to allow for reasonable dissipation of odors and emissions.

1.15 FIELD OFFICES AND SHEDS

A. General:

1. All temporary storage, field offices along with specified equipment and furnishings shall be provided within the Contract Sum for the full duration of project (until Substantial Completion), and at no additional cost to the Owner.
2. Availability: Provide two trailers minimum. One for the General Contractor's Field Office and one for the Owner's Field Office. Provide offices ready for occupancy within 15 days after date fixed in Notice to Proceed.
3. Field offices: Provide furnished, insulated, weathertight, office(s) which shall be portable or mobile building(s), or buildings constructed with floors raised above ground, securely fixed to foundations, with steps and landings at entrance doors.
    a. Securely support trailer on temporary masonry or preservative treated wood piers and not on trailer wheels. Anchor trailer to prevent overturning due to wind or other causes.
    b. Temporary offices
4. Location: The location of the field offices and storage areas for equipment and materials shall be upon cleared portions of the job site or areas to be cleared, and shall require review and written acceptance of the Architect. Submit plans showing field offices and storage facilities for equipment and materials for acceptance by the Architect.
    a. Offices and sheds located within the construction area, or within 30 feet of building lines shall be of noncombustible construction. Comply with requirements of NFPA 241.
    b. Construction of offices shall have sound insulation adequate to exclude sounds of routine construction activities and reduce server noise to less than 70 dB.
5. Field Offices, General Requirements:

a. Housekeeping and Supplies: General Contractor shall provide reliable weekly periodic cleaning and maintenance of field offices and storage areas to the satisfaction of the Owner and the Owner's Project Manager or more frequently as required or requested.
   1) Provide reliable weekly cleaning service for Owner's Field Office including toilet room for the duration of the project including cleaning, mopping, and waxing floors. Provide toilet tissue, paper towels, and liquid hand soap as requested by Owner's Project Manager or Owner's Field Representative (Clerk of the Works) for the duration of Project
b. Provide air conditioning and heating to maintain a temperature range of 65 to 78 degrees F.
c. Provide sufficient lighting for 50 foot candles at desk top level over 100 percent of floor area.
d. Excluding computer, computer software and related equipment; all other non-consumed furnishings and equipment, will be returned to the General Contractor upon project completion.
e. The General Contractor shall provide all necessary office supplies to run both field offices on a day to day basis including but not limited to paper, pen, pencils, filing equipment, manila folders, envelopes, toilet paper and paper towels.

B. General Contractor's field office(s): Provide habitable office(s) or space, of size to accommodate personnel, include as a minimum the following:
   1. Size: General Contractor field office shall be not less than 12 by 50 foot long office trailer. Sectioning of trailer shall be as required by General Contractor. Each section of trailer shall have direct access to an exterior locking door and a communicating door.
   2. Furnishings:
      a. Conference table of sufficient size with seating to accommodate personnel and anticipated visitors for specified conferences and weekly progress meetings. Conference table shall comfortably seat not less than 20 people.
      b. Racks and files for Contract Documents, submittals and Project Record Documents.
   3. Outdoor weather thermometer with high/low readings.
   4. Hard-hats for site visitors.
   5. Duplex convenience outlets, at least one per wall.
   6. Telephone service as specified herein above.
   7. Other equipment and furniture as the General Contractor deems necessary.

C. Owner's Field Office: Provide separate trailer for sole use of Owner, Owner's Project Manager, Owner's Field Representative (Clerk of Works), Architect, engineering consultants, with separate entrance door with new lock and three keys. Provide office furnished, insulated, weathertight, and habitable with tightly screened

doors and windows, secure locking devices and separate toilet facilities complying with the following criteria, and with specified equipment and furniture:

1. Owner's Field Office Criteria:
    a. Field office shall be approved by Owner's Project Manager, and located on site where acceptable by Owner's Project Manager and Architect.
    b. Size: Owner's Project Manager's field office shall be not less than 12 foot by 60 foot long temporary field office facility, equal to WilScot, and being of less than 3 years old.
        1) Division of Field Office:
            a) Architect's Office, 12 by 12 feet minimum, with separate keyed interior entry.
            b) Owner's Project Manager's office, shared with Owner's Field Representative (Clerk of Works), 12 by 16 feet minimum, with separate keyed interior entry.
            c) Conference room of sufficient size to accommodate meetings of not less than 12 individuals. Provide electrical power service and 120-V ac duplex receptacles, with no fewer than one receptacle on each wall. Furnish room and conference table, padded chairs.
            d) Toilet facilities as specified herein below.
    c. Sanitary Facilities: Provide a toilet room within the owner's site office for sole use of Owner, Owner's Project Representative, Architect, Clerk of the Works, and their visitors. Equip toilet room with a water closet and lavatory, plumbed with hot and cold water and waste and vent. Connect to Town sewer if possible or provide holding tank with regular pumping service.
        1) Provide a 5 gallon electric water heater. Maintain plumbing in good working order, and dispose of waste effluent in a legal manner. Install mirror, toilet paper holder, and paper towel holder. Toilet room to have one ground fault duplex electrical outlet, switched ceiling recessed combination exhaust fan/light, and locking door.
        2) Temporary 'Port-A-Potty' style toilet facilities which are located on site are not acceptable in lieu of providing functional toilet facilities within the Owner's Field Office.
        3) Provide toilet tissue, paper towels, and liquid hand soap as requested by Owner's Project Manager or Clerk of the Works for the duration of Project
2. Furnishings: All furnishings shall be new and clean.
    a. Three (3) metal desks with plastic laminate tops, 30 by 60 inches, pedestal style with two drawer letter hanging file on one side and three drawer pedestal on the other side, pencil drawer center, pencil drawer and one pedestal lockable, with two keys. Each desk to have secretarial return (attachment that forms an "L" shaped unit).
    b. Three (3) cushioned office swivel chairs, fully adjustable, with arms and five caster base.

c. Six (6) four-drawer letter size metal file cabinets, with metal hanging frame in each drawer, lockable with three keys each. Provide one cabinet fire-rated.

d. Two portable 30 inch hanging plan rack units, on casters, each with twelve sticks for 30 inch sheet size, each stick with three tightening knobs.

e. Three waste baskets and one (1) thirty gallon waste basket/trash can. Provide waste bags/liners for duration of project.

f. One coat rack, consisting of wall mounted panel of six coat hooks spaced 6 inches apart, with hat shelf.

g. Six individual coat hooks located as directed.

h. Plan table, minimum size 42 by 72 inches with sloped surface, raised lip at front (low) edge, height as directed.

1) Two drafting stools/chairs with casters and adjustable height and back..

i. Four folding tables, 72 by 30 inches each.

j. Sixteen metal folding chairs, with cushioned seats.

k. Sample Shelving: Minimum 12 feet of 10 inch deep shelving.

l. Four aluminum framed tackboards 12 square feet each, minimum.

m. Three, 4 by 3-foot wall mounted dry erase with boards; include 4 marker and eraser kits.

3. Equipment: All equipment shall be new, clean and serviceable. Upon completion of the Work all printers, copier, computers, iPad's, digital cameras, monitors and video conferencing equipment shall be delivered to the Owner.

a. Fully stocked first aid kit, with supplies regular replenished and replaced before expiration dates.

b. Two outdoor thermometers with high/low readings.

c. Three recycling bins.

d. One under counter refrigerator with freezer compartment.

e. One microwave oven.

f. One automatic coffee maker, Keurig Office K Cup or approved equal. Provide coffee and supplies for the duration of the project.

g. One water dispenser with hot and cold spigots. Four five gallon containers of spring water delivered every two weeks, continuous stock of flat bottom cups.

h. Three wall calendars.

i. One type ABC fire extinguisher, 20 lb., charged and inspected.

j. Copier/Printer: Full function networked large format dry (toner) color copier/printer capable of 35 copies per minute, with 50 sheet automatic document feeder, double sided copying, automatic sorter, capable of sorting 20 copies, reduction and enlargement feature, built-in stapler, trays for letter portrait with 500 sheet draw, landscape with 250 sheets, legal and 11 by 17 inch paper, include cabinet stand

with casters, provide full documentation, manuals, and service agreement covering all required replacement parts for the duration of the project, furnish paper staples, and toner as requested by Owner's Project Manager/Clerk of the Works for the duration of the project.

1) Copier/printer shall be capable of 8 1/2 x 11, 8 1/2 x 14 & 11x17 paper printing. Provide a 3 year supply of each type of paper size
2) Copier/printer shall be network capable or have Wi-Fi connectivity so that printing from local computers can be performed.

k. Videoconferencing equipment, including:
   1) Logitech MeeetUp camera, Model No. 960-001101 or equal.
      a) Optional TV Mount: Logitech Model No. 939-001498 or equal.
      b) 120 degree field of view
      c) Motorized pan/tilt/zoom
      d) 4k resolution
      e) Integrated speakers and 3 microphones
      f) USB plug and play
      g) Includes remote
      h) 5x HD zoom
      i) 3 camera presets
      j) Bluetooth
      k) 5M USB 2.0 cable included

l. Samsung 65 inch 4K flat screen LCD monitor on cart, Model No. LH65BETHLGFXGO or equal.
   1) Monitor characteristics:
      a) 3840x2160 resolution
      b) 250nit brightness or higher
      c) 16/7 operation or longer
      d) 4700:1 contrast ratio or higher
      e) 178 degree viewing angle
      f) 8ms response time or lower
      g) Two built in speakers
      h) HDMI x2 input min
      i) Built in Wifi
      j) USB M media player
      k) 3 year limited parts/labor warranty included
      l) Include 25' HDMI cable.
   2) Display mount for flat screen: Peerless PR560M or equal
      a) 200X200 to 800X500 VESA mounting pattern
      b) 65" mounting height
      c) Shelf
      d) Supports monitors 55" to 86"
      e) Heavy duty casters

f) Spring assisted vertical adjustment poles

m. Provide one iPad Pro 12.9 inch, WiFi and 5G enabled with service for the duration of the Project plus three months, complete with 512 GB of memory, built in camera, and three-year Accidental Damage Protection with next day technical support required to all hardware and software operational for the duration of the Project.

1) IPad software shall include:

a) PDF review and editing and CAD file review, Package to enable office document review/editing, Security/ Password software, and Notes pad.

b) Software: Microsoft office 365 suite to include Outlook and PDFpen by Nitro, one time purchase.

c) PlanGrid with “Dozer” level subscription.

d) 65 inch to 70 inch LCD display, commercial grade, with wall mount and installation for OPM field office.

e) HDMI cable, 16 feet long

f) Three IPAD adapters, Apple Lightning to Digital AV (HDMI) Adapters.

g) Wireless access point/WiFi modem.

h) Include stand alone Apple Magic keyboard, USB-C, wireless, Bluetooth and rechargeable, (keyboard shall not require attachment to the ipad)

2) Accessories shall include

a) Military Grade protective case and clear protective screen cover

b) Car/ wall power adapters, External wireless keyboard, and stylus.

c) Include Apple Pencil 2nd generation.

d) IP68 Waterproof with fully submersible to 5' / 1.5 meter for 1 hour

e) Shockproof withstands drops from 3.9' / 1.2 meter complied to MIL STD 810Gs

f) Crystal clear built-in screen protector

g) Fully protected from extreme environment - snow, ice, dirt & dust particles

h) 360 degree swivel Hand strap

i) Include optional Shoulder strap

3) Additional software to include:

a) Microsoft office 365 suite to include Outlook

b) PlanGrid ‘Dozer’ subscription

c) PDFpen by Nitro, one time purchase

4. Provide computer monitors for three laptop workstations: 32” monitors, Samsung S60A or equal having:

a. Flat panel

b. 2560x1440or higher resolution

c. 300 cd/m2 brightness or higher
d. 5ms response time or lower
e. 16:9 aspect ratio
f. 3000:1 contrast ratio or higher
g. 178 degree viewing angle
h. Rotates for portrait view
i. HDMI input
j. High Dynamic range HDR10

5. Safety equipment: OHSA approved.
   a. 12 Construction hard hats.
   b. 12 construction safety goggles.
   c. 12 orange safety vests.
   d. Supply of US-KN95 safety masks for duration of project, FDA Cleared.
6. Data Cabling: Provide data cabling as follows:
   a. Provide adequate data cabling within the Owner's site office so that there is a minimum of three data connection (Cat 5e or Cat 6) in each office at each planned workstation/desk.
      1) The use of a wireless network within the trailer is NOT an acceptable alternative (wireless capabilities are acceptable, but are NOT to be used in lieu of data cabling).
      2) The exact location and quantity of data drops shall be coordinated and approved by the Architect prior to implementation.
   b. Provide cabling from the ISP entry point of the trailer to each wall jack.
   c. An additional two data drops and power outlets shall be available in the center of the trailer for use by visitors. Typically this connection point will be situated near the conference room table. Another data drop shall be provided at a central location in the trailer for use by a networked printer.
7. Documents:
   a. Rhode Island State Building Code (electronically available).
   b. Means Construction Estimate Book including mechanical, electrical, and general building construction books (electronically available).
   c. NFPA 13, 13A, 14, 14A, 20, 70 and 10 1 Standards (electronically available).
   d. ASTM Standards in Building Code, latest Edition (electronically available).
   e. Complete set of Contract Documents, including Drawings and Specifications. Provide one full size set and one half-size set of Drawings and two sets of specifications in D-ring binders.
8. Provide broadband high speed internet access such as DSL, Cable or equivalent with unlimited internet access and Router. Each office area shall be wired to accept computer set up with internet access. Wireless access shall be provided and configured as specified in Article 1.10 herein above.

9. General Contractor install and make all connections so that printer, internet and e-mail connections are in working order.
10. One industrial quality first aid kit intended for construction use and up to ten (10) persons.
11. Provide security grates over all windows and through bolted security bars at all doors.
12. Other furnishings and equipment as required by Owner.

D. Storage and fabrication sheds: Provide sheds, equipped to accommodate materials and equipment involved.
   1. Subcontractors are responsible for their own storage facilities, coordinate locations.

E. Maintain approach walks to field office and storage/fabrication sheds free of mud, water, and snow.

1.16 SANITARY FACILITIES

A. Sanitary facilities: Provide self-contained single occupant chemical toilet units, wash facilities and drinking water fixtures.
   1. Sanitary facilities shall be located within the fenced construction zone.

B. Provide toilet tissue, paper towels, paper cups, cleaning compounds and similar materials.

C. Maintain facilities, throughout term of construction, and keep clean, provide covered waste containers for used material.

1.17 CANTEEN SERVICES

A. Canteen vehicles must access the worksite at predetermined times coordinated with the Owner, and are limited to service within the construction site only.

1.18 FIRST AID AND FIRE EXTINGUISHERS

A. First aid supplies: Comply with governing regulations.

B. Fire extinguishers: Provide and maintain on site, adequate fire extinguishers UL rated for A-B-C type fires. Provide red-painted plywood standards for each extinguisher. Additionally provide a dry chemical fire extinguisher at each location where welding, torch cutting and other similar hazardous work is in progress.

1.19 CONSTRUCTION AIDS - USE OF PERMANENT ELEVATORS

A. Temporary use of permanent elevator(s): For temporary use of elevator equipment prior to Project Substantial Completion, make necessary arrangements with elevator installer, subject to approval of Owner’s Project Manager and governing code compliance. General Contractor is required to reimburse elevator installer for labor and materials that are not part of permanent installation and that are required to provide temporary elevator service, including, but not limited to:
   1. Temporary car enclosures.

2. Guards or other protection for elevator machine room and hoistway openings.
3. Main line switch with wiring.
4. Necessary power, signaling devices, and lights in car.
5. Testing and obtaining special permits or certificates.
6. Sign elevator installer's temporary acceptance form before placing elevator into temporary service.
7. Pay costs of power and operation, including maintenance of equipment.

1.20 CONSTRUCTION AIDS - TEMPORARY HOISTS AND CRANES

A. Hoisting equipment and machinery: Furnish all hoisting equipment, crane services and lift machinery required to perform the Work of this Contract, except that required by Trade contractors. Install, operate and maintain in safe condition.
   1. Do not charge applicators and installers for these services during normal working hours.
   2. Trade contractors are responsible for their own hoisting equipment, crane services and lift machinery required to perform the Work of their respective trade.

1.21 CONSTRUCTION AIDS - SCAFFOLDING, PLATFORMS, STAGING, CHUTES

A. Provide ladders, ramps, runways, platforms, railings, chutes, and other mounted or installed construction aids as specified herein to facilitate the Work. Furnish and erect construction aids and maintain in safe condition for the use of all subcontractors, installers and applicators.

B. Furnish and erect scaffolds, staging, and maintain in safe condition, dismantle when no longer required. The General Contractor and Trade contractors shall provide scaffolds, staging, and other similar raised platforms, required to access the Work, per the following
   1. Scaffolds and staging shall be erected and maintained in safe condition, dismantle when no longer required.
      a. General Contractor is responsible to provide, maintain and remove when no longer required, all tarpaulins and enclosures necessary to cover scaffolding (including that furnished by Trade contractor) to maintain specified temporary heat as specified herein under Article entitled "TEMPORARY WEATHER PROTECTION" from the dates of November 1 to March 31.
   2. Scaffolding required for used by Trade contractors shall be furnished, erected, maintained, and dismantled, by the Filed Trade requiring such scaffolding.
      a. Each Trade contractor is responsible to provide, maintain and remove at dismantling, all tarpaulins and similar protective measures necessary to cover scaffolding for inclement weather conditions and as additionally required for dust control.
   3. Scaffolding of any height, required for used by installers and applicators of non-filed trades, shall be furnished, erected, and maintained by the General Contractor.

C. Ladders, temporary stairs, platforms and railings, shall comply with OSHA guidelines.

1. Provide and maintain temporary stairs until permanent stairs are in place and functional. When permanent stairs are erected, provide temporary railings and guards. Protect permanent stairs with temporary covers and protective treads.
2. Portable ladders and mobile platforms of all required heights, shall be provided by individual users.

1.22 VEHICULAR ACCESS AND PARKING

A. Vehicular access: Construct temporary all-weather access roads from public thoroughfares to serve construction area, of a width and load bearing capacity to provide unimpeded traffic for construction purposes.

1. Construct temporary bridges and culverts to span low areas and allow unimpeded drainage.
2. Extend and relocate as Work progress requires, provide detours as necessary for unimpeded traffic flow.
3. Locate access roads where acceptable to Architect.

B. Provide and maintain access to fire hydrants free of obstructions. Provide unimpeded access for emergency vehicles. Maintain 20 foot width driveways with turning space between and around combustible materials.

C. Snow and ice removal: Maintain all vehicular and pedestrian access roads and walkways free from ice and snow during the winter season for the duration of the Project.

D. Vehicular Parking:

1. Construct temporary parking areas within the construction fenced area to accommodate use of construction personnel. Locate parking areas where acceptable to Architect/Engineer.
   a. NO on-street parking is permitted.
   b. NO parking in Owner-occupied areas and parking lots is permitted.
2. Construct temporary parking areas within the construction fenced area and adjacent to the Owner’s Field Office. Provide a minimum of eight dedicated parking spaces for use by Owner’s Project Manager, Architect, Owner’s Field Representative and consultant engineers.
3. Monitor parking of construction personnel private vehicles. Maintain free vehicular access to and through on-site parking areas. Prohibit parking on or adjacent to access roads, and in non-designated areas.

E. Prior to Substantial Completion, the installed base for permanent roads and parking areas may be used for construction traffic.

1. Avoid traffic loading beyond paving design capacity. Tracked vehicles not allowed.
2. Permanent parking structures may be used by construction personnel on execution of agreement with Owner.

1.23 VEHICULAR TRAFFIC CONTROL

A. The General Contractor shall not close or obstruct any portion of any street public or private, without obtaining permits therefore from the proper authorities.

1. Provide and pay for police traffic details at anytime that construction takes place in a public street (right of way). The General Contractor is responsible for coordinating, requesting. and paying the prevailing rate of wage for police traffic details directly with the City of Central Falls Police Department.

B. Construction parking control: Control vehicular parking to preclude interference with public traffic or parking, access by emergency vehicles, User Agency's operations, or construction operations.

C. Vehicle and Equipment Security: Lock all unattended vehicles including construction machinery and equipment. Do not leave vehicles or equipment unattended accessible to public with the motor running, or with keys easily accessible.

D. Haul routes: Consult with governing authorities and establish public thoroughfares which will be used as haul routes and site access. Confine construction traffic to designated haul routes.

1. Confine construction traffic to designated haul routes.
   a. Arrival/Departure: Refer to Section 01 14 00 - WORK RESTRICTIONS.
2. Provide traffic control at critical areas of haul routes to expedite traffic flow and to minimize interference with normal public traffic.
3. Travel through neighborhoods is prohibited.

E. Traffic signals and signs: Provide, operate and maintain temporary equipment, services, and personnel, with traffic control and protective devices to direct and maintain an orderly flow of traffic in all areas under General Contractors control, or affected by General Contractors operations, including but not limited to haul routes, at site entrances, at on-site access roads, and parking areas during construction.

1. Provide traffic control and directional signs as needed to direct construction and public traffic.
2. Provide warning signs for public traffic and "STOP" signs for entrance onto public roads.
3. Comply with signage and traffic control requirements of authorities having jurisdiction.
4. Provide traffic control and directional signs, mounted on barricades or standard posts as needed to direct construction and public traffic, including but not limited to:
   a. At each change of direction of a roadway and each crossroad.
   b. At detours.
   c. At parking areas.
   d. At entrance points onto public roads.
5. Provide automatic traffic control signals where required by local authorities having jurisdiction.

6. Provide traffic cones and drums to maintain orderly flow of traffic.
7. Provide flares and lights during periods of low visibility to clearly delineate traffic lanes and to guide traffic.

F. Provide areas of illumination of critical traffic and parking areas.

1.24 DUST CONTROL

A. Provide positive means to prevent air-borne dust from dispersing into atmosphere.
1. Take all necessary measures and provide equipment and materials to minimize dust from rising and blowing across the site and also to control surface water throughout the operation so that it does not run onto paved ways without being filtered. Control all dust created by construction operations and movement of construction vehicles, both on site and on paved ways.
2. Take control measures to prevent dust and debris from blowing onto abutting neighbors to the Site. Control measures may include additional height fencing with dust barriers, additional water-down operations and other measures as necessary to protect abutting neighbors.
3. During the progress of the work, maintain the areas of construction activities including sweeping and sprinkling of streets as necessary. Provide and use calcium chloride for more effective dust control, when deemed necessary by regulatory agencies, without additional cost to the Owner.

B. Prevent air-borne dust from dispersing into ducts (air supply and return) during construction. Seal all open ends of completed ductwork, and overnight work-in-progress. Inspect ducts on daily basis to ensure seals are intact. Protect ductwork waiting, to be installed with surface wrapping.
1. Ductwork protection during construction is a joint responsibility between the General Contractor and HVAC Trade contractor.
2. HVAC Trade contractor is responsible to wipe down internal surfaces of ductwork immediately prior to installation to remove all dust and debris.

C. Prevent air-borne dust from dispersing into Owner occupied spaces (after partial Owner-occupancy, if occurs). Provide interior dust-tight temporary partitions as may be required, at no additional cost to Owner.
1. Provide air filters over openings and grilles in air-return ducts occurring within construction areas.
2. Provide openings in temporary partitions where air-return grilles occur outside of work areas. In each opening, provide standard 2 inch thick, throw-away type filter having a rated efficiency of 35 percent. Review with Architect size requirements of filtered openings, locations of openings and how many are required.
3. Replace air filters as required to maintain their efficiency.

1.25 NOISE CONTROL

A. Develop and maintain a noise-abatement program and enforce strict discipline over all personnel to keep noise to a minimum.

1. The General Contractor shall schedule and conduct demolition and construction operations in a manner that will minimize, to the greatest extent possible, any noise disturbance to the public in areas adjacent to the Work and to occupants of buildings or structures in the vicinity of the Work.
2. Configure the construction site in a manner to locate loud equipment and activities as far away as possible from noise-sensitive locations.
3. Submit proposed noise abatement program to the Owner's Project Manager and Architect for review.

B. The General Contractor shall use all reasonable efforts to implement noise reduction methods to minimize construction noise emission levels. Noise reduction methods shall include, but are not be limited to:

1. Execution of construction work by methods and by use of equipment which will reduce excess noise.
2. Equip air compressors with silencers, and power equipment with mufflers.
3. The local power grid shall be used wherever feasible to limit generator use. No generators larger than 25 KVA shall be used and, where a generator is necessary, it shall have maximum available noise muffling capacity.
4. Attaching noise-deadening material to the inside of hoppers and chutes.
5. Limit the number and duration of equipment idling on the site, the use of annunciators or public address systems and the use of air or gasoline-driven hand tools.
6. Manage vehicular traffic and scheduling to reduce noise:
   a. Use barrels or signage to detour traffic away from plated trenches.
   b. Minimize noise from backup alarms using measures that meet OSHA regulations including the use of self-adjusting ambient-sensitive backup alarms, manually-adjustable alarms on low setting, use of observers, and scheduling of activities so that alarm noise is minimized.
      1) Configure construction site to minimize backup alarm noise. Develop site access in a manner to permit vehicular movement through the site in a forward manner without the need to back up.

C. Suspension of Noise Generating Work: The Owner retains the right to direct General Contractor to temporarily suspend noise generating work, or to utilize other means and methods, as practical, and acceptable to the Owner, which are less disruptive to the educational activities of the adjacent middle school. MCAS Testing, Mid-Term and Final's testing, Graduation Ceremonies, are examples of when suspension of noise generating work may be required.

1.26 TEMPORARY BARRICADES

A. Provide barriers and barricades to prevent unauthorized entry to construction areas.

1. Comply with standards and code requirements for erection of barricades, where required provide lighting, including flashing lights.
2. Paint with appropriate colors, graphics and warning signs to inform personnel and the public of the hazard being protected against.

3. Provide special barriers necessary to protect entrances and areas around building and to prevent persons from coming in contact with material or construction operations.

B. Provide temporary enclosures, for protection of construction from exposure to weather, other construction operations and similar activities. Where heat is needed and the building envelope is incomplete, provide enclosures where there is no other provision for containment of heat.

1. Provide doors with self-closing hardware and locks.
2. Provide barricades and protective entrances at least 48 inches high around openings in floors, escalators and elevators.

C. Provide temporary roofing as needed to maintain the building water tight.

1.27 TEMPORARY FENCES

A. Construction fence: Provide a 6 foot high commercial grade chain link fence in areas designated on the phasing plans to provide a secure perimeter around the construction site; equip with vehicular and pedestrian gates and locks.

1. Relocation of all fences and gates as required due to construction phasing. Relocations shall be provided at no additional cost to the Owner.
2. Vehicular and Pedestrian Gates: Build into fence at approved locations. Provide gates with cross-bracing, and hung on heavy strap hinges with post and hook for double gates. Provide heavy hasps and padlocks.
3. Visual Barrier: Provide a continuous ‘solid visual barrier’ at all fencing. Solid barrier shall be constructed approved by Architect by use of an opaque applied scrim. Barrier shall be a height of 6 feet above grade for full length of barrier.

B. Emergency Key Cabinet: Provide emergency access key cabinet (“Knox Box”): medium duty, surface mounted. Locate emergency key cabinet in readily-accessible location outside of fence line. Provide keys for emergency key cabinet to Owner’s designated representative(s).

1. Inside emergency key cabinet maintain keys for fence entrance gates, and construction core keys for building, once it is closed in.
2. Inside emergency key cabinet include the Emergency Contact List as specified under Section 01 33 00 – SUBMITTAL PROCEDURES.

C. Fence, General: Fence shall be industrial-grade, heavy-duty construction: Galvanized fabric with galvanized frame.

1. Chain link fabric shall be made of coated-steel, 9 gage (0.148 inch) core wire woven in 2-inch uniform mesh, height (roll width) to suit fence height, with bottom selvage knuckled, top selvage twisted, with woven fabric having a minimum breaking strength of 1290 pounds.
   a. Construction privacy and containment mesh: 80 to 85 percent privacy (15 to 20 percent open) 100 percent polyethylene mesh having weight of approximately 5.1 ounces per square yard, color green. Provide with four-ply sewn hems, reinforced with 2 inch wide 18 ounce vinyl-coated UV resistant polyester tape. Finish hem width is 1 inch. Furnish with

number 2 size brass grommets at 12 to 18 inches on-center, along hemmed edges.

1) No advertising signage, logos or graphics are permitted on screening.

2. Framework: Posts and rails shall be sized as detailed on the drawings , Type 1 seamless steel pipe, ASTM A-120, standard weight schedule 40, hydrostatic testing waived.
3. Gate Posts: Standard weight pipe 2-7/8 inches OD nominal weight, 5.79 pounds per foot.
4. Gate Frames: 2 inches OD standard weight pipe, 2.73 pounds. per foot with heavy malleable iron or pressed steel corner fittings securely riveted. Fabric to match the fence shall be installed in the frame by means of tension bars and hook bolts. Each frame to be equipped with 3/8 inches diameter adjustable truss rods.
5. Bottom hinges to be ball and socket type designed to carry the weight of the gate on the post footing. Upper hinge to be wrap around adjustable type. All gates to be equipped for padlocking and with semi-automatic outer catches to secure gates in opened position.
6. Fittings: Pressed steel or malleable iron, hot-dipped galvanized conforming to the requirements of ASTM A153. Tie wires shall be minimum nine-gage galvanized wire. Attachment bolts shall be galvanized.
7. Post Settings: Driven into ground.
   a. Temporary concrete bases may be considered where fencing is scheduled for relocation, as approved by Owner, Owner's Project Manager and Architect.

D. Snow Fence: Provide continuous orange plastic "snow" fence.

1. Scope and Extent: If not otherwise indicated, provide "snow fence" for all fencing except where "chain link security fence" is required.
2. Height: Minimum 4 feet above grade.
3. Posts: Provide painted steel posts set at least 24 inches into the ground. Space posts not more than 8 feet on center. Erect and maintain posts plumb. Tie plastic fabric to posts at least three times per post.

1.28 TREE AND PLANT PROTECTION

A. Comply with requirements specified in Section 01 56 39 - TREE PROTECTION AND TRIMMING, and as specified herein.

1. Provide temporary guards or fencing to protect trees and vegetation to be left standing. Protect plant life by placing boards, planks, poles or fencing around tree driplines.
2. A reasonable sum (cost of equivalent replacement) will be deducted from the Contract Sum for any permanent damage to existing trees or plantings which are outside the construction site area but on the Owner's property or within the construction site area, and areas designated to be protected. Damage to trees and plants off the Owner's property shall be fully the responsibility of the General Contractor.

1.29 POLLUTION CONTROL

A. Provide methods, means, and facilities required to prevent contamination of soil, water, or atmosphere by, the discharge of noxious substances from construction operations.

1. Comply with all applicable Federal, State, County, and municipal laws regarding pollution.
2. Prevent pollution of streams, lakes, or reservoirs with fuels, oils, bitumens, calcium chloride, acids, waste products, effluents, chemicals or other harmful substances. Prevent from such substances from entering storm drains and sanitary sewers.

B. Provide equipment and personnel, perform emergency measures required to contain any spillage and to remove contaminated soils or liquids.

1. Excavate and legally dispose of any contaminated earth off-site, and replace with suitable compacted fill and topsoil.

1.30 PEST CONTROL

A. Provide rodent control as necessary to prevent infestation of construction and storage areas. Employ methods and use materials which will not adversely affect conditions at the site or on adjoining properties.

B. Provide marked metal containers with lids for all edible rubbish and enforce their use by all employees. Empty containers and legally dispose of contents off site to maintain rodent control.

C. If the General Contractor’s basic rodent control program proves to be ineffective, obtain the services of a professional exterminator, at no additional cost to the Owner.

D. Should rodenticides be considered necessary, submit copies of proposed program to Owner and Architect. Use of rodenticide shall comply with manufacturer’s published instructions and recommendations. Clearly indicate:

1. Area or areas to be treated.
2. Rodenticides to be used.
3. Manufacture’s printed instructions.
4. Pollution preventive measures to be employed.

1.31 FIRE PREVENTION MEASURES

A. Prior to commencement of work at the site, the Owner's Project Manager, and General Contractor shall meet with the City of Central Falls Fire Marshal to plan site and building access in the event of fire.

1. Access paths for heavy firefighting equipment shall be laid out and maintained.
2. Free access from streets to fire hydrants and to outside connections for standpipes, sprinklers or other fire extinguishing equipment shall be provided and maintained.

B. The General Contractor shall take all necessary precautions for the prevention of fire during construction. Install and maintain temporary fire protection facilities of the types needed to protect against reasonably predictable and controllable fire losses. Maintain unobstructed access to fire extinguishers, fire hydrants, temporary fire protection facilities, stairways, and other access routes. Ascertain and comply with requirements of Project insurance carrier, local fire department and the state fire marshal.

1. Maintain the area within contract limits orderly and clean.
    a. Remove combustible rubbish promptly from the site and when required, store combustible materials in containers in fire-safe locations.
2. Maintain clear access to exits from within the building.
3. Smoking is not permitted on-site.

C. Establish procedures for fire protection for welding, cutting and open torch work, and other potentially hazardous operations. Obtain permission from local authorities having jurisdiction for such work as required by law. Provide special fire extinguishers at welding and torch cutting work.

1. After Owner occupancy: Maintain a fire watch when fire protection and warning systems have been temporarily de-activated. Maintain watch during all working hours for full period of de-activation at no cost to Owner.
2. The General Contractor will assign personnel to inspect all construction areas at the end of each day's work for fire hazards prior to lock-up.

D. Provide for outside storage of gas tanks, sufficiently clear of any structure. Promptly remove welding and cutting equipment from the building when no longer required. Do not store welding or cutting materials within the building when work is not being performed.

E. Permanent fire protection system may be activated to meet these requirements. Replace fusible link heads and other expended or discharged components at time of Substantial Completion.

1.32 SECURITY MEASURES

A. Protect Work, and Owner's operations from theft, vandalism, and unauthorized entry. Initiate a security program at job mobilization.

B. Maintain security program throughout construction period until Owner occupancy

C. Provide entry control:

1. Restrict entrance of persons and vehicles into Project site.
2. Allow entrance only to authorized persons with proper identification.
3. Maintain log of workmen and visitors, make available to Owner's Project Manager on request.

1.33 PROJECT IDENTIFICATION AND TEMPORARY SIGNAGE

A. General: Signs other than those specified herein are not permitted, except those required by law or expressly authorized by the Owner.

1. At all times during the project, signage must clearly direct occupants and the general public in the safe use of the building. Signs must clearly indicate areas of no admittance, and further must clearly define and direct users to building entries, exits, school offices and other important destinations. All such interim signage must be painted by a professional sign painter on 3/4-inch medium density overlay plywood with letters no less than 3 inches in height. Coordinate required signage with Architect.

B. Project sign:

1. Provide 8 foot wide by 4 foot high foot project sign of exterior grade MDO plywood and wood frame construction, painted, with self-adhesive color printed text with reproduction of building rendering. Architect will provide signage design.
    a. Color prints for rendering shall be 3M Scotchprint marking film series 8640 or equal, 4 mil thickness, “ControlTac” vinyl film as manufactured by 3M company having a positional pressure activated pigmented adhesive.
    b. Overlay protecting film, Scotchprint Film, clear over laminating film, as manufactured by 3M company.
2. List title of project, Owner (Awarding Authority), Owner’s Project Manager, Architect, engineering sub-consultants, and General Contractor and major Trade contractors.
3. Erect on site at location established by Architect.

C. Signage at perimeter of construction site: Provide clear and visible warning signage with appropriate language such as: “Prohibited Access – Hard Hat Only – No Admittance – Authorized Personnel Only”.

1.34 REMOVAL OF TEMPORARY UTILITIES, CONTROLS, AND FACILITIES

A. Remove temporary above grade and buried utilities, equipment, facilities, materials, prior to Substantial Completion inspection.

1. Do not remove erosion control devices until after all disturbed earth has been paved or vegetated.

B. Remove underground work and compacted materials to a depth of 2 feet; fill and grade site as specified.

C. Restore permanent facilities used during construction to specified condition.

D. Clean and repair damage caused by installation or use of temporary work.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

End of Section

Section 01 56 39
TEMPORARY TREE AND PLANT PROTECTION

PART 1 - GENERAL

1.1 SUMMARY

A. Drawings and General Provisions of Contract, including General and Supplementary Conditions and Division 01 Specification sections, apply to work of this section.

B. Related Sections: The following sections contain requirements that relate to this section.
1. Section 31 00 00 – Earthwork
2. Section 32 91 01 – Soil Preparation for Lawn Establishment
3. Section 32 91 03 – Soil Preparation for Trees and Planting Beds
4. See Item 1.7 for Sustainable Requirements

C. References: The following specifications and standards of the organizations and documents listed in this paragraph form a part of the specification to the extent required by the references thereto. In the event that the requirements of the following referenced standards and specification conflict with this specification section the requirements of this specification shall prevail. In the event that the requirements of any of the following referenced standards and specifications conflict with each other the more stringent requirement shall prevail.
1. ANSI A 300 (Part 5) – Standard Practices for Tree, Shrub and other Woody Plant Maintenance, most current edition.
2. Pruning practices shall conform with recommendations “Structural Pruning: A Guide For The Green Industry”; Published by Urban Tree Foundation, Visalia, California, most current edition.
3. Glossary of Arboricultural Terms, International Society of Arboriculture, Champaign Illinois, most current edition.

1.2 DESCRIPTION OF WORK

A. The scope of work includes all labor, materials, tools, equipment, facilities, transportation and services necessary for, and incidental to performing all operations in connection with protection of existing trees and other plants as shown on the drawings and as specified herein.
1. Provide preconstruction evaluations
2. Provide tree and plant protection fencing.
3. Provide protection of root zones and above ground tree and plants
4. Provide pruning of existing trees and plants.
5. Coordinate with the requirements of Section Soil Preparation for modifications to the soil within the root zone of existing trees and plants.
6. Provide protective matting outside of the protection fencing to allow for construction activities near the fence while protecting roots.
7. Provide all insect and disease control.
8. Provide maintenance of protected trees and plants including irrigation during the construction period as recommended by the arborist report.
9. Provide maintenance of protected trees and plants including irrigation during the post construction plant maintenance period.
10. Remove tree protection fencing and other protection around and under trees and plants.

11. Clean up and disposal of all excess and surplus material.

B. Work includes trimming and protection of trees that are indicated to remain but interfere with or are in close proximity to new construction, as herein specified. All tree work shall be performed with the approval of the Landscape Architect and under the direction of a qualified Arborist, see section 1.3 “Quality Assurance”, herein.

C. Refer to Demolition Plans, which shows limits of removal of trees, shrubs and other vegetation interfering with new construction.

D. Refer to Tree Protection Plan for tree protection fencing and notes.

1.3 QUALITY ASSURANCE

A. Arborist: Contractor shall engage a Rhode Island Certified Arborist who is also an ISA Board Certified Master Arborist to perform the following work:
1. Remove branches from trees, which are to remain, if required to clear for new construction.
2. Recommend procedures to compensate for loss of roots, if any, and perform initial pruning of branches to stimulate root growth where removed to accommodate new construction.
3. Perform root pruning where construction activities close to the trees will occur.
3. Perform tree repair work for damage incurred by new construction.
4. Remove dead wood, crossing branches and any other trimming on trees which are to remain, as required by the Landscape Architect.

B. All scaled dimensions on the drawings are approximate. Before proceeding with any work, the Contractor shall carefully check and verify all dimensions and quantities, and shall immediately inform the Owner’s Representative of any discrepancies between the information on the drawings and the actual conditions, refraining from doing any work in said areas until given approval to do so by the Owner’s Representative.

1.4 SUBMITTALS

A. QUALIFICATIONS SUBMITTAL: **For each applicable person expected to work on the project, provide copies of the qualifications and experience of the Consulting arborist, proof of an ISA Board Certified Master Arborist and any required Herbicide/Pesticide license to the Owner’s Representative, for review prior to the start of work on this project. Submit current State certification to the Owner’s Representative.**

B. ARBORIST REPORT: Prior to the start of construction, submit, for approval by the Owner’s Representative, the report of a consulting arborist who is an ISA Board Certified Master Arborist, which details the following information for all trees to remain within the area designated on the drawings as the Tree and Plant Protection Area. The report shall include the following:
1. A description of each tree to remain indicating its genus and species, condition including any visible damage to the root system or soil within the root zone, tree diameter at breast height (dbh) and approximate height, size and any visible disease, insect infestations and or branch and trunk structural deficiencies.
2. The report shall note all trees or parts of trees, which are considered a hazard or significant or extreme risk level. Include the International Society of Arboriculture hazard evaluation sheet for each tree, which may reasonably be identified as a potential hazard tree.

3. Recommendations as to treatment of all insect, disease and structural problems encountered.
4. Recommendations for fertilizer treatments, if any.
5. A plan of the site showing the location of all trees included in the report.
6. Submit written certification by registered ISA Board Certified Master Arborist to the Owner's Representative that trees indicated to remain have been protected during the course of construction in accordance with recognized standards of the industry. Also certify that where damage did occur trees were promptly and properly treated. Indicate which damaged trees, if any, are incapable of retaining full growth potential and are recommended to be removed and replaced.

C. CONTRACTOR QUALIFICATIONS:
1. All pruning, branch tie back, tree removal, root pruning, and fertilizing required by this section shall be performed by or under the direct supervision of an ISA Certified Arborist.
2. All applications of pesticide or herbicide shall be performed by a person maintaining a current state license to apply chemical pesticides valid in the jurisdiction of the project.

D. PRODUCT DATA & MATERIALS: Submit manufacturer product data and literature describing all products required by this section to the Owner's Representative for approval. Provide submittal four weeks before the start of any work at the site. Submit material samples for all products used under this specification.

1.5 PRE-CONSTRUCTION CONFERENCE

A. Contractor shall schedule a pre-construction conference with the Owner's Representative at least seven (7) days before beginning work to review any questions the Contractor may have regarding the work, administrative procedures during construction and project work schedule.
1. The following Contractors shall attend the preconstruction conference:
a. General Contractor
b. Consulting Arborist
c. Subcontractor assigned to install Tree and Plant Protection measures
d. Earthwork Contractor
e. All site utility Contractors that may be required to dig or trench into the soil
f. Landscape Subcontractor
g. Landscape Architect

B. Prior to this meeting, Contractor shall mark all trees and plants to remain and or be removed as described in this specification for review and approval by the Owner's Representative.

1.6 JOB CONDITIONS

A. Temporary Protections: Provide construction fencing to protect trees and other plants, which are to remain, from damage.

B. Protect Root Systems: The contractor shall not store construction materials, debris or excavated material within drip line (outer perimeter of branches). The Contractor shall not permit vehicles within drip line, unless noted on the Plans and stated herein. The Contractor shall restrict foot traffic to prevent excessive compaction of soil over root systems.

1.7 NE-CHPS GENERAL REQUIREMENTS

A. The work of this Section is required to comply with general requirements and procedures for compliance with certain prerequisites and credits needed for the Project to obtain CHPS Verified certification based on Northeast Collaborative for High Performance Schools Criteria Version 3.2 (NE-CHPS) and as outlined in Division 01 Section “Sustainable Design Requirements.”
1. The General Contractor is responsible to coordinate with the work of other Sections and comply with all NE-CHPS requirements in accordance with the Contract Documents such that the work carried out by this Section does not compromise the achievement of any other NE-CHPS prerequisites and credits applicable to the entire Project.

B. Related Sections for Sustainable Design Requirements:
1. Division 01 Section “Substitution Procedures” for NE-CHPS substitution procedures.
2. Division 01 Section “Submittal Procedures” for NE-CHPS submittal requirements.
3. Division 01 Section “Construction Controls and Temporary Facilities” for requirements for temporary facilities.
4. Division 01 Section “Product Requirements” for additional NE-CHPS submittal requirements.
5. Division 01 Section “Construction Waste Management and Disposal” for waste management, recycling and disposal.
6. Division 01 Section “Sustainable Design Requirements” for general procedures for compliance with NE-CHPS prerequisites and credits.
7. Division 01 Section “Construction Indoor Air Quality (IAQ) Management Plan” for material and procedure requirements.

PART 2 - PRODUCTS

2.1 MATERIALS

A. DRAINAGE CRUSHED STONE: Selected stone or gravel, graded to pass criteria established in Section 31 00 00 - Earthwork.
1. Submit supplier’s product data that product meets the requirements and one gallon sample for approval.

B. NEW TOPSOIL: Fertile, friable, surface soil, containing natural loam. Refer to Section 32 91 03 Soil Preparation for Trees and Planting Beds and Section 32 91 01 – Soil Preparation for Lawn Establishment.
1. Submit supplier’s product data that product meets the requirements and one gallon sample for approval.

C. MULCH: Pine Bark Mulch shall be derived from evergreen tree bark aged to a minimum of six months and no more than eighteen months. The bark shall be shredded so that the resulting pieces are no more than ¼ inch thick and no longer than three inches (3”). The mulch shall be free of stringy material and shall not contain an excess of fine particles. The mulch shall be brown in color, free of leaves, twigs, sod, weeds, shavings and other foreign materials which are injurious to health plant growth.
1. Submit supplier’s product data that product meets the requirements and one gallon sample for approval.

D. TREE PROTECTION FENCING: Tree fence type is at the discretion of the Landscape Architect or Owner, refer to Demolition Plans for more information.

1. CHAIN LINK FENCE: 6-foot-tall galvanized chain link fence set in metal frame panels on movable core drilled concrete blocks of sufficient size to hold the fence erect in areas of existing paving to remain and direct burial posts in landscape areas, see Existing Conditions and Demolition Plan for locations along existing tree line.
   a. SIGNAGE - Heavy-duty weather-proof signs, 8.5 inches x 11 inches, white colored background with black 2 inch high or larger letters block letters. The signs shall be attached to the Chain Link tree protection fence every 50 feet o.c. The tree protection sign shall read “Tree and Plant Protection Area- Keep Out”.
2. Submit supplier’s product data that product meets the requirements for approval.
3. Contractor is responsible for all costs incurred from any additional protection devices required by the Owner’s Representative due to negligence, sagging, and total removal of protection devices.

E. MATTING
1. Matting for vehicle and work protection shall be heavy duty matting designed for vehicle loading over tree roots, such as Alturnamats as manufactured by Alturnamats, Inc. Franklin, PA 16323 or approved equal.
2. Submit supplier’s product data that product meets the requirements for approval.

F. GEOGRID
1. Geogrid shall be woven polyester fabric with PVC coating, Uni-axial or biaxial geogrid, inert to biological degradation, resistant to naturally occurring chemicals, alkalis, acids.
2. Geogrid shall be Miragrid 2XT as manufactured by Ten Cate Nicolon, Norcross, GA.
http://www.tencate.com or approved equal.
3. Submit supplier’s product data that product meets the requirements for approval.

G. FILTER FABRIC
1. Filter Fabric shall be nonwoven polypropylene fibers, inert to biological degradation and resistant of naturally occurring chemicals, alkalis and acids.
2. Filter Fabric shall be Mirafi 135 N as manufactured by Ten Cate Nicolon, Norcross, GA. http://www.tencate.com or approved equal.
3. Submit supplier’s product data that product meets the requirements for approval.

PART 3 - EXECUTION

3.1 SITE EXAMINATION

A. Examine the site, tree, plant and soil conditions. Notify the Owner’s Representative in writing of any conditions that may impact the successful Tree and Plant Protections that is the intent of this section.

3.2 COORDINATION WITH PROJECT WORK

A. The Contractor shall coordinate with all other work that may impact the completion of the work.

B. Prior to the start of work, prepare a detailed schedule of the work for coordination with other trades.

C. Coordinate the relocation of any irrigation lines or heads currently present on the

irrigation plans, or the conduits of other utility lines or structures that are in conflict with tree projection areas. Roots shall not be altered to fit around lines. Notify the Owner's Representative of any conflicts encountered.

3.3 TREE AND PLANT PROTECTION AREA

A. The Tree and Plant Protection Area is defined as all areas indicated on the tree protection plan. Where no limit of the Tree and Plant Protection area is defined on the drawings, the limit shall be the drip line (outermost edge of the branch canopy) of each tree.

3.4 PREPARATION

A. Prior to the preconstruction meeting, mark trees for removal and protection (see below), layout the limits of the Tree and Plant Protection Area and then alignments of required Tree and Plant Protection Fencing and root pruning. Obtain the Owner's Representative's approval of the limits of the protection area and the alignment of all fencing and root pruning.

B. Flag all trees and shrubs to be **removed** by wrapping orange plastic ribbon around the trunk and on a prominent branch for each shrub. Obtain the Owner's Representative's approval of all trees and shrubs to be removed prior to the start of tree and shrub removal. After approval, mark all trees and shrubs to be removed with orange paint in a band completely around the base of the tree or shrub 4.5 feet above the ground.

C. Flag all trees and shrubs to **remain** with white plastic ribbon tied completely around the trunk or each tree and on a prominent branch for each shrub. Obtain the Owner's Representative's approval of all trees and shrubs to be remain prior to the start of tree and shrub removal.

D. Prior to any construction activity at the site including utility work, grading, storage of materials, or installation of temporary construction facilities, install all tree protection measures. Refer to Part 2, 2.1 – Materials.

3.5 INSTALLATION OF GEOGRIDS, FILTER FABRIC, MATTING, WOOD CHIPS AND OR MULCH

A. Install Geogrids, Filter Fabric, Matting, or Mulch in areas and depths shown on the plans and details or as directed by the Owner's Representative. In general, it is the intent of this specification to provide the following levels of protection:
   1. All exposed edges along the Tree and Plant Protection Area shall have a minimum of 5 inches of Mulch.
   2. Areas where foot traffic or storage of lightweight materials is anticipated to be unavoidable provide a layer of Filter Fabric under the 5 inches of Mulch.
   3. Areas where occasional light vehicle traffic is anticipated to be unavoidable provide a layer of Geogrids under 8 inches of Mulch.
   4. Areas where heavy vehicle traffic is unavoidable provide a layer of Geogrids under 8 - 12 inches of Mulch and a layer of matting over the Mulch.

B. The Owner's Representative shall approve the appropriate level of protection.

C. In the above requirements, light vehicle is defined as a track skid steer with a ground pressure of 4 psi or lighter. A heavy vehicle is any vehicle with a tire or track pressure of greater than 4 psi. Lightweight materials are any packaged materials that can be physically moved by hand into the location. Bulk materials such as soil, or aggregate

shall never be stored within the Tree and Plant Protection Area.

3.6 PROTECTION

A. Protect the Tree and Plant Protection Area at all times from compaction of the soil; damage of any kind to trunks, bark, branches, leaves and roots of all plants; and contamination of the soil, bark or leaves with construction materials, debris, silt, fuels, oils, concrete wash-out and any chemicals substance. Notify the Owner's Representative of any spills, compaction or damage and take corrective action immediately using methods approved by the Owner's Representative.

3.7 GENERAL REQUIREMENTS AND LIMITATIONS FOR OPERATIONS WITHIN THE TREE AND PLANT PROTECTION AREA

A. The Contractor shall not engage in any construction activity within the Tree and Plant Protection Area without the approval of the Owner's Representative including: operating, moving or storing equipment; storing supplies or materials; locating temporary facilities including trailers or portable toilets and shall not permit employees to traverse the area to access adjacent areas of the project or use the area for lunch or any other work breaks. Permitted activity, if any, within the Tree and Plant Protection Area maybe indicated on the drawings along with any required remedial activity as listed below.

B. In the event that construction activity is unavoidable within the Tree and Plant Protection Area, notify the Owner's Representative and submit a detailed written plan of action for approval. The plan shall include: a statement detailing the reason for the activity including why other areas are not suited; a description of the proposed activity; the time period for the activity, and a list of remedial actions that will reduce the impact on the Tree and Plant Protection Area from the activity. Remedial actions shall include but shall not be limited to the following:
   1. In general, demolition and excavation within the drip line of trees and shrubs shall proceed with extreme care either by the use of hand tools, directional boring and or Air Knife excavation where indicated or with other low impact equipment that will not cause damage to the tree, roots or soil.
   2. When encountered, exposed roots, 1-inch and larger in diameter shall be worked around in a manner that does not break the outer layer of the root surface (bark). These roots shall be covered in Wood Chips and shall be maintained above permanent wilt point at all times. Roots one inch and larger in diameter shall not be cut with-out the approval of the Owner's Representative. Excavation shall be tunneled under these roots without cutting them. In the areas where roots are encountered, work shall be performed and scheduled to close excavations as quickly as possible over exposed roots.
   3. Tree branches that interfere with the construction may be tied back or pruned to clear only to the point necessary to complete the work. Other branches shall only be removed when specifically indicated by the Owner's Representative. Tying back or trimming of all branches and the cutting of roots shall be in accordance with accepted arboricultural practices (ANSI A300, part 8) and be performed under supervision of the arborist.
   4. Matting: Install temporary matting over the Wood Chips or Mulch to the extent indicated. Do not permit foot traffic, scaffolding or the storage of materials within the Tree and Plant Protection Area to occur off of the temporary matting.
   5. Trunk Protection: Protect the trunk of each tree to remain by covering it with a ring of 8 foot long 2-inch x 6 - inch planks loosely banded onto the tree with 3 steel bands. Staple the bands to the planks as necessary to hold them securely in place. Trunk protection must be kept in place no longer than 12 months. If

construction requires work near a particular tree to continue longer than 12 months, the steel bands shall be inspected every six months and loosened if they are found to have become tight.

6. Air Excavation Tool: If excavation for footings or utilities is required within the Tree and Plant Protection Area, air excavation tool techniques shall be used where practical or as designed on the drawings.
   a. Remove the Wood Chips from an area approximately 18 inches beyond the limits of the hole or trench to be excavated. Cover the Wood Chips for a distance of not less than 15 feet around the limit of the excavation area with Filter Fabric or plastic sheeting to protect the Wood Chips from silt. Mound the Wood Chips so that the plastic slopes towards the excavation.
   b. Using a sprinkler or soaker hose, apply water slowly to the area of the excavation for a period of at least 4 hours, approximately 12 hours prior to the work so that the ground water level is at or near field capacity at the beginning of the work. For excavations that go beyond the damp soil, rewet the soil as necessary to keep soil moisture near field capacity.
   c. Using an air excavation tool specifically designed and manufactured for the intended purpose, and at pressures recommended by the manufacturer of the equipment, fracture the existing soil to the shape and the depths required. Work at rates and using techniques that do not harm tree roots. Air pressure shall be a maximum of 90-100 psi.
      1.) The air excavation tool shall be “Air-Spade” as manufactured by Concept Engineering Group, Inc., Verona, PA (412) 826-8800, or Air Knife as manufactured by Easy Use Air Tools, Inc. Allison Park, Pa (866) 328-5723 or approved equal.
   d. Using a commercial, high-powered vacuum truck if required, remove the soil from the excavation produced by the Air Knife excavation. The vacuum truck should generally operate simultaneously with the hose operator, such that the soil produced is picked up from the excavation hole, and the exposed roots can be observed and not damaged by the ongoing operation. Do not drive the vacuum truck into the Tree and Plant Protection Area unless the area is protected from compaction as approved in advance by the Owner’s Representative.
   e. Remove all excavated soil and excavated Wood Chips, and contaminated soil at the end of the excavation.
   f. Schedule the work so that foundations or utility work is completed immediately after the excavation. Do not let the roots dry out. Mist the roots several times during the day. If the excavated area must remain open overnight, mist the roots and cover the excavation with black plastic.
   g. Dispose of all soil in a manner that meets local laws and regulations.
   h. Restore soil within the trench as soon as the work is completed. Utilize soil of similar texture to the removed soil and lightly compact with hand tools. Leave soil mounded over the trench to a height of approximately 10% of the trench depth to account for settlement.
   i. Restore any Geogrids, Filter Fabric, Wood Chips or Mulch and or matting that was previously required for the area.

3.8 EXCAVATION AROUND TREES

A. Excavate within drip line of trees only where indicated.

B. Where trenching for utilities is required within drip line, tunnel under or around roots by

hand digging. Do not cut main lateral roots or tap roots; cut only smaller roots which interfere with installation of new work. Cut roots with sharp pruning instruments; do not break or chop.

C. Where excavating for new construction is required within drip line of trees, hand excavate to minimize damage to root systems. Provide sheeting at excavations if required. Use narrow tine spading forks and comb soil to expose roots.
   1. Relocate roots in backfill areas wherever possible. If large, main lateral roots are encountered, expose beyond excavation limits, as required, to bend and relocate without breaking. If encountered immediately adjacent to location of new construction and relocation is not practical, cut roots approximately 3" back from new construction

D. Do not allow exposed roots to dry out before permanent backfill is placed; provide temporary earth cover, or pack with peat moss and wrap with burlap. Water and maintain in moist condition and temporarily support and protect from damage until permanently relocated and covered with earth.

E. Prune branches to balance loss to root system caused by damage or cutting of root system.

3.9 GRADING AND FILLING AROUND TREES

A. Maintain existing grade within drip line of trees, unless otherwise indicated.

B. Lowering Grades: Where existing grade is above new finish grade shown around trees, carefully hand excavate within drip line to new finish grade. Cut roots exposed by excavation or provide permanent protections as recommended by Arborist.
   1. Prune branches to stimulate root growth and to compensate for loss of roots. Provide subsequent maintenance during the contract period as recommended by Arborist. Provide Owner with typed instructions for recommended long-range maintenance procedures to be followed after completion of construction operations.

C. Raising Grades
   1. Minor Fills: Where existing grade is 6" or less below elevation of finish grade shown, use topsoil fill material specified. Place in single layer and do not compact; hand grade to required finish elevations.
   2. Moderate Fills: Where existing grade is more than 6", but less than 12" below finish grade elevation, place a layer of drainage fill on existing grade prior to placing topsoil. Carefully place against trunk of tree approximately 2" above finish grade elevation and extend not less than 18" from tree trunk on all sides. For balance of area within drip line perimeter, place drainage fill to an elevation 6" below grade and complete fill with a layer of topsoil to finish grade elevation. Do not compact drainage fill or topsoil layers; hand grade to required elevations.

3.10 TREE REMOVAL

A. Remove all trees indicated by the drawings and specifications, as requiring removal, in a manner that will not damage adjacent trees or structures or compacts the soil.

B. Remove trees that are adjacent to trees or structures to remain, in sections, to limit the opportunity of damage to adjacent crowns, trunks, ground plane elements and structures.

C. Do not drop trees with a single cut unless the tree will fall in an area not included in the Tree and Plant Protection Area. No tree to be removed within 50 feet of the Tree and Plant Protection Area shall be pushed over or up-rooted using a piece of grading equipment.

D. Protect adjacent paving, soil, trees, shrubs, ground cover plantings and understory plants to remain from damage during all tree removal operations, and from construction operations. Protection shall include the root system, trunk, limbs, and crown from breakage or scarring, and the soil from compaction.

E. Remove stumps and immediate root plate from existing trees to be removed. Grind trunk bases and large buttress roots to a depth of the largest buttress root or at least 18 inches below the top most roots whichever is less and over the area of three times the diameter of the trunk (DBH).
   1. For trees where the stump will fall under new paved areas, grind roots to a total depth of 18 inches below the existing grade. If the sides of the stump hole still have greater than approximately 20% wood visible, continue grinding operation deeper and or wider until the resulting hole has less than 20% wood. Remove all wood chips produced by the grinding operation and back fill in 8-inch layers with controlled fill of a quality acceptable to the site engineer for fill material under structures, compacted to 95% of the maximum dry density standard proctor. The Owner’s Representative shall approve each hole at the end of the grinding operation.
   2. In areas where the tree location is to be a planting bed or lawn, remove all woodchips and backfill stump holes with planting soil as defined in Specification Section Planting Soil, in maximum of 12-inch layers and compact to 80 - 85% of the maximum dry density standard proctor.

3.11 PRUNING

A. Within six months of the estimated date of substantial completion, prune all dead or hazardous branches larger than 2-inch in diameter from all trees to remain.

B. Implement all pruning recommendations found in the arborist report.

C. Prune any low, hanging branches and vines from existing trees and shrubs that overhang walks, streets and drives, or parking areas as follows:
   1. Walks - within 8 feet vertically of the proposed walk elevation.
   2. Parking areas - within 12 feet vertically of the proposed parking surface elevation.
   3. Streets and drives - within 14 feet vertically of the proposed driving surface elevation.

D. All pruning shall be done in accordance with ANSI A300 (part 1), ISA BMP Tree Pruning (latest edition, and the "Structural Pruning: A Guide for the Green Industry", Edward Gilman, Brian Kempf, Nelda Matheny and Jim Clark, 2013 Urban Tree Foundation, Visalia CA.

E. Perform other pruning task as indicated on the drawings or requested by the Owner's Representative.

F. Where tree specific disease vectors require, sterilize all pruning tools between the work in individual trees.

3.12 WATERING

A. The Contractor shall be fully responsible to ensure that adequate water is provided to all plants to be preserved during the entire construction period. Adequate water is defined to be maintaining soil moisture above the permanent wilt point to a depth of 8 inches or greater.

B. The Contractor shall adjust the automatic irrigation system, if available, and apply additional water, using hoses or water tanks as required.

C. Periodically test the moisture content in the soil within the root zone to determine the water content.

3.13 WEED REMOVAL

A. During the construction period, control any plants that seed in and around the fenced Tree and Plant Protection area at least three times a year.
   1. All plants that are not shown on the planting plan or on the Tree and Plant Protection Plan to remain shall be considered as weeds.

B. At the end of the construction period provide one final weeding of the Tree and Plant Protection Area.

3.14 INSECT AND DISEASE CONTROL

A. Monitor all plants to remain for disease and insect infestations during the entire construction period. Provide all disease and insect control required to keep the plants in a healthy state using the principles of Integrated Plant Management (IPM). All pesticides shall be applied by a certified pesticide applicator.

3.15 CLEAN-UP

A. During tree and plant protection work, keep the site free of trash, pavements reasonably clean and work area in an orderly condition at the end of each day. Remove trash and debris in containers from the site no less than once a week.
   1. Immediately clean up any spilled or tracked soil, fuel, oil, trash or debris deposited by the Contractor from all surfaces within the project or on public right of ways and neighboring property.

B. Once tree protection work is complete, wash all soil from pavements and other structures. Ensure that Mulch is confined to planting beds.

C. Make all repairs to grades, ruts, and damage to the work or other work at the site.

D. Remove and dispose of all excess Mulch, Wood Chips, packaging, and other material brought to the site by the Contractor.

3.16 REMOVAL OF FENCING AND OTHER TREE AND PLANT PROTECTION

A. At the end of the construction period or when requested by the Owner’s Representative remove all fencing, Wood Chips or Mulch, Geogrids and Filter Fabric, trunk protection and or any other Tree and Plant Protection material.

3.17 DAMAGE OR LOSS TO EXISTING PLANTS TO REMAIN

A. Any trees or plants designated to remain and which are damaged by the Contractor shall be replaced in kind by the Contractor at their own expense. Trees shall be replaced with a tree of similar species and of equal size or 6-inch caliper whichever is less. Shrubs shall be replaced with a plant of similar species and equal size or the largest size plants reasonably available whichever is less. Where replacement plants are to be less than the size of the plant that is damaged, the Owner's Representative shall approve the size and quality of the replacement plant.
   1. All trees and plants shall be installed per the requirements of Specification Section Planting.

B. Plants that are damaged shall be considered as requiring replacement or appraisal in the event that the damage affects more than 25 % of the crown, 25% of the trunk circumference, or root protection area, or the tree is damaged in such a manner that the tree could develop into a potential hazard. Trees and shrubs to be replaced shall be removed by the Contractor at his own expense.
   1. The Owner's Representative may engage an independent arborist to assess any tree or plant that appears to have been damaged to determine their health or condition.

C. Any tree that is determined to be dead, damaged or potentially hazardous by the Owner's arborist and upon the request of the Owner's Representative shall be immediately removed by the Contractor at no additional expense to the owner. Tree removal shall include all clean-up of all wood parts and grinding of the stump to a depth sufficient to plant the replacement tree or plant, removal of all chips from the stump site and filling the resulting hole with topsoil.

D. Any remedial work on damaged existing plants recommended by the consulting arborist shall be completed by the Contractor at no cost to the owner. Remedial work shall include but is not limited to: soil compaction remediation and vertical mulching, pruning and or cabling, insect and disease control including injections, compensatory watering and additional mulching.

E. Remedial work may extend up to two years following the completion of construction to allow for any requirements of multiple applications or the need to undertake applications at required seasons of the year.

End of Section

Section 01 60 00
PRODUCT REQUIREMENTS

PART 1 - GENERAL

1.1 SUMMARY

A. Definition of Terms

B. Basic product requirements.

C. Owner's proprietary products.

D. Owner furnished products.

E. General environmental requirements for products.

F. Recycled content of materials.

G. Regional materials.

H. Sustainable wood, chain of custody.

I. Product delivery requirements.

J. Product storage and handling requirements.

K. Construction waste management.

1.2 RELATED REQUIREMENTS

A. Section 01 25 13 - PRODUCT SUBSTITUTION PROCEDURES:

1. Product options.
2. Product substitution procedures.

B. Section 01 74 19 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL: Procedural and administrative requirements for construction and demolition recycling.

C. Section 01 81 13 - SUSTAINABLE DESIGN REQUIREMENTS: special administrative and procedure requirements related the Owner's NE CHPS Certificate goals of energy conservation and efficiency, indoor air quality, and natural resource efficiency.

1.3 DEFINITIONS

A. "Products" is defined as new material, machinery, components, equipment, fixtures, and systems used in the Work. Products do not include machinery and equipment used for preparation, fabrication, conveying and erection of the Work. Products may also include existing materials or components required for re-use.

B. "Materials" are products that are shaped, cut, worked, mixed, finished, refined or otherwise fabricated, processed, or installed to form a part of the Work.

C. "Equipment" is a product with operational parts, whether motorized or manually operated, that requires service connections such as wiring or piping.

D. “Fasteners” include all products required for mechanical connections and include, but are not limited to: nails, screws, bolts, expansion bolts, chemical bolts, epoxy anchors, pins, powder-actuated devices, and similar fasteners, anchors, and connections.

E. Definitions in this article are not intended to negate the meaning of other terms used in Contract Documents, including "specialties", "systems", "structure", "finishes", "accessories", "furnishings", "special construction", and similar terms, which are self-explanatory and have recognized meanings in the construction industry.

1.4 BASIC PRODUCT REQUIREMENTS

A. General Product Requirements: Provide products that comply with the Contract Documents, that are undamaged and, unless otherwise indicated, that are new at time of installation.

1. Where possible utilize materials harvested and manufactured regionally, within a 500-mile radius of the project site.

B. To the fullest extent possible, provide products of the same kind, from a single source.

C. Provide interchangeable components of the same manufacturer, for similar components.

D. When the General Contractor has the option of selecting two or more products, ensure that products selected shall be compatible with products previously installed or approved.

E. Provide all products complete with all accessories, trim, finish, safety guards and other devices and details needed for a complete installation and for the intended use and effect.

F. Galvanic Corrosion: Install materials in manner which will effectively isolate dissimilar metals which may potential for galvanic corrosion. Use non-absorptive dielectric material, isolation coatings, or other protective isolator approved by Architect.

1. For non-humidity controlled environments, and all building shell components, the following applies:

a. For all fasteners, anchors, and connections, provide types of metal to prevent galvanic corrosion. Small anodic areas (fasteners) relative to the cathodic areas (field) should be avoided. Utilize same metal or more noble metals (cathodic) for fasteners and bolts.

1) Apply corrosion-inhibiting pastes or compounds under heads of screws or bolts inserted into dissimilar metal surfaces whether or not the fasteners had been previously plated.

b. Use non-absorptive dielectric material, isolation coatings, or other protective isolator approved by Architect.

c. Seal faying edges to preclude the entrance of liquids.

G. Fasteners, Anchors, and Connections: Provide all fasteners, anchors, and connections needed to safely, securely, and appropriately secure all Work permanently in place.

1. General: The General Contractor is solely responsible for the capacity, suitability, adequacy, and safety of all welded, fastened and anchored connections.

a. Comply with applicable code requirements regarding fastener selection and installation.

b. Provide at least two fasteners for each individual item being fastened.

c. Utilize fastener manufacturer's published load tables for working loads to assist in determining fastener size and space. Do not use ultimate load capacity in determining fastener selections.

d. Provide a minimum safety factor of 4.

e. Select and utilize fasteners having minimum galvanic corrosion factor.

f. Hydrogen embrittlement prevention:

1) Do not use high-strength and low-alloy fasteners which have been subjected to an acid pre-treatment (because they can become brittle and fail), utilize instead equivalent capacity and size bi-metal, stainless steel or high strength aluminum fasteners, as appropriate to the conditions and materials where being used.

2) Utilize low-hydrogen electrodes for welding high-strength steels to prevent hydrogen embrittlement.

2. To permit the General Contractor control over means and methods, some fastener conditions may not be fully defined in the Contract Documents. In particular, individual specification sections that require delegated independent engineering. In such instances the General Contractor is fully responsible to determine method of fastening appropriate for each condition. The General Contractor shall take into consideration substrate material(s) and product(s) being fastened, live and dead loading, and both atmospheric and visual exposure considerations. General Contractor is responsible to determine fastener type, material, finish, size, diameter, length and spacing.

3. Torque structural fasteners as recommended by fastener manufacturer, or as otherwise specified in the Contract Documents.

H. Permanent Labels and Nameplates:

1. Restrictions:

a. Do not provide exposed-to-view labels, nameplates, or trademarks which are not required by code, or regulations.

b. Do not expose manufacturers, suppliers, or installer's name, logo, or trade names on normally visible surfaces.

c. Do not provide labels, nameplates or trademarks when individual specification sections specifically exclude them.

d. All exposed-to-view advertising and name-brand labels shall be fully removed without damage to substrate finish.

2. Location for required labels: Required labels, approval plates and stamps shall be located on a concealed surface, or where required for observation after installation on accessible non-conspicuous surface.

3. Data Plates: Provide permanent data plate on each item of service-connected or power-operated equipment.

a. Data Plate Information: Include manufacturer, model, serial number, date of manufacture, capacity, ratings, power requirements, and all other similar essential data.

b. Locate data plates on easily accessible surface that is inconspicuous in occupied spaces.

1.5 OWNER'S PROPRIETARY PRODUCTS

A. Owner's proprietary products: Under provisions of 220-RICR-30-00-9 the Owner has determined that specific products shall be proprietary for 'sound reasons in the public interest'. This determination has been made by City of Central Falls Chief Purchasing Officer or member of the Executive Department, and has been recorded in writing for public record.

B. The following products are designated as proprietary, equipment and fixture references are included in the individual specification sections:

1. Identification Card Access Control: refer to Section 28 00 00 – ELECTRONIC SAFETY AND SECURITY

a. Identicard PremiSys by PDC.

2. Door Hardware & Keying Configuration: refer to Section 08 71 00 – DOOR HARDWARE

a. Schlage - 6 pin keyway.

3. Intrusion Panel (DMP brand): refer to Section 28 00 00 – ELECTRONIC SAFETY AND SECURITY

a. DMP XR550.

4. Charging Towers: refer to Section 27 10 00 – STRUCTURED CABLING

a. LOCK N CHARGE FUYL Tower 15 with network kit part numbers LNC3-10439 and 10224.

1.6 OWNER FURNISHED PRODUCTS

A. Owner Furnished Products: As provided in the General Conditions, the Owner will provide products by others under a separate agreement.

1. Owner's responsibilities regarding Owner furnished products:

a. Arrange for and deliver Owner reviewed shop drawings, product data, and samples to General Contractor.

b. Arrange and pay for product delivery to site.

c. On delivery, inspect products jointly with General Contractor.

d. Submit claims for transportation damage, and replace damaged, defective, or deficient items.

e. Arrange for manufacturers' warranties, inspections, and service agreements.

2. General Contractor's responsibilities regarding Owner furnished products:

a. Review Owner reviewed shop drawings, product data, and samples to General Contractor.

b. For Owner-Furnished, Contractor Installed (OFCI) Products: Receive and unload products at site, inspect for completeness or damage, jointly with Owner.

c. Handle, store, and provide temporary protection.

d. Repair or replace items damaged after receipt.

e. As required by this Contract, finish, install, and clean Owner-furnished products.

f. Provide protection of installed work.

g. When not installed under this Contract, the General Contractor shall coordinate Owner installed work with interfacing work of this Contract. The General Contractor shall provide temporary protection and final cleaning of Owner installed products, except as directed otherwise.

3. Items noted in Drawings as "Not in Contract" or "N.I.C.", identify work or products which either exist, or are furnished by Owner; such work requires coordination with the Work of this Contract and may even require installation by this General Contractor.

B. The General Contractor has coordinating responsibility for Testing laboratory services as identified under Section 01 45 29 - TESTING LABORATORY SERVICES and as specified under individual specification sections.

1.7 GENERAL ENVIRONMENTAL REQUIREMENTS FOR PRODUCTS

A. General: Comply with NE CHPS Certification requirements and as specified herein. Prohibit the use of or incorporation into the work of materials which contain toxic, hazardous and harmful materials.

1. Hazardous materials: Defined as pesticides, biocides, and carcinogens as listed by recognized authorities, such as the Environmental Protection Agency (EPA), the International Agency for Research on Cancer (IARC) or regulated under OSHA Hazard Communication Standard, 29 CFR 1910.1200.
2. Harmful materials: Defined as materials which contain the presence of chemical, physical, or biological elements or agents which adversely affect human health or welfare; unfavorably alter ecological balances; or degrade the utility of the environment for aesthetic, cultural, or historical purposes.
3. Owner restricted materials: Defined as all products to which the Owner has a reasonable objection because of its content, composition, properties, or characteristics.

B. Vapors, Gases, Fumes, Odors:

1. General: Comply with all state and federal VOC requirements. Wherever possible use non-VOC materials.
    a. Limit use of products to the greatest extent possible which have "off-gassing", fumes, flammability, and other harmful characteristics.
        1) Prohibit use of products which contain substances that contribute significantly to the production of photochemical smog, tropospheric ozone, or poor indoor-air quality.
    b. Limit use of ozone-depleting compounds to the greatest extent possible. An ozone-depleting compound is any compound with an ozone-depletion potential greater than 0.01 (CFC 11 = 1).
    c. Use organic and biodegradable cleaners to the greatest extent possible.
2. Do not install, use for installation, and use for cleaning those materials which may produce objectionable (to Owner and public) vapors, gases, fumes, odors, or similar conditions.
3. Do not install or use products which may have possible chemical or biological reactions with other on-site materials.

C. Toxicity of prefabricated wood products (composite wood and agrifiber products): Products shall contain no added urea-formaldehyde resins.

1. Laminating adhesives used to fabricate on-site and shop-applied composite wood and agrifiber assemblies shall contain no added urea-formaldehyde resins.

D. Adhesives: Provide adhesives approved by the manufacturers of the products being adhered which are Low-VOC or non-VOC, non-flammable, water-proof after cured, odor free and comply with NE CHPS certification requirements:

1. For field applications that are inside the weatherproofing membrane: Adhesives must be tested and determined compliant in accordance with California Department of Public Health (CDPH) Standard Method v1.2-2017, using the applicable exposure scenario. The default scenario is the private office scenario.

2. All adhesives wet-applied on site must meet the applicable chemical content requirements of SCAQMD Rule 1168, October 6, 2017, Adhesive and Sealant Applications, as analyzed by the methods specified in Rule 1168. The provisions of SCAQMD Rule 1168 do not apply to adhesives subject to state or federal consumer product VOC regulations. :

a. Architectural Applications	VOC Limit [g/L less water]
1) Outdoor floor covering adhesives	250
2) Non-membrane Roof Installation and Repair Adhesive	300
3) Single-ply Roof Membrane Roof Installation and Repair Adhesive	250

b. Specialty Applications	VOC Limit [g/L less water]
1) Thin-Metal Laminating	780
2) Waterproof Resorcinol Glue	170

c. Substrate Specific Applications	VOC Limit [g/L less water]
1) Flexible Vinyl	250
2) Rubber	250
3) Other Substrates	250

d. Adhesive Primers	VOC Limit [g/L less water]
1) Plastic Cement Welding	650
2) Single-ply Roof Membrane	250
3) Traffic Marking Tape	150
4) Other	250

E. Sealants:

1. For field applications that are inside the weatherproofing membrane: Sealants must be tested and determined compliant in accordance with California Department of Public Health (CDPH) Standard Method v1.2-2017, using the applicable exposure scenario. The default scenario is the private office scenario.

2. All adhesives wet-applied on site must meet the applicable chemical content requirements of SCAQMD Rule 1168, October 6, 2017, Adhesive and Sealant Applications, as analyzed by the methods specified in Rule 1168. The provisions of SCAQMD Rule 1168 do not apply to sealants subject to state or federal consumer product VOC regulations.

a. Sealants	VOC Limit [g/L less water]
1) Architectural	250
2) Single-Ply Roof Membrane	450
3) Non-membrane Roof	300
4) Roadway	250
5) Other	420

b. Sealant Primers VOC Limit [g/L less water]
   1) Architectural Non Porous 250
   2) Architectural Porous 775
   3) Other 750

3. Sealants containing aromatic solvents, fibrous talc, formaldehyde, halogenated solvents, mercury, lead, cadmium, chromium and their compounds, are not permitted.

4. Avoid the use of the following products: Butyl Rubber; Solvent Acrylic; Neoprene; Styrene Butadiene Rubber; Nitril.

F. Carpet systems: Refer to Section 09 68 00 - Carpeting and Section 09 68 13 – Tile Carpeting for VOC requirements.

G. Interior Paints: Provide products that comply with specified VOC limits, refer to Section 09 91 00 – PAINTING for additional requirements.

1. For interior applications use paints and coatings that comply with the following limits for VOC content when calculated according to 40 CFR 59, Subpart D (EPA method 24) and the following chemical restrictions:
   a. Flat Paints and Coatings: VOC not more than 50 g/L.
   b. Non-Flat Paints and Coatings: VOC not more than 150 g/L.
   c. Anti-Corrosive Coatings: VOC not more than 250 g/L.
   d. Clear wood finishes:
      1) Varnishes: VOC not more than 350 g/L.
      2) Lacquer: VOC not more than 550 g/L
   e. Floor coatings: VOC not more than 100 g/L
   f. Sealers:
      1) Waterproofing sealers: VOC not more than 250 g/L.
      2) Sanding sealers: VOC not more than 275 g/L.
      3) All other sealers: VOC not more than 200 g/L.
   g. Stains: VOC not more than 250 g/L.

H. Material Safety Data Sheets (MSDS): Obtain and maintain on-site record data sheets for each product brought onto the Site.

1. Maintain an organized file of Material Safety Data Sheets at the job-site for quick reference.

2. Furnish MSDS for all finishes, paints, coatings, curing compounds, sealers, adhesives, mastics, waterproofing, dampproofing, sealants, cleaning chemicals, carpets, upholstery, fabrics and all similar products.

I. Cleaning and maintenance products:

1. Provide data on manufacturers' recommended maintenance, cleaning, refinishing and disposal procedures for materials and products utilized. These procedures are for final General Contractor cleaning of the project prior to substantial completion and for provided materials and products by the specific specification sections.
    a. Where chemical products are recommended for these procedures, provide documentation to indicate that no component present in the cleaning product at more than 1% of the total mass of the cleaning product is a carcinogen or reproductive toxicant as defined in the lists in this specification section.
    b. For purposes of reporting, identification of product VOC contents shall not be limited to those regulated.
2. Avoid cleaning products containing alpha-pinene, d-limonene or other unsaturated carbon double bond alkenes due to chemical reactions with ozone to formaldehydes, acidic aerosols, and ultra fine particulate matter in indoor air.

J. Establish written General Contractor's safety and emergency response procedures for safety precautions, accidents, emergency conditions, and clean-up methods.

1.8 RECYCLED CONTENT OF MATERIALS

A. To the greatest extent possible, all building materials shall have recycled content. As a minimum, post-consumer recycled content plus one-half of pre-consumer recycled content for Project shall constitute a minimum of 10 percent of cost of materials used for Project.
    1. Cost of post-consumer recycled content plus one-half of pre-consumer recycled content of an item shall be determined by dividing weight of post-consumer recycled content plus one-half of pre-consumer recycled content in the item by total weight of the item and multiplying by cost of the item.
    2. Do not include furniture, plumbing, mechanical and electrical components, and specialty items such as elevators and equipment in the calculation.

1.9 REGIONAL MATERIALS

A. To the greatest extent possible, all building materials shall be sourced (manufactured, and extracted, harvested or recovery for raw materials) within 500 miles measured directly point to point from Project Site. As a minimum, not less than 10 percent of building materials (by cost) shall qualify as 'regional materials'. Qualifying products or portions thereof (components) shall comply with:
    1. Sourcing location(s): Less than 500 miles from location of extraction, harvesting, and recovery and the project site.
        a. Priority of sourcing: To the greatest extent possible materials shall be manufactured, and extracted, harvested or recovered for raw materials in the State of Rhode Island as a first priority. Materials manufactured, and extracted, harvested or recovered in the United States of America shall take second priority.

2. Manufacturing location(s): Less than 500 miles from location of manufacturing facility to the project site.

1.10 SUSTAINABLE WOOD, CHAIN OF CUSTODY

A. To the greatest extent possible, all wood products shall be sustainably harvested and certified under Forest Stewardship Council Guidelines. Not less than 50 percent (by cost) of wood-based materials shall be produced from wood obtained from forests certified by an FSC-accredited certification body to comply with FSC STD-01-001, "FSC Principles and Criteria for Forest Stewardship."

B. Wood-based materials may include, but are not limited to, the following materials when made from wood, engineered wood products, or wood-based panel products:

1. Rough carpentry.
2. Miscellaneous carpentry.
3. Finish carpentry.
4. Architectural woodwork.
5. Wood flooring.

1.11 PRODUCT DELIVERY AND HANDLING REQUIREMENTS

A. Transport and handle products in accordance with manufacturer’s instructions and as specified in individual specification sections.

1. Packing: Arrange for the return of packing materials, such as wood pallets, where economically feasible.
2. Ductwork: All ductwork shall be sealed from time of manufacturer, with seals intact upon delivery to construction site, and remain so, until ready for installation. General Contractor is jointly responsible with Trade contractor to ensure ducts are properly sealed and maintained.
    a. Store ductwork in clean dry conditions and keep sealed while it is stored.

B. Packaging: Deliver materials in recyclable or in reusable packaging such as cardboard, wood, paper, or reusable blankets, which will be reclaimed by supplier or manufacturer for recycling.

1. General: Minimize packaging materials to maximum extent possible while still ensuring protection of materials during delivery, storage, and handling.
    a. Unacceptable Packaging Materials: Polyurethane, polyisocyanurate, polystyrene, polyethylene, and similar plastic materials such as “foam” plastics and “shrink-fit” plastics.
    b. Reusable Blankets: Deliver and store materials in reusable blankets and mats reclaimed by manufacturers or suppliers for reuse where program exists or where program can be developed for such reuse.

1) Non-returnable containers should be donated to local and community organizations to the greatest extent possible to reduce quantity of disposed materials.

c. Pallets: Where pallets are used, suppliers shall be responsible to ensure pallets are removed from site for reuse or for recycling. Avoid use of virgin wood pallets whenever possible. It is preferable that pallets be manufactured from recycled wood and recycled plastic.

d. Corrugated Cardboard and Paper: Where paper products are used, recycle as part of construction waste management recycling program, or return to material's manufacturer for use by manufacturer or supplier.

e. Sealants, Paint, Primers, Adhesives, and Coating Containers: Return to supplier or manufacturer for reuse where such program is available.

2. Purchase materials in bulk where possible. Take measures to avoid individual packaging for volume purchases.

C. Labeling of plastics used for packaging: Plastic is marked by manufacturers for type of plastic material in accordance with the Society of Plastic resin codes. Maintain marks, or sort by manufacturer's resin codes for recycling purposes.

1. Type 1: Polyethylene Terephthalate (PET, PETE).
2. Type 2: High Density Polyethylene (HDPE).
3. Type 3: Vinyl (Polyvinyl Chloride or PVC).
4. Type 4: Low Density Polyethylene (LDPE).
5. Type 5: Polypropylene (PP).
6. Type 6: Polystyrene (PS).
7. Type 7: Other. Use of this code indicates that the package in question is made with a resin other than the six listed above, or is made of more than one resin listed above, and used in a multi-layer combination.

D. Schedule deliveries to avoid delays in installation of products, to minimize long-term storage, to prevent overcrowding of construction spaces and to limit potential damage to stored materials. Coordinate with installation to ensure minimum holding time for items that are flammable, hazardous, easily damaged, or sensitive to deterioration, theft and other losses.

E. Promptly inspect shipments to assure that products comply with requirements, quantities are correct, and products are undamaged.

F. Provide equipment and personnel to handle and store products by methods to prevent soiling, disfigurement, or damage.

1.12 PRODUCT STORAGE AND PROTECTION REQUIREMENTS

A. Store and protect products in accordance with manufacturer's instructions and as specified in individual specification sections.

1. Provide all necessary equipment and personnel to store products by methods to prevent soiling, disfigurement and damage.
2. Avoid excessive material handling and potential product damage, locate storage areas convenient to work areas.
3. Store and protect products with seals and labels intact and legible.
4. Store and handle materials in a manner as to prevent loss from weather and other damage.

B. For exterior storage of fabricated products, place on sloped supports, above ground.

C. Provide off-site storage and protection when site does not permit on-site storage or protection.

1. Cover products subject to deterioration with impervious sheet covering. Provide ventilation to avoid condensation.
2. Store sensitive products in weather-tight, climate controlled enclosures.
3. Prevent contact with material that may cause corrosion, discoloration, or staining.

D. Store loose granular materials on solid flat surfaces in a well-drained area; prevent mixing with foreign matter.

E. Arrange storage of products to permit access for inspection. Periodically inspect to assure products are undamaged and are maintained under specified conditions.

F. Store heavy materials in locations and in a manner that will not damage or disfigure existing, or new construction.

1.13 MOLD PROTECTION

A. General: Comply with NE CHPS requirements for Prerequisite IEQ credit.

1. Keep building materials dry to prevent the growth of mold and bacteria, including, but not limited to: gypsum wallboard, wood, porous insulation, paper, and fabric.
2. Cover materials to prevent rain damage, and if resting on the ground, use spacers to allow air to circulate between the ground and the materials.
3. Thoroughly dry all water damaged materials within 24 hours from time of moisture damage. Materials that have been damp or wet for more than 24 hours shall be jointly reviewed by General Contractor and Architect, or Owner’s Project Manager to determine whether damp/wet materials need to be disposed.
    a. Review moisture damaged materials for signs of mold and mildew, including any with moisture stains, from the site and properly dispose of them.

b. Replace water damaged and moldy materials with new, undamaged materials.

1.14 CONSTRUCTION WASTE MANAGEMENT

A. General: Comply with requirements of Section 01 74 19 – CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL.

B. Source separation: Separate, store, protect, and handle at the site identified recyclable and salvageable waste products in order to prevent contamination of materials and to maximize recyclability and salvageability of identified materials.

C. Return: Set aside and protect incorrectly delivered and substandard products and materials and return to supplier for credit.

D. Reuse and Salvage: Set aside, sort, and protect separated products and materials for collection, re-use by Owner, as designed for re-use on-site or designated for salvage by Owner's separate waste recycling contractor.

E. Recycling: Arrange for timely pickups from the site or deliveries to recycling facility in order to prevent contamination of recyclable materials.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

End of Section

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Section 01 73 00

EXECUTION

PART 1 - GENERAL

1.1 SUMMARY

A. Examination of existing conditions and acceptance of conditions.

B. Project preparation.

C. Surveying and field engineering.

D. Execution of the Work.

E. Cutting and patching of in-place work

F. Cleaning.

G. Protecting installed work.

1.2 RELATED REQUIREMENTS

A. Section 01 10 00 - SUMMARY: Work performed by Owner or under separate contract(s).

B. Section 01 74 19 – CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL: Special administrative and procedural requirements for the Project waste management and recycling activities

1.3 EXAMINATION OF AND ACCEPTANCE OF EXISTING CONDITIONS

A. The General Contractor, its subcontractors and Trade contractors shall inform themselves of existing conditions before submitting his bid, and shall be fully responsible for carrying out all work required to completely and properly execute the work of the Contract, regardless of the conditions encountered in the actual work. No claim for extra compensation or extension of time will be allowed on account of actual conditions inconsistent with those assumed, except those conditions described in the General Conditions.

1.4 SURVEYING AND FIELD ENGINEERING

A. Employ a Land Surveyor or Professional Engineer registered in the State of Rhode Island and acceptable to the Architect.

1. Submit evidence of Surveyor’s Errors and Omissions (E&O) Insurance coverage in the form of an Insurance Certificate.

B. Submittals.

1. Submit name, address, and telephone number of at least three proposed Land Surveyors and obtain Architect’s acceptance before starting survey work.

2. On request, submit documentation verifying accuracy of survey work.
3. Submit a copy of registered site drawing and certificate signed by the Land Surveyor, that the elevations and locations of the Work are in conformance with the Contract Documents.

C. Examination.
1. Verify locations of survey control points prior to starting work.
2. Promptly notify Architect of any discrepancies discovered.

D. Survey Reference Points.
1. General Contractor shall locate and protect survey control and reference points.
2. Control datum for survey is that established by Owner provided Survey.
3. Protect survey control points prior to starting site work; preserve permanent reference points during construction.
4. Promptly report to Architect/Engineer the loss or destruction of any reference point or relocation required because of changes in grades or other reasons.
5. Replace dislocated survey control points based on original survey control. Make no changes without prior written notice to the Architect.

E. Survey Requirements.
1. Provide field engineering services. Utilize recognized engineering survey practices.
2. Prior to construction, verify the location and invert elevation at points of connection of sanitary sewer, storm sewer and water service piping.
    a. The existence and location of underground utilities and construction indicated on Drawings as existing are not guaranteed. Before beginning sitework, verify the existence and location of underground utilities and other construction.
3. Establish a minimum of 2 permanent bench marks on site, referenced to established control points. Record locations, with horizontal and vertical data, on Project Record Documents.
4. Establish elevations, lines and levels. Locate and lay out by instrumentation and similar appropriate means:
    a. Site improvements including pavements; stakes for grading, fill and topsoil placement; utility locations, slopes, and invert elevations.
    b. Grid or axis for structures.
    c. Building foundation, column locations, and ground floor elevations.
5. Periodically verify layouts by same means.

F. Surveys for Measurement and Payment
1. Perform surveys to determine quantities of unit cost work, including control surveys to establish measurement reference lines. Notify Architect prior to starting work.

2. General Contractor’s Engineer shall sign surveyor’s field notes or keep duplicate field notes, and shall calculate and certify quantities for payment purposes.

G. Project Record Documents.

1. As-built survey, progress submissions: Surveyor shall develop an as-built survey for the work-in-place. Copies of survey shall be submitted along with request for payments for foundation work, site utilities and paving work.
2. Surveyor's log: Maintain a complete and accurate surveyor's log of control and other surveys, required by Owner and authorities having jurisdiction. Make this log available for reference.
3. Submit Final Property Survey and log under the provisions of Section 01 78 00 - CLOSEOUT SUBMITTALS.

1.5 PROTECTION OF ADJACENT ELEMENTS

A. Protect installed Work and provide special protection where called for in individual specification Sections.

B. Protect existing facilities and adjacent properties from damage from construction and demolition operations. Provide temporary and removable protection for installed products and occupied areas.

C. Protect finished floors, stairs, and other surfaces from traffic, dirt, wear, damage, or movement of heavy objects, by protecting with durable sheet materials. Coordinate with requirements under individual specification sections.

D. Prohibit traffic or storage upon waterproofed or roofed surfaces. If traffic or activity is necessary, obtain recommendations for protection from waterproofing or roofing material manufacturer.

E. Protect all existing landscape areas not indicated to be cleared. Do not deface, injure, or destroy trees or other plant life. Do not remove or cut trees or other plant life, without authorization from the Owner. Do not attach any anchorages, ropes, cables or guys to any trees scheduled to remain.

1. Prohibit traffic from landscaped areas.

F. Protect non-owned vehicles, stored materials, site and structures from damage.

G. Refer to respective Sections for other particular protection requirements.

1.6 PROTECTION OF INTERIOR CONCRETE SLABS

A. No satisfactory chemical or cleaning procedure is available to remove petroleum stains from the concrete surface. Prevention is therefore essential for areas scheduled to receive concrete stains and sealers, specified under Division 3.

1. All hydraulic powered equipment must be diapered to avoid staining of in-place concrete.
2. No trade will park vehicles on the inside slab. If necessary to complete their scope of work, drop cloths will be placed under vehicles at all times.

3. No pipe cutting machine will be used on the inside floor slabs.
4. Steel will not be placed on interior slabs to avoid rust staining.

1.7 EXECUTION REQUIREMENTS FOR INSTALLATION, APPLICATION AND ERECTION

A. Inspection of conditions: The Installer of each component shall inspect the substrate and conditions under which Work is performed. Do not proceed until unsatisfactory conditions have been corrected.

B. Resource Efficiency of Materials:
1. Use construction practices such as material reduction and dimensional planning that maximize efficient use of resources and materials.
a. Recheck measurements and dimensions, before starting installation.
2. Provide materials that utilize recycled content to maximum degree possible without being detrimental to product performance or indoor air quality.
3. Where possible and feasible, provide for non-destructive removal and re-use of materials after their service life in this building.

C. Manufacturer's instructions: Comply with manufacturer's installation instructions and recommendations, to the extent that they are more stringent than requirements in Contract Documents.

D. Inspect material immediately upon delivery and again prior to installation Reject damaged and defective items.

E. Install each component during weather conditions and project status that will ensure the best results. Isolate each part from incompatible material as necessary to prevent deterioration.

F. Coordinate temporary enclosures with inspections and tests, to minimize uncovering completed construction for that purpose.

G. Limiting exposures: Supervise operations to ensure that no part of construction, completed or in progress, is subject to harmful or deleterious exposure. Such exposures include:
1. Excessive static or dynamic loading.
2. Excessive internal or external pressures.
3. Excessive weathering.
4. Excessively high or low temperatures or humidity.
5. Air contamination or pollution.
6. Water or ice.
7. Chemicals or solvents.
8. Heavy traffic, soiling, staining and corrosion.
9. Rodent and insect infestation.
10. Unusual wear or other misuse.
11. Contact between incompatible materials.

12. Theft or vandalism.

H. Provide attachment and connection devices and methods necessary for securing each construction element. Secure each construction element true to line and level. Allow for expansion and building movement.

I. Visual effects: Provide uniform joint widths in exposed Work. Arrange joints to obtain the best effect. Refer questionable choices to the Architect for decision.

J. Mounting heights: Where mounting heights are not indicated, review heights with Architect, prior to commencement of Work.

K. Cleaning and protection: During handling and installation, clean and protect construction in progress and adjoining materials in place. Apply protective covering where required to ensure protection from damage or deterioration at Substantial Completion.

L. Clean and maintain completed construction as often as necessary through the construction period. Adjust and lubricate operable components to ensure operability without damaging effects.

1.8 CUTTING AND PATCHING OF IN-PLACE WORK

A. Scope: General Contractor is responsible for coordination and quality of all cutting and patching work. Performance of cutting and patching work shall be by trades requiring such work, except as specified otherwise within this Article 1.8, Paragraph G below. Cutting and patching of the Work includes, but is not limited to:

1. All cutting, altering, patching, and fitting as necessary for the Work to comply with the Contract Documents.
    a. Make all products and their components of the Work fit together properly.
    b. Fully integrate all cutting and patching, to present the visual appearance of an entire, completed, and unified project in compliance with the Contract Documents.
2. Provide openings in elements of the Work, and the patching of same, for penetrations required by all trades, including but not limited to mechanical, plumbing, fire protection and electrical work.
    a. Individual Trade contractors are responsible for designated types of coring and drilling penetrations for piping, conduit, ducts and other penetrations.
3. Uncover work to provide for installing, inspecting, or both, of ill-timed work;
4. Remove and replace work not conforming to requirements of the Contract Documents or as otherwise determined to be defective.
5. Patch and match all surfaces and products disturbed or damaged.
6. Remove samples of in-place construction as specified for testing.

B. Structural elements: Do not cut and patch structural elements in a manner that would reduce the load-carrying capacity or load deflection ratio. Always obtain written approval of the cutting and patching proposal before cutting and patching structural elements.

1. Do not drill through structural beams, slabs or columns. Core drilling through concrete block walls and stair platforms must be approved by the Architect.
2. Where cutting and patching involves adding reinforcement to structural elements, submit details and engineering calculations showing integration of reinforcement with the structure.

C. Exposed elements: Employ appropriate tradesperson to perform cutting and patching for weather exposed and moisture resistant elements, and sight exposed surfaces.

D. Penetrating elements: Fit work tight to pipes, sleeves, ducts, conduit, and other penetrations through surfaces. At penetrations of fire rated walls, partitions, ceiling or floor construction, completely seal voids with fire rated materials in accordance to applicable codes and regulations, and compatible to surrounding construction.

E. Visual requirements: Do not cut and patch construction exposed on the exterior or in occupied spaces, in a manner that would, in the Architect's opinion, reduce the building's aesthetic qualities, or result in visual evidence of cutting and patching. Remove and replace Work cut and patched in a visually unsatisfactory manner.

F. Operational and safety limitations: Do not cut and patch operating elements or safety components in a manner that would reduce their capacity to perform as intended, or would increase maintenance, or decrease operational life safety of the building when occupied.

G. General requirements of cutting and patching:
1. Submit written proposals to perform cutting and patching when cutting work affects the following:
    a. Structural integrity of any element in the project.
    b. Integrity of weather-exposed or moisture-resistant elements.
    c. Aesthetic and visual qualities of exposed-to-view elements.
    d. Work of Owner or work performed under separate Contract.
2. Cutting: Cut in-place construction using methods least likely to damage elements of as-built construction.
3. Coring and Drilling of holes incidental to work of individual sections shall be performed by the trade requiring the penetration:
    a. Coring and drilling of holes greater than 8 inches in diameter in masonry, concrete decks and slabs, exterior walls and roof decking shall be performed by the Trade contractor or subcontractor requiring the same. All penetrations shall be marked for approval by the General Contractor before performing and coring or drilling.
    b. Coordination of all coring and drilling and resultant patches necessary for the completion of this Contract and for the quality and appearance of all patch Work in exposed-to-view finished materials.
4. Refinish surfaces to match adjacent finish. For continuous surfaces, refinish to nearest intersection or natural break; for assemblies, refinish entire unit.

1.9 PROGRESS CLEANING AND DISPOSAL OF WASTE MATERIALS

A. General: Maintain site in a clean and orderly condition. Maintain work and surrounding areas free of waste materials, debris, and rubbish; remove from site on a on-going basis through-out the term of construction.

1. Adjacent Areas: Keep adjacent areas, neighboring properties, public ways, and all nearby areas clean and free of construction debris and dirt including wind blown debris.
2. Trade contractors are responsible for cleanup and removal of their own rubbish, debris, shipping materials and waste materials through-out the term of their work.
    a. Trade contractors are responsible to comply with requirements of Section 01 74 19 – CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL.
3. General Contractor shall furnish dumpsters and provide general site cleaning services, except as explicitly specified otherwise under individual Sections of the Specifications.

B. Control accumulation of waste materials and rubbish; periodically dispose of off-site. The General Contractor shall bear all costs, including fees resulting from such disposal.

C. Conduct cleaning and disposal operations to comply with local ordinances and anti-pollution laws. Comply with the requirements of Section 01 74 19 – CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL.

1. Do not burn or bury rubbish and waste materials on site.
2. Do not dispose of volatile wastes such as mineral spirits, oil, or paint thinner in storm or sanitary drains.
3. Do not dispose of wastes into streams or waterways.
4. Comply with requirements of authorities having jurisdiction including, without limitation, requirements related to fire prevention, rodents, pests, vermin, waste storage, waste trucking, waste removal, waste disposal, street cleaning, truck tire cleaning, and other requirements.

D. Clean interior areas prior to start of finish work and maintain areas free of dust and other contaminants during finishing operations.

E. Maintain project in accordance with all local, State, and Federal Regulatory Requirements.

F. Store volatile wastes in covered metal containers, and remove from premises daily.

G. Prevent accumulation of wastes which create hazardous conditions.

H. Provide adequate ventilation during use of volatile or noxious substances.

1. Remove debris and rubbish from pipe chases, plenums, attics, crawl spaces, and other closed or remote spaces, prior to enclosing the space.
2. Broom and vacuum clean interior areas prior to start of surface finishing, and continue cleaning to eliminate dust.

I. Use only those materials which will not create hazards to health or property and which will not damage surfaces.

J. Use only those cleaning materials and methods recommended by manufacturer of surface material to be cleaned.

K. Execute cleaning to ensure that the buildings, the sites, and adjacent properties are maintained free from accumulations of waste materials and rubbish and windblown debris, resulting from construction operations.

L. General Contractor shall provide on-site containers (dumpsters) for collection and containment of, waste materials, debris and rubbish.

1. Trash Barrels and Containers: Use containers with tightly fitting lids. Use only steel containers and lids when there is any evidence of rodent or pest activity.
2. Returnables: Provide special, labeled containers for deposit returnables such as soda cans.

M. Remove waste materials, debris, and rubbish from site at least once weekly, and dispose off-site. Comply with NFPA 241 for removal of combustible waste.

N. Handle material in a controlled manner with as few handlings as possible. Do not drop or throw materials from heights.

O. Schedule cleaning operations so that dust and other contaminants resulting from cleaning process will not damage surrounding surfaces.

1.10 SITE MAINTENANCE AND CLEANING

A. Maintain traffic and parking areas in a sound condition, free of excavated material, construction equipment, products, mud, snow, and ice.

1. Provide means of removing mud from vehicle wheels before entering public streets and Owner’s parking areas and access.

B. Maintain existing and permanent paved areas used for construction.

1. If any street or private way shall be rendered unsafe by the General Contractors operations, the General Contractor shall make such repairs or provide such temporary ways or guards as shall be acceptable to the governing authority.
2. Promptly repair breaks, potholes, low areas, standing water, and other deficiencies, to maintain paving and drainage in original, or specified, condition.

1.11 FINAL CLEANING

A. Scheduling: Perform final cleaning immediately prior to the Architect’s review of the project for issue of the Certificate of Substantial Completion.

1. Re-clean all surfaces, materials and products of the Work immediately prior to Owner’s occupancy of the Project.

a. Should the Owner occupy any portion of the Work prior to completion of the Contract, the responsibilities for interim and final cleaning shall be in accordance with the General Conditions.

B. Qualifications: Commercial cleaning firm, with a minimum of 3 years experience specializing in the post-construction cleaning of facilities.

C. Protection: During the operation of final cleaning, protect surrounding materials and finishes against undue damage by the exercise of reasonable care and precautions. Clean, or repair all products and surfaces which are soiled or otherwise damaged by Work of this Section, to match original profiles and finishes. Materials and finishes which cannot be cleaned, or repaired shall be removed and replaced with new work in conformance with the Contract Documents.

D. General cleaning requirements:

1. Control accumulation of waste materials and trash. Recycle or dispose of off-site at intervals approved by the Owner and in compliance with waste management procedures specified in Section 01 74 19 – CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL.
2. Remove from the job site all tools, surplus materials, equipment, scrap, debris, and waste.
3. Remove all advertising matter and temporary instructional material from exposed surfaces throughout.
4. Use only methods and cleaning materials which are compatible with and as recommended by the manufacturer of the material being cleaned.
5. Finished surfaces: Remove paint smears, spots, marks, dirt, mud and dust and similar disfigurement created by the Work, from all exposed to view existing or new interior and exterior finished surfaces.
6. Polished surfaces: Apply the polish recommended by the manufacturer of the material being polished.
7. Cleaning Materials: Only non-hazardous cleaning materials shall be used in the final cleanup.

E. Waste Management and Recycling during Final Cleaning:

1. Recycle, salvage, and return construction and demolition waste from Project in accordance with requirements in Section 01 74 19 – CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL.
2. Arrange for pick-up of salvageable materials in accordance with the Waste Management Plan.
3. Disposal Operations: Promptly and legally transport and dispose of all trash. Do not burn, bury, or otherwise dispose of trash on the Project site.

F. Exterior building surfaces:

1. Visually inspect exterior surfaces and remove all traces of soil, waste materials, smudges, and other foreign matter.
2. Remove all traces of splashed materials from adjacent surfaces.

3. If necessary to achieve a uniform degree of cleanliness, hose down the exterior of the structure.
4. In the event of stubborn stains not removable with water, the Architect may require light sandblasting or other cleaning at no additional cost to the Owner.
5. Concrete: Clean exposed concrete free of all foreign matter. If, in the opinion of the Architect, further cleaning of specific areas is required, they shall be scrubbed with water or other cleaning agents. Acid cleaners shall not be used, except as may otherwise specifically permitted in the trade sections.

G. Bright metal: Clean metal surfaces, hardware, fixtures, appliances, equipment, and similar items free of all foreign matter. Lightly scrub specific stains with clean water, mild soap, and soft rags, thoroughly rinsed and wiped with clean, soft white rags. Do not use abrasive cleaners.

H. Glass: Replace broken, chipped and defective glass. Remove from glass: stains, spots, marks, paint smears; dirt and foreign materials. Clean and polish both surfaces of all interior and exterior glass. Clean and polish mirrors.

I. Carpet: Vacuum clean carpet and remove all spots and stains.

J. Hardware: Clean and polish finished hardware, remove marks, stains, scratches and blemishes.

K. Tile: Clean and polish floor and wall tile, remove grout film and excess grout.

L. Woodwork: Dust and clean architectural woodwork and finish woodwork items, remove all stains, spots, and foreign matter using methods and cleaning agents which will not harm the various finishes.

M. Site: Sweep exterior paved surfaces broom clean; rake clean unpaved surfaces.

N. Equipment: Thoroughly clean all items of food service, mechanical and electrical equipment; remove excess oils and grease from exposed surfaces.
1. Clean permanent filters and replace disposable filters if ventilating units were operated during construction.
2. Clean ducts, blowers and coils, if units were operated without filters during construction.

1.12 PROTECTING INSTALLED WORK

A. Protect all built, and in-place Work. In addition to requirements specified elsewhere, the General Contractor shall protect all installed work from subsequent damage or deterioration from construction activities, and atmospheric damage until Owner’s Substantial Completion and occupancy precludes the need for protection activities. No attempt is made in this Section to list all elements requiring protection or to describe how each element will be protected. It is the responsibility of the General Contractor to determine for itself the scope and nature of protection required.
1. Protection of some products/building elements may be required to remain in place for a large portion duration of the project. As such, materials should be installed to provide adequate protection throughout the full extent of

construction activities. Repair or reinstall protection throughout the duration of construction.

B. Finish Products: Some finishes may need to be physically isolated from construction operations by means of protective barriers and coverings.

1. General: After installation, provide coverings to protect products from damage due to traffic and construction operations. Replace protective coverings which may become wet, torn, or ineffective. Remove coverings when no longer needed.
2. Doors, door frames and hardware: Protect from damage due to traffic and construction operations.
3. Floor and Finished Surfaces Protection: Protect against construction traffic, rolling loads, static loads, damage from material movement and storage, or similar causes of damage.
4. Walls: Protect from impact, dents, marks, water damage, and similar damage.
5. Glass: Protect from damage including etching and staining. Keep glass clean.
6. Protect products sensitive to water damage from becoming wet.
7. Protect products sensitive to ultra-violet exposure and atmospheric exposure by limiting exposure to within limits recommended by respective product manufacturer.
8. Protect products from biological growth, molds and mildew.
9. Protect products from rodents and other animals, birds and insect damage.

C. Roofing and waterproofing systems: Protect and isolate from traffic and construction operations. Protect from chemicals. Work and traffic directly upon roofing and waterproofing is prohibited, provide temporary walkways and platforms.

D. General Protection from chemicals:

1. Cover adjacent surfaces with materials that are proven to resist chemical cleaners selected for Project unless chemicals being used will not damage adjacent surfaces. Use covering materials that contain only waterproof, UV-resistant adhesives. Apply masking agents to comply with manufacturer's written instructions. Do not apply liquid masking agent to painted or porous surfaces. When no longer needed, promptly remove masking to prevent adhesive staining.
2. Do not clean surfaces during winds of sufficient force to spread cleaning solutions to unprotected surfaces.
3. Neutralize and collect alkaline and acid wastes and dispose of off-site.
4. Dispose of runoff from chemical operations by legal means and in a manner that prevents soil erosion, undermining of paving and foundations, damage to landscaping, and water penetration into building interiors.

E. Save plastic coverings. At completion of Project, reuse if practical; if not, then recycle if local market exists.

PART 2 - PRODUCTS **(Not Used)**

PART 3 - EXECUTION **(Not Used)**

End of Section

Section 01 74 19

CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes: Special administrative and procedural requirements for the General Contractor and subcontractors as required for the Project waste management and recycling activities and as described herein.

1. Recycling goals and waste management program intent.
2. List of recyclable materials.
3. Waste management plan.
4. Waste management plan implementation.
5. Waste management reporting.

1.2 RECYCLING GOALS AND WASTE MANAGEMENT PROGRAM INTENT

A. Waste Stream Diversion Program Goal: It is the Owner's determination that this Project shall generate the least amount of construction waste possible. This program goal shall be accomplished by the following processes:

1. Construction Waste Diversion Requirement: **Minimum 95% waste diversion is mandatory for this project.**
    a. Comply with requirements of NE CHPS prerequisite MP.2 and NE CHPS credit MC.1.
2. Ensure the reduction of waste generated due to errors, poor planning, breakage, mishandling, contamination, or other factors shall be employed.
3. Efficiently use waste material to the fullest extent possible in the completion of this Project, including the following.
    a. Reuse of materials on site where possible.
    b. Recycling of waste generated during the construction processes.
4. The Contractor is encouraged to include additional resource efficient methods in the Project.
5. In the management of waste consideration shall be given to the availability of viable markets, the condition of the material, the ability to provide the material in suitable condition and in a quantity acceptable to available markets, and time constraints imposed by internal project completion mandates.

B. Contractor Participation: The Contractor shall take a pro-active, responsible role in the management of construction and demolition waste and require all subcontractors, vendors, and suppliers to participate in the effort.

1. The Contractor is responsible for implementation of special programs involving rebates or similar incentives related to recycling of waste.
2. Revenues or other savings obtained for salvage, or recycling shall accrue to the Contractor. Firms and facilities used for recycling, reuse, and disposal

shall be appropriately permitted for the intended use to the extent required by federal, state, and local regulations.

C. Waste disposal: In no case shall material be disposed of in a landfill or incinerator where an approved and less costly recycling or reuse alternative exists. Waste disposal in landfills and incinerators shall be minimized and shall be considered the alternative of last resort.

1.3 DEFINITIONS

A. Clean: Untreated and unpainted; not contaminated with oils, solvents, caulk, or the like.

B. Commingled: Materials of varied types deposited into the same receptacle or pile, or mixed together during demolition.

C. Construction Waste: Solid wastes typically including building materials, packaging, trash, debris, and rubble resulting from construction operations.

1. Construction waste includes excess or otherwise unusable construction materials, packaging materials for construction products, and other materials generated during the construction process but not incorporated into the work.

D. Hazardous: Exhibiting the characteristics of hazardous substances, i.e., ignitability, corrosiveness, toxicity or reactivity.

E. Hazardous Waste: Any material or byproduct of construction whose handling, storage and disposal is regulated by the Environmental Protection Agency.

F. Non-hazardous: Exhibiting none of the characteristics of hazardous substances, i.e., ignitability, corrosiveness, toxicity, or reactivity.

G. Nontoxic: Neither immediately poisonous to humans nor poisonous after a long period of exposure.

H. Off-Site Separation: Sorting and separating commingled waste at a location other than the construction jobsite, that location having been established for the purpose of recycling.

I. Recyclable: The ability of a product or material to be recovered at the end of its life cycle and remanufactured into a new product for reuse by others.

J. Recycle: To remove a waste material from the Project site to another site for remanufacture into a new product for reuse by others.

K. Recycling: The process of sorting, cleansing, treating and reconstituting solid waste and other discarded materials for the purpose of using the altered form. Recycling does not include burning, incinerating, or thermally destroying waste.

L. Return: To give back reusable items or unused products to vendors for credit.

M. Reuse: To reuse a construction waste material in some manner on the Project site.

N. Salvage: To remove a waste material from the Project site to another site for resale or reuse by others.

O. Sediment: Soil and other debris that has been eroded and transported by storm or well production run-off water.

P. Source Separation: The act of keeping different types of waste materials separate beginning from the first time they become waste.

Q. Toxic: Poisonous to humans either immediately or after a long period of exposure.

R. Trash: Any product or material unable to be reused, returned, recycled, or salvaged.

S. Volatile Organic Compounds (VOCs): Chemical compounds common in and emitted by many building products over time through outgassing: solvents in paints and other coatings; wood preservatives; strippers and household cleaners; adhesives in particleboard, fiberboard, and some plywoods; and foam insulation.

T. Waste Management Plan: A Project-related plan for the collection, transportation, and disposal of the waste generated at the construction site. The purpose of the plan is to ultimately reduce the amount of material being landfilled.

U. Waste: Extra material or material that has reached the end of its useful life in its intended use. Waste includes salvageable, returnable, recyclable, and reusable material.

1.4 LIST OF RECYCLABLE MATERIALS.

A. Materials to be recycled, salvaged, or reused during this project include, but are not limited to, the following:

1. Asphaltic paving.
2. Asphalt / bituminous roofing.
3. Beverage containers.
4. Brick.
5. Carpet and carpet pad trim.
6. Cement fiber products, including shingles, panels, siding.
7. Concrete, concrete block, concrete masonry units (CMU), slump stone (decorative concrete block), and rocks.
8. Fluorescent light tubes, per local regulatory requirements.
9. Furnishings.
10. Glass.
11. Green materials (i.e. tree trimmings and land clearing debris).
12. Gypsum wallboard.
13. Insulation.
14. Metals including, but not limited to: stud trim, ductwork, piping, reinforcing steel (rebar), roofing, other trim, steel, iron, galvanized sheet steel, stainless

steel, aluminum, copper, zinc, lead, brass, and bronze. (ferrous and non-ferrous).

15. Paint.
16. Paper, including bond, newsprint, cardboard, mixed paper, packing materials, and packaging.
17. Plastics, plastic buckets and plastic sheeting.
18. Porcelain plumbing fixtures.
19. Rigid foam insulation and packing materials.
20. Soils and land clearing debris.
21. Wood, including clean dimensional wood, pallet wood, plywood, oriented strand board (OSB), particle board.

1.5 RESOURCES

A. Resources: The following sources may be useful in development of the specified Waste Management Plan:

1. Licensed or Registered Construction and Demolition Debris Processing Facilities: The following list from the RHODE ISLAND DEPARTMENT OF ENVIRONMENTAL MANAGEMENT, contains licensed and registered construction and demolition debris processing facilities.. This list is provided for information only and is not necessarily comprehensive; other processors and markets are acceptable. For more information, contact: Rhode Island Department of Environmental Management, Office of Waste Management, 235 Promenade Street, Providence RI 02908 (telephone 401-222-2797).

a. Construction and Demolition Debris Processing Facilities:

Coastal Recycling
431 Allens Avenue
Providence, RI 02905

Pond View Recycling, Inc, C&D Facility
1 Dexter Road
East Providence, RI 02914

RIRRC – Plainfield Pike Facility
2550 Plainfield Pike
Cranston, Rhode Island

Waste Management Transfer Station and C&D Debris Processing Facility
65 O'Keefe Lane
Warwick, Rhode Island 02888

1.6 SUBMITTALS

A. Submit the following under provisions of Section 01 33 00 - SUBMITTAL PROCEDURES:

1. Waste Management Plan: Submit draft(s) and Final Waste Management Plan, as specified herein under the Article entitled "Waste Management Plan".
2. Recycling Facilities List: Submit list of names, addresses, and telephone numbers for all proposed recycling facilities and obtain Architect's acceptance

prior to use of recycling facilities. Additionally, with submittal, include for each recycling facility a certification letter on recycling facility letterhead which is signed by responsible party at recycling facility containing the following information:

a. End use of each recycled material handled by facility.

b. Recycling rate of the recycling facility.

c. Facility Permitting Information: For ABC rubble crushing and/or recycling facilities, provide a copy of the facility's current solid waste management facility permit.

3. Monthly recycling analysis reports: Submit monthly with each Application for Payment, recycling analysis report. Include separate reports for demolition and construction waste. Include the following information:

a. Material category.

b. Generation point of waste.

c. Total quantity of waste in tons).

d. Quantity of waste salvaged, both estimated and actual in tons.

e. Quantity of waste recycled, both estimated and actual in tons.

f. Total quantity of waste recovered (salvaged plus recycled) in tons.

g. Total quantity of waste recovered (salvaged plus recycled) as a percentage of total waste.

h. Tracking Report and Projections: Monthly recycling analysis reports shall additionally include updated projections for end-of-project recycling rates, salvage rates, and landfill rates demonstrating that the specified mandatory percentage of the construction waste will be diverted (recycled or salvaged) by date of Substantial Completion.

B. Submit the following under provisions of Section 01 78 00 - CLOSEOUT SUBMITTALS.

1. Waste Reduction Calculations: Before request for Substantial Completion, submit calculated end-of-Project rates for salvage, recycling, and disposal as a percentage of total waste generated by the Work.

a. Record Keeping for Donations, Recycling and Landfill Disposal: Submit a complete materials audit and include the additional information specified following:

1) Records of Donations: Indicate receipt and acceptance of salvageable waste donated to individuals and organizations. Indicate whether organization is tax exempt.

2) Records of Sales: Indicate receipt and acceptance of salvageable waste sold to individuals and organizations. Indicate whether organization is tax exempt.

3) Recycling and Processing Facility Records: Indicate receipt and acceptance of recyclable waste by recycling and processing facilities licensed to accept them. Include manifests, weight tickets, receipts, and invoices. Include documentation for backcharge fees, if any, for improperly segregated waste.

4) Landfill and Incinerator Disposal Records: Indicate receipt and acceptance of waste by landfills and incinerator facilities licensed to accept them. Include manifests, weight tickets, receipts, and invoices.

1.7 WASTE MANAGEMENT PLAN

A. Draft Waste Management Plan: Within 14 calendar days after receipt of Notice of Award of Bid, and prior to any waste removal, the Contractor shall submit a Draft Waste Management Plan to both Architect and Owner. Submit draft Waste Management Plan and obtain approval from Architect and Owner prior to engagement of waste or recycling subcontractors. The Draft Waste Management Plan shall include as a minimum the following:

1. Analysis of the jobsite waste expected to be generated, categorized by material types and approximate quantities.
   a. List specific waste materials that will be salvaged for resale, salvaged and reused, or recycled.
   b. Estimated percentage of waste diverted by this Plan.
   c. Identification of materials that cannot be recycled or reused
2. Disposal options: The name of all landfills and incinerators proposed for trash disposal, the respective tipping fees for each of these disposal options including transportation costs, and the projected cost of disposing of all Project waste in the landfills.
3. Alternatives to Incineration or Landfill Disposal: A list of each material proposed to be salvaged, reused, or recycled during the course of the Project. Include the following information:
   a. The proposed end use or market for each material.
   b. The respective tipping fees for each end use or market (including transportation costs).
   c. The estimated net cost savings or additional costs resulting from separating and recycling each material (versus landfilling or other disposal).
      1) “Net” means that the following have been subtracted from the cost of separating and recycling: (a) revenue from the sale of recycled or salvaged materials and (b) landfill tipping fees saved due to diversion of materials from the landfill.

B. Final Waste Management Plan: Once the Owner has reviewed the draft Waste Management Plan and made appropriate suggested modifications, the Contractor shall submit, within 14 calendar days of receiving such suggested modifications, a Final Waste Management Plan, incorporating Owner’s input. The Final Waste Management Plan shall contain the following:

1. Analysis of the jobsite waste expected to be generated, categorized by material types and approximate quantities.
   a. List specific waste materials that will be salvaged for resale, salvaged and reused, or recycled.

2. Materials Handling Procedures: A description of the means by which any waste materials identified to be salvaged, reused, or recycled, will be protected from contamination, and a description of the means to be employed in recycling the above materials consistent with requirements for acceptance by designated facilities.
3. Markets: A list of the markets or other on-site or off-site end uses that will be used for each material that will be separated for reuse, salvage, or recycling.
    a. Identify (and utilize) local and regional reuse programs, including non-profit organizations such as schools, local housing agencies, and organizations that accept used materials such as materials exchange networks, and Habitat for Humanity.
4. Transportation: Describe the means of transportation of the recyclable materials and destination of all waste materials.
    a. Transported materials includes:
        1) Materials that will be site-separated and hauled to designated centers
        2) Mixed materials will be collected by a waste hauler and removed from the site).
        3) Mixed materials that will be removed from site and later separated for recycling.
5. Disposal options: The name of all landfills and incinerators proposed for trash disposal, the respective tipping fees for each of these disposal options including transportation costs, and the projected cost of disposing of all Project waste in the landfill(s).
    a. Alternatives to Incineration or Landfill Disposal: A list of each material proposed to be salvaged, reused, or recycled during the course of the Project.
6. Cost of Reuse, Salvage, or Recycling. An estimate of the cost, including separation, transportation, and marketing, to reuse, salvage, or recycle the materials identified.
7. Schedule of special meetings to required to address waste management implementation.

1.8 WASTE MANAGEMENT PLAN IMPLEMENTATION

A. Manager: The Contractor shall designate a specific party (or parties) responsible for instructing workers in recycling and overseeing and documenting results of the Waste Management Plan for the Project.

B. Distribution: The Contractor shall distribute copies of the Waste Management Plan to the Job Site Foreman, each Subcontractor, the Owner, and the Architect.

C. Instruction: The Contractor or his designated waste manager shall provide on-site instruction regarding appropriate separation, handling, and recycling, salvage, reuse, and return methods to be used by all involved parties at the appropriate stages of the Project.

D. Separation facilities: As appropriate during each stage of the Project, the Contractor shall lay out and label a specific area(s) to facilitate separation of materials for potential recycling, salvage, reuse, and return. Recycling and waste bin areas are to be kept neat and clean and clearly marked in order to avoid contamination of materials.

E. Hazardous wastes: Hazardous wastes shall be separated, stored, and disposed of according to local regulations.

1.9 WASTE MANAGEMENT REPORTING

A. Application for Progress Payments: The Contractor shall submit with each Application for Progress Payment, a Summary of Waste generated by the Project. Failure to submit this information shall render the Application for Payment incomplete and shall delay Progress Payment. The Summary shall be submitted on a form acceptable to the Owner and shall contain the following information:

1. The amount (in tons or cubic yards) of material landfilled from the Project, the identity of the landfill, the total amount of tipping fees paid, transportation costs (if separate) and the total disposal cost. Include manifests, weight tickets, receipt, and invoices.
2. For each material recycled, reused, or salvaged from the Project, the amount (in tons or cubic yards), the date removed from the jobsite, the receiving party, the transportation cost, the amount of any money paid or received for the recycled or salvaged material, and the net total cost or savings of salvage or recycling each material. Attach manifests, weight tickets, receipts, and invoices.

PART 2 - PRODUCTS (Not Used)

PART 3 – EXECUTION

3.1 GENERAL WASTE MANAGEMENT

A. Use detailed material estimates to reduce risk of unplanned and potentially wasteful cuts.

B. Arrange for vendors and material suppliers is to take back shipping and packing materials for re-use or recycling to the maximum extent economically feasible.

1. Include in material purchasing agreements a waste reduction provision requesting that materials and equipment be delivered in packaging made of recyclable material, that they reduce the amount of packaging, that packaging be taken back for reuse or recycling, and to take back all unused product. Insure that subcontractors require the same provisions in their purchase agreements.

C. Provide clearly labeled containers for recycled waste that is to be recycled, with a list of acceptable and unacceptable materials. The list of acceptable materials must be the same as the materials recycled at the receiving material recovery facility or recycling processor.

1. Separate corrugated cardboard in accordance with the Waste Management Plan and place in designated areas for recycling.
2. Separate and recycle waste materials in accordance with the Waste Management Plan and to the maximum extent economically feasible.
3. Place materials defined as hazardous or toxic waste in designated containers.

D. Provide labeled containers for all recycled waste that is to be disposed in a landfill.

E. Handle and transport recyclable materials in manner to prevent contamination of materials from incompatible products and materials.

F. Conduct regular visual inspections of dumpsters and recycling bins to remove contaminants.

3.2 SOURCE SEPARATION

A. General: Separate recyclable materials from general construction waste. Separate recyclable materials by type.
1. Provide containers, clearly labeled, by type of separated materials or provide other storage method for managing recyclable materials until they are removed from Project site.
2. Stockpile processed materials on-site without intermixing with other materials. Place, grade, and shape stockpiles to drain surface water. Cover to prevent windblown dust.
3. Stockpile materials away from demolition area. Do not store within drip line of remaining trees.
4. Store components off the ground and protect from weather.

B. Source Separation Methods:
1. Waste products and materials that are recyclable shall be separated from trash and sorted into appropriately marked separate containers and then transported to the respective recycling facility for further processing.
2. Comingled Method: Recyclable materials shall be placed into a single container and then transported to a recycling facility where the recyclable materials are sorted and processed.
a. Do not put recycled waste that will be disposed in a landfill into a co-mingled waste recycling container.
3. Other Methods: Other methods proposed by the Contractor may be used when approved by the Architect and Owner.

C. Waste materials not suitable for reuse, but having value as being recyclable, shall be made available for recycling whenever economically feasible.

3.3 REMOVAL OF CONSTRUCTION WASTE MATERIALS

A. Remove recycled waste materials from project site on a regular basis. Do not allow recycled waste to accumulate on-site.

B. Transport recycled waste materials off Owner's property and legally dispose of them.

1. Materials with no practical use or economic benefit shall be disposed at a landfill or incinerator.

End of Section

Section 01 75 00

STARTING AND ADJUSTING

PART 1 - GENERAL

1.1 SUMMARY

A. Testing, adjusting, and balancing.

B. Operation, maintenance, and service.

1.2 TESTING, ADJUSTING, AND BALANCING

A. General: Adjust operating products and equipment to ensure smooth and unhindered operation.

1. General Contractor is advised that testing and balancing agents may be required during commissioning activities as specified in Section 01 91 00 – COMMISSIONING, or as may be additionally directed by Architect/Engineer.

B. General Contractor will employ services of an independent firm to perform testing, adjusting and balancing. Submit to Owner at least three qualified testing firms for Owner's review and acceptance.

C. General Contractor and Trade contractors (Division 21 – Fire Suppression, Division 22 – Plumbing and Division 23 – Heating, Ventilating and Air Conditioning) are jointly responsible and required to provide assistance to the Owner's independent Commissioning agent as specified under Section 01 91 00 – COMMISSIONING.

D. The independent firm will perform services specified under Division 21 - Fire Suppression, Division 22 - Plumbing, and Division 23 - Heating, Ventilating, and Air Conditioning.

E. Reports will be submitted by the independent firm to the Architect/Engineer indicating observations and results of tests and indicating compliance or non-compliance with specified requirements and with the requirements of the Contract Documents.

1.3 AIR QUALITY TESTING

A. Air quality testing: The Owner reserves the right to employ the services of an independent testing agency to perform air quality testing. Testing will occur prior to General Contractor's request for inspection for Substantial Completion. The intent of testing is to certify that the building is "Clear" of airborne contaminants.

1.4 OPERATION, MAINTENANCE, AND SERVICE

A. Coordinate schedule for start-up of various equipment and systems.

B. Notify Architect/Engineer and Owner 7 days prior to start-up of each item.

C. Verify that each piece of equipment or system has been checked for proper lubrication, drive rotation, belt tension, control sequence, or other conditions which may cause damage.

D. Verify that tests, meter readings, and specified electrical characteristics agree with those required by the equipment or system manufacturer.

E. Verify wiring and support components for equipment are complete and tested.

F. Execute start-up under supervision of responsible General Contractors' personnel in accordance with manufacturers' instructions.

G. When specified in individual specification Sections, require manufacturer to provide authorized representative to be present at site to inspect, check and approve equipment or system installation prior to start-up, and to supervise placing equipment or system in operation.

H. Submit a written report in accordance with Section 01 77 00 - CLOSEOUT PROCEDURES that equipment or system has been properly installed and is functioning correctly.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

End of Section

Section 01 77 00

CLOSEOUT PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

A. Closeout of incomplete work (punch list) requirements.

B. Closeout procedures.

C. Conferences occurring after Substantial Completion.

1.2 RELATED REQUIREMENTS

A. Section 01 78 00 - CLOSEOUT SUBMITTALS: Requirements for project record documents.

B. Section 01 78 36 - WARRANTIES: Administrative and procedural requirements for warranties, guarantees and bonds.

1.3 PUNCH LIST REQUIREMENTS AND PROCEDURES

A. Definitions:

1. General Contractor's Punch List: Complete list of incomplete and incorrect Work prepared by the General Contractor prior to request of Architect's inspection for Certification of Substantial Completion. As a minimum the List shall include the following information for each work item:
    a. Location identification organized by Building, Area, Room Number, or combination thereof as appropriate to project.
    b. Clear identification of each incomplete work item, including all subcontractor's work.
    c. Estimated value of each incomplete work item.
    d. A short statement of why work is not complete.
    e. Identify subcontract responsibility, as appropriate to each item.
2. Architect's Punch List: A list of incomplete and incorrect Work prepared by the Architect, which modifies the General Contractor's Punch List, following review and acceptance of the General Contractor's Punch List.

B. Pre-Closeout requirements: Prior to requesting initial Architect's inspection for Certification of Substantial Completion, submit to the Architect a full and complete list of all incomplete work items (General Contractor's Punch List).

C. Punch list procedures at Substantial Completion:

1. Architect will review submitted General Contractor's Punch List and determine whether it is suitable to proceed with the Substantial Completion Process.
    a. If the Architect determines that the amount of completed work is insufficient to be considered for Substantial Completion, the Architect will

not proceed with the Punch lists process until sufficient completion of the Project is achieved.

b. The Architect will review the General Contractor's Punch List and if the Architect determines that it does not reflect proper identification of the incomplete and incorrect work, he/she will request revision and resubmission of the General Contractor's Punch List.

c. If the Architect determines that the amount of work indicated on the General Contractor's Punch List is excessive, the Architect will suspend its review until the scope of Work identified in the General Contractor's Punch is reduced to a level satisfactory to the Architect.

d. When the Architect reviews and accepts the General Contractor's Punch List as being an accurate reflection of incomplete and incorrect work; the Architect will prepare and issue to the General Contractor the "Architect's Punch List".

1) The Architect's Punch List will be based on the General Contractor's Punch List with modifications and additions as may be required.

2) The Architect's Punch List includes Work which must be completed and corrected prior to Final Completion.

2. Upon receipt of the Architect's Punch List, the General Contractor shall immediately distribute the list to all subcontractors.

D. Completion of Punch List Work: Make reasonable efforts to ensure that all "Architect's Punch List" items are completed or corrected within 14 calendar days from the date of the Architect's Punch List" or within the Contract Time, whichever is earlier.

E. Architect's Final Inspection and review of Punch List Work:

1. After General Contractor certification that all punch list Work has been properly completed the Architect will then perform the Final Inspection.

a. Incomplete Items: If the Architect discovers any incomplete or incorrect "Architect's Punch List" items or any other deficiency in the work, the Architect will prepare a "Revised Punch List" which may also include other incomplete Contract requirements such as record documents, owner's operation and maintenance manuals, warranties, and other Contract requirements. Architect's site reviews of the Work for this "Revised Punch List" and any subsequent revised Punch Lists shall be performed as additional service to Owner, back-charged to the General Contractor.

b. The Architect may assign a dollar value for each item of incomplete or incorrect work remaining.

F. Additional Inspections and related additional services fee: The Architect and the Architect's consultants will provide two site inspections, one at Substantial Completion, and one to confirm that the "Architect's Punch List" has been completed.

1. "Revised Punch List: If the Architect prepares and issues a "Revised Punch List: because of the General Contractor's failure to complete the Work, then the Owner shall compensate the Architect and the Architect's consultants for

their additional services and additional inspections. The payment for additional services and inspections will be back-charged to General Contractor. The Owner will deduct the amount of the Architect's additional services fee from final payment to the General Contractor by Change Order.

1.4 CLOSEOUT PROCEDURES - SUBSTANTIAL COMPLETION

A. Prior to requesting inspection for certification of Substantial Completion, complete the following:

1. On Application for Payment, show 100 percent completion for portions of work claimed as substantially complete.
    a. Submit list of incomplete items (Punch List), value of incomplete work, and reasons work is not complete.
2. Obtain evidence of compliance with requirements of governmental agencies having jurisdiction including, but not necessarily limited to:
    a. Certificate of Final Inspections, "signed off" by authorities having jurisdiction.
    b. Certificate of Occupancy.
3. Submission of product and installation warranties, workmanship bonds, maintenance agreements, installer certifications and similar documents specified in individual sections.
4. Submission of test/adjust/balance reports.
5. Change-over permanent locks and transmit keys to the Owner.
6. Remove temporary facilities and services that are no longer required.
7. Remove mock-ups, field samples and similar items.
8. Complete Final Cleaning, including repair and restoration, or replacement of damaged Work.
9. Remove surplus materials, rubbish and similar elements.
10. Documentation of completed flush out procedures.
11. Application for reduction of retainage.
12. Consent of Surety.
13. Advise the Owner of the change-over in security provisions.
14. Notification of shifting insurance coverage.
15. Final progress photographs.
16. All commissioning functional testing.

B. Within 2 weeks after receipt of the notice of Substantial Completion from the General Contractor, the Architect will inspect to determine status of completion.

1. Should the Architect determine that the Work is not substantially complete:
    a. The Architect will notify the General Contractor in writing, stating the reasons therefore.
    b. The General Contractor shall remedy the deficiencies and send a second written notice of Substantial Completion to the Architect, requesting re-inspection.

C. When the Architect concurs that the Work is substantially complete:

1. The Architect will prepare AIA Document G 704 - CERTIFICATE OF SUBSTANTIAL COMPLETION, in accordance with the requirements of the GENERAL CONDITIONS and SUPPLEMENTARY CONDITIONS, accompanied by the General Contractor's list of items to be completed or corrected, as verified by the Architect.
2. The Architect will submit the Certificate to the Owner, and to the General Contractor, for their written acceptance of the responsibilities assigned to them in the Certificate.

1.5 CLOSEOUT PROCEDURES - FINAL ACCEPTANCE

A. Prior to requesting inspection for certification of Final Acceptance and final payment, perform the following:

1. Completion of incomplete Work. Submit a copy of the final inspection list stating that each item has been completed or otherwise resolved for acceptance.
2. Prove that all taxes, fees and similar legal obligations have been paid.
3. Submit final payment requests with release of all liens, and supporting documentation.
4. Provide written assurances that all unsettled claims are in the process of and will be resolved.
5. Submit final meter readings for utilities, a record of stored fuel, and similar data, taken on date of Substantial Completion.
6. Submit updated final statement, including accounting for final additional changes to the Contract Sum. Show additional Contract Sum, additions and deductions, previous Change Orders, total adjusted Contract Sum, previous payments and Contract Sum due.
7. Submit consent of surety to Final Payment.
8. Submit evidence of continuing insurance coverage complying with insurance requirements.
9. Transmit certified property survey.
10. Remove remaining temporary facilities and services.
11. Deliver to Owner and obtain receipts for:
    a. Operation and Maintenance Manuals for items so listed in individual Sections of the Specifications, and for other items when so directed by the Architect.
    b. Project Record Documents (as-builts), including autocad format drawings on discs.
    c. Warranties and bonds specified in individual Sections of the Specifications.
    d. Keys and keying schedule.
    e. Spare parts and materials extra stock.
    f. Pest Control Inspection Report.

g. List of subcontractors, service organizations, and principal vendors, including names, addresses, and telephone numbers where they can be reached for emergency service at all times including nights weekends, and holidays.

12. Submit Certification stating Work has been inspected for compliance with the Contract Documents.
13. Submit Certification stating equipment and systems have been tested in presence of Owner's representative and are fully operational.
14. Submit Certification stating that Work is 100 percent complete and ready for final inspection.

B. Within 2 weeks after receipt of the request for Final Acceptance from the General Contractor, the Architect will inspect to determine status of completion.

1. Should the Architect determine that the Work is incomplete or defective:
   a. The Architect will notify the General Contractor in writing, stating the reasons listing the incomplete or defective work.
   b. The General Contractor shall take immediate steps to remedy the deficiencies and send a second written notice of request for Final Acceptance to the Architect.
   c. Costs relative to the Architects re-inspection due to failure of Work to comply with claims made by the General Contractor, will be compensated by the Owner, who will deduct the amount of such compensation from the Final Payment due to the General Contractor.

C. After the Architect finds the Work acceptable, the Architect will review the Final Close-out submittals.

D. Application for Final Payment: Submit Application for Final Payment in accordance with procedures and requirements of the General Conditions and Supplementary Conditions.

1. The Architect will prepare a Final Change Order, reflecting approved adjustments to the Contract Sum not previously made by other Change Orders.

1.6 CONFERENCES AFTER SUBSTANTIAL COMPLETION

A. The Owner reserves the right to call for conferences commencing with the date of Substantial Completion and continuing for one year thereafter, for purposes of inspecting the Work and to plan correction of any deficiencies or failures discovered during this period.

1. Attendance is required by General Contractor's Project Manager, Architect, Owner's Project Manager and each applicator, installer, and supplier as the Owner may direct or the General Contractor may wish to have present. All representatives attending such meetings shall be the same persons, or shall have the same powers and authority, as those attending progress meetings occurring prior to the Date of Substantial Completion.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

End of Section

Section 01 78 00

CLOSEOUT SUBMITTALS

PART 1 - GENERAL

1.1 SUMMARY

A. Project record documents.

B. Record Project Manual.

C. Project Record Drawings (As built drawings).

D. Final Site Survey.

E. Operation and maintenance data, preventive maintenance instructions.

F. Materials and finishes manual.

G. Product warranties and bonds.

H. Maintenance contracts.

I. Spare parts and maintenance materials.

J. Attic stock.

1.2 RELATED SECTIONS

A. Section 01 31 00 - PROJECT MANAGEMENT AND COORDINATION:

1. Coordination Drawing Requirements.
2. CAD File Requirements for base sheets to prepare Project Record Drawings (As built drawings).

B. Section 01 78 36 – WARRANTIES: Administrative and procedural requirements for warranties, guarantees and bonds.

1.3 PROJECT RECORD DOCUMENTS

A. General: Record documents shall reflect actual “as-built” condition and the products installed. Include all changes and deviations from original Contract Documents, and incorporate information from:

1. Original Contract Documents.
2. Addenda.
3. Change orders.
4. Construction change directives.
5. Field directives, and instructions from the Owner, Architect or regulatory authorities having jurisdiction.

B. Project Record Documents include, but are not limited to:

1. Record Project Manual.
2. Project record drawings (as-builts).
3. Final Site Survey.
4. Operation and maintenance data, preventive maintenance instructions.
5. Materials and finishes manual.
6. Product warranties and bonds.
7. Maintenance contracts.
8. Record of all test reports and inspections.
9. Wall charts and data such as valve diagrams, electrical panel board directories, and similar information.
10. List of all attic stock, spare parts, maintenance and extra materials turned over to the Owner. List shall be organized and sorted by specification section, and have fields for product description and quantity. A separate list shall be provided for each school building and include items from the General Contractor, Trade contractors and their respective sub-subcontractors.

C. Labeling and identification of Record Documents

1. Clearly label all record documents with name of Project and the words “Record Document”.
2. Date progressive entries of information as appropriate.
3. Date Record Documents with the final submission date.

1.4 SUBMITTAL QUANTITY REQUIREMENTS

A. Furnish Architect with three flash drive sets, each set containing all of the following closeout submittals. Additionally furnish the following quantities of hard copies:

1. Record Project Manual: 2 bound copies.
2. Project record drawings (as built drawings): Autodesk Revit (version 2015) and Autocad MEP (version 2015) digital format.
   a. 2 “blackline print” sets of Drawings.
3. Final Site Survey: 3 copies.
4. Operation and maintenance data, preventive maintenance instructions: 2 bound copies.
5. Owner Training Video for operation of building systems and major equipment: 2 copies on discs. Refer to Section 01 79 00 – DEMONSTRATION AND TRAINING for video recording requirements.
6. Materials and finishes manual: 2 bound copies.
7. Product warranties and bonds: 2 copies
8. Maintenance contracts: 2 copies
9. Record of all test reports and inspections: 2 copies.

1.5 RECORD PROJECT MANUAL

A. The General Contractor is responsible to maintain a Project Manual reflecting revisions and changes to the Original Issue Project Manual.

1. Clearly label the Record Project Manual as “Record Document Specifications, in a three ring binder.
2. Do not use Record Project Manual for construction purposes; protect from loss in a secure location.
3. Record all variations and deviations to the Contract Documents, including changes made by Addenda, Bulletin, Change Order, Change Directive and other modifications to the Contract..
   a. Cut and paste revisions into their applicable specification section.
   b. Identify all changes with cross-reference to appropriate Addendum Number, Modification Number, Change Order Number.
4. In each individual Specification Section, under “*Part 2 – Products*”, identify all manufacturers and products which are actually used as part of the Work.
5. Give particular attention to concealed elements that would be difficult to measure and record at a later date.

B. Record Project Manual: Provide prior to request for Final Acceptance.

1. Manuals shall be in 8-1/2 by 11 inch pages and bound in 3-ring (D-shape) binders with durable plastic covers. Internally subdivide the binder contents by Division with permanent page dividers.
2. Label front cover and spine of each binder with laser printed titles, dates, and project information.
3. All information from “in-progress” manual shall be clearly and completely transferred.
4. Pages shall be undamaged.

1.6 PROJECT RECORD DRAWINGS

A. The General Contractor is responsible to maintain a clean, undamaged set of prints of Contract Drawings and shop drawings for preparing the record drawings.

1. Where shop drawings are used, record a cross-reference at the corresponding location on the Contract Documents.

B. Do not use Record Documents for construction purposes; protect from loss in a secure location. Mark-up these drawings to show clearly and completely the actual installation reflecting all changes made in the Work during construction.

1. Mark whichever drawing is most capable of showing conditions accurately.
2. Record all variations and deviations to the Contract Documents, including changes made to schedules, details, and all architectural changes to structure, exterior enclosure, interior partitions and ceilings.
3. Record new information that is important to the Owner, but was not shown on the Contract Drawings or shop drawings.

4. Give particular attention to concealed elements that would be difficult to measure and record at a later date.

C. The fire protection, plumbing, mechanical and electrical trades shall be responsible to the General Contractor to keep the record documents for their portions of the work marked currently to record all changes in the mechanical and electrical work made during construction.

D. The Architect may periodically inspect these record drawings, and their proper maintenance may be a condition precedent to approval of applications for periodic payments.

E. Deliver all Project Record Documents, shop drawings, product data, and samples to the Architect for the Owner's use, upon completion of the Work and prior to request for Final Acceptance of the Work.

F. In addition at the completion of the work, the General Contractor shall be responsible for the preparation of neat, clean, and complete electronic file of record drawings in AutoCAD format, at no additional costs to the Owner. The Architect shall assist this process by providing the General Contractor with electronic AutoCAD files of all required drawings as they appeared when released as bid documents, and including revisions to reflect addenda, architect's supplemental instructions, and change orders processed by the Architect. The General Contractor will be responsible for making ANY OTHER revisions to these drawings which are required to reflect the as-built construction conditions and any adjustments made during the completion and coordination of construction. This shall include but not be limited to adjustments which occur as a result of the fire protection, plumbing, mechanical, or electrical coordination drawing process. The General Contractor shall deliver these electronic AutoCAD record drawings to the Architect for review and approval at project substantial completion.

1.7 FINAL SITE SURVEY

A. Under provisions of Section 01 73 00 - EXECUTION, Surveyor shall provide final corrected submission of Final Site Survey (As-built Property Survey) after work has been completed.

1. Final site survey shall show significant features for the Project. Include a certification, signed by the Surveyor, to the effect that metes, bounds, lines and levels of the Project are accurately positioned as shown on the survey.

B. Survey format shall be in accordance with requirements of the authorities having jurisdiction, and show the following as a minimum:

1. Property boundaries.
2. All required legal descriptions.
3. Bench marks.
4. Completed foundation work.
5. Building extremities.
6. Pad mounted equipment.
7. All paving work.

8. Revisions to wetland areas.
9. Easements and modifications to easements.
10. Underground utilities and all changes in existing utilities.
    a. Include rim and invert elevations at all utility structures.
11. Final grading elevations.

C. Record deviations from required lines and levels. Advise the Architect when deviations that exceed indicated or recognized tolerances are detected. On Final Site Survey, record deviations that are accepted and not corrected.

D. Submit signed, sealed and certified copies shall be provided to the architect's office for review prior to filing with authorities having jurisdiction. Ensure information is complete, accurate submitted in a timely fashion.
    1. Recording: At Substantial Completion, have the final survey recorded by or with local authorities as the official "Property Survey".

1.8 OPERATION AND MAINTENANCE MANUALS

A. General: Coordinate content and submission requirements of operation and maintenance manuals with Owner's Commissioning Agent.

B. Prepare data in the form of an instructional manual. Furnish separate manuals for each of the following groups of equipment:
    1. Food service equipment.
    2. Elevators.
    3. Special equipment and systems.
    4. Fire protection system.
    5. Utilities and plumbing systems.
    6. Heating, ventilation and air conditioning system.
    7. Electrical systems.

C. Furnish bound and properly identified Manuals prior to request for Final Acceptance.
    1. Manuals shall be in 8-1/2 by 11 inch pages and bound in three "D ring" capacity binders with durable plastic covers. Internally subdivide the binder contents with permanent page dividers.
        a. Arrange content by section number and systems, process flow, under section numbers and sequence as listed in the Table of Contents of this Project Manual.
        b. Drawings: Preferable 11 inches in height bound in with text with reinforced punched binder tab. Fold drawings larger than 8-1/2 by 11 inches to size of text pages. Provide a drawing pocket for Drawings larger than 11 by 17 inches; locate pocket inside rear cover or bound in with text.
    2. Each manual shall include the same following minimum information:
        a. Table of Contents.

b. Directory of General Contractor, subcontractors, and major equipment supplies listing addresses, phone numbers and appropriate emergency phone numbers.
   1) Include local sources of supplies and replacement parts.
c. Directory of Architect and consultants listing addresses and phone numbers.
d. Operation and maintenance instructions. Provide schematic diagrams of control systems, circuit directories for each electric panel and charts showing the tagging of all valves.
e. Air and water test and balancing reports.
f. Maintenance and cleaning instructions for finishes.
g. Product and manufacturer's Certificates.
h. Photocopies of all extended warranties and bonds.

3. Submit one copy of completed volume in final form 21 days prior to Final Inspection. This copy will be returned after final inspection with Architect's comments; Revise and submit all volumes to Owner.

D. For each item of equipment, include description of equipment, component parts and accessories. Identify function, normal operating characteristics, and limiting conditions. Include performance curves, with engineering data and tests, and complete nomenclature and commercial number of replaceable parts. Additionally provide the following for each item:

1. Panelboard circuit directories: Provide electrical service characteristics, controls and communications.
2. Include color coded wiring diagrams as installed.
3. Operating procedures: Include start-up, break-in, and routine normal operating instructions and sequences. Include regulation, control, stopping, shut-down, and emergency instructions. Include summer, winter, and any special operating instructions.
4. Maintenance requirements: Include routine procedures and guide for trouble-shooting; disassembly, repair, and re-assembly instructions; alignment, adjusting, balancing, and checking instructions.
   a. Maintenance drawings: Supplement product data to illustrate relation of component parts of equipment and systems, to show control and flow diagrams. Do not use project Record Documents as maintenance drawings.
5. Provide servicing and lubrication schedule, and list of lubricants required.
6. Include manufacturer’s printed operation and maintenance instructions.
7. Include sequence of operation by controls manufacturer.
8. Provide control diagrams by controls manufacturer as installed.
9. Provide General Contractor’s coordination drawings, with color coded piping diagrams as installed.
10. Provide charts of valve tag numbers, with location and function of each valve, keyed to flow and control diagrams.

11. Provide original manufacturer's parts (OEM) list, illustrations assembly drawings, and diagrams required for maintenance.
    a. Provide list of original manufacturer's spare parts (OEM), current prices, and recommended quantities to be maintained in storage.
    b. Include local source of supplies and replacement parts, and any other data pertinent for procurement procedures.
12. Additional requirements: As specified in individual specification Sections.

E. Standards:
1. Measurements: Provide all measurements in U.S. standard units such as feet and inches, pounds, and cfm; provide additional measurements in the "International System of Units" (SI).
2. Abbreviations: Provide complete nomenclature of all parts of all equipment; include part numbers of all replaceable parts.

1.9 MATERIALS AND FINISHES MANUAL

A. Furnish bound and properly identified manuals for all materials and finishes prior to request for Substantial Completion review.
1. Manuals shall be in 8-1/2 by 11 inch pages and bound in three "D ring" capacity binders with durable plastic covers. Internally subdivide the binder contents with permanent page dividers and logically organized.
2. Provide a listing in Table of Contents for design data, with tabbed fly sheet and space for insertion of data.
    a. Arrange content by section number and systems, process flow, under section numbers and sequence as listed in the Table of Contents of this Project Manual.
    b. Drawings: Preferable 11 inches in height bound in with text with reinforced punched binder tab. Fold drawings larger than 8-1/2 by 11 inches to size of text pages. Provide a drawing pocket for Drawings larger than 11 by 17 inches larger drawings; locate pocket inside rear cover or bound in with text.

B. Manuals shall include the following:
1. Product data, with catalog number, size, composition, and color and texture designations for all building products, applied materials, and finishes. Provide information for re-ordering custom manufactured products.
2. Instructions for care and maintenance: Include manufacturer's recommendations for cleaning agents and methods, precautions against detrimental agents and methods, and recommended schedule for cleaning and maintenance.
3. Moisture protection and weather exposed products: Include product data listing applicable reference standards, chemical composition, and details of installation. Provide recommendations for inspections, maintenance, and repair.
4. Additional requirements: As specified in individual specification Sections.

1.10 PRODUCT WARRANTIES AND BONDS

A. Categories of Specific Warranties: Warranties on the work are in several categories, including those of General Conditions, and including (but not necessarily limited to) the following specific categories related to individual units of work specified in sections of Divisions 2 through 16 of these Specifications:

1. Special Project Warranty (Guaranty): A warranty specifically written and signed by General Contractor for a defined portion of the work; and, where required, countersigned by subcontractor, installer, manufacturer or other entity engaged by General Contractor.
2. Specified Product Warranty: A warranty which is required by Contract Documents, to be provided for a manufactured product incorporated into the work; regardless of whether manufacturer has published a similar warranty without regard for specific incorporation of product into the work, or has written and executed a special project warranty as a direct result of Contract Document requirements.
3. Coincidental Product Warranty: A warranty not specifically required by Contract Documents (other than as specified in this Section), but which is available on a product incorporated into the work, by virtue of the fact that manufacturer or product has published warranty in connection with purchases and use of product without regard for specific applications except as otherwise limited by terms of warranty.

B. Commencement of Warranties: All warranties shall commence no sooner than the Date of Substantial Completion of the Project, except as explicitly specified otherwise in individual Specification Sections.

1. Equipment and systems start-up, operation and use, occurring prior to Project Substantial Completion, will not be considered commencement of warranty period under any terms of this Contract.

C. Refer to individual section of Divisions 2 through 16 for the determination of units of work which are required to be specifically or individually warranted, and for the specific requirements and terms of those warranties (or guarantees).

D. General Limitations: It is recognized that specific warranties are intended primarily to protect Owner against failure of the work to perform, and against deficient, defective, and faulty materials and workmanship, regardless of sources. Except as otherwise indicated, specific warranties do not cover failures in the work which result from: 1) Unusual and abnormal phenomena of the elements, 2) The Owner's misuse, maltreatment or improper maintenance of the work, 3) Vandalism after time of substantial completion, or 4) Insurrection or acts of aggression, including war.

1. Disclaimers and Limitations: Manufacturer's disclaimers and limitations on product warranties do not relieve the General Contractor of the warranty on the Work that incorporates the products, nor does it relieve suppliers, manufacturers, and subcontractors required to countersign special warranties with the General Contractor.

E. Related Damages and Losses: In connection with General Contractor's correction of warranted work which has failed, remove and replace other work of project

which has been damaged as a result of such failure, or must be removed and replaced to provide access for correction of warranted work.

1. Consequential Damages: Except as otherwise indicated or required by governing regulations, special project warranties and product warranties are not extended to cover damage to building contents (other than work of Contract) which occurs as a result of failure of warranted work.

F. Reinstatement of Warranty Period: Except as otherwise indicated, when work covered by a special project warranty or product warranty has failed and has been corrected by replacement or restoration, reinstate warranty by written endorsement for the following time period, starting on date of acceptance of replaced or restored work.

1. A period of time ending upon date original warranty would have expired if there had been no failure, but not less than half of original warranty period of time.

G. Replacement Cost, Obligations: Except as otherwise indicated, costs of replacing or restoring failing warranted units or products is General Contractor's obligation, without regard for whether Owner has already benefited from use through a portion of anticipated useful service lives.

H. Rejection of Warranties: Owner reserves the right, at time of substantial completion or thereafter, to reject coincidental product warranties submitted by General Contractor, which in opinion of Owner tend to detract from or confuse interpretation of requirements of Contract Documents.

I. General Contractor's Procurement Obligations: Do not purchase, subcontract for, or allow others to purchase or sub-subcontract for material or units of work for project where a special project warranty, certification or similar commitment is required, until it has been determined that entities required to countersign such commitments are willing to do so.

J. Specific Warranty Forms: Where a special project warranty (guaranty) or specified product warranty is required, prepare a written document to contain terms and appropriate identification, ready for execution by required parties. Submit draft to Owner (through Architect) for approval prior to final executions.

1.11 ATTIC STOCK

A. Provide to the Owner extra materials in quantities specified for individual specification Sections as follows:

1. Section 08 51 13 – ALUMINUM WINDOWS:
   a. 20 hinges.
   b. 20 roto-crank assemblies.
   c. 5 screens for each size of window installed.
   d. 5 sash gaskets for each size of window installed.
2. Section 08 71 00 – DOOR HARDWARE:
   a. 2 standard closers.

b. 5 lock sets.

3. Section 09 30 19 - PORCELAIN TILING: 3 percent of tile and trim of each color, size, finish and type installed.
4. Section 09 51 00 - ACOUSTICAL CEILINGS: 3 percent of each ceiling type and suspension system installed.
5. Section 09 65 13 - RESILIENT BASE AND ACCESSORIES: 24 linear feet for each color and type of resilient base installed.
6. Section 09 65 16 - RESILIENT SHEET FLOORING: 3 percent of each material in each color, and pattern installed. Additionally, furnish a quantity of adhesive of each type used in sealed cans or containers sufficient to apply the above materials.
7. Section 09 65 23 - RUBBER FLOORING: 3 percent of each material in each color, and pattern installed. Additionally, furnish a quantity of adhesive of each type used in sealed cans or containers sufficient to apply the above materials.
8. Section 09 65 36 - STATIC-CONTROL RESILIENT FLOORING: 3 percent of each material in each color, and pattern installed. Additionally, furnish a quantity of adhesive of each type used in sealed cans or containers sufficient to apply the above materials.
9. Section 09 68 00 – CARPETING: 3 percent of each color, pattern and type of carpet installed. Additionally, furnish a quantity of adhesive of each type used in sealed cans or containers sufficient to apply the above materials.
10. Section 09 68 13 - TILE CARPETING: 3 percent of each color, pattern and type of carpet tile installed. Additionally, furnish a quantity of adhesive of each type used in sealed cans or containers sufficient to apply the above materials.
11. Section 09 91 00 – PAINTING: 1 gallon per color and type of paint.
12. Section 10 28 13 – TOILET ACCESSORIES: 3 percent of robe hooks as installed.
13. Section 22 00 00 – PLUMBING:
    a. 5 faucet sets.
    b. 5 pistons for flushometer (water closet).
14. Section 23 00 00 – HEATING, VENTILATING AND AIR CONDITIONING:
    a. One year supply of filters of each type and size for all HVAC equipment.
    b. One additional condensate pump.
15. Section 26 00 00 – ELECTRICAL:
    a. 5 sensors.
    b. 5 relays
    c. 5 standard light switches
    d. 5 smoke detectors.

1.12 SPARE PARTS AND MAINTENANCE MATERIALS

A. Provide products, spare parts, maintenance and extra materials in quantities specified in individual specification Sections.

B. Deliver materials to on-site location designated by the Owner; obtain receipt.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

End of Section

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Section 01 78 36

WARRANTIES

PART 1 - GENERAL

1.1 SUMMARY

A. General: This Section specifies general administrative and procedural requirements for warranties, guarantees and bonds required by the Contract Documents, including manufacturers standard warranties on products and special warranties. Warranty, Guarantee and Bond requirements of this Section are applicable to all trades, all Divisions of the Specifications, and applies to all Work performed under this Contract.

1. Warranties required under the Contract are in addition to and not in lieu of any remedy or warranty to which the Owner is entitled under law.
2. Warranties required under the Contract are not a waiver of Owner’s legal rights.

B. General Contractor's Procurement Obligations: Do not purchase, subcontract for, or allow others to purchase or sub-subcontract for material or units of work for project where a special project warranty, certification or similar commitment is required, until it has been determined that entities required to countersign such commitments are willing to do so.

1.2 RELATED REQUIREMENTS

A. General provisions of the Contract, including General and Supplementary Conditions apply to this Section.

B. Individual Specification Sections contain additional specific requirements for warranties and bonds.

C. Certifications and other commitments and agreements for continuing services to Owner are specified elsewhere in the Contract Documents.

1.3 DISCLAIMERS AND LIMITATIONS

A. General Limitations: It is recognized that specific warranties are intended primarily to protect Owner against failure of the work to perform, and against deficient, defective, and faulty materials and workmanship, regardless of sources.

B. Disclaimers and Limitations: Manufacturer's disclaimers and limitations on product warranties do not relieve the General Contractor of the warranty on the work that incorporates the products, nor does it relieve suppliers, manufacturers, Trade contractors and subcontractors required to countersign special warranties with the General Contractor.

1. Pro-rating of warranties: Except where explicitly specified otherwise, each warranty issued shall cover the full cost of warranty-related repairs throughout the full term of the warranty.

1.4 DEFINITIONS

A. Categories of Specific Warranties: Warranties on the work are in several categories, including those of General Conditions, and including (but not necessarily limited to) the following specific categories related to individual units of work specified in sections of Divisions 2 through 50 of these Specifications:

1. General Contractor's Comprehensive Warranty: The General Contractor shall provide a comprehensive two-year warranty covering all labor, materials, equipment and work related to the entire Contract, and shall promptly repair or replace defective and deficient work.
2. Special Project Warranty (Guaranty): A warranty specifically written and signed by General Contractor for a defined portion of the work; and, where required, countersigned by subcontractor, installer, manufacturer or other entity engaged by General Contractor. Special Warranties extend time limits provided by standard warranties or to provide greater rights for the Owner.
3. Specified Product Warranty: A warranty which is required by Contract Documents, to be provided for a manufactured product incorporated into the work; regardless of whether manufacturer has published a similar warranty without regard for specific incorporation of product into the work, or has written and executed a special project warranty as a direct result of Contract Document requirements.
    a. Standard Product Warranties are preprinted written warranties published by individual manufacturers for particular products and are specifically endorsed by the manufacturer to the Owner.
4. Coincidental Product Warranty: A warranty not specifically required by Contract Documents (other than as specified in this Section), but which is available on a product incorporated into the work, by virtue of the fact that manufacturer or product has published warranty in connection with purchases and use of product without regard for specific applications except as otherwise limited by terms of warranty.

1.5 WARRANTY REQUIREMENTS

A. Warranty Minimum: The minimum material and workmanship warranty for the project shall be one year from date of Project Substantial Completion.

1. Warranty requirements specified in individual specification sections that specify a required warranty or guarantee greater than one year shall negate this requirement.

B. Warranty Period Commencement Date: Effective stating date for Warranty periods is the Date of Substantial Completion for Project.

1. Equipment and systems start-up, operation and use, occurring prior to Project Substantial Completion, will not be considered commencement of warranty period under any terms of this Contract.
2. Exceptions: Starting dates for warranties prior to the Project Date of Substantial Completion are not permitted, except for the two conditions below:
    a. Warranties for Incomplete work: The effective date for warranty of work which has not been completed prior to the Date of Substantial

Completion, shall be effective on the date of Final Completion and Owner’s acceptance of the Work.

C. Related Damages and Losses: In connection with General Contractor's correction of warranted work which has failed, remove and replace other work of project which has been damaged as a result of such failure, or must be removed and replaced to provide access for correction of warranted work.

1. Consequential Damages: Except as otherwise indicated or required by governing regulations, special project warranties and product warranties are not extended to cover damage to building contents (other than work of Contract) which occurs as a result of failure of warranted work.

D. Reinstatement of Warranty Period: Except as otherwise indicated, when work covered by a special project warranty or product warranty has failed and has been corrected by replacement or restoration, reinstate warranty by written endorsement starting on date of acceptance of replaced or restored work.

1. Reinstated warranty value: The reinstated warranty shall be equal to the original warranty with an equitable adjustment for depreciation.
2. Reinstated warranty period: A period of time ending upon date original warranty would have expired, if there had been no failure, but not less than half of original warranty period of time.

E. Warranties are Irrevocable: Warranties issued to the Owner are irrevocable.

1. Non-Payment: If warrantor refuses to issue warranty, or attempts to revoke warranty due to lack of payment by any party other than the Owner, the General Contractor shall resolve the payment conflict, and cause the warranty to be issued or reinstated.
2. Incomplete or incorrect Installation: If warrantor refuses to issue warranty, or attempts to revoke warranty due to improper installation or other deficiency, the General Contractor shall correct the deficiency and cause the warranty to be issued or reinstated.

F. Transferable Warranties: All warranties shall permit Owner to transfer or assign warranties to future owners or other assignors at no additional cost to the Owner for the full warranty period.

G. Replacement Cost: Upon determination that work covered by a warranty has failed, replace or rebuild the work to an acceptable condition complying with requirements of Contract Documents. The General Contractor is responsible for the cost of replacing or rebuilding defective work regardless of whether the Owner has benefited from use of the work through a portion of its anticipated useful service life.

1. Work repairs or replaced under warranty shall be warranted for the full duration of the original warranty.

H. Owner's Recourse: Written warranties made to the Owner are in addition to implied warranties, and shall not limit the duties, obligations, rights and remedies otherwise available under the law, nor shall warranty periods be interpreted as limitations on time in which the Owner can enforce such other duties, obligations, rights, or remedies.

I. Rejection of Warranties:

1. Owner reserves the right, at time of substantial completion or thereafter, to reject coincidental product warranties submitted by General Contractor, which in opinion of Owner tend to detract from or confuse interpretation of requirements of Contract Documents.
2. Owner reserves the right to reject warranties and to limit selection to products with warranties which are not in conflict with the requirements of the Contract Documents.

J. Owner's right to refuse Work: The Owner reserves the right to refuse to accept work for the project where a special warranty, certification, or similar commitment is required on such work or part of the work, until evidence is presented that entities required to countersign such commitments are willing to do so.

1.6 COMPREHENSIVE WARRANTY

A. Comprehensive Warranty: In addition to all other warranties, the General Contractor shall issue a Comprehensive Total Contract Warranty which shall include all work of this Contract, without limitation including consequential damages.

1. Duration of Comprehensive Warranty: Two year from date of Substantial Completion.
2. Consequential damages: Warranty includes consequential damages which relate to a warranty claim, these include without limitation:
   a. All costs required to uncover and repair all work related to warranty claim.
   b. All costs relating to repair and restoration of damaged property, resulting from warranty claim.
   c. All costs resulting from failure to conform to the Contract Documents, and for required rebuilding, construction or reconstruction to correct work.
   d. Perform to the satisfaction of the Owner all repairs, reconstruction, and restoration to original condition of adjacent and related work affected by damage under a warranty claim.

B. Warranty Claims: Owner will notify General Contractor in writing of each warranty claim. Warranty repairs shall be completed within 30 days of written notice, except as pre-approved by Owner.

1. In the event of an emergency condition, where in the reasonable opinion of the Owner an immediate repair under warranty is necessary, warranty repairs shall be completed within 14 calendar days from date of notice.
2. Owner's right to correct: In the event the General Contractor fails to respond to a warranty claim within the specified time limits, the Owner reserves the right to make the necessary corrections or repairs and recover all costs and expenses from the General Contractor.

C. General Contractor's responsibilities under Comprehensive Warranty:

1. Notify in writing each affected warrantor and original Trade contractor, subcontractor, installer, vendor as appropriate to the warranty claim.
2. Manage the warranty claim for the Owner.
3. Assist the Owner in obtaining warranty satisfaction.
4. Arrange and manage all warranty related work including work relating to consequential damages.

1.7 SUBMITTALS

A. Submit written warranties to the Owner prior to the date certified for Substantial Completion. In compliance with requirements specified under Section 01 77 00 – CLOSEOUT PROCEDURES and Section 01 78 00 – CLOSEOUT SUBMITTALS.

1. When a designated portion of the Work is completed and occupied, or used by the Owner by separate agreement with the General Contractor during the construction period, submit properly executed warranties to the Owner within 14 calendar days of completion of the designated portion of Work.
2. Refer to individual section of Divisions 2 through 50 for the determination of units of work which are required to be specifically or individually warranted, and for the specific requirements and terms of those warranties (or guarantees).
3. Specific Warranty Forms: Where a special project warranty (guaranty) or specified product warranty is required to be executed, prepare a written document to contain terms and appropriate identification, ready for execution by all required parties (including manufacturers, vendors, and subcontractors). Submit draft to Owner (through Architect) for approval prior to final executions.

B. Form of Submittal: At Final Completion, compile three (3) copies of each required warranty and bond properly executed by the General Contractor, or by the General Contractor, Trade contractors, subcontractor, supplier or manufacturer. Organize the warranty documents into an orderly sequence based on the Table of Contents of the Project Manual.

1. Bind warranties and bonds in heavy-duty, commercial quality, durable 3-ring vinyl-covered loose-leaf binders, thickness as necessary to accommodate contents, and sized to receive 8-1/2" by 11" paper.
2. Provide heavy paper dividers with celluloid-covered tabs for each separate warranty. Mark the tab to identify the product or installation. Provide a typed description of the product or installation, including the name of the product, and the name, address and telephone number of the installer.
3. Identify each binder on the front and the spine with the typed or printed title "WARRANTIES AND BONDS", the project title or name, and the name of the General Contractor.
4. When operating and manuals are required for warrantied construction, provide additional copies of each required warranty, as necessary, for inclusion in each required manual.

PART 2 - PRODUCTS (Not Used)

PART 3 – EXECUTION

3.1 SCHEDULE

A. Provide warranties on products and installations as specified in individual specification Sections in Divisions 2 through 50 of the Project Manual.

End of Section

Section 01 79 00

DEMONSTRATION AND TRAINING

PART 1 - GENERAL

1.1 SUMMARY

A. Demonstrating equipment.

B. Instruction and training of Owner's personnel.

1.2 DEMONSTRATING EQUIPMENT

A. Demonstrate operation and maintenance of Products to Owner's personnel 2 weeks prior to date of Substantial Completion.

B. For equipment or systems requiring seasonal operation, perform demonstration for other season within six months from date of Substantial Completion.

C. Utilize operation and maintenance manuals as basis for instruction. Review contents of manual with Owners' personnel in detail to explain all aspects of operation and maintenance.

D. Demonstrate start-up, operation, control, adjustment, trouble-shooting, servicing, maintenance, and shutdown of each item of equipment at agreed-upon times, at equipment location.

1.3 INSTRUCTION AND TRAINING OF OWNER'S PERSONNEL

A. Before final inspection, instruct Owner's designated personnel in operation, adjustment, and maintenance of products, equipment, and systems, at agreed upon times.

B. For equipment requiring seasonal operation, perform instructions for other seasons within six months .

C. Use operation and maintenance manuals as basis for instruction. Review contents of manual with personnel in detail to explain all aspects of operation and maintenance.

D. Prepare and insert additional data in Operation and Maintenance Manual when need for such data becomes apparent during instruction.

E. Provide sufficient formal instructional time for training Owner's personnel, so that the Owner's personnel will fully comprehend operation and maintenance of the facility's equipment and systems. General Contractor's personnel designated for Owner training shall be competent and knowledgeable and have good communication skills.

1. Training sessions shall be pre-arranged directly with the Owner.

a. Instructors shall arrive at pre-scheduled training sessions on-time and be fully prepared to teach using a preplanned training program.

b. All instructors are subject to the Owner's approval. Replace unacceptable instructors and reschedule training as directed by the Owner at no increased cost to the Owner.

2. Training shall include the following:

a. General overview of Record Documents:

1) Record Drawings.

2) Record Project Manual.

3) Operation and Maintenance Manuals.

4) Finishes.

5) Warranty and maintenance agreements.

6) Test reports and inspections.

b. Fire suppression systems and equipment.

c. Fire alarm systems and equipment.

d. HVAC systems and equipment.

e. Plumbing systems and equipment.

f. Electrical systems and equipment.

F. Training Personnel:

1. Instructor Qualifications: A factory-authorized service representative, experienced in operation and maintenance procedures and training.

a. Designated personnel for Owner training shall be competent and knowledgeable and have good communication skills.

2. Instructors shall arrive at scheduled training sessions on-time and be fully prepared to teach using a preplanned training program.

3. All instructors are subject to the Owner's approval. Replace unacceptable instructors and reschedule training as directed by the Owner at no increase cost to the Owner.

G. Training Modules: Develop a learning objective and teaching outline for each module. Include a description of specific skills and knowledge that participant is expected to master. For each module, include instruction for the following as applicable to the system, equipment, or component:

1. Basis of System Design, Operational Requirements, and Criteria: Include the following:

a. System, subsystem, and equipment descriptions.

b. Performance and design criteria if General Contractor is delegated design responsibility.

c. Operating standards.

d. Regulatory requirements.

e. Equipment function.

f. Operating characteristics.

g. Limiting conditions.
h. Performance curves.

2. Documentation: Review the following items in detail:
   a. Emergency manuals.
   b. Operations manuals.
   c. Maintenance manuals.
   d. Project record documents.
   e. Identification systems.
   f. Warranties and bonds.
   g. Maintenance service agreements and similar continuing commitments.
3. Emergencies: Include the following, as applicable:
   a. Instructions on meaning of warnings, trouble indications, and error messages.
   b. Instructions on stopping.
   c. Shutdown instructions for each type of emergency.
   d. Operating instructions for conditions outside of normal operating limits.
   e. Sequences for electric or electronic systems.
   f. Special operating instructions and procedures.
4. Operations: Include the following, as applicable:
   a. Startup procedures.
   b. Equipment or system break-in procedures.
   c. Routine and normal operating instructions.
   d. Regulation and control procedures.
   e. Control sequences.
   f. Safety procedures.
   g. Instructions on stopping.
   h. Normal shutdown instructions.
   i. Operating procedures for emergencies.
   j. Operating procedures for system, subsystem, or equipment failure.
   k. Seasonal and weekend operating instructions.
   l. Required sequences for electric or electronic systems.
   m. Special operating instructions and procedures.
5. Adjustments: Include the following:
   a. Alignments.
   b. Checking adjustments.
   c. Noise and vibration adjustments.
   d. Economy and efficiency adjustments.
6. Troubleshooting: Include the following:

a. Diagnostic instructions.
b. Test and inspection procedures.

7. Maintenance: Include the following:
   a. Inspection procedures.
   b. Types of cleaning agents to be used and methods of cleaning.
   c. List of cleaning agents and methods of cleaning detrimental to product.
   d. Procedures for routine cleaning
   e. Procedures for preventive maintenance.
   f. Procedures for routine maintenance.
   g. Instruction on use of special tools.
8. Repairs: Include the following:
   a. Diagnosis instructions.
   b. Repair instructions.
   c. Disassembly; component removal, repair, and replacement; and reassembly instructions.
   d. Instructions for identifying parts and components.
   e. Review of spare parts needed for operation and maintenance.

1.4 VIDEO DOCUMENTATION OF DEMONSTRATIONS AND INSTRUCTIONS

A. Recording Requirements:
   1. Videotape Photographer: Engage a qualified commercial photographer to record construction videotapes.
   2. Mount camera on tripod before starting recording, unless otherwise necessary to show area of construction. Display continuous running time. At start of each videotape, record weather conditions from local newspaper or television and the actual temperature reading at Project site.
      a. Resolution: Produce videos in High Definition (HD) mode with vibration reduction technology.
      b. Audio Use audio pick-up devices as necessary to ensure training material can be clearly heard above background and machinery noise.
      c. Light Levels: Provide three point lighting as required for clear video production, including back lighting, fill lighting, and key lighting on subject(s). Evenly distribute lighting to prevent shadows. Utilized diffused lights in front of subject matter.
   3. Narration: Describe scenes on videotape by dubbing audio narration off-site after videotape is recorded. Include description of items being viewed, recent events, and planned activities. Describe vantage point, indicating location, direction (by compass point), and elevation or story of construction.
   4. Transcript: Provide a typewritten transcript of the narration. Display images and running time captured from videotape opposite the corresponding narration segment.
   5. Submission format: DVD.

B. Video Training Record: video (digitally) record the instruction and training of the Owner's personnel, and all system startup and operation.

1. Record instruction of Owner's personnel in the operation and maintenance of equipment and systems. Edit videotape to remove non-instructional conversation. Photographer shall select vantage points to best show equipment, systems, and procedures demonstrated.
2. Provide sound recording apparatus and record verbal instructions over background noise of equipment.
3. Submit DVD copies to Owner’s designated representative upon completion of training sessions as a closeout submittal
4. DVD identification:
    a. Provide protective sleeve or case for all DVDs.
    b. Clearly label disc contents using indelible ink on adhesive labels on both the individual DVD and protective sleeves/cases.

C. Manufacturer's Instruction Videos: Original DVDs, in original packaging, as prepared by system or equipment manufacturers may be provided to supplement instruction and demonstration specified above. Recorded demonstration and instruction concerning the specific systems, equipment, and components as specified above must be provided in addition to any manufacturer prepared videos.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

End of Section

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Section 01 81 13

SUSTAINABLE DESIGN REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Overview:

1. This section includes special Project administrative and procedure requirements related the Owner's program for energy conservation and efficiency, indoor air quality, and natural resource efficiency, which is in compliance with the *High Performance Schools Exchange, Northeast Energy Efficiency Partnerships NE-CHPS, New Construction and Major Renovations Version 4.0, May 2023 Edition*.
2. Section includes general requirements and procedures for compliance with certain prerequisites and credits needed for Project to obtain specified NE-CHPS certification and recognition. Specific requirements for NE-CHPS are also included in other Sections of Division 1 – GENERAL REQUIREMENTS and in individual Specification Sections and referenced documents.

B. To obtain NE-CHPS certification and recognition, the Contractor during the construction phase of this project shall implement the following:

1. Designate an experienced and qualified "NE-CHPS Representative" who will assist the Owner and Architect with fulfilling NE-CHPS construction documentation and submittals required by NE-CHPS.
2. Coordinate the procurement, installation, and tracking of building materials that prioritize:
    a. Recycled Content.
    b. FSC Certification.
    c. Environmental Product Declarations (EPDs).
    d. Healthy Product Declarations (HPDs).
    e. Local manufacturing within 500 mile the project site.
3. Coordinate a CHPS materials strategy plan.
4. Provide verification that materials used have been reviewed for environmental considerations as specified, prior to procurement.
5. Provide Submittal CHPS Data: Confirm completeness of submittals and include a completed the NE-CHPS Product Data Form, with each submittal, with all supplementary and supporting documentation.
    a. Extract all CHPS information from submittals and maintain a digital file on an accessible shared drive for the CHPS Construction Documentation submittal.
6. Provide Tracking logs:

a. Maintain a Materials Tracking Log throughout the construction process that demonstrates the status of the CHPS materials credits MWc3.1, MWc5.1, and MWc11.1.

b. Maintain a Waste Diversion Log throughout the construction process that demonstrates the status of the total percentage and weight of Waste Diverted from the project.

7. IAQ: Coordinate the Construction Indoor Air Quality activities with team members and document all IAQ activities. Control environmental air quality pollutants by controlled selection of materials and processes used in project construction in order to attain acceptable indoor air quality as specified.

8. Conduct quarterly CHPS meetings to present a status update of the following:

a. Materials tracking log.

b. Waste Diversion log.

c. SWPPP activities.

d. Construction IAQ activities.

e. All other CHPS construction credits.

1.3 RELATED REQUIREMENTS

A. Section 01 25 13 - PRODUCT SUBSTITUTION PROCEDURES.

B. Section 01 31 00 - PROJECT MANAGEMENT AND COORDINATION: Preconstruction, progress and special project meeting requirements regarding NE-CHPS Certification.

C. Section 01 33 00 - SUBMITTAL PROCEDURES:

1. NE-CHPS Verification Report.

2. Environmental product certifications.

D. Section 01 50 00 - TEMPORARY FACILITIES AND CONTROLS.

E. Section 01 60 00 - PRODUCT REQUIREMENTS.

F. Section 01 74 19 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL.

G. Section 01 77 00 - CLOSEOUT PROCEDURES.

H. Division 31 - EARTHWORK: Erosion and sedimentation control.

1.4 DEFINITIONS

A. The term “CHPS” as used herein and throughout the Project Manual refers to *the Collaborative for High Performance Schools.*

B. The term “NE-CHPS” as used herein and throughout the Project Manual refers to the *High Performance Schools Exchange, Northeast Energy Efficiency Partnerships NE-CHPS, New Construction and Major Renovations Version 4.0, May 2023 Edition*.

C. Certificates of Chain-of-Custody: Certificates signed by manufacturers certifying that wood used to make products was obtained from forests certified by a Forest Stewardship Council (FSC)-Accredited certification body to comply with FSC 1.2,

"Principles and Criteria." Certificates shall include evidence that mill is certified for chain-of-custody by an FSC-accredited certification body.

D. Rapidly Renewable Materials: Materials made from agricultural products that are typically harvested within a ten-year or shorter cycle. Rapidly renewable materials include products made from bamboo, cotton, flax, jute, straw, sunflower seed hulls, vegetable oils, or wool.

E. Regionally Manufactured Materials: Materials that are manufactured within a radius of 500 miles (800 km) from the project location. Manufacturing refers to the final assembly of components into the building product that is installed at the project site.

F. Recycled Content: The percentage of weight of constituents that have been recovered or otherwise diverted from the solid waste stream, either during the manufacturing process (pre-consumer), or after consumer use (post-consumer).

1. Spills and scraps from the original manufacturing process that are combined with other constituents after a minimal amount of reprocessing for use in further production or the same product are not recycled materials.
2. Discarded materials from one manufacturing process that are used as constituents in another manufacturing process are pre-consumer recycled materials.

G. Health Product Declaration (HPD): A standard format for reporting product content and associated health information of building products and materials. The three acceptable formats for HPDs are:

1. Nested materials inventory with material-level threshold.
2. Nested materials inventory with product-level threshold.
3. Basic inventory with product-level threshold.

H. Environmental Product Declaration (EPD): classified as Type III, is defined by the International Standards Organization (ISO) 14025, as a declaration which “quantifies environmental information on the life cycle of a product to enable comparisons between products fulfilling the same function.” EPDs must conform to the requirements of ISO 14025 on Type III environmental declarations and/or ISO 21930 on environmental declarations of building products. The Environmental Product Declaration must address the requirements found in Appendix A of the ISO standards. The Declaration must justify the omission of any impact category in narrative form within the document.

1.5 GENERAL CONTRACTOR’S NE-CHPS REPRESENTATIVE

A. The General Contractor shall designate a NE-CHPS Representative, acceptable to both the Owner and Architect, who is experienced in construction management, sustainable construction methods and practices, and waste-recycling documentation. The General Contractor’s NE-CHPS Representative is responsible for implementation, coordination, and documentation of specified NE-CHPS Credit Requirements.

B. The General Contractor’s NE-CHPS Representative is responsible for overseeing the Owner’s environmental goals for this Project during construction.

C. General Contractor’s NE-CHPS Representative shall attend all Environmental Quality Review Meetings, Project Progress Meetings (at least monthly), Pre-

installation Meetings, Special Meetings regarding environmental issues and CHPS quarterly check-in meetings through-out the term of construction as specified in Section 01 31 00 - PROJECT MANAGEMENT AND COORDINATION.

D. Prior to the start of on-site Work, the General Contractor's NE-CHPS Representative shall distribute copies of the NE-CHPS certification requirements and credit goals to General Contractor's Project Manager and General Contractor's Project Superintendent, and each applicator, installer, and supplier involved with the Project.

1. Copies of the distribution list shall be furnished to the Owner's on-site Representative (Clerk of the Works/Resident Engineer), the Owner's Project Manager, and the Architect. Update distribution list as additional applicators, installers, and suppliers are contracted, re-issue as distribution list is revise.

1.6 NE-CHPS VERIFICATION PLAN

A. Submit to Architect a written plan for achieving the specified NE-CHPS Credit Certification requirements within 30 calendar days of Notice to Proceed. Plan shall include the following:

1. A written narrative describing proposed procedures to be implemented for each CHPS credit.
2. CHPS Materials strategies plans for the following credits:
   a. MWc3.1 Recycled Content: Confirm the materials that will be use to ensure the project meets the 20% threshold for recycled materials in terms of construction.
   b. MWc5.1 Certified Wood: Confirm the materials that will be used to ensure the project meets the 50% threshold for FSC wood materials in terms of cost.
   c. MWc11.1 Locally Produced Materials: Confirm the materials that will be used to ensure the project meets the 20% threshold for local materials (manufactured within 500 miles of the project site) in terms of cost.

B. General Contractor shall submit to the Architect two (2) copies of a NE-CHPS Certification Progress Report quarterly throughout the work. Include a written narrative describing progress to date.

1.7 GENERAL NE-CHPS CREDIT REQUIREMENTS

A. General: Owner's goal NE-CHPS prerequisites and credit points are included in the NE-CHPS Project Checklist included in the Project Drawings. The following list is coordinated with the NE-CHPS Project Checklist and includes prerequisites and credits that require submittals from the General Contractor.

1. Additional NE-CHPS and sustainable design requirements are specified in individual Specification Sections.

B. Submit NE-CHPS certification documentation demonstrating compliance with the corresponding NE-CHPS Credit Requirements. Submit NE-CHPS documentation under provisions of Section 01 33 00 - SUBMITTAL PROCEDURES, the GD Series (Green Design) Drawings, and this Section 01 81 13.

1. Submission of NE-CHPS documentation is separate and additional to, progress schedules, product literature submittals, samples, mock-ups,

commissioning and all other project-related submittals required under other Division One Specification Sections and individual Specification Sections.

C. The NE-CHPS Credit Requirements for NE-CHPS compliance are in addition to environmental quality requirements specified elsewhere in the Specifications.

1.8 SUBMITTAL SCHEDULE FOR NE-CHPS CREDIT REQUIREMENTS

A. During Construction: Submit a completed NE-CHPS Product Data Form, for all submittals. Extract all CHPS information from submittals and maintain a digital file on an accessible shared drive for the CHPS Construction Documentation submittal. Sort the information by CHPS category. Use the information collected to complete the CHPS Verified Plan sheets.

B. Construction Review Phase: At Substantial Completion, the Contractor shall prepare both the CHPS Verified Plan sheet as well as the CHPS backup documentation collection from the individuals for submittal, for CHPS review by CHPS Technical Committee or designated review board determined by the Owner. Contractor to provide all information in digital format to the location requested by the review body. Contractor to respond to all requests for additional information within 20 business days of notification request.

C. Appeals: Any construction credits that require an appeal are the responsibility of the Contractor. Appeal fees for construction-related activities shall be paid for by the Construction team.

1. Additional NE-CHPS and sustainable design requirements are specified in individual Specification Sections.

D. Integrated Design (II) Credits:

1. Prerequisite II 1.0.1 – Integrated Design
    a. Contractor and all Major Subcontractors to provide representation for NE-CHPS Preconstruction Workshop(s). Multiple meetings may be required as determined by Owner and Architect. Contractor’s Project Manager, Project Superintendent and General Contractor’s NE-CHPS Representative attendance is mandatory at all workshops.
2. Credit II 5.0 –Educational Display.
    a. Submit as built drawing and record submittals indicating compliance with prerequisite requirements.
    b. Submit electronic copies of photographs. Submit at least two, and up to six photos of the installed educational display. At least one photo must show the context/location of the display, and at least one photo must show readable details of the content of the display.
3. Credit II 5.1 –Demonstration Area.
    a. Submit as built drawing and record submittals indicating compliance with prerequisite requirements.
    b. Submit electronic copies of photographs. Submit two to three photos of each of the installed demonstration area with a brief description of each. One of the two required photos must show the Demonstration Area in context, and the other required photo must be a close-up and show readable detail of any signage. A total of 6 minimum, and up to 9 photos should be submitted. Explain any changes from the Design Review submittals of this credit.

4. Credit II 9.1 - Innovation.
    a. Submit at least two, and up to six photos of each type of installed bottle filling stations. At least one photo must show the context/location of the water bottle filling station.
        1) Provide simplified floor diagrams showing location of the 10 filling stations.
    b. Submit documentation proving the compliance with the Green During Construction Indoor Air Quality Pledge:
        1) Document dust control program, supplemented with photographs showing implementation.
        2) Document reduce idling program.
        3) Document reduced emissions requirements.
5. Credit II 10.1 – Biophilic & Responsive Design.
    a. Submit photographic evidence of Biophilic Educational Signage, provide photographs of each sign or plaque, with at least one photo showing the context/location of signage.

E. Operations and Metrics (OM) Credits:
1. Credit OM 8.0 – Anti-Idling Measures.
    a. Submit Product Data and Shop Drawings for anti-idling signage.
2. Credit OM 10.0 – Energy Star Equipment
    a. Submit Product Data for all ENERGY STAR equipment and appliances purchased as part of the Work. This includes temporary equipment designated to be turned over to the Owner at Substantial Completion. ENERGY STAR equipment and appliances include, but are not limited to computers, monitors, copy machines, water coolers, printers, scanners, refrigerators, ceiling fans, and washing machines.
3. Credit OM 11.1 – Computerized Maintenance Management system.
    a. Submit a copy of a signed contract or receipt for purchase of a CMMS system.

F. Indoor Environmental Quality (EQ) Credits:
1. Prerequisite EQ 1.0 – HVAC Design ASHRAE 62.1.
    a. Submit a list of all air handling units, roof top units, unit ventilators and the rating of filters used for each piece of equipment.
        1) Submit verification that filtration media shall have a Minimum Efficiency Reporting Value (MERV) of **11** or higher, for all new HVAC systems excluding unit ventilators, which can have MERV 7 .
        2) Submit affidavit verifying that all HVAC filtration media was replaced immediately prior to Project Substantial Completion or Owner occupancy whichever occurs first.
2. Credit EQ 1.1 – Enhanced Filtration.
    a. Submit manufacturer’s product information for filters with a MERV 13 efficiency rating (excluding unit ventilators). Submit schedule of equipment having MERV 13 filters.
3. Prerequisite EQ 2.0.1 –Off-Gassing.
    a. Submit as built drawing and record submittals indicating compliance with prerequisite requirements.

b. Submit electronic copies of photographs of installed systems and hardware.

4. Prerequisite EQ 2.0.2 –Walk-Off Mats.
   a. Submit as built drawing and record submittals indicating compliance with prerequisite requirements.
   b. Submit electronic copies of photographs of installed walk off mats or equivalent track-off mitigation at entrances. Include both permanent and non-permanent mats provided as part of the Work.
5. Prerequisite EQ 2.0.3 –Hard Surface Paving.
   a. Submit as built drawing and record submittals indicating compliance with prerequisite requirements.
   b. Submit electronic copies of photographs of installed paving and canopies/coverings at entrances.
6. Prerequisite EQ 2.0.4 –Electronic Ignitions for Gas-Fired Equipment.
   a. Submit as built drawing and record submittals indicating compliance with prerequisite requirements.
   b. Submit electronic copies of photographs of installed ignition systems.
7. Prerequisite EQ 2.0.6 –Carbon Monoxide Monitors in Occupied Spaces .
   a. Submit as built drawing and record submittals indicating compliance with prerequisite requirements.
   b. Submit electronic copies of photographs of installed CO monitoring systems.
8. Prerequisite EQ 2.0.7 –Electronic Devices.
   a. Submit record product data for school electronic devices which are included as part of the Work indicating compliance with prerequisite requirements including EPEAT Silver or Gold rating. Electronic devices include but are not limited to computers, imaging devices and TV/AV systems.
9. Credit EQ 3.0 – Outdoor Moisture Management.
   a. Test drain tap and gravity drainage systems for compliance with water flow credit requirements, and submit affidavit letter.
   b. Submit photographs of installed measures, minimum of one photo for each measure taken.
10. Credit EQ 5.1.1 – Comply with “Design Approaches of the Sheet Metal and Air Conditioning National Contractors Association (SMACNA) *IAQ Guideline for Occupied Buildings Under Construction*, 2007, Chapter 3”.
    a. Submit photographs, taken at various times during construction, with a narrative for each photo describing compliance with the various requirements.
11. Credit EQ 5.1.2 – Comply with SMACNA Guidelines for “Duct Cleanliness for New Construction Guidelines”
    a. Submit electronic copies of photographs for removal (internal wipe-down) of oil film from ductwork taken at various times during construction, with a narrative for each photo describing compliance with the various requirements.
    b. Submit documentation indicating compliance with SMACNA “Duct Cleanliness Guidelines Advanced Levels”.

12. Credit EQ 5.1.3 – Building Flush Out .
    a. Submit narrative describing implementation of the flush-out option chosen, a document on company letterhead that describes when the flush out occurred, the duration of time, the temperature and humidity maintained, and the specifics about the mechanical units utilized to perform the flush out.
    b. Submit photographs and affidavit affirming that flush-out operations took place.
13. Credit EQ 5.2 – Construction Moisture Management
    a. Submit photographs taken at various times during construction, with a narrative for each photo describing techniques for protecting building materials from mold and moisture damage.
        1) All photographs shall be date timestamped.
        2) Furnish not less than 4 photographs per date, from at least 10 different dates documenting the sequence of activities from framing to occupancy.
14. Prerequisite EQ 7.0 – Low Emitting Materials .
    a. Submit the Schedule of Values for the project, formatted to group together all products within any category claimed for Low Emitting credit or prerequisite. Include subtotals of the value for compliant products and all products by category.
        1) In addition to testing methods and acceptable levels required under NE-CHPS, refer to Section 01 60 00 for specified VOC requirements.
    b. Complete the CHPS Verified Plan Sheet to confirm compliance with requirements.
15. Credit EQ 7.1 – Additional Low Emitting Materials .
    a. Submit the Schedule of Values for the project, formatted to group together all products within any category claimed for Low Emitting credit or prerequisite. Include subtotals of the value for compliant products and all products by category.
    b. Complete the CHPS Verified Plan Sheet to confirm compliance with requirements.
16. Credit EQ 10.1 – Individual Controllability.
    a. Submit timestamped photographs of installed temperature control devices and/or operable windows.
17. Prerequisite EQ 11.0 – Daylighting: Glare Protection.
    a. Submit timestamped photographs of installed light controls.
18. Credit EQ 13.1 – Electric Lighting Performance.
    a. Submit approved submittal with cover sheet and applicable materials that contain the required specifications from the manufacturer.
19. Credit EQ 16.1 – High Intensity Fluorescent Fixtures.
    a. Submit receipts for purchase of specified equipment.

G. Energy Credits (EE):
1. Credits EE 3.0, EE 3.1 and EE 3.2 –Commissioning.

a. Assist and support efforts for this Credit by submission of performance documentation for building system components as well as commissioning plan, and final commissioning report.

2. Credit EE 3.3 – Enhanced Commissioning.
   a. Submit systems manuals as well as commissioning plan, and final commissioning report.

H. Water Credits (WE):
1. Prerequisite WE 1.0 – Minimum Reduction in Indoor Potable Water Use.
   a. Provide photographs of installed fixtures, and manufacturer receipts, proof of purchase, or approved submittals for the water-efficient products purchased.
2. Credit WE 2.1 - Reduce Potable Water Use for Sewage Conveyance.
   a. Provide pictures of installed fixtures, and manufacturer receipts, proof of purchase, or approved submittals for the water-efficient products purchased.
3. Credit WE 3.0 – Irrigation & Exterior Water Budget/Use Reduction.
   a. Should irrigation systems be added to the project, provide proof of purchase, installation, pictures, approved submittals or other supporting documents that show compliance.
4. Credit WE 4.1 – Reduce Portable Water Use for Non-Recreational Landscaping Areas.
   a. Provide proof of purchase, installation, pictures, approved submittals or other supporting documents that show compliance.
5. Credit WE 5.1 – Reduce Portable Water Use for Recreational Landscaping Areas.
   a. Provide proof of purchase, installation, pictures, approved submittals or other supporting documents that show compliance.
6. Credit WE 6.0 – Irrigation System Commissioning.
   a. Provide commissioning of irrigation system, with acceptance testing. Submit commissioning performance verification that tests were performed; submit test results and final commissioning report.
7. Credit WE 8.1 – Water Management System.
   a. Provide proof of purchase, installation, approved submittals, pictures or other supporting documents that show compliance.

I. Site Credits (SS):
1. Credit SS 4.1 – Construction Site Runoff Control/Sedimentation.
   a. Provide the SWPPP and timestamped pictures identifying measures taken throughout construction.
2. Credit SS 10.1 – Reduce Heat Islands – Landscaping/Sites.
   a. Submit as-built site plan indicating all trees which contribute to shade; and highlight light-colored non-roof impervious surfaces.
   b. Submit cut sheets for all hardscape materials that show their SRI values.
3. Credit SS 11.1 –Reduce Heat Islands - Cool Roofs.

a. Submit manufacturer's product information indicating values for solar reflectance and emissivity. Include area calculations demonstrating percentage of the total roof area the roofing material is used.

b. Submit as-built roof plan indicating all roof areas, include calculated area for roofing.

4. Credit SS 14.1 – Use Locally Native Plans for Landscape.

a. Submit construction documents with planting schedule. Notate documents which plants are native and non-native.

J. Materials & Waste Management Credits (MW):

1. Prerequisite MW 1.0 – Storage and Collection of Recyclables.

a. Provide pictures of the centralized recycling collection point and typical classroom/common area recycling bins/dumpsters.

2. Prerequisite MW 2.0 – Construction Site Waste Management, divert 50% from disposal.

a. General: Comply with requirements specified under Section 01 74 19 – CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL.

b. Submit a Waste Management Plan for the project. Identify recycling and salvage requirements of construction materials.

1) Provide calculations on end-of-project recycling rates, salvage rates, and landfill rates demonstrating that 75% of construction wastes were recycled or salvaged.

2) Update calculations monthly and submit with monthly request for Progress Payment.

c. Submit summary of all weight tickets collected for demolition and construction debris removal. The summary shall include the following information by line item (for material that is removed from site, and does not generate a waste ticket, provide a written estimate of weight and volume of materials removed).

1) Date of load disposal.

2) Name of facility to which debris was taken.

3) Ticket number.

4) Type of debris.

5) Number of loads, yards and total pounds for each line item.

6) Number of pounds recycled for each line item.

7) Percentage of material recycled for each line item.

8) Totals for each figure listed above.

3. Credit MW 2.1 – Construction Site Waste Management, divert minimum 75% from disposal.

a. General: Comply with requirements specified under Section 01 74 19 – CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL.

b. Submit a Waste Management Plan for the project. Identify recycling and salvage requirements of construction materials.

1) Provide calculations on end-of-project recycling rates, salvage rates, and landfill rates demonstrating that 75% of construction wastes were recycled or salvaged. (1 point eligible)

2) Provide calculations on end-of-project recycling rates, salvage rates, and landfill rates demonstrating that 90% of construction wastes were recycled or salvaged. (2 additional point eligible)
3) Update calculations monthly and submit with monthly request for Progress Payment.

c. Submit summary of all weight tickets collected for demolition and construction debris removal. The summary shall include the following information by line item (for material that is removed from site, and does not generate a waste ticket, provide a written estimate of weight and volume of materials removed).
1) Date of load disposal.
2) Name of facility to which debris was taken.
3) Ticket number.
4) Type of debris.
5) Number of loads, yards and total pounds for each line item.
6) Number of pounds recycled for each line item.
7) Percentage of material recycled for each line item.
8) Totals for each figure listed above.

4. Credit MW 3.1 – Single Attribute Recycled Content.
a. Submit a completed NE-CHPS Product Data Form, for ALL submittals. Identify the pre- and post-consumer recycled content percentage and the cost of the materials on the form.
b. Complete the CHPS Materials Worksheet for the CHPS Construction Documentation submittal at Substantial Completion. Provide cut sheets for materials claimed to have the required recycled content. Proof of purchase and/or installation is only required if audited during construction review.
1) Update worksheet monthly and submit with monthly request for Progress Payment.
2) Submit manufacturer’s product data for all materials included in the spreadsheet summary.

5. Credit MW 5.1 – Single Attribute Certified Wood.
a. Submit a completed NE-CHPS Product Data Form, for all submittals. Identify the FSC materials, COC number, percentage of FSC material, and product cost.
b. Complete the CHPS Materials Worksheet for the CHPS Construction Documentation submittal at Substantial Completion. Provide cut sheets for materials claimed to have the required recycled content. Proof of purchase and/or installation is only required if audited during construction review.
1) Include statement indicating costs for each product containing Certified Wood.
2) Include statement indicating total cost for wood-based materials incorporated into the Work. Do not include materials used for temporary construction.
3) Submit manufacturer’s product data for all materials included in the spreadsheet summary.

6. Credit MW 7.1 – Multi-Attribute Material Selection.

a. Submit a completed NE-CHPS Product Data Form, for all submittals. Identify the Environmental Product Declarations for each of the 10 chosen products.

7. Credit MW 10.1 – Health Product Related Information Reporting for Building Products.
   a. Submit Health Product Declarations for each of the 10 chosen products. Complete the CHPS Materials Worksheet.
8. Credit MW 11.1 – Locally Produced Materials.
   a. Submit a completed NE-CHPS Product Data Form, for all submittals. Identify the regional qualities and product cost on the form.
   b. Maintain receipts or purchase orders to confirm compliance.
   c. Complete the CHPS Materials worksheet for the CHPS Construction Documentation submittal at Substantial Completion.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

End of Section

NE-CHPS PRODUCT DATA FORM
(ATTACHMENT A)

This document is to be fully completed, and attached to, ALL product submittals for NE-CHPS Credit Achievement required for the Project. Use additional sheets as needed. Attach cut sheets, technical data sheets, safety data sheets, photographic and other documentation supporting product data and NE-CHPS version 4.0 compliance claims.

Fill out material attribute information in form as appropriate to credits identified.

General Submittal Information:

Central Falls High School
Central Falls, Rhode Island

Architect:

Ai3 Architects, LLC
111 Speen Street, Suite 300
Framingham, Massachusetts 01701

General Contractor:

_____
_____
_____

Subcontractor:

_____
_____
_____

Vendor:

_____
_____
_____

NE-CHPS Credit #'s:

_____

Date submitted: _____

Specification Section Reference:_____

Drawing Number Reference:_____

Standard References (ANSI, ASTM and similar) or attach separate list.

_____
_____
_____

Attachments *:

☐☐ Product Data ☐☐ Warranties
☐☐ Drawings ☐☐ SDS
☐☐ Samples ☐☐ Schedules
☐☐ Reports ☐☐ Calculations
☐☐ Tests ☐☐ 3rd. Party Certification

* **Attachments Note**: Attach supporting documentation for NE-CHPS Credit Certification. Submittals without adequate documentation will be returned without review

Product Information:

Product Description/Name: _____

Specified Manufacturer: _____ model #:_____

Submitted Manufacturer: _____ model #:_____
(company name & address)

_____

_____

Manufacturer's Phone #: _____

Deviation from contract documents?:

☐ NO Deviations ☐ YES (attach complete documentation)

Lead time after approval: _____

Date items required at project: _____

Contractor's Affidavit: The Contractor certifies product submitted complies with the project NE-CHPS Certificate requirements and with the Specified Requirements by initiating each line below:

Investigation for compliance: ---------- _____

Independent Verification Testing: ---------- _____

FSC Wood: ---------- _____

Calculation for Recycled Content: *2 ---------- _____

VOC Verification: ---------- _____

Multi-Attribute Materials Selection: ---------- _____

Cost Data: ---------- _____

Health Product Related Information ---------- _____

Locally Product Materials ---------- _____

*2 The recycled content value of a material assembly shall be determined by weight. The recycled fraction of the assembly is then multiplied by the cost of assembly to determine recycled content value.

Submitted by:
(company name & address) _____

_____

_____

Authorized Signature _____

Instructions to Contractor/Installer: Complete the following materials attribute information in all appropriate categories. Use one submittal form for each product or material (e.g. tile and grout each get their own sheet) Attach any other additional information to this form.

NE-CHPS Credit SS 10.1 – Heat Island Effect, Roof Materials

Do concrete asphalt, pavers, sport courts, artificial turf, playground areas, other hardscape components or non-roof impervious surfaces contain materials with a Solar Reflectance Index (SRI) of at least 29?

Components	Solar Reflectance Index (SRI)

NE-CHPS Credit SS11.1 – Heat Island Effect, Non-Roof

Do roof materials/products have a Solar Reflectance Index (SRI) of at least 78 for low-sloped roofs and 29 for sloped roofs?

Components	Solar Reflectance Index (SRI)

NE-CHPS Credit MW 3.1 – Single Attribute: Recycled Content

Does the material/product contain post-consumer and/or pre-consumer content?

Percentage of post-consumer content:	
Percentage of pre-consumer content:	

If only part of the assembly contains recycled content, fill in the chart below:

Assembly Components	Weight	% Post Consumer	% Pre-consumer
Totals by weight (should equal 100% of assembly)			

NE-CHPS Credit MW 5.1 – Combined Materials Attributes: Certified Wood

Does the material/product contain FSC certified wood (Chain of Custody)?

Component	Chain of Custody Cert. #	FSC %	Cost of Material ($)

NE CHPS Credit MW 7.1 – Multi-Attribute Material Selection

Does the product have a third-party certified Type III Environmental Product Declaration (EPD) or ISO 21930 on Environmental Declarations of Building Products?

Product Name	HPD (yes/no)	Disclosure Level (ppm)

NE CHPS Credit Mw 10.1 – Health Product Related Information Reporting

Does the product have a published Health Product Declaration (HPD) with a disclosure level of 1000ppm?

Product Name	HPD (yes/no)	Disclosure Level (ppm)

NE HCPS Credit MW-11.1 – Locally Produced Materials

Has the product been manufactured within a 500 mile radius?

Product Name	Manufactured within 500 miles (yes/no)	Manufacturer's Address	Manufacturer's Information Included

NE-CHPS Credit EQ 7.1 – Low-Emitting Materials: Adhesives, Sealants and Concrete Sealers *(excludes exterior products)*

Does the material/product comply and been certified to be within specified VOC limits

Product Name:	Yes/no	VOC Content (grams/liter)

NE-CHPS Credit EQ 7.1.2 – Low-Emitting Materials: Carpet Systems and Associated Adhesives

Does the carpet materials/product meet the Carpet and Rug Institute's Green Label Plus Program?

Carpet Product Name (and backing type):	CRI ID #

Does the carpet pad material/product meet the Carpet and Rug Institute's Green Label Plus Program?

Carpet Pad Product Name:	CRI ID #

Do Adhesives meet specified VOC requirements?

Product Name:	VOC Content

NE-CHPS Credit EQ 7.0 + EQ 7.1 – Low-Emitting Materials: Acoustical Ceiling Tiles and Wall Panels

Does the acoustical tiles and panels materials/product have Indoor Advantage Gold Certification?

Acoustical tiles and panels Product Name:	Certification Agency

Do Adhesives meet specified VOC requirements?

Product Name:	VOC Content

NE-CHPS Credit EQ 7.0 + EQ 7.1 – Low-Emitting Materials: Paints and Coatings *(interior walls, floors and ceilings)*

Does the material/product comply with specified VOC limits?

Product Name:	VOC Content (grams/liter)

NE-CHPS Credit EQ 7.0 + EQ 7.1 - Low-Emitting Materials: Flooring Systems

Do wood flooring materials/product have FloorScore, GreenGuard or Indoor Advantage Certification?

Resilient Flooring Product Name:	Certification Agency

Do Adhesives meet specified VOC requirements?

Product Name:	VOC Content (grams/liter)

NE-CHPS Credit EQ 7.0 + EQ 7.1 – Low-Emitting Materials: Composite Wood

Does the material/product contain added urea-formaldehyde resins?

Product Name:	Yes or No

NE-CHPS Credit EQ 7.0 + EQ 7.1 – Low-Emitting Materials: Ceiling and Wall Systems

Does gypsum board meet the testing and State of California Department of Public Health, Standard Method for the Testing and Evaluation of Volatile Organic Emissions from Indoor Sources Using Environmental Chambers, Version 1.1, CDPH/EHLB/Standard Method, V1.1 (February 2010)?

Acoustical tiles and panels Product Name:	Certification Agency

Additional Environmental Attributes/Notes: *(attached additional sheets as required)*

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

End of Document

Section 01 81 19

INDOOR AIR QUALITY REQUIREMENTS

PART 1 - GENERAL

1.1 SUMMARY

A. Compliance with requirements for dust protection and air quality control is required for new construction work. Dust removal and final cleaning requirements apply to all work. Contractor shall employ dust and pollution prevention procedures so that a healthy Owner's environment is fully maintained at all times.

B. Indoor air quality management goals.

1. The Owner has established that the Project shall prevent indoor air quality problems resulting from the construction process, to sustain long-term installer and occupant health and comfort.
2. Protect the ventilation system components during construction and cleanup of contaminated components after construction is complete.
3. Control sources of potential IAQ pollutants by controlling selection of materials and processes used in project construction.
4. With regard to these goals the Contractor shall develop, for Owner and Architect's review, an IAQ Management Plan for the Project.

C. Requirements for contamination and infection control include the following provisions, but are not limited to:

1. Environmental Monitoring Plan.
2. Maintaining a clean work environment.
3. Post construction work area cleaning procedures.
4. Furnishing MSDS for all supplies used on the project site.
5. Training of construction personnel.
6. Upon completion of work:
    a. Remove temporary dust barriers.
    b. Restore marred surfaces in or outside the construction area to original condition.
    c. Remove temporary seals, blocks and caps.
    d. Restore alterations in mechanical systems to original specifications.

1.2 REFERENCES

A. Comply with applicable requirements of the following standards and those others referenced in this Section, under the provisions of Section 01 42 00 - REFERENCES. The publications are referenced in text by basis designation only.

1. ANSI Z86.11973 - Commodity Specification for Air.
2. ANSI Z9.2 - HEPA Filter Specifications.
3. ASHRAE - Ventilation for Acceptable Indoor Air Quality

4. Environmental Protection Agency (EPA):
    a. National Emissions Standards for Hazardous Air Pollutants (NESHAPS) Title 40 Code of Federal Regulations (CFR), Part 61.
    b. National Ambient Air Quality Primary Standard Title 40 Code of Federal Regulations (CFR), Part 50.6, 50.7.
5. OSHA (Occupational Safety and Health Administration):
    a. Respiratory Protection, 29 CFR 1910.134.
    b. Hazard Communication Program, 29 CFR 1910.1200.
6. National Institute for Occupational Safety and Health (NIOSH): Respiratory Protection A Guide for the Employee".
7. SMACNA - IAQ Guideline for Occupied Buildings under Construction, 2007 Second Edition.

1.3 SUBMITTALS

A. Information and Review Submittals: Submit the following under provisions of Section 01 33 00 - SUBMITTAL PROCEDURES:
    1. Within 21 calendar days after receipt of Notice to Proceed, submit, Construction IAQ Management Plan highlighting the five requirements of the SMACNA IAQ Guideline for Occupied Buildings under Construction, 2007 Second Edition, Chapter 3 “Control Measures”. The proposed Plan shall include, but not be limited to, the following:
        a. Protection of ventilation system components during construction.
        b. Cleaning and replacing contaminated ventilation system components after construction, including filtration media.
        c. Temporary ventilation.
        d. Protection of absorptive materials from moisture damage when stored on-site and after installation, including exterior wall rain protection.
        e. Sequence of finish installation plan.
        f. Selection of cleaning products and procedures to be used during construction and final cleaning.
        g. Other items as required by SMACNA IAQ Guidelines for Occupied Buildings under Construction, Chapter 3.
        h. Comply with the requirements of NECHPS Credits.
    2. Provide Safety Data Sheets (SDS) on all materials used, whether incorporated into the work, and for temporary use on-site.
    3. Photographs documenting construction IAQ management measures implemented during construction such as duct protection measures and measures to protect on-site stored or installed absorptive materials from moisture.
    4. Cut sheets of filtration media used during construction and installed immediately prior to occupancy with MERV values highlighted.
    5. Plans for location of dust prevention barriers (as applicable). Details of interfacing conditions.

1.4 REGULATORY REQUIREMENTS

A. The codes, regulations, standards and policies of the following entities shall govern this work and be considered minimum requirements.

1. All applicable Federal, State and Local codes, regulations, policies and requirements, including but not limited to OSHA (Occupational Safety and Health Administration), Environmental Protection Agency (EPA), Department of Environmental Protection (DEP), ASHRAE, ACGIH, local Board of Health and any other agency having jurisdiction.
2. Applicable Federal, State and/or local inspection authority.

1.5 QUALITY ASSURANCE

A. General: It is the responsibility of the Contractor to maintain the integrity of air quality and the dust control barriers of the construction environment throughout the duration of the project.

1. Contractor must take proactive measures to assure compliance with the intent of this section.
   a. Inspection of barriers must be conducted regularly (hourly if necessary).
   b. If compromising the barrier is necessary the Contractor must discuss logistics with Owner’s representative.
2. Train key supervisory personnel of the Contractor and subcontractors will be trained on the importance of contamination control and the critical nature of the area(s) they will be working in by Owner’s personnel prior to the start of work.
   a. Trained supervisory personnel will be responsible for training other site personnel on these matters and helping to enforce procedures.
3. Participate in periodic areas review of the construction area with Owner’s representatives. Perform any corrective work required to maintain air quality and dust control within the project area.

B. Maintain acceptable air quality and hygiene practices in accordance with these specifications, EPA and OSHA regulations, American Society of Heating, Refrigerating and Air Conditioning Engineers, Inc. (ASHRAE), American Society of Healthcare Engineering (ASHE/AHA) recommendations and guidelines, American Conference of Governmental industrial Hygienists (ACGIH) recommendations and guidelines and any other applicable Federal, State and local government regulations and guidelines.

C. Documentation:

1. Take photographs of each IAQ/SMACNA measures at least 3 separate time intervals for the project providing a minimum of 18 Photographs.
2. Annotate photographs to indicate each IAQ measure depicted and its general location.
3. Provide photographs of the methods employed to protect stored and installed absorptive materials from moisture damage during construction and preoccupancy.

1.6 INDOOR AIR QUALITY MONITORING PLAN

A. General: Prior to the start of any construction activities, establish an Indoor Air Quality Monitoring Plan (EMP) and implementation procedures. Submit to Architect and Owner for review, Owner's approval of EMP must be obtained prior to the start of Work.

B. Develop a Draft Indoor Air Quality (IAQ) Management Plan for the construction and preoccupancy phases of the building as follows: (1) during construction meet or exceed the minimum requirements of the Sheet Metal and Air Conditioning National Contractors Association (SMACNA) IAQ Guidelines for Occupied Buildings under Construction 2007, Chapter 3, (2) Protect stored on-site or installed absorptive materials from moisture damage.

1. Comply with NECHPS for minimum indoor air quality (IAQ) performance standards during the construction period.
    a. Replacement of MERV8 filtration media immediately prior to occupancy.
    b. Creation of continuous ventilation during installation of materials that emit high levels of VOCs. Interior areas will be ventilated directly to the outdoors.
    c. Perform frequent periodic maintenance if the HVAC system is being utilized. When activities that produce high dust, such as drywall sanding, concrete cutting, masonry work, wood sawing and insulating or pollution levels occur, seal off the return air system openings completely for the duration of the task.
    d. If permanently installed air handlers are used during construction, filtration media will be used at each return air grille that meets one of the following criteria below:
    e. Filtration media with a minimum efficiency reporting value (MERV) of 8 as determined by ASHRAE Standard 52.2–2007.
    f. Filtration media is Class F5 or higher, as defined by CEN Standard EN 779–2002, Particulate air filters for general ventilation, Determination of the filtration performance.
    g. Filtration media with a minimum dust spot efficiency of 30% or higher and greater than 90% arrestance on a particle size of 3–10 µg.
    h. Provide periodic duct inspections during construction. If ducts become contaminated due to inadequate protection, clean the ducts professionally in accordance with NADCA (National Air Duct Cleaning Association) standards.
    i. Store ductwork and equipment off floor and out of water during construction.
    j. Installation of odorous or VOC-containing products prior to the installation of porous or fibrous materials. Where this is not possible, the porous or fibrous materials will be protected with plastic.
    k. Collection from Subcontractors of all MSDS sheets for VOC-containing products. These sheets will be kept in the CM Field Office.
    l. Tobacco Smoke will be non-existent as there is no smoking allowed within the building or onsite unless you are within the designated

smoking area, which is located over 100 feet from the building. These limitations shall also apply to electronic cigarettes and chewing tobacco.

2. Comply with NE-CHPS Requirements for assessment of minimum indoor air quality (IAQ) performance standards through either building flush-out or air testing before occupancy.
3. The SMACNA IAQ Guidelines for Occupied Buildings under Construction provides an overview of air pollution associated with construction, control measures, construction process management, quality control, communicating with occupants, and case studies. These guidelines can be accessed at www.smacna.org. Chapter 3 of the SMACNA Guidelines recommends Control Measures in five areas: HVAC protection, source control, pathway interruption, housekeeping, and scheduling. Review the applicability of each Control Measure and include those that apply in the Draft IAQ Management Plan.
    a. HVAC Protection: Shut down the return side of the HVAC system whenever possible during heavy construction. If the system must remain operational during construction include the following strategies that apply:
        1) Fit the return side of the HVAC system with temporary filters.
        2) Isolate the return side of the HVAC system from the surrounding environment as much as possible (e.g., place all tiles for the ceiling plenum, repair all ducts and air handler leaks).
        3) Damper off the return system in the heaviest work areas and seal the return system openings with plastic.
        4) Upgrade the filter efficiency where major loading is expected to affect operating HVAC system.
        5) Clean permanent return air ductwork per National Air Duct Cleaning Association standards upon completion of all construction and finish installation work.
        6) If permanently installed air handlers are used during construction, filtration media with a Minimum Efficiency Reporting Value (MERV) of 8 shall be used at each return air grille, as determined by ASHRAE 52.2-2007, with errata (or equivalent filtration media class of F5 or higher, as defined by CEN Standard EN 779–2002, Particulate Air Filters for General Ventilation, Determination of the Filtration Performance), are installed at each return air grille and return or transfer duct inlet opening such that there is no bypass around the filtration media. Immediately before occupancy, replace all filtration media with the final design filtration media, installed in accordance with the manufacturer’s recommendations..
    b. Source Control: Propose the substitution of non-toxic formulations of materials that are generally the responsibility of the General Contractor such as caulks, sealants, and cleaning products.
        1) Adhesives and Sealants: Implement effective measures during construction to reduce the quantity of indoor air contaminants that are odorous, irritating or harmful to the comfort and well-being of workers and occupants. Measures will include the adherence to Adhesives, Sealants and Sealant Primers: South Coast Air Quality

Management District (SCAQMD) Rule #1168 concerning VOC limits.

2) Paints & Coatings: In order to reduce the quantity of indoor air contaminants that are odorous, irritating or harmful to the comfort and well being of workers and occupants, use paints and coatings that meet the criteria as outlined in United States Green Building Council,

c. Pathway Interruption: Prevent contamination of clean spaces. Include the following strategies that apply:
   1) Use 100% outside air ventilation (when outside temperatures are between 55 degrees F and 85 degrees F and humidity is between 30% and 60%) with air exhausted directly to the outside during installation of finishes and other VOC emitting materials.
   2) Erect some type of barrier between work areas or between the inside and outside of the building to prevent unwanted airflow from dirty to clean areas

d. Exhaust and Dilution Ventilation:
   1) Provide exhaust ventilation to collect air contaminants, dust and debris at the source of generation inside the work area and direct them outside of the building. Additionally, the system outlet ducting will be directed away from the building HVAC system inlets (mechanical or natural) and other migration vectors into the building. Capture velocities shall be sufficient (as specified in ACGIH Industrial Ventilation Manual) to maintain the levels of air contaminants in the work area to less than one- half the Permissible Exposure Limit (PEL) as defined in 29 CFR 1910.1000 and the Threshold Limit Value.
   2) Where materials or processes are used in the construction area that are hazardous, unpleasant, produces strong odors or generates fine particulate, HEPA equipped air filtration devices will be utilized to clean the air before discharging to the outside.

e. Housekeeping: Reduce construction contamination in the building prior to occupancy through HVAC and regular space cleaning activities.
   1) Store building materials in a weather tight, clean area prior to unpacking for installation.
   2) Check for possible damage to the HVAC system and Building assemblies from high humidity.
   3) Clean all coils, air filters, and fans before testing and balancing procedures are performed.

f. Scheduling: Specify construction sequencing to reduce absorption of VOC’s by materials that act as sinks or contaminant sources. Complete application of wet and odor-emitting materials such as paints, sealants, and coatings before installing sink materials such as ceiling tiles, carpets, insulation, gypsum products, and fabric-covered furnishings are installed.

4. Protect stored on-site or installed absorptive materials from exposure to moisture through precipitation, plumbing leaks, or condensation from the HVAC system to prevent microbial contamination.

C. Draft IAQ Management Plan Review Meeting: Once the Owner and Designer have reviewed the Draft IAQ Management Plan and prior to construction at the site, schedule and conduct a meeting to review the Draft IAQ Management Plan and discuss procedures, schedules and specific requirements for IAQ during the construction and preconstruction phases of the building. Discuss coordination and interface between the General Contractor and other construction activities. Identify and resolve problems with compliance to the requirements. Record minutes of the meeting, identify all conclusions reached and matters requiring further resolution.

1. Attendees: The General Contractor and related construction personnel associated with the Work of this section, including personnel to be in charge of the IAQ management program, Designer, Owner and such additional personnel as the Designer or Owner deems appropriate.

D. Final IAQ Management Plan: Make any revisions to the Draft IAQ Management Plan agreed upon during the meeting identified in item (B) above and incorporate resolutions agreed to be made subsequent to the meeting. Submit the revised plan to the Owner and Designer for approval within 10 calendar days of the meeting.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Take special care to prevent accumulation of moisture on materials and within packaging during delivery, storage, and handling to prevent development of mold and mildew inside packaging and on products.

B. Immediately remove from site and properly dispose of materials showing signs of mold and mildew, including materials with moisture stains.

PART 2 - PRODUCTS

2.1 MATERIALS

A. General: Refer to applicable sections of the specifications for materials requirements specified in this Section.

2.2 TOOLS AND EQUIPMENT

A. Negative Air Filtration Unit: Asbestos filtration devices shall utilize high efficiency particulate air (HEPA) filtration systems. 99.97% efficient to 0.3 micrometer diameter of mono-disperse particles. The negative air filtration unit shall be equipped with the following:

1. Magnehelic gauge to monitor the units air pressure difference across the filters and be able to interpret magnehelic readings to cfm.
2. Automatic shut off for filter failure or filter absence.
3. Audible alarm with flashing red light for unit shutdown.
4. Amber flashing warning light for filter loading.
5. Must have safety system that prevents unit from being operated with the HEPA filter in backwards.

B. Vacuum Equipment: All vacuum equipment implemented in the work area shall utilize HEPA filtration systems. 99.97% efficient to 0.3 micrometer diameter of mono-disperse particles.

C. Water Sprayer: The water sprayer shall be an airless or other low pressure sprayer for amended water application.

D. Other Tools and Equipment: The Contractor shall provide other suitable tools for the demolition, cleaning, and disposal activities including but not limited to: mops, sponges, rounded edge shovels, brooms, and carts.

PART 3 - EXECUTION

3.1 IMPLEMENTATION OF IAQ MANAGEMENT PLAN

A. Contractor shall designate an on-site party (or parties) responsible for instructing workers and overseeing and the IAQ Management Plan for the Project.

B. Progress Meetings: Construction related IAQ procedures shall be included in the preconstruction and construction progress meeting agendas.

C. Distribution: The General Contractor shall distribute copies of the IAQ Management Plan to the Job Site Foreman, each Subcontractor, the Owner, and the Designer.

D. Instruction: The General Contractor shall provide on-site instruction of the IAQ procedures and ensure that all participants in the construction process understand the importance of the goals of the IAQ Management Plan.

3.2 CLEAN WORK ENVIRONMENT

A. HEPA filtered vacuum will be located so that workers/visitors leaving the work area can vacuum off shoes and clothing inside of work area or vestibule.

B. Vacuum and thoroughly clean and remove all debris on a daily basis. Shovel and vacuum to control the spread of airborne dust. Do not sweep!

C. Dust tracked outside the barrier must be immediately cleaned, either by use of a HEPA-filtered vacuum and/or damp mopping.

D. Levels of airborne respirable dust in Occupied Area resulting from construction activities which are in excess of the EPA National Ambient Air Quality Standard, 150 Hg/m3, shall be deemed excessive.

1. Should such level occur, immediately stop activities which are creating dust, and take such steps as required to reduce the level of dust to acceptable limits.

E. After airborne dust levels have been reduced, clean surfaces of floors, furniture, woodwork and other areas that have surface dust in the affected areas. Clean with HEPA vacuums or alternative method approved by the Owner's Industrial Hygienist.

F. No sawing, sanding and performing other dust producing operations with power equipment will be permitted in Owner Occupied areas.

G. Where extensive dirt or dust operations are performed on, and adjacent to, site, thoroughly wet construction materials and dirt by spraying with water. Trucking access roads shall be cleaned of dirt and debris daily as required by governing agencies and authorities to prevent migration of dust and dirt. Dust must be minimized and controlled to prevent related air pollution beyond limits of work.

3.3 VENTILATION

A. General: Prevent dust and odors from entering the existing or new HVAC system which services occupied areas of the building. Disconnect supply and return ductwork in Work Area from HVAC systems which service occupied areas. Seal ends of duct runs connected to systems outside of work area during construction.

B. Welding: When necessary to weld during periods of Owner's active use of occupied spaces, advise the Owner 24 hours in advance. Provide temporary portable ventilation units which vent directly to the outdoors to immediately draw welding fumes outside the building. Locate the exterior exhaust well away from open windows or vents to prevent fumes from entering the building.

3.4 WATER DAMAGE

A. General: To prevent growth of harmful fungus, mold and similar biological activity, take precautions to prevent porous materials such as gypsum board, insulation, ceiling tile, wood and similar products from becoming wet.

B. Remove and replace construction which becomes wet or which shows evidence of biological growth due to presence of moisture.

3.5 CLEAN-UP

A. General: Prior to turning over work area(s) to Owner, conduct final cleaning to remove dust to the minimum practical level.

B. When construction is completed the entire construction area shall be completely cleaned before the final supply ducts and exhausts duct are connected. This cleaning will be of all surfaces (new, existing, barriers, ceilings, walls, etc.) and will be done by wet wiping and/or HEPA vacuuming until no visible dust exists

C. Cleanings shall be performed from the top down. Meaning all high surfaces shall be cleaned first working your way down to the floor.

D. Clean duct work registers and grilles and HVAC equipment.

E. Change replaceable HVAC filters, wash down permanent filters.

F. If Owner occupancy is scheduled to occur within 14 days of cleaning, do not use solvent-based cleaners in final cleaning of Work Areas(s).

G. Daily and routine cleanings by the Contractor shall be coordinated with the Owner. Owner reserves the right to require further clearing.

3.6 PRE-OCCUPANCY OFF-GASSING VENTILATION

A. Complete all work, allow at least 4 calendar days prior to Owner's scheduled time for beginning active use of completed work area(s) for building flush out in compliance with Commissioning Agent's requirements.

End of Section

SECTION 01 91 13 - GENERAL COMMISSIONING REQUIREMENTS

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. This section presents general commissioning requirements for the Central Falls High School project to be met in addition to specific commissioning requirements for work on the commissioned systems in Divisions 22, 23 and 26.

B. The Owner requires participation in comprehensive commissioning of selected systems, assemblies, and components. This section includes general requirements that apply to all commissioned systems, assemblies, or components. Additional specific requirements are found in Divisions 22, 23 and 26. Systems and components to be commissioned on this project are listed in Paragraph 1.6 below.

C. This section includes the following Appendices:

"Appendix A" – Sample Training Agenda

"Appendix B" – Sample Commissioning Checklists

"Appendix C" – Sample Commissioning Test Procedures

"Appendix D" – Sample Component Commissioning Schedule

D. All requirements on drawings and in the general provisions of the Contract, including but not limited to the Agreement and General Conditions, apply to this Section.

1.2 RELATED COMMISSIONING SECTIONS

A. Section 22 08 00 Commissioning of Plumbing

B. Section 23 08 00 Commissioning of HVAC

C. Section 26 08 00 Commissioning of Electrical

1.3 ABBREVIATIONS AND DEFINITIONS

A. BOD: Basis of Design. A document that records concepts, calculations, decisions, operational performance criteria and product selections used to meet the OPR and to satisfy applicable regulatory requirements, standards, and guidelines. The document includes both narrative descriptions and lists of specific items required to meet the Owner's Project Requirements.

B. Commissioning Authority: The reviewing entity employed directly by the Owner to verify that the Owner's Project Requirements are met, and to assist the Owner by providing quality improvement services.

C. Commissioning Issues Log: The primary document for recording and communicating issues identified through the commissioning process.

D. Design Professional: The design professional or professionals of record responsible for sealing the construction documents, permit applications and for consultations with the authority having jurisdiction at various stages of plan review and construction. They are

referred to separately when they perform distinct functions with respect to commissioning, such as considering commissioning comments during formal review of product data and other submittals.

E. FPT: Functional Performance Testing, including testing of individual components, entire systems, and intersystem performance.

F. O&M: Operations and Maintenance.

G. OPR: Owner's Project Requirements. A document that details the functional requirements of a project and the expectations of how it will be used and operated. These include Project goals, measurable performance criteria, cost considerations, benchmarks, success criteria, and supporting information. The commissioning process verifies and documents whether the final built commissioned systems in the project meet the OPR.

H. PFC: Pre-Functional Checklists developed by Stephen Turner Inc. for completion by Trade Contractors.

I. Submittals: Documents required by the contract documents including product data and other formal submittals.

J. Systems, Subsystems, Equipment, and Components: Where these terms are used together or separately, they shall mean "as-built" systems, subsystems, equipment, and components.

K. Systems Checklists: Checklists developed and completed by Stephen Turner Inc.

L. TAB: Test, Adjust and Balance.

1.4 COMMISSIONING PROCESS

A. For this project, Stephen Turner Inc. is the commissioning authority contracted directly by the Owner to lead the commissioning process. The design team, General Contractor, and contractors, along with the Owner (Project Manager, Users, and Operations), form the commissioning team.

B. The commissioning process, including Functional Performance Tests, is separate from and does not reduce or replace the requirements of the formal acceptance process by the Owner and Design Professional or the requirements of the authorities having jurisdiction. Stephen Turner Inc. will accept documented testing performed as part of the formal acceptance process that is witnessed by the Owner, Design Professional or the authorities having jurisdiction in order to avoid duplicate testing where possible.

C. Sampling

1. Generally, representative samples of the work will be periodically verified by Stephen Turner Inc. as an indicator of the quality of the work.
2. This sampling method will be used as a quality check for equipment, piping, redline or record drawings, etc. The intent is that commissioning verification occurs when each aspect of commissioned work first begins, so that any resulting changes required are made after only a small portion of the work is put in place, not all of it.

D. Problem Solving

1. Stephen Turner Inc. will suggest solutions to issues but does not assume the burden of responsibility to solve and correct issues that are found.

E. Communication During Construction Phase

1. Coordination of Trade Contractor participation in the commissioning team is through the General Contractor. Comments, observations, etc. resulting from commissioning activities will be recorded in the Commissioning Issues Log and relayed directly to the responsible party whenever possible, with copies to the Owner, Design Professional and General Contractor, as applicable. This includes submittal comments, site observation reports, test reports, etc. This direct communication approach is intended to avoid delays from traditional remote paper exchanges, will encourage dialogue and discussion of options and alternatives, and generally maintain an atmosphere of cooperation and quality.
2. Stephen Turner Inc. is not responsible for design concept, design criteria, compliance with codes, design or general construction scheduling, cost estimating, or construction management.
3. Stephen Turner Inc. may assist with problem solving, non-conformance or deficiencies, but ultimately that responsibility resides with the General Contractor.
4. The primary role of Stephen Turner Inc. is to develop and coordinate the execution of the commissioning plan including testing, to observe and document performance, and to document whether systems are functioning in accordance with the documented Owner's Project Requirements.
5. Stephen Turner Inc. does not direct or redirect the General Contractor or the Trade Contractors in their contracted work, and no communication shall be construed as such direction.
6. Stephen Turner Inc. is not authorized to:
    a. Release, revoke, alter or expand requirements of Contract Documents.
    b. Approve or accept any portion of the work.
    c. Perform any duties of the General Contractor, its consultants, or its contractors.

F. Response Times

1. Timeliness in delivering information or forming responses to Stephen Turner Inc., and back, are essential to providing the built project to the Owner on time, as well as to implementing commissioning.
2. The following are guidelines established to meet this objective and should be followed unless there are extenuating circumstances – in which case the delay shall be explained to each party in advance of the delay. Failure to avoid delays means that the delayed work product may not be incorporated into the commissioning reporting process, requiring a separate resolution process with the Owner without commissioning assistance.
    a. Construction schedule by the General Contractor incorporating separate activities for commissioning activities, as a minimum including pre-functional checklists, equipment start-ups, controls completion, TAB, and functional performance testing.
        1) Within 10 business days after award of Division 22, 23 and 26 work.
        2) Appendix C shows a typical component-level commissioning schedule by Stephen Turner Inc. with the dependencies between construction activities and commissioning activities.
    b. Project-specific comments from Stephen Turner Inc. on how commissioning activities and dates are incorporated into the schedule:

1) Within 10 business days after receiving component schedule for Division 22, 23 and 26 work and updates throughout project.

c. Submittal comments by Stephen Turner Inc.:

1) 7 business days from date of receipt by Stephen Turner Inc. for typical product submittals; 15 business days for Controls, TAB, energy recovery equipment, and other selected complex submittal packages. Stephen Turner Inc. will identify other selected complex submittal packages in advance if provided with the submittal register.

2) For this paragraph's purposes, "receive" means electronic or hard copy in the hands of Stephen Turner Inc.

d. Approved submittals to Stephen Turner Inc.:

1) Within 5 business days of receipt by General Contractor.

e. Commissioning checklists by Stephen Turner Inc. to General Contractor:

1) 10 business days before scheduled delivery of commissioned equipment, provided that the schedule and the approved submittals have been provided to Stephen Turner Inc. 20 business days in advance.

f. Delivery of draft O&M manuals for Stephen Turner Inc. to review:

1) 30 business days after approved submittals.

g. Delivery of final O&M manuals and training materials to Stephen Turner Inc.:

1) 10 business days prior to each scheduled owner training session.

h. Delivery of record drawings marked to as-built conditions to Stephen Turner Inc.:

1) Prior to each scheduled training session.

i. Delivery of final as-built drawings to Stephen Turner Inc.:

1) Within 20 business days of start of warranty period(s).

j. Commissioning Issues Log entries by Stephen Turner Inc.:

1) Within 5 business days after observation.

k. Response by General Contractor and Trade Contractor to commissioning Issues Log entries and field comments:

1) 5 business days after receipt of Issues Log where other parties are not involved, or at the next commissioning meeting.

l. Delivery of functional performance testing procedures by Stephen Turner Inc. to General Contractor:

1) 20 business days before scheduled testing provided that schedule and draft O&M manuals have been provided to Stephen Turner Inc. at least 40 business days in advance of scheduled testing.

1.5 GENERAL CONTRACTOR AND TRADE CONTRACTOR REQUIREMENTS

A. General Contractor

1. The General Contractor's responsibility for construction safety is unaffected by this section.
2. The General Contractor's responsibility for the quality of the installed work is unaffected by this section.
3. The General Contractor shall establish at least one contact person, plus alternates where appropriate, for each trade or system involved in the commissioning process. This requirement facilitates effective communication during commissioning.

4. The General Contractor shall communicate to the commissioning team the construction schedules, milestones, completion schedules, planned testing, etc., including updates. The General Contractor shall incorporate commissioning activities closely tied to the construction activities into the project schedule as agreed by the General Contractor, the Owner, and Stephen Turner Inc.
5. Stephen Turner Inc. has no authority to change the contract or direct the General Contractor in any of their work, only to provide comments and suggestions. Any issues that Stephen Turner Inc. identifies that cannot be resolved with the General Contractor and the Trade Contractors will be jointly presented to the Owner for resolution.
6. As each commissioning issue is identified, the General Contractor shall consider it with the Trade Contractors and respond to Stephen Turner Inc. The General Contractor shall cooperate in resolving commissioning issues that are within the project scope.
7. The General Contractor shall ensure that each required Trade Contractor and direct Supplier participates and cooperates in commissioning, and provides information, assistance, and responses within the time frames in this section.
8. The General Contractor shall ensure that each required trade supports integrated testing and commissioning of inter-related work.
9. Warranty
    a. The General Contractor shall provide a summary of warranty items as specified, delineated by specification section number, title, and description. Stephen Turner Inc. will use this as part of the commissioning comparison and verification of warranty items. This step is intended to assure the Owner that the intended warranty protection will be provided.
    b. For each warranty item, include the date when the warranty is to begin, the duration of the warranty, and Owner's obligations to maintain to protect warranty.
10. The General Contractor shall schedule in advance and coordinate execution of seasonal or deferred commissioning testing by the Trade Contractors, which shall be witnessed by Stephen Turner Inc. The General Contractor and the Trade Contractors shall correct deficiencies and make necessary adjustments to O&M manuals and as-built drawings for applicable issues identified in seasonal testing.

B. Trade Contractors
1. The Trade Contractors' responsibility for construction safety in their work is unaffected by this section.
2. The Trade Contractors' responsibility for the quality of their installed work is unaffected by this section.
3. The Trade Contractors for commissioned systems and related work will be required to perform certain tasks to assist in the commissioning process. These tasks are described in this section and the commissioning section of each Division that includes commissioned systems. Sample documents relating to these tasks are included in the appendix section of this specification to further clarify this work.
4. The responsibility for safe operation of components, equipment, and systems during commissioning testing rests with the Trade Contractors.
5. Stephen Turner Inc. has no authority to change the contract or direct the Trade Contractors in any of their work, only to provide comments and suggestions. Any issues that Stephen Turner Inc. cannot resolve with the General Contractor and the Trade Contractors will be jointly presented to the Owner for resolution.
6. As each commissioning issue is identified, the Trade Contractors shall, with the General Contractor, consider the issue and respond to Stephen Turner Inc. Trade Contractors

shall cooperate in the resolution of commissioning issues that are within their contracted scope.

7. PFCs to verify components and work will be provided by Stephen Turner Inc. for completion on-site by Trade Contractors, preferably by the person performing the work. PFCs shall be completed as the work progresses.
8. FPT procedures will be developed and led by Stephen Turner Inc. and performed by the Trade Contractors on each commissioned system.
9. Inter-related work is subject to integrated inter-system functional performance testing and participation of each related trade is required. This includes seasonal performance testing.

1.6 INCLUDED SYSTEMS

A. For the following tables listing systems and their components by Division, Stephen Turner Inc. will develop Pre-Functional Checklists (PFC) that are completed by the Trade Contractors and Functional Performance Tests (FPT) that are executed by the Trade Contractors with Stephen Turner Inc. The installing contractors must complete Pre-Functional Checklists developed by Stephen Turner Inc. for components and systems listed; no sampling is allowed. Installing contractors are required to participate in all Functional Performance Testing.

Building Systems to be Commissioned	Pre-Functional Checklists	Functional Performance Testing
HVAC Systems and Associated Controls		
ERUs	Yes	100%
VRF Indoor Units	Yes	Sampling
VRF Outdoor Units	Yes	100%
ERV	Yes	100%
Kitchen Hood Exhaust Fan	Yes	100%
Exhaust Fans	Yes	100%
Building Automation System	Yes	100%
Electrical Systems		
Lighting and Lighting Controls	Yes	Sampling
Generator	Yes	100%
Connections to Equipment Listed in Section 019113	Yes	Support
Plumbing Systems		
Heat Pump Hot Water Heaters	Yes	100%
Electric Hot Water Heaters	Yes	100%
Hot Water Pumps	Yes	100%

PART 2 – PRODUCTS

2.1 TEST EQUIPMENT

A. Standard testing equipment required to perform startup, initial checkout, and required testing shall be provided by the Contractor, and shall remain the property of the Contractor.

B. System-specific test equipment, tools and instruments (e.g. test equipment specific to a piece of equipment) required shall be included in the base bid price by the Contractor.

C. Equipment and software provided by Stephen Turner Inc. to test equipment shall not become the property of the Owner.

D. Testing equipment shall be of sufficient quality and accuracy to measure system performance with the tolerances listed in the system or product specifications.

E. Calibration tags shall be affixed or certificates readily available. Equipment shall be calibrated according to the manufacturer's recommended intervals, recalibrated when dropped, and repaired and recalibrated when damaged.

PART 3 - EXECUTION

3.1 COMMISSIONING TEAM

A. The General Contractor and each Trade Contractor performing work on commissioned systems or equipment shall designate personnel to the commissioning team. Such personnel, including knowledgeable sub-contractors or equipment suppliers, shall be responsible for coordinating commissioning activities with Stephen Turner Inc. and attending meetings.

3.2 COMMISSIONING TEAM RESPONSIBILITIES

A. The Commissioning Personnel for the General Contractor and each Trade Contractor and equipment supplier for commissioned systems or equipment shall have expertise and authority to act on their firm's behalf and shall be scheduled to participate in and perform commissioning activities including, but not limited to:

1. Cooperate with Stephen Turner Inc. for resolution of issues recorded in the Issues Log.
2. Attend commissioning team meetings. General Contractor and Trade Contractors for commissioned systems to attend each commissioning meeting.
3. Integrate and coordinate commissioning process activities into the construction schedule.
4. Review and complete component pre-functional checklists provided by Stephen Turner Inc.
5. Consider and respond to commissioning issues in the Issues Log, which shall be the central communication and record for the commissioning team's efforts and progress.
6. Review commissioning process test procedures provided by Stephen Turner Inc.
7. Prepare and pre-check components and systems to ensure successful functional performance testing.
8. Execute commissioning functional performance test procedures.
9. Evaluate performance issues identified in test reports and, in collaboration with entity responsible for system and equipment installation, recommend corrective action.

10. In the event retesting is required, pre-check components and systems to ensure successful re-testing. Stephen Turner Inc. provides effort for initial and final testing. The General Contractor and Trade Contractors shall provide the efforts required to ensure that subsequent additional re-testing is not required.
11. Review Training Manuals.

3.3 COMMISSIONING MEETINGS

A. One hour commissioning meetings including one Construction Phase kick-off meeting will be held throughout the construction period and will be a separate meeting series, not as part of another meeting such as Owner's, Design Professional, OAC Meetings, Coordination Meetings, etc.). Commissioning activities and issues will be handled during these regularly scheduled commissioning meetings.

B. At least one (1) representative from the General Contractor and each Trade Contractor of the systems being commissioned shall participate in scheduled construction phase commissioning activities. These persons should be prepared and qualified to discuss system items relevant to commissioning.

C. Commissioning meetings will be held quarterly during demolition and rough-ins, monthly until system start-up, biweekly during system start-up, and weekly during functional performance testing, and as required by Owner to resolve issues after move-in.

D. Commissioning meetings will be held through the first year of occupancy to ensure that all commissioning issues are resolved prior to end of first-year. The frequency of these meetings is contingent on the number of open items that require participation by the project team.

3.4 SUBMITTALS

A. The General Contractor and the Trade Contractors shall provide a submittal log from which Stephen Turner Inc. will determine what system/component submittals should be forwarded to Stephen Turner Inc. for review in addition to the copies sent to the Design Professional. Stephen Turner Inc. will review selected submittals with respect to the Owner's Project Requirements.

B. Submittals shall show evidence that they have been reviewed and approved for submittal by the General Contractor and the Trade Contractors prior to circulation to Owner, Stephen Turner Inc., the Design Professionals, and others for review or action. The General Contractor's and the Trade Contractors' pre-review shall include a technical review of the material compared to the drawings and specifications, by persons familiar with that field. Submittals that do not meet the specifications are to be corrected prior to sending to Stephen Turner Inc. for review.

C. Submittals for products that are a substitution shall be clearly indicated on the cover page.

D. Submittals shall be marked to show exact items, sizes, components, electrical characteristics, operating characteristics, details required for this project, service clearances, and shall be annotated to match drawing schedules.

1. Product data sheets not showing clearly marked the individual specific type, model, and options intended for use on the project will be returned by Stephen Turner Inc. as not suitable for further review until revised.

E. Catalog information which makes reference to several options, variations, sizes, etc. shall be clearly marked (arrow, underline, circled, etc.) to indicate exactly the intended item. Generic cut sheets are not acceptable.

F. Provide Manufacturers' detailed installation requirements clearly marked (arrow, underline, circled, etc.) to exactly indicate the intended item.

G. Provide Manufacturers' detailed start-up requirements and procedures clearly marked (arrow, underline, circled, etc.) to indicate only the intended item.

H. Provide Manufacturers' operation instructions clearly marked (arrow, underline, circled, etc.) to indicate only the intended item.

I. Provide Manufacturers' recommended maintenance and troubleshooting procedures clearly marked (arrow, underline, circled, etc.) to indicate only the intended item.

J. Provide Warranty and clear statement of Owner's obligations to maintain equipment to preserve warranty.

K. Product data submittals for any OEM Variable Speed Drives shall include details of compliance with the Owner's standards for VSDs.[GH1][NT2]

L. Stephen Turner Inc. shall be provided commissioning-related submittals for review in parallel with the Design Professional review. The focus of this commissioning review will be to:

1. Verify that the equipment or system meets the Owner's Project Requirements.
2. Verify that equipment or system includes provisions and accessories for access, maintenance, start-up and functional performance testing.

M. Stephen Turner Inc. will forward review comments to the Owner with copies sent simultaneously to the Design Professional. The Design Professional will select which of these commissioning comments are appropriate to incorporate in their submittal actions.

N. Training Manuals for commissioned equipment and systems shall be provided as formal submittals.

O. O&Ms, As-Builts, and BAS programming files shall be provided as formal submittals.

3.5 PRE-FUNCTIONAL CHECKLISTS

A. The intent of the commissioning pre-functional checklists is to detect and reduce or eliminate problems in delivery and installation.

B. Stephen Turner Inc. will produce Pre-Functional Checklists for certain commissioned components.

1. Upon receipt of comments, to Stephen Turner Inc. will modify checklists to address the General Contractor and Trade Contractors comments, as applicable. Where inconsistencies occur between the PFCs and the contract documents, the contract documents take precedence.
2. Stephen Turner Inc. will develop component-based Pre-Functional Checklists and provide the General Contractor with all PFCs (for individual Trade Contractors responsible) printed out and in a dedicated filing cabinet for use on the jobsite.
3. Each installing contractor's personnel actually performing the installation work is responsible for completing that trade's checklist for each component.

C. Timely completion of checklists is required within two business days of completing the related work.

D. Each Contractor is responsible for picking up checklists from the General Contractor's jobsite office, completing them, and returning them to the General Contractor's jobsite office.

E. The General Contractor is responsible for managing and checking the checklists for timely, accurate completion.

F. Stephen Turner Inc. will provide the General Contractor and Trade Contractors with training on the checklist process. Stephen Turner Inc. will review the checklist for each type of equipment with the respective Trade Contractor(s) prior to installation of the equipment to ensure the Trade Contractors understand the checklist process and the specific items on the checklists.

G. The completion of the component checklist does not eliminate the General Contractor and Trade Contractors responsibility for meeting other requirements in the specifications and drawings.

H. Stephen Turner Inc. will periodically verify the accuracy, completeness and tracking of the component checklists. If persistent errors are found, the responsible Trade Contractor shall re-validate 100% of the component checklists for the problem equipment or system type.

3.6 O&M MANUALS

A. General

1. O&M manuals in electronic format shall be submitted to Stephen Turner Inc. for review in addition to the other parties.
2. Stephen Turner Inc. will provide their review comments to the Design Professional, who will select which of these commissioning comments are appropriate to incorporate in their submittal actions.
3. The General Contractor and Trade Contractors shall make changes to the O&M manual based on the comments of the Design Professional and Owner.
4. After delivering final copies of O&M manuals to the owner, confirm in writing the person who took delivery of the manuals and the date and time they were received.

B. Content

1. Include in the O&M Manuals all information required elsewhere, but not less than the following:
   a. A one-page informational sheet with:
      1) Tag number or system name
      2) Location / room number
      3) Manufacturer, model number, serial number, and other informational data listed on the nameplate
      4) Name, address, and telephone number of installing Contractor and equipment vendor
      5) Names, telephone numbers, and URL (internet address) of sources of service and repair parts

6) Date of installation and of start-up

7) Operational and performance data per installed conditions

8) Setpoints at time of start-up

b. A copy of equipment specifications

c. A copy of the approved submittal (and/or RFI or change order if applicable)

d. Manufacturer's installation, operation, and maintenance manuals, including:

1) Installation instructions

2) Operation instructions, including start-up, break-in, shutdown, seasonal, emergency, and special operation procedures

3) Maintenance instructions, including intervals, procedures and instructions for problem corrections, preventive maintenance, testing, alignment, adjustment, and repair

4) Removal and replacement instructions, including removal, replacement, disassembly, and assembly instructions, including any specific tools required, required tolerances, settings, or adjustments

5) Troubleshooting and diagnostic procedures, including troubleshooting and diagnostic procedures for common component malfunctions and the tools required for these procedures

e. Manufacturer's recommended preventive maintenance tasks for the component in a timeline fashion. Includes:

1) Preventive maintenance task

2) Procedure for the task

3) Special tools and instruments required for the task

4) Frequency of the task

f. Inspection and testing reports, including all documentation related to the start-up, balancing, and certification of the component

g. Maintenance records, indicating maintenance performed by the General Contractor and Trade Contractors prior to operation of the component being turned over to the owner

h. A copy of the warranty, including the covered items, date of inception, and date of expiration

i. A single page document listing any special tools or testing equipment required for the operation, testing, or maintenance of the component

j. The sequence of operation and control diagrams for components controlled by the building automation system, or other commissioned controls

k. Wiring diagrams

C. Electronic O&M Manual Edits and Mark-Ups

1. O&M manual data should be edited and marked up to clearly indicate which products, model numbers, accessories, and options were provided with the equipment for this project.
2. The O&M manual shall be organized by system, equipment type, and component name (tag number).

D. Electronic O&M Manual Format

1. If a paper O&M Manual is also submitted, the electronic O&M should be labeled and organized so that all its sections appear in the same order in both versions.
2. All documents shall be submitted in standard formats acceptable to the Owner.
3. All electronic O&M data is to be delivered on CDs or DVD-ROM disks that are formatted for reading from a standard drive.
4. CDs are to be contained in durable plastic cases.
5. The CDs or DVD-ROM disks shall be labeled permanently in legible ink with the project name, “OPERATION AND MAINTENANCE MANUAL – VOLUME _ OF _” and a description of the contents, e.g., which systems are contained on the CD or DVD-ROM disks.
6. The O&M data shall be organized by the following naming structure for the electronic files:
   a. (Equipment Type Name)_(DOCUMENT TYPE IN CAPS).(file extension)
   b. Example: a manufacturer’s O&M manual for air handling unit AHU-1 would be named: AHU-1_OM.pdf.
   c. Example: a chilled water piping submittal would be named CHW Pipe_SUB.pdf.
   d. The following are additional examples of documentation type abbreviations:
      1) O&M Manual: OM
      2) Installation Instructions: INSTL
      3) Submittal: SUB
      4) Specification Section: SPEC
      5) Change Order: CO
      6) Sequence Of Operation: SOO
      7) Control Diagrams: CRTLD
      8) Preventive Maintenance Instructions: PM
      9) Warranty: WTY
      10) Parts List: PL
      11) Tools List: TL
      12) Inspection/Test Reports: ITR
      13) Maintenance Records: MR
      14) Spare Parts List: SPL
      15) Wiring Diagrams: WD
7. The files on each CD or DVD-ROM disk should be organized by system according to the following folder structure:
   a. System name (e.g., Chilled Water System)
      1) Component Type / System Type (e.g., pumps, chilled water piping)

2) Tag number or system name (e.g., Pump P-1, chilled water piping)

3) For numerous, repetitive equipment such as terminal units, the O&M documentation does not need to be separated by tag number. Rather, similar types of the equipment (e.g., fan powered with reheat, fan powered without reheat, etc.) can be grouped into one file and a table provided to document the tag numbers, model numbers, and capacity/performance data.

8. Where more than one CD or DVD-ROM disk is required, do not split the documentation for a system apart and include parts on two different CDs or DVD-ROM disks.

9. All documentation provided shall be clearly marked to indicate the installation for the present project. Unedited general cut sheets and manuals for multiple models, installations, etc. are not acceptable.[GH3][NT4]

3.7 EQUIPMENT START-UP

A. The General Contractor will coordinate start-up of commissioned systems and equipment by the Trade Contractors, and provide at least two working days notice to Stephen Turner Inc.

B. Stephen Turner Inc. will witness start-up of selected commissioned systems and equipment for compliance with the Owner's Project Requirements.

C. For all commissioned systems and equipment, one copy of the start-up report shall be forwarded to Stephen Turner Inc. for review and to document that the equipment is installed, operational, and ready for commissioning testing.

3.8 COMMISSIONING FUNCTIONAL PERFORMANCE TESTING

A. All Pre-Functional Checklists, start-ups, adjustments, controls programming, and verification of proper operation shall be completed by the Contractors prior to Functional Performance Testing.

1. While components can be tested as work is completed, system functional performance testing requires completion of all testing prerequisites: checklists, start-up, start-up forms, controls point-to-point checks, controls sequences programming and debugging, TAB, and other contractual requirements.

B. In general, Functional Performance Testing shall include testing each sequence in the sequence of operations, and other significant modes, sequences and control strategies not mentioned in the written sequences; including, but not limited to startup, shutdown, unoccupied and manual modes, modulation up and down the unit's range of capacity, power failure, alarms, component staging and backup upon failure, interlocks with other equipment, and sensor and actuator calibrations.

1. All interlocks and interactions between systems shall be tested.
2. All larger equipment will be individually tested.
3. Like units or assemblies that are numerous (many smaller rooftop packaged units, air terminal units, exhaust fans, windows, etc.) may have an appropriate sampling strategy applied per the list in the Table in Paragraph 1.6 above.
4. Heating equipment must be tested appropriately during winter and air conditioning equipment must be tested appropriately during summer to demonstrate performance under near-design conditions.

C. For systems and components in the Table in Paragraph 1.6 above, perform Functional Performance Tests as developed and led by Stephen Turner Inc. with the commissioning team.

1. Stephen Turner Inc. will provide draft Functional Performance Test procedures for review by the commissioning team members. Stephen Turner Inc. will incorporate any comments received into revised procedures. No response within five business days indicates approval.
2. The contractors will provide all tools or the use of tools to start, access equipment, check-out and functionally test equipment and systems, except for specified testing with portable data-loggers, which shall be supplied and installed by Stephen Turner Inc.

D. If major problems are discovered during any test (i.e. problems that will delay the completion of the test), the General Contractor, with the responsible Trade Contractors, will fix the problem after the conclusion of testing. Once the General Contractor and Trade Contractors have resolved the problem, testing shall be rescheduled and redone. If the issue is still not resolved, Stephen Turner Inc. shall determine with the Owner how Stephen Turner Inc.'s cost for subsequent retesting will be borne.

E. For identical or near-identical components (e.g., terminal units, diffusers, traps, valves, etc.): if 10%, or three, whichever is greater, of identical pieces of equipment fails to perform (size alone does not constitute a difference), not allowing it to meet its designed performance specification, all identical units may be considered unacceptable by the Owner. In such cases, the Contractor shall provide the Owner with the following:

1. Within one week of notification from the PM, the Contractor or manufacturer's representative shall examine all other identical units, making a record of the findings. The findings shall be provided to the PM and General Contractor within two weeks of the original notice.
2. Within two weeks of the original notification, the Contractor or manufacturer shall provide a signed and dated, written explanation of the problem, cause of failures, etc. and all proposed solutions which shall include full equipment submittals. The proposed solutions shall not significantly exceed the specification requirements of the original installation.
3. The Owner will determine whether a replacement of all identical units or a repair is acceptable. Two examples of the proposed solution will be installed for examination by the Owner and Stephen Turner Inc.
4. Stephen Turner Inc. will be allowed to test the installations for up to one week, after which the Owner will decide whether to accept the solution.
5. Upon acceptance, the Contractor and/or manufacturer shall replace or repair all identical items, at their expense and extend the warranty accordingly, if the original equipment warranty had begun. The replacement/repair work shall proceed with reasonable speed beginning within one week from when parts can be obtained.
6. For any functional performance testing issue identified that is not related to any issue identified on a pre-functional checklist or to a start-up fault, Stephen Turner Inc. will direct the retesting of the equipment once after the General Contractor indicates the issue has been resolved. If the issue is still not resolved, Stephen Turner Inc. shall determine with the Owner how Stephen Turner Inc.'s cost for subsequent retesting will be borne.

F. Any required retesting shall not be considered a justified reason for a claim of delay or for a time extension by the Contractor.

G. Every effort will be made to expedite the testing process and minimize unnecessary delays, while not compromising the integrity of the testing procedures. As tests progress and an issue is identified, Stephen Turner Inc. will discuss the issue with the appropriate Trade Contractor who is performing the test to determine how to proceed.

1. Corrections of minor issues identified may be made during testing at the discretion of Stephen Turner Inc. In such cases the issue and resolution will be documented on the test procedure form.
2. Major issues shall be corrected after the completion of testing. In such cases the issue and the General Contractor and Trade Contractors proposed resolution will be documented on the test procedure form. Upon re-testing, the actual resolution will be documented.

H. Seasonal Commissioning Tests

1. Portions of the final commissioning test procedures including but not limited to FPTs will be seasonally dependent (e.g., cooling system needs to be tested in late spring, summer, or early fall) and will need to be performed at a different time of year than the rest of the final commissioning testing.

3.9 SITE OBSERVATIONS AND VERIFICATION

A. The Commissioning Authority will periodically visit the site to observe the work in progress. Observations and recommended corrective measures will be tracked in the commissioning issues log and communicated to the General Contractor and Owner.

B. Any commissioning observation that does not meet the Owner's Project Requirements is a commissioning issue and will be included in the Commissioning Issues Log or other reports as appropriate. Each observation is intended to improve the project quality and achieve the Owner's Project Requirements.

3.10 DOCUMENTATION OF COMMISSIONING ISSUES

A. The Commissioning Issues Log focuses on systemic issues and is not a complete "punch list" containing all occurrences of the issue, i.e., all pieces of the equipment type mentioned in the issue may not have been individually verified.

B. To aid in issue resolution, any commissioning issues identified during commissioning testing will be noted in the Issues Log.

C. The General Contractor shall respond to the Commissioning Authority and PM at least as often as commissioning meetings are being scheduled concerning the status of each outstanding issue identified during commissioning. Discussion shall cover explanations of any disagreements and proposals for their resolution.

1. If issues remain open for more than two commissioning meetings without steps taken toward resolution or without a plan communicated for resolving the issue, Stephen Turner may request, and the General Contractor shall provide, a response in writing including explanations of any disagreements and proposals for their resolution.

D. If the commissioning team cannot reach a resolution to an issue or disagree on whether an item should be an issue, Stephen Turner Inc. and the General Contractor will present the issue jointly to the Owner for direction.

3.11 TRAINING

A. General

1. The General Contractor, with input from the Owner, shall be responsible for training coordination and scheduling and ultimately to ensure that training is completed.

2. Stephen Turner Inc. will verify that the General Contractor provides the training schedule in advance to the Owner.
3. The Trade Contractor for the respective system is responsible for the development and implementation of the training material for the system.
4. Training shall be completed and accepted by the Owner prior to occupancy.

B. Scope of Training

1. Training Manual
   a. A Training Manual shall be developed in collaboration with the owner, commissioning agent, and contractor, and shall consist of two main sections, The Training Plan section composed of the training schedule and agendas covering individual training sessions, and the Training Materials section containing training handouts, sign-in sheets and other documentation to be provided by the contractors.
      1) The contractor shall propose for the owner's approval how many training sessions are needed for each Division. The first training session for all Divisions shall be conducted at the time of start-up and checkout. The remaining sessions shall be scheduled and conducted prior to substantial completion and occupancy. The training sessions shall be conducted at the site and the agenda developed by the contractor shall specify the breakout and duration of each session.
      2) The contractor shall provide the owner and commissioning agent a draft training schedule and agendas for review and comments. Contractors must provide training agendas as a formal submittal three weeks prior to the scheduled training session. Comments are due within 3 business days of receipt. Owner shall approve and sign off on the schedule and agendas before contractors proceed with the training sessions.
2. The General Contractor shall provide designated Owner personnel with comprehensive orientation and training in the understanding of the systems and the operation and maintenance of each piece of equipment.
3. The training topics shall include all equipment and systems. The General Contractor shall provide training on each piece of equipment. Training schedule shall include a breakdown of the time allotted for each system.
4. Training shall include hands-on training on each piece of equipment, which shall illustrate all modes of operation, including startup, shutdown, emergency, power failure, seasonal changeovers, etc.
5. General training topics shall include the following for each training session:
   a. Overview and description of the purposes of the system.
   b. Proper operating requirements
   c. Special tools needed and recommended spare parts.
   d. Review Operations and Maintenance manuals.
   e. Service, maintenance, and preventive maintenance.
   f. Common troubleshooting issues and methods, control system warnings and error messages, including using the control system for diagnostics.
   g. System troubleshooting: description of diagnostic step-by-step procedures for determining the source of problems on the system level; review technical service manual in detail.

h. Component troubleshooting: description of diagnostic procedures for determining the source of problems on the component level.

i. Component maintenance: instruction of required procedures for weekly, monthly, and annual preventive maintenance checks and timely repairs to preserve system integrity.

j. Upkeep of the systems manual and associated maintenance documentation logs.

k. Review of control drawings and schematics.

l. Startup, loading, normal operation, unloading, shutdown, restart after power loss or emergency shutdown, unoccupied operation, seasonal change-over etc. as applicable.

m. BAS controls: Programming, troubleshooting, alarms, manual operation, interface with integral controls.

n. Integral controls (OEM controls on packaged equipment): programming, troubleshooting, alarms, manual operation.

o. The installing contractor shall coordinate training on OEM controls with the BAS vendor installing the building controls.

p. Special requirements for adjusting controls for proper seasonal functionality.

q. Interactions with other systems, operation during power outages and fire.

r. Relevant health and safety issues and concerns and special safety features.

s. Energy conserving operation and strategies.

t. Any special issues to maintain warranty.

u. Contractors shall provide a list of equipment warranty, and documented equipment startup dates.

v. Questions and answers period.

w. Restore systems to fully automatic operation.

6. Specific training topics including level of training shall be as follows:

a. Training on Mechanical and Plumbing Systems

1) General familiarization with and operating procedures for all the plumbing systems and HVAC&R.

2) Provide training and demonstrations of the equipment sequences of operation to the Operations department staff for each plumbing and HVAC&R system.

3) Specific operating maintenance procedures for: variable refrigerant flow system consisting and automatic temperature control system consisting of all associated hardware, software, and program logic.

4) Documented procedures for all preventive maintenance required to preserve warranties and guarantees shall be provided and reviewed for each system.

5) Factory-trained technician shall demonstrate and review both normal and failure modes of system Controls operation where provided.

6) Routine maintenance procedures for all major equipment and components, including procedures for cleaning, lubrication, maintenance, replacement of routine expendable parts and all other actions required for normal operations and maintenance.

7) During training demonstrations the factory-trained technician should operate the systems for a minimum of two hours or five repetitions, or as otherwise determined by the owner.

8) The factory-trained technician on the above systems and equipment shall propose minimum session durations, and owner shall approve.

b. Training on Electrical Systems

1) General familiarization and operating procedures for the entire electrical installation.

2) Provide training and demonstrations of the equipment sequences of operation to Operations department staff for the switchboards, generator, and lighting control systems.

3) Specific operating and maintenance procedures for: lighting control systems and generator.

4) Documented procedures for all preventive maintenance required to preserve warranties and guarantees shall be provided and reviewed for each system.

5) Factory-trained technician shall demonstrate and review both normal and failure modes of system Controls operation where applicable.

6) During training demonstrations the factory-trained technician shall operate the systems for a minimum of two hours or five repetitions of all programmed scenes and occupancy modes, unless otherwise determined by the owner.

7) Routine maintenance procedures for equipment, including cleaning, lubrication, maintenance, replacement of routine expendable parts and all other actions required for normal operations and maintenance.

8) The factory-trained technician on the above systems shall propose minimum session durations, and owner shall approve.

c. Training on Building Management System (BAS)

1) All training sessions shall include training on completed, properly functioning head end graphics with remote alarm annunciation and energy monitoring screens. In the event that all work is not complete at turnover, additional interim training shall be provided at that time and other required training shall be provided upon proper completion.,

2) A minimum of two formal training sessions for operators on the BAS system shall occur. Factory-trained personnel familiar with the specific installation shall propose a session duration for each session; owner shall approve.

3) The owner to determine the number of operators to be provided the training to for each session.

4) An additional separate training course provided on the BAS system for supervisory personnel, focusing on the more advanced features of the system with emphasis on energy conservation strategies and reporting capabilities of the system.

5) Documented procedures for all preventive maintenance required to preserve warranties and guarantees shall be provided and reviewed for each system.

C. Preparation for Training

1. Training agenda forms shall be prepared by the relevant Trade Contractors. The agenda shall be followed to assure efficient training and a knowledge level that meets or exceeds the owner’s intent.

2. Training manuals, O&M manuals, BAS programming files, and available as-builts must be provided as formal submittals 21 calendar days prior to each training session.
3. Stephen Turner Inc. will review the proposed training material from the General Contractor and the Trade Contractors and will provide comments and suggestions to supplement the training material for operations and maintenance personnel, if and where appropriate.
4. The General Contractor and Trade Contractors training material shall include:
   a. Detailed agenda
   b. Trade Contractor contact sheet, including address, phone number, fax number and e-mail.
   c. Detailed training material divided by sections.
   d. Maintenance checklists/ log sheets.

D. Implementation of Training
1. The trainer, prior to and during each training session, shall complete the prepared training record form. The trainer is responsible for checking the subjects covered from the training agenda and for obtaining signatures from the trainees in attendance.
2. All trainers shall have an in-depth working knowledge of the specific installation or system to be covered.
3. All trainers shall be in place, set up, and ready to provide training as scheduled for each training session.

E. Training Documentation
1. All training sessions shall be professional visually recorded using a standard compact disk or other format specified by the owner. The sessions can be recorded however contractor deems suitable but must be transferred to owner's requested method of distribution.
2. Format of final training deliverable must be organized and easy to use for maintenance purposes. Final training videos shall be labeled and provided in DVD format.

F. Prior to the end of the General Contractor and Trade Contractors warranty period (typically the ninth or tenth month for a one year warranty), Stephen Turner Inc. will review operational issues reported by the owner's operation and maintenance personnel and building users, to help determine if there are any operational problems which have construction or manufacturer's deficiencies as their root cause. If any such problems are identified, Stephen Turner Inc. will work with the Contractor to identify a recommended course of action to correct the deficiencies. The contractual responsibility of the subcontractor or supplier to remedy the problem shall not be diminished by Stephen Turner Inc.'s cooperation.

G. Any resolutions to warranty issues shall be incorporated as changes to as-built, O&M and other required documentation.

3.12 AS-BUILT DRAWINGS

A. Redline or record drawings shall be kept up to date at all times.

B. The General Contractor shall ensure that accurate red-line or record drawings of as-built conditions are maintained by each trade, at the job site, throughout the construction phase. The record drawings shall be available for review by Stephen Turner Inc. If discrepancies are noted on the Trade Contractor's record drawings, the General Contractor will review the Trade Contractors' recording procedures and adjustments to ensure that the record drawings

are kept up to date and accurate. The record drawings shall be corrected promptly to ensure the accuracy of the as-built drawings throughout the project.

C. The redline or record drawings maintained by the Trade Contractors will be periodically reviewed and verified during construction by Stephen Turner Inc. Discrepancies in the drawings will be documented and the Trade Contractors shall verify the as-built drawings against the installed system for all similar problems for correction.

D. As-built drawings in compliance with the Owner's requirements for electronic drawings shall be formally submitted and provided to Stephen Turner Inc. for review and use in commissioning documentation within 30 days of training.

E. As-built drawing one-lines and riser diagrams shall show the locations of all installed meters and sub-meters, as well as virtual meters, if applicable.

APPENDICES

APPENDIX A - SAMPLE TRAINING AGENDA

Date: _____ ***Equipment / System:*** _____

SECTION 1. AUDIENCE AND GENERAL SCOPE

Intended audience type: ___facility engineer, operations, maintenance, technician

__occupant, user, or other:_____

General scope of training: ___ Overview ___ Intermediate ___ Detailed

SECTION 2. INSTRUCTORS

Attach qualifications for each trainer

ID	**Trainer**	**Company**	**Qualifications Attached** (✓)
1)	_____	_____	
2)	_____	_____	

etc. as needed

SECTION 3. AGENDA

Subjects to be covered (see next page for Owner's requests; attach additional sheets if needed)

Session 1 Date:_____ Location:_____

Duration_____Instructor(s)_____(hrs)_____ID(s)__

Session 2 Date:_____ Location:_____

Duration_____Instructor(s)_____(hrs)_____ID(s)__

etc. as needed

Total duration of training (hrs) ----------> ☐

SECTION 4. APPROVALS

This plan has been approved by the following individuals, subject to any additions and clarifications noted. (This is not an approval of training completion.)

_____ _____

Owner's Representative Date

_____ _____

Commissioning Authority Date

Session Subject	**Date**	**Duration (hrs)**	**Instructor (ID#)**	**Completed (✓)**
1. Safety issues for the system and components				

2. Overview and description of the purposes of the system				
3. Troubleshooting: description of diagnostic step by step procedures for determining the source of problems on the system and component level; review technical service manual in detail				
4. Maintenance: instruction of required procedures for weekly, monthly and annual preventative checks and timely repairs to preserve system and component integrity. Any special issues to maintain warranty.				
5. Review of control drawings and schematics (have copies for attendees)				
6. Startup, loading, normal operation, unloading, shutdown, unoccupied operation, seasonal changeover, etc, as applicable				
7. On-board controls (for skid or packaged equipment): Programming, troubleshooting, alarms, manual operation				
8. Building automation controls (BAS): Programming, troubleshooting, alarms, setpoints, manual operation, interface with integral controls				
9. Critical BAS sensors and recommended recalibration intervals for each				
10. Interactions with other systems, operation during power outage and fire				
11. Utility metering				
12. Energy conserving operation and strategies				
13. Question and Answer Period				
14. Additional Topic: _____				
15. Additional Topic: _____				
16. Additional Topic: _____				
Total Duration of training (hrs) ----------→				

END OF APPENDIX A

APPENDIX B – SAMPLE COMMISSIONING CHECKLISTS

1.2 PRE-FUNCTIONAL CHECKLIST: SAMPLE PROVIDED AS AN EXAMPLE OF THE LEVEL OF RIGOR REQUIRED

AHU-1 - DELIVERY

AIR HANDLING UNIT AHU-1

Note: Complete upon arrival of unit

Shipment Inspected: _____

Date checklist completed: _____

ITEM	SPECIFIED	SUBMITTED	ACTUAL
Manufacturer	YORK	TRANE	
Model Number	YSWU025	LPCAA21D	
Total CFM / Minimum OA	8500 / 2300	8500 / No Spec	
External Static (in)	2.0	2.0	
Motor Manufacturer	n/a	n/a	
Model Number	n/a	n/a	
Serial Number	n/a	n/a	
Nameplate HP	15	10	
Volts/Phase/Amps	208V/3ph/42A	208V/3ph/32.2A	
Preheat MBH	223.5	223.5	
Cooling Coil	5 Row 12 Fins per Inch	6 Row 14 Fins per Inch	
Cooling MBH (Total/Sensible)	333/248	333/257.45	
VFD Manufacturer/Model	No Spec	No Spec	
Serial Number	n/a	n/a	
VFD HP Rating	No Spec	No Spec	
VFD Line Reactor %	No Spec	No Spec	

Additional observations & notes_____

_____

_____

1.3 PREFUNCTIONAL CHECKLIST:

AIR HANDLING UNIT AHU-1 - CONNECT

Note: Complete after installation & connections

Date checklist completed: _____

Installation Check	(Y/N)	Notes
1. Equipment tag & nameplate permanently affixed		
2. Unit on concrete pad with vibration isolators, isolators released from shipping bolts.		
3. Casing condition good - (no dents, no leaks, gaskets installed, access doors close)		
4. Duct connections to unit tight, fully sealed without leaks, and in good condition		
5. Duct flex connectors and sound attenuators provided and installed per drawings		
6. Hydronic piping complete and in compliance with plans & specs, including gauges, sensor wells and PT test plugs		
7. Preheat valve and actuator provided and properly installed (VG1241DN+936GGA)		
8. Cooling valve and actuator provided and properly installed (VG1241ER+956GGA)		
9. Condensate drain complete, trapped and pitched per, plans, specs & mfgr's rec.		
10. Adequate access for maintenance and removal/replacement of coils, shafts, etc.		
11. Acoustic insulation properly installed according to specification		
12. Clean up of equipment completed per contract documents		
13. Fan bearings lubricated (checked by installer)		
14. Belts properly aligned, tensioned and all guards in place		
15. Filters installed per specifications		
16. No unusual vibration or noise		

Additional observations & notes_____

_____

_____

1.4 PREFUNCTIONAL CHECKLIST: AHU-1 - POWER **ELECTRICAL**

AIR HANDLING UNIT AHU-1

Note: Complete after wiring complete

Date checklist completed: _____

Installation Check	(Y/N)?	Note or #
1. Feeders and devices adequately sized per code to serve fan and VFD		
2. Feeders and devices supported per code		
3. Power disconnect in place and labeled		
4. Input and output VFD feeders in separate conduits		
5. All electrical connections tight		
6. Fan rotation correct (in both VFD and bypass mode if bypass provided)		
7. Electrical feeders, VFD and devices labeled per Brown requirements		

Additional observations & notes_____

_____

_____

1.5 PREFUNCTIONAL CHECKLIST: AHU-1 - CONTROLS **CONTROLS**

AIR HANDLING UNIT AHU-1

Note: Complete after controls are installed, wired and fully tested
Date checklist completed: _____

Installation Check	(Y/N)?	Note or #
1. Damper actuators adequately sized; dampers operate smoothly and close tightly		
2. Damper actuators and EMS damper outputs adjusted to stroke simultaneously		
3. Filter dP switch properly installed, wired, calibrated and tested		
4. Mixed air averaging sensor located per specs and tested		
5. Preheat discharge averaging sensor located per specs and tested		
6. Low temperature cutout located per specs, interlocked with VFD's and EMS input, adjusted correctly, and tested		
7. Air flow station properly located per specifications and calibrated to TAB results		
8. High static cutout interlocked with VFD's & EMS input, adjusted properly & tested		
9. Discharge air temperature sensor properly located and tested		
10. Duct static sensor properly located 2/3 down duct at location appv'd by engineer, calibrated & tested		
11. VFD interface points (S/S, Speed modulation, run status and smoke detector interlock) all installed completely and tested.		
12. Fan status CT adjusted to indicate run status reliably at minimum fan speed		
13. Controls fully tested, defect-free and ready for functional performance testing		

Additional observations & notes_____

_____

_____

END OF APPENDIX B

APPENDIX C – Sample Commissioning Test Procedures

FUNCTIONAL PERFOMANCE TEST PROCEDURE: SAMPLE PROVIDED AS AN EXAMPLE OF THE LEVEL OF RIGOR REQUIRED

AHU CONTROL SEQUENCE TESTS

Date / Time:		Test Observed By:	

EQUIPMENT SAFETIES

PROCEDURE

Test 1: High Static Pressure. Install a manometer in the ductwork to read static pressure. Fan off during this test. Determine the design shutdown setting. If not specified on the drawings, get this information from the design engineer. Using a manometer and a squeeze bulb, slowly apply pressure to the switch sensing input until the threshold pressure is achieved. Verify that the switch activates. Release the pressure and verify that the switch remains activated (manual reset). Verify that the fan will not start in automatic or manual modes, either through the BAS, motor starter, or VFD as applicable. Press the manual reset and verify that the equipment will re-start.

This portion of the test will be considered successful if the high static switch shuts down the fan unconditionally, and cannot be bypassed by any manual controls.

Test 2: Low Temperature (Freeze Stat). Lower the temperature of the freeze stat sensing element. Verify that the switch activates. Raise the element temperature and verify that the switch remains activated (manual reset). Verify that isolation and outdoor air dampers close, that preheat valve opens, coil heats up, and that the fan will not start in automatic or manual modes, either through the BAS, motor starter, or VFD as applicable. Press the manual reset and verify that the equipment will re-start.

This portion of the test will be considered successful if the freeze stat shuts down the fan unconditionally, heating coil temperature rises, and the fan cannot be bypassed by any manual controls.

Test 3: AHU Fire Alarm Shutdown. Disconnect one end of the wire at the duct detector or fire alarm relay that is intended to shutdown the AHU. Verify that the fan will not start in automatic or manual modes, either through the BAS, motor starter, or VFD as applicable. Replace the wire and verify that the equipment will re-start.

This portion of the test will be considered successful if the control circuit as wired shuts down the fan unconditionally, and cannot be bypassed by any manual controls. NOTE: this is not a fire alarm test, this only tests that the interface method used will shut down the fan unconditionally.

When finished, return all overridden points, modes and sequences to their original state.

RESULTS & NOTES:

Test #	Acceptance Criteria	Tolerance	Accepted ? (Y / N)	Remarks
1	High Static Shutdown: The high static switch shuts down the fan unconditionally, and cannot be bypassed by any manual controls.	Shutdown at +/- 0.2 in.w.c. from setting		
2	Freeze Stat Shutdown: the freeze stat shuts down the fan unconditionally, and cannot be bypassed by any manual controls.	Shutdown at +/- 2°F from setting		
3	Fire Alarm Shutdown: The control circuit as wired shuts down the fan unconditionally, and cannot be bypassed by any manual controls.	None		

SUPPLY FAN VFD "RAMP-UP" AND "RAMP-DOWN"

PROCEDURE

Begin the test with the VFD driven motor in the off position. With the fan in manual control, cause a step change from 0 to 50% commanded output. Verify that the VFD "ramp up" settings cause the motor to slowly increase in speed, and do not cause a abrupt change in speed. Cause a step change from 50 to 25% commanded output. Verify that the VFD "ramp down" settings cause the motor to slowly decrease in speed, and do not cause a abrupt change in speed.

Once the test is completed, return all overridden points, modes and sequences to their original state.

This portion of the test will be considered successful if the motor speed changes gradually after a step change output from the control system, indicating the "ramp-up" and "ramp-down" controls have been set in the VFD.

1.1

RESULTS

Acceptance Criteria	Tolerance	Accepted ? (Y / N)	Remarks
The motor speed changes gradually after a step change output from the control system, indicating the "ramp-up" and "ramp-down" controls have been set in the VFD.	Abrupt changes not allowed		

SUPPLY FAN STATIC PRESSURE CONTROL TEST

PROCEDURE

Complete the high static pressure safety and VFD "Ramp-Up" and "Ramp-Down" tests before beginning this test.

Set up trends for the supply air static pressure, setpoint, and VFD percentage.

Begin the test with the fan at 0% capacity. With the duct static setpoint at 1.0 in. w.c., start the fan. Observe the VFD and motor to see if the control action is smooth and does not hunt. Allow sufficient time for the control system to stabilize, approximately 2 or 3 minutes maximum. Read the static pressure and verify that the setpoint was achieved. Decrease the static pressure setpoint by 0.5 in. w.c. and observe the control system reaction to the step change.

Return all overridden points, modes and sequences to their original state.

This portion of the test will be considered successful if the controls are stable and the duct static pressure controls achieve their setpoint.

RESULTS

Acceptance Criteria	Tolerance	AHU	Accepted ? (Y / N)	Remarks
The controls are stable and the duct static pressure controls achieve their setpoint.	+/-0.1 in. w.c.	B4		
		C2		

AIR-SIDE ECONOMIZER CONTROL TEST

PROCEDURE

High static pressure and freeze protection shutdown safety controls must be verified prior to this test, to avoid equipment damage during the test. For VAV system, open VAV boxes to permit unrestricted flow of the supply fan.

The relationship between the outside air temperature, return air temperature, and mixed air temperature setpoint must be appropriate for utilizing the outdoor air for cooling purposes. In general, the OAT should be 55°F or less in order to conduct this test, and colder is better. In general, this test can be conducted if the OAT meets these requirements: OAT below RAT, OAT above freezing. If the OAT is not in the proper range, a complete test of the mixed air system will require a subsequent visit when the conditions are appropriate (seasonal test).

Control the supply fan capacity for VAV air handlers manually during this test.

Set up trends for OA, MA, and RA temperatures; OA cfm and setpoint; and OA and RA damper positions.

Test 1: Override the outside air temperature value to a point just above the lower limit of the economizer enable threshold value (temperature or enthalpy as applicable). When the threshold value is crossed, the control should respond by entering and leaving the economizer mode. When entering the economizer mode, observe the dampers begin to modulate to maintain mixed air temperature setpoint. When leaving the economizer mode, observe the dampers revert to minimum outside air position.

This portion of the test will be considered successful if the system enters and leaves the economizer mode according to outside air temperatures at the specified thresholds, and maintains the minimum ventilation rate when the economizer is disabled.

Test 2: If there is an economizer "enable" or "lockout" temperature or enthalpy, temporarily manipulate this point as required to keep it from interfering with the test (e.g. enable the economizer without regard to OAT or enthalpy). Based on (OAT) and (RAT), determine a reasonable mixed air setpoint that will set the controls into motion. Observe the mixing dampers to see if the control action is smooth and does not hunt. Allow sufficient time for the control system to stabilize, approximately 2 or 3 minutes maximum. Read the mixed air temperature and verify that the setpoint was achieved. Select a different mixed air temperature setpoint, preferably at least 10 degrees different than the original setpoint, and observe the control system reaction to the step change.

Return all overridden points, modes and sequences to their original state.

This portion of the test will be considered successful if the controls are stable and the mixed air controls achieve their setpoint.

RESULTS

SUPPLY AIR TEMPERATURE CONTROL TEST

PROCEDURE

High static pressure and freeze protection shutdown safety controls must be verified prior to this test, to avoid equipment damage during the test. For VAV system, open VAV boxes to permit unrestricted flow of the supply fan.

Temporarily disable the Air-Side Economizer Control operation before beginning this test.

Test 1: Temporarily disable the HW heating controls. Start the SA fan, and gradually increase the speed until 50 % capacity is reached. Adjust the SA heating temperature setpoint to 80°F and be sure it is higher than the SA temperature at this point. Release the HW controls. Observe the HW valve to see if the control action is smooth and does not hunt. Allow sufficient time for the control system to stabilize, approximately 2 or 3 minutes maximum. Read the SA temperature and verify that the setpoint was achieved. Gradually increase the SA fan capacity to 100 % and observe the control system reaction to the step change.

Test #	Acceptance Criteria	Tolerance	AHU	Accepted ? (Y / N)	Remarks
1	The system enters and leaves the economizer mode according to outside air conditions at the specified thresholds, and maintains the minimum ventilation rate when the economizer is disabled.	Event occurs at specified temp.	B1		
			C2		
2	The mixed air controls are stable and achieve their setpoint.	+/- 10 % of setpoint	B1		

This portion of the test will be considered successful if the controls are stable and the SAT controls achieve their setpoint.

Test 2: Temporarily disable the CW cooling controls. Start the SA fan, and gradually increase the speed until 50 % capacity is reached. Adjust the SA cooling temperature setpoint to 55°F and be sure it is lower than the SA temperature at this point. Release the CW controls. Observe the CW valve to see if the control action is smooth and does not hunt. Allow sufficient time for the control system to stabilize, approximately 2 or 3 minutes maximum. Read the SA temperature and verify that the setpoint was achieved. Gradually increase the SA fan capacity to 100 % and observe the control system reaction to the step change.

Return all overridden points, modes, and sequences to their original state.

This portion of the test will be considered successful if the controls are stable and the SAT controls achieve their setpoint.

RESULTS

POWER FAILURE TEST

Date / Time: _____ **Investigator(s):** _____

This test must follow the regulations and requirement of local Fire Department. Perform this test before the building is occupied. Notify the Fire Department before this test is started.

1.1 OBJECTIVES

The purpose of this test is to verify that the generator starts within the designed time period after a power failure and supplies the power required by the systems. All systems and equipment must operate as intended after the power is restored and the power will maintain the specified quality as equipment start up. The circuit must be switched to supply generated power to all system and equipment required to be on emergency power. When power goes back to the normal condition the equipment and systems shall operate as normal without interruptions and the generators shall shut off.

1.2 PROCEDURE

Verify the generator start up time, voltage, and shut down. Verify that a random selection of equipment operates as intended.

The power failure procedure is as follows:

Test #	Acceptance Criteria	Tolerance	Accepted ? (Y / N)	Remarks
1	The HW controls are stable and the SAT controls achieve their setpoint.	+/- 2°F, no hunting		
2	The CW controls are stable and the SAT controls achieve their setpoint.	+/- 2°F, no hunting		

1. Notify the local fire department
2. Disconnect the electrical power supply to the building
3. Verify that all emergency functions are operable until the generator supplies power
4. Verify that the generator and all equipment operate as required
5. Connect the building to the electrical supply
6. Verify that the equipment continues to operate as intended
7. Notify the local fire department that the testing is completed

This test will require several observers (with 2-way radios) in different locations to verify when the equipment and systems are operational unless the building automation system is able to monitor all the equipment and systems.

1.3 MEASURING EQUIPMENT

Prepare following measuring equipment, which shall have been calibrated less than 12 months before these tests:

- Stop watch
- Voltmeter
- Light meter

1.4 RESULTS

Emergency Lighting

Room number	Emergency Lighting ?	Room number	Emergency Lighting ?
	Yes / No		Yes / No
	Yes / No		Yes / No
	Yes / No		Yes / No
	Yes / No		Yes / No
	Yes / No		Yes / No
	Yes / No		Yes / No

Emergency Functions

Equipment	Power available ?	Equipment	Power available ?
	Yes / No		Yes / No
	Yes / No		Yes / No
	Yes / No		Yes / No

Generator

Start Up duration	( ) Sec.
Maintains required voltage during start-up	Yes / No
Maintains required voltage during power restoration	Yes / No
Shut Down duration	( ) Sec.

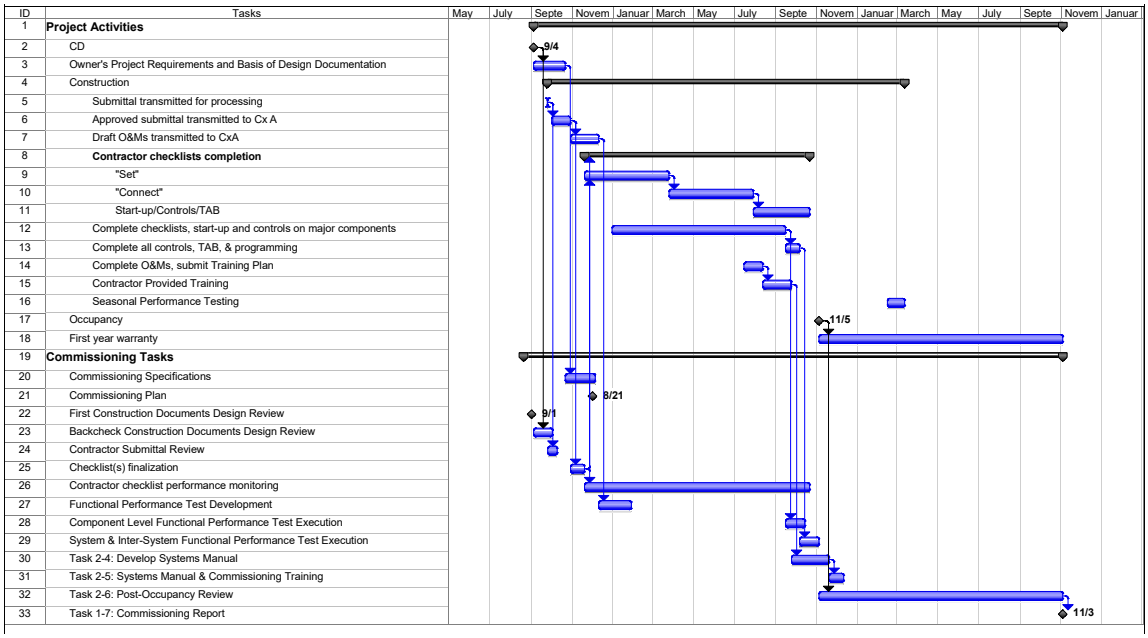
Equipment

Equipment type and #	Start up time after power failure (s)	Operates as intended during external power outage ?	Operates as intended after external power is restored ?	Comments
		Yes / No	Yes / No	
		Yes / No	Yes / No	
		Yes / No	Yes / No	
		Yes / No	Yes / No	
		Yes / No	Yes / No	
		Yes / No	Yes / No	
		Yes / No	Yes / No	
		Yes / No	Yes / No	
		Yes / No	Yes / No	
		Yes / No	Yes / No	
		Yes / No	Yes / No	

1.5 GENERAL COMMENTS:

END OF APPENDIX C

APPENDIX D: SAMPLE COMMISSIONING SCHEDULE



ID	Tasks
1	**Project Activities**
2	CD
3	Owner's Project Requirements and Basis of Design Documentation
4	Construction
5	Submittal transmitted for processing
6	Approved submittal transmitted to Cx A
7	Draft O&Ms transmitted to CxA
8	**Contractor checklists completion**
9	"Set"
10	"Connect"
11	Start-up/Controls/TAB
12	Complete checklists, start-up and controls on major components
13	Complete all controls, TAB, & programming
14	Complete O&Ms, submit Training Plan
15	Contractor Provided Training
16	Seasonal Performance Testing
17	Occupancy
18	First year warranty
19	**Commissioning Tasks**
20	Commissioning Specifications
21	Commissioning Plan
22	First Construction Documents Design Review
23	Backcheck Construction Documents Design Review
24	Contractor Submittal Review
25	Checklist(s) finalization
26	Contractor checklist performance monitoring
27	Functional Performance Test Development
28	Component Level Functional Performance Test Execution
29	System & Inter-System Functional Performance Test Execution
30	Task 2-4: Develop Systems Manual
31	Task 2-5: Systems Manual & Commissioning Training
32	Task 2-6: Post-Occupancy Review
33	Task 1-7: Commissioning Report

END OF APPENDIX D

APPENDIX E: SAMPLE CONTRACTOR'S AFFIDAVIT OF READINESS FOR TESTING COMMISSIONED SYSTEMS

CONTRACTOR'S AFFIDAVIT OF READINESS FOR TESTING COMMISSIONED SYSTEMS

Completion of this form is a required prerequisite before scheduling functional performance testing of each commissioned system. The Contractor shall complete and return this form to Stephen Turner Inc. before testing will be scheduled.

The following table lists the commissioned systems in the project. The contractor hereby confirms that the following systems are ready for testing and that all applicable prerequisites listed further below have been satisfied.

Commissioned System Name	Ready for Testing
[EQUIPMENT #1]	
[EQUIPMENT #2]	
[ETC]	

Note that BAS system configuration is considered a component of the installation for each relevant piece of commissioned equipment.

The following testing prerequisite documents have been provided to Stephen Turner Inc. for all of the applicable systems marked as “Ready for Testing”.

- Start-Up Reports
- Approved Test and Balance Reports (air and water)
- Completed Pre-Functional Checklists
- Controls Point-to-Point Checkout Report
- Start-Up Reports for all major HVAC equipment
- BAS Trend Data for initial pre-testing commissioning analysis

A.

The following testing prerequisites have been completed for all of the systems marked as “Ready for Testing” above.

- The Contractor confirms Systems are on permanent power.
- The Contractor confirms Controls are on permanent network.
- The Contractor confirms that trend data has been set up for all controls input & output points.
- The Contractor confirms that control system alarms are programmed and ready for verification.
- The Contractor confirms that control system head-end graphics are completed and ready for verification.
- The Contractor confirms that redline drawings are current and available onsite for reference during testing.
- The Contractor confirms that they have reviewed the draft Functional Performance Tests and have completed all work required to execute the test procedures with Stephen Turner Inc.
- The Contractor confirms that all systems being commissioned by Stephen Turner Inc. have been installed and verified to be fully functioning in a manner consistent with the design and construction documentation.
- Any and all known incomplete work or deficiencies are listed below.

B.

Indicate whether the controls contractor has independently executed the test procedures prior to scheduling formal commissioning functional performance testing. **Yes / No**

Any known incomplete work or deficiencies on the above-listed systems:

_____

_____

Name of Contractor: _____

Name of Contractor’s Project Manager: _____

Signature of Contractor's Project Manager: _____

Date: _____

END OF APPENDIX E

END OF SECTION

SECTION 01 91 19 – BUILDING ENCLOSURE COMMISSIONING

1.1 SUMMARY

A. This document details the implementation of the Building Enclosure Commissioning (BECx) process, to supplement to the quality control processes executed by the design and construction team for the proposed building. As the Building Enclosure Commissioning Provider (BECxP) for this project, it is the responsibility of Building Enclosure Science, LLC (BES) to implement the BECx process along with the commissioning team. Direction for the commissioning team is provided by the Owner's Project Requirements (OPR).

D. The role of the BECxP will be carried out by Building Enclosure Commissioning Specialists (BECxS) and Building Enclosure Commissioning Technologists (BECxT) who shall work with the Contractor and Contractor's Quality Assurance and Quality Control Plan and personnel to oversee the BECx processes and performance testing. The BECxP will observe tests as deemed appropriate. All required testing, unless otherwise specified in BECx Testing Matrix or in the individual BE technical sections (Divisions 03 through 08), will be performed by an independent third-party testing agency retained by the Contractor.

E. The BECxP will be contracted under the Commissioning Authority (CxA) / TBD or Owner for commissioning services. The Contractor shall coordinate and assist the BECxP to complete the scope of work outlined in this specifications section.

F. Commissioning does not relieve the installing contractors of their own internal, self-testing and/or quality control procedures.

1.2 SCOPE

A. This Section includes exterior enclosure commissioning procedures, including substructure, superstructure, exterior enclosure, and roofing construction that protects climate-controlled interior spaces from unconditioned spaces and the exterior environment, as follows:

1. Below-grade construction including foundations, basements, and slab-on-grade that functions as part of the exterior enclosure system but excluding structural systems and components.
2. Superstructure floor and roof construction that functions as part of the exterior enclosure system.
3. Exterior enclosure construction, above grade, including exterior opaque walls, windows, and doors including sheathing, framing, and insulation, and interior finish materials attached to the exterior wall.
4. Roofing, including roofing system, roofing insulation, and skylights, hatches, and other roof openings.

1.3 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this section.

B. Commissioning Specifications: See Division 01 Section 01 91 13 - General Commissioning Requirements for general requirements for all commissioning including definitions, means and methods for conducting the commissioning process, commissioning team members, Owner's responsibilities, Contractor's responsibilities, and CxA's responsibilities.

C. Individual Building Enclosure Specification Sections: Individual building enclosure technical sections (Divisions 03 through 08) stipulate requirements for material performance testing criteria, and warranties for the material, product or assembly specified in the Section. Installation, product testing, and assembly testing are stipulated in each section.

1.4 RELATED SECTIONS

A. Project Enclosure Related Specifications Sections 03-09.
B. See Table 1 of BECx Plan for a list of building envelope systems to be commissioned.
C. See Table 5 of BECx Plan for a project specific BECx testing matrix.

1.5 WORK INCLUDED

A. Commissioning requirements common to all Building Enclosure-Related Sections, including but not limited to the following:
   1. Validation of proper and thorough installation of Building Enclosure components.
   2. Building enclosure component performance verification.
   3. Documentation of tests, procedures, and installations.
   4. Coordination and requirements for field mock-up, trial installation and Functional Performance Testing events.
   5. Preparation and coordination of Building Enclosure Commissioning Report

1.7 REFERENCED STANDARDS

A. ASHRAE Guideline 0 - 2005 "The Commissioning Process"

B. NIBS Guideline 3-2012, "Exterior Enclosure Technical Requirements for the Commissioning Process"

C. ASTM E2813, “Standard Practice for Building Enclosure Commissioning”

D. ASTM E2947, “Standard Guide for Building Enclosure Commissioning”

D. Reference standards as identified in the individual Building Enclosure technical sections of this specification.

E. Reference standards as identified in Appendix E Referenced standards of this specification

1.8 DOCUMENTATION

A. The Contractor shall provide a letter, signed by the Contractor and all relevant subcontractors stating that each acknowledges in writing that the Owner regards the new building enclosure to be an important and performance-sensitive single element of the project. In support of this requirement, the Contractor must also acknowledge that they are solely responsible for the quality and coordination all exterior enclosure materials, components and systems such that they result in a fully integrated, weather-tight exterior enclosure that is in compliance with the Contract Documents

B. The Owner shall provide to the BECxP (and maintain) current contract documents for review and comment at the earliest possible time prior to the onset of construction. BECxP shall perform a constructability review and provide comments related to the durability, performance and BE conformance with the Owner Project Requirements for consideration by the Owner, A/E and Contractor.

C. The Contractor shall provide to the BECxP the following per the procedures specified herein and in other Building Enclosure Technical Sections of the specification (Divisions 03 through 08) and Division 01 Section 01 33 00 Submittal Procedures:

1. Shop Drawings and Product Data: Provide shop drawings and submittal data for materials, products, systems and equipment that will be part of the BECx process.

   a. The Contractor shall notify the BECxP when Shop Drawings and Product Data have been posted to Project Web-site and after the submittals have been reviewed and commented upon by the A/E. BECxP shall review and provide comments on the A/E reviewed submittal, and submit the BECxP review to the Owner and A/E, who will then review and incorporate the BECxP comments at their discretion and return to the Contractor. The Contractor shall then notify BECxP when the reviewed submittal with A/E submittal review stamp has been posted.

b. Any action taken by the A/E or Contractor based in whole or in part on the comments and recommendations provided by the BECxP as part of its submittal review shall be the sole responsibility of the A/E or Contractor.

2. Factory/Laboratory Test Reports: The Contractor shall provide any factory or laboratory testing documentation, material compatibility testing, or certified test reports required by the specifications. These shall be provided prior to acceptance and installation of the specific item.

3. Schedule Updates: The Contractor shall issue periodic updates to the construction schedule every two weeks or less as appropriate. Contractor shall use schedule to notify BECx team of scheduled tests and milestone installation events.

4. Action Item Response: Respond to Action Items to which BECx team members assign the Contractor responsibility within 10 business days of issue.

5. Testing Agency Reports. Provide all documentation of work of independent testing agencies required by the specification. These shall be provided prior to acceptance by A/E and installation.

D. Record Drawings: The Contractor shall maintain at the site an updated set of record or 'As-Built' documents reflecting actual installed conditions and all approved changes and modifications to the contract documents. The Contractor shall provide access to the BECxP to review the As-Built and Record Drawings. The Record Drawings shall be maintained concurrently with construction.

1.9 COORDINATION MANAGEMENT PROTOCOLS

A. Unless otherwise defined and agreed to by the parties to the contract documents for this project, coordination responsibilities and management protocols relative to BECx are defined below, subject to further refinement during the Construction Phase BECx pre-construction meeting.

1. Submittals and Shop Drawings: The BECxP shall review submittals and shop drawings in accordance with documentation and procedural requirements outlined in this section.

2. Deficiencies Identified by the BECxP: When the BECxP identifies a deficiency, the Contractor shall make a good faith assessment of responsible parties. Those parties shall be notified of the perceived deficiency. This communication is for information only and is not a direction to resolve the deficiency. Contractor may accept responsibility and resolve the deficiency voluntarily. If Contractor contests either the deficiency or responsibility for that deficiency, Contractor shall respond to that affect in writing to the project team for review.

3. Requests for Meetings (beyond regularly scheduled meetings): In generals requests by the Contractor for additional meetings with the BECxP shall be routed through the Owner who will then confirm the necessity for the meeting. Note that every attempt should be made to deal with BECx issues at regularly scheduled BECx Meetings.

4. Scheduling Coordination: Contractor shall review the BE technical specifications, identify required BECx items (including field test requirements, specified test standards, mock- ups, product submissions, milestone installations, and similar) and provide a schedule to the BECxP with anticipated dates for each. It is the responsibility of the Contractor to provide adequate time from submission of each BECx requirement to response from the BECxP, and resolution of any identified deficiencies without unnecessary deleterious impact on the project schedule.

    a. Contractor shall include BECx commissioning activities in the construction schedule.

5. Notification of Completion Milestones: Contractor shall notify Owner and BECxP at least two weeks prior to an anticipated BECx activity or BECx milestone (such as installation of a new facade component). Contractor and BECxP shall then coordinate the scheduling of the activity between all required parties as applicable. Notification shall be via e-mail.

6. Action List: BECxP maintains a categorized Action List which tracks the BECx related action items. All content of the Action List will be available to all parties who have credentials on the portal. Any party with credentials may post an Action Item. Any party that is copied on an email resulting from an Action Item posting may respond to it and contribute to the dialogue.

1.10 CONTRACTOR’S RESPONSIBILITIES

A. As defined in this Section and in the individual technical Building Enclosure Technical Sections (Divisions 03 through 08), identified in Section 01 91 19 Building Enclosure Commissioning Table 1, including but not limited to the following:

1. Review and distribute submittals. Review and comment on BECxP comments on the submittals.

2. Integrate commissioning activities into the master construction schedule with input from the BECxP.

3. Attend the routine BECx meetings.

4. Provide and administrate the internet based commissioning portal for collaboration on BECx activities.

5. Coordinate and chair pre-construction/pre-installation and construction-phase coordination meetings.

6. Provide summary and schedule of field quality control tests and inspections required by the Contract Documents to BECxP.

7. Participate in BECx Kickoff meeting.

8. Participate in pre-construction mock-up and field-testing coordination meetings.

9. Coordinate with the BECxP for pre-construction mock-ups and construction testing and submit laboratory and field quality control testing, field checklists and inspection reports on building enclosure construction to the BECxP. Perform out of sequence work as require facilitating field tests.

10. Perform internal quality control procedures and document procedures prior to notifying the BECxP that the systems are ready for testing.

11. Submit maintenance data for products, assemblies, and components to the BECxP.

12. Provide test data, inspection reports, and certificates to BECxP.

13. Review and respond to AI in a timely manner (typically within ten (10) business days).

14. Provide input for final BECx documentation.

15. Participate in warranty inspection.

16. Assist and coordinate with all field performance testing efforts as outlined in Section 01 91 19 Building Enclosure Commissioning Testing Matrix, whether the Contractor or other party is identified as responsible for the testing.

1.11 A/E RESPONSIBILITIES

A. Attend the Preconstruction BECx Conference and routine BECx meetings.

B. Attend pre-construction and construction-phase coordination meetings.

C. Participate in Pre-construction, Mock-Up, and Field-Testing coordination meetings.

D. Provide recommendations for resolving items for which the BECxP and Contractor may disagree.

E. Provide input for final commissioning documentation.

F. Review and comment on BECxP review comments, reports and/or issues logs

1.12 OWNER RESPONSIBILITIES

A. Review and comment on BECxP review comments, reports and/or issues logs

B. Attend the Preconstruction BECx Conference and routine BECx meetings.

1.13 BECXP RESPONSIBILITIES

A. Review submittals.

B. Attend pre-construction meetings.

C. Conduct BECx kickoff meeting.

D. Participate in Project-Specific mock-ups and outline the commissioning process for both field and laboratory performance test procedures and testing criteria.

E. Conduct observations at the fenestration and cladding system fabrication and assembly shops to observe and document that required work and quality processes are being carried out by the relevant contractors in any pre-assembly or off-site construction. The BECxP will document noncomplying work items, report them to the Project Team, and provide a summary report of observations. The summary report will include a list of noncomplying work items to serve as an ongoing record that is updated after each site visit.

F. BECxP will conduct site visits during construction to review the progress of the enclosure work, evaluate its compliance with the design documents and industry standards, witness building enclosure field testing, and milestone installations. The BECxP will document noncomplying work items, report them to the Project Team, and provide a summary report of observations. The summary report will include a list of noncomplying work items to serve as an ongoing record that is updated after each site visit.

G. Conduct routine BECx meetings to review progress on AI list and resolve issues affecting the building enclosure.

H. Compile test data, inspection reports, and certificates for inclusion in the BECx Report.

I. Assist contractor with coordinating independent third-party testing agency for mock-up and field performance testing of building enclosure, or conduct testing as outlined in Section 01 91 19 Building Enclosure Commissioning Testing Matrix.

J. Participate in 10-month warranty inspection.

1.14 BUILDING ENCLOSURE PERFORMANCE TESTING

A. Quality Assurance and Control: Specific BECx quality-assurance and quality-control requirements for individual Building Enclosure and materials, methods, and assemblies are specified in the BE Technical Sections relating to those activities. Specified commissioning tests, inspections, and related actions are specified in Section 01 91 19 Building Enclosure Commissioning Testing Matrix, do not limit Contractor's other quality-assurance and quality- control procedures that facilitate compliance with the Contract Document requirements.

B. The objective of Building Enclosure Performance Testing is to demonstrate that each Building Enclosure system, and system-to-system interfaces meet or exceed the performance requirements of the Contract Documents.

C. Contractor and their subcontractors shall provide assistance, coordination and scheduling of field performance testing in accordance with the following requirements:

1. Complete testing prior to installation of interior insulation and gypsum board.

2. Complete testing after installation of adjacent air barrier with cladding anchorage components and/or cladding components.

3. Contractor and their subcontractors to provide powered scaffold, aerial lifts, hose, water supply, communication system and manpower to perform tests.

4. Contractor will work with the Test Agency and BECxP to determine necessity for additional test methods and for field chamber tests based upon evaluation of initial test results. The BECxP will interpret marginal results and adjust the test procedures as appropriate.

5. Contractor shall perform out-of-sequence work as required facilitating system tests and comply with BECx field testing schedule and milestones.

D. Initial Building Enclosure Performance Testing should be conducted as soon as possible during the construction phase so that adjustments to material selection, fabrication methods, or installation practices may be identified and implemented for the remaining construction to minimize negative impacts to overall project cost, schedule, and quality.

1.15 DEFICIENCIES IDENTIFIED DURING BECX FUNCTIONAL PERFORMANCE TESTING

A. Non-Conformance. Non-conformance deficiencies identified during Periodic Site Visits or Building Enclosure Performance Testing shall be resolved as follows:

1. The BECxP will record the results of the review / field performance test in the BECx Software project database and post reports to Project Web-site. All deficiencies or non- conformance issues shall be noted as Action Items and reported to the Contractor.

2. Corrections of identified minor deficiencies may be made during the review / tests at the discretion of the BECxP. In such cases the deficiency and associated resolution will be documented in the database.

3. Every effort will be made by the BECxP to expedite the review / testing process and minimize unnecessary delays, while not compromising the integrity of the procedures.

4. As reviews / tests progress and a deficiency is identified, the BECxP will discuss the issue with the Contractor for follow-up and resolution.

   a. When there is no dispute with respect to the deficiency and the Contractor accepts responsibility to correct it:

      1) The BECxP shall document the deficiency and the Contractor’s response. A copy/email of the deficiency shall be generated and provided to the Contractor. The Contractor corrects the deficiency, completes the Action Item response certifying that the issue is resolved and /or the product, material or assembly is ready to be retested and notifies the Project Team.

   b. If there is a dispute about a deficiency:

      1) The deficiency shall be documented as an Action Item with the Contractor’s response and the Contractor will be notified. The Contractor will track this issue under the construction contract dispute resolution provisions.

      2) Final interpretive authority is with the Owner. Final acceptance authority is with the Owner or A/E.

      3) The BECxP documents the resolution to the Action Item.

4) Once the interpretation and resolution have been decided, the appropriate party corrects the deficiency, and responds to the Action Item indicating completion. The Contractor reschedules the review / test and the review / test is repeated until satisfactory performance is achieved. The Action Item is then considered as closed.

B. Failure: As defined in each Building Enclosure Technical Sections (Divisions 03-13) and/or Section 01 91 19 Building Enclosure Commissioning. In event of test failure, the Contractor shall provide the Owner with the following:

1. Installer/Manufacturer's response in writing as to the cause of the failure and proposed resolution.

2. Installer/Manufacturer shall implement their proposed resolution on a representative sample of the product.

3. The Contractor coordinates and schedules re-testing at their own cost. Re-testing shall be performed by the same Testing Agency that performed the initial testing unless alternate Testing Agency is approved by the owner. This process is repeated until the test result(s) meets or exceeds the requirements of the contract documents and, at the discretion of the Owner, the remedial action taken will be implemented on a project- wide basis where applicable.

4. The Owner will determine whether a replacement of all identical units is required or if a repair is acceptable.

5. Upon acceptance, the responsible Party shall replace or repair all identical items at their expense and shall extend the warranty accordingly.

6. Systemic or frequent failures may result in additional testing beyond originally identified to verify performance.

7. Based on the type of failure and the rate of frequency, the number of additional tests will be negotiated between the BECxP, the Owner, and the Contractor.

C. Cost of Retesting and/or Additional Testing:

1. Contractor is responsible for the cost of all re-tests and additional testing and compensation of time for BECxP related to all additional work necessitated by re-testing or additional testing of specimens, if contractor or subcontractors are responsible for the deficiency. If not responsible, cost recoveries for retesting will be negotiated with Contractor.

1.16 COMMISSIONING REPORT CONTENT

A. Building Enclosure Commissioning Report

1. Maintenance Schedule: Contractor will provide a summary table that indexes the building enclosure component requiring maintenance and indicates the frequency each component will require repair or replacement (i.e. replacement of sealants, gaskets, IGUs, repair of paints or coatings). Contractor will provide subcontractors with an Excel spreadsheet that will be completed by each applicable subcontractor and returned to the Contractor for incorporation in the BECx Report by the BECxP.

2. Maintenance Information: Contractor shall provide Maintenance Information for each entry containing the following:

   a. Product Data Sheet: Provide a summary of performance data.

   b. Extended Warranty Information: Include all warranties for products, equipment, components, and sub-components whose duration exceeds one year. Include warranties on components with the system they are a part of. Reference all specific operation and maintenance procedures that must be performed to keep the warranty valid.

   c. Sources of Material: Include reference to contact information where specific materials can be obtained.

   d. Installation and Maintenance Instructions: For each material, component or system.

B. Construction Record Documentation

1. Record Drawings: Contractor shall provide an index of all record drawings with drawing number, title, and electronic file name(s) including electronically referenced drawings.

2. Record Specifications: Contractor shall provide a detailed index of the record specification. Include sections and major items in the specification all indexed to the appropriate page number.

3. Approved Product Data and Shop Drawings:

   a. Contractor shall provide an index of all product data and shop drawings. This shall list all BE materials, components or systems with the associated submittal number.

   b. Contractor shall organize and compile only approved product data and shop drawings. Providing these in a filing format is acceptable provided all files are identified and organized for easy access.

   c. Inclusion of any of this information in previous sections of the Commissioning Report does not allow exclusion in this section.

4. Commissioning Record: BECxP shall provide complete commissioning records including all Performance Test documentation, in both written and electronic format at the discretion of the Owner.

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SECTION 02 28 20
ASBESTOS REMEDIATION

PART I - GENERAL

1.01 GENERAL PROVISIONS

A. General Conditions, Supplementary Conditions and applicable parts of Division 1 form a part of this specification and the Contractor shall consult them in detail for instructions.

B. Examine all Drawings and all other Sections of the Specifications for requirements therein affecting the work of this trade.

1.02 RELATED WORK UNDER OTHER SECTIONS

A. Environmental Procedures

1.03 DESCRIPTION OF WORK

A. The work includes the complete removal and disposal of all ACM materials (ACM) as indicated in Part 3 of this Section.

B. The General Contractor shall retain the services of a Rhode Island licensed asbestos abatement contractor. The asbestos contractor must include in its scope of work all required services included in the RIDOH Approved Plan to be prepared by UEC once a contractor has been selected.

1.04 POTENTIAL ASBESTOS HAZARD & DEBRIS

A. Where in the performance of the work, workers, supervisory personnel, subcontractors, or consultants may encounter, disturb, or otherwise function in the immediate vicinity of any identified ACM, take appropriate continuous measures as necessary to protect all building occupants from the potential hazard of exposure to airborne asbestos. Such measures shall include the procedures and methods described herein, and compliance with regulations of applicable federal, state, and local agencies.

B. If the Contractor failed to comply with the requirements of the specifications, the Owner's Representative (Asbestos Project Monitor) may present a written stop of work order. The Contractor must immediately and automatically stop all work until authorized in writing by the Asbestos Project Monitor to commence work. All costs related to delays shall be at the Contractor’s expense.

1.05 DEFINITIONS

A. Abatement: Procedures to control fiber release from ACM. Includes encapsulation, enclosure, and removal.

B. Air Monitoring: The process of measuring the fiber content of a specific volume of air in a stated period of time.

C. Area Monitoring: Sampling of asbestos fiber concentrations within the asbestos control area and outside the asbestos control area, which is representative of the airborne concentrations of asbestos fibers, which may reach the breathing zone.

D. Asbestos: The name given to a number of naturally occurring hydrated mineral silicates that possess a unique crystalline structure are incombustible and are separable into fibers. Asbestos includes Chrysotile, Crocidolite, Amosite, Anthophyllite, and Actinolite.

E. ACM: Any material containing more than 1% or greater by weight of asbestos of any type or mixture of types. State laws may vary in their definition of ACM material.

F. Barrier: Any surface that seals off the work area to inhibit the movement of fibers.

G. Critical Barrier: A solid, asbestos impermeable partition erected so as to constitute a work area closure; the outer perimeter of an asbestos work area, usually erected across corridors or other open spaces to complete containment.

H. Designer: State of Rhode Island licensed Designer Ammar Dieb, Universal Environmental Consultants.

I. Enclosure: All herein specified procedures necessary to complete enclosure of all ACM behind airtight, impermeable, permanent barriers.

J. Friable Asbestos Material: Material that contains more than one percent asbestos by weight and that can be crumbled, pulverized, or reduced to powder by hand pressure when dry.

K. HEPA Filter: A High Efficiency Particulate Absolute (HEPA) filter capable of trapping and retaining 99.97% of asbestos fibers greater than 0.3 microns in length.

L. Asbestos Project Monitor: An Asbestos Project Monitor certified in the Commonwealth of Rhode Island to perform air monitoring.

M. Removal: All herein specified procedures necessary to strip all ACM from the designated areas and to dispose of these materials at an acceptable site.

N. Respirator: A device designed to protect the wearer from the inhalation of harmful atmospheres.

O. Visible Emissions: Any emissions containing particulate asbestos material that are visually detectable without the aid of instruments. This does not include condensed uncombined water vapor.

P. Wet Cleaning: The process of eliminating asbestos contamination from building surfaces and objects by using cloths, mops, or other cleaning tools which have been dampened with water, and by afterwards disposing of these cleaning tools as asbestos contaminated waste.

Q. Work Area: Any area indicated on the Drawings as asbestos abatement areas or as areas containing friable asbestos material.

R. Worker Decontamination Enclosure System: A decontamination enclosure system for workers, typically consisting of a clean room, a shower room, and an equipment room.

1.06 STOP WORK

A. If the Owner or the Asbestos Project Monitor presents a written stop work order, immediately and automatically stop all work. Do not re-commence work until authorized in writing by the Asbestos Project Monitor and or Designer.

1.07 CONTRACTOR'S USE OF THE EXISTING BUILDING

A. Keep existing driveways and entrances serving the premises clear and available to the Owner and his employees at all times. Do not use these areas for parking or storage of materials, unless authorized in writing by the Owner.

B. Smoking or open fires will not be permitted within the building enclosure or on the premises.

1.08 ADMINISTRATIVE AND SUPERVISORY PERSONNEL

A. Provide a full time Site Supervisor for work under this Section with all appropriate state licenses, who is experienced in administration and supervision of asbestos abatement projects including work practices, protective measures for building and personnel and disposal procedures. This person is the Competent Person in accordance with 29 CFR 1926 for the Contractor and is the Contractor's representative responsible for compliance with all applicable federal, state, and local regulations, particularly those relating to ACM. This person shall have completed a course at an EPA Training Center or equivalent certificate course in asbestos abatement procedures, have had a minimum of two years on the job training and meet all additional requirements set forth in 29 CFR 1926 for a Competent Person.

B. The Site Supervisor must be certified by the State of Rhode Island. Asbestos Contractor shall provide proof of such certification to the Asbestos Project Monitor not less than 10 days prior to commencing any work.

1.09 SPECIAL REPORTS

A. Except as otherwise indicated, submit special reports directly to the Asbestos Project Monitor within one day of occurrence requiring special report, with copies to all others affected by the occurrence.

B. When an event of unusual and significant nature occurs at the site (examples: failure of negative pressure system, rupture of temporary enclosures, unauthorized entry into work areas), prepare and submit a special report listing date and time of event, chain of events, persons participating, response by Contractor's personnel, evaluation of results or effects, and similar pertinent information. When such events are known or predictable in advance, advise the Asbestos Project Monitor in advance at earliest possible date.

C. Prepare and submit special reports of significant accidents, at the site and anywhere else, work is in progress related to this project. Record and document data and actions; comply with industry standards. For this purpose, a significant accident is defined to include events where personal injury is sustained, or property loss of substance is sustained, or where the event posed a significant threat of loss or personal injury.

1.10 CONTINGENCY PLAN

A. Prepare a contingency plan for emergencies including fire, accident, power failure or any other event that may require modification of decontamination or work area isolation procedures. Include in the plan specific procedures for decontamination or work area isolation. A copy of the plan shall be submitted to and approved by the Asbestos Project Monitor prior to any work being done.

B. Post in the clean room of the decontamination unit and in the Contractor's office trailer telephone numbers and locations of emergency services including but not limited to fire, ambulance, doctor, hospital, and police.

1.11 PERMITS AND NOTIFICATIONS

A. Secure necessary permits in conjunction with asbestos removal, hauling, and disposition and provide timely notification as may be required by federal, state, regional, and local authorities. Notify the RIDOH and provide copies of the notification to the Asbestos Project Monitor, Asbestos Project Monitor, and the State Environmental Regulatory Agency 10 working days (Document Submission Date) prior to commencement of the work.

B. No later than the Document Submission Date, notify the local fire, police, and Health Departments, in writing, of proposed asbestos abatement work. Advise the fire department of the nature of the asbestos abatement work, and the necessity that all firefighting personnel who may enter the work site in the case of fire wear self-contained breathing apparatus. Provide one copy of the notices to the Asbestos Project Monitor prior to commencing the work.

C. No later than the Document Submission Date, submit proof satisfactory to the Asbestos Project Monitor that all required permits, site location, and arrangements for transport and disposal of ACM or contaminated materials, supplies, and the like have been obtained.

1.12 SAFETY COMPLIANCE

A. Comply with laws, ordinances, rules, and regulations of federal, state, regional, and local authorities regarding handling, storing, transporting, and disposing of asbestos waste materials.

B. Comply with the applicable requirements of the current issue of 29CFR 1926.1101 and 40CFR 61, Subparts A and B. Submit matters of interpretation of standards to the appropriate administrative agency for resolution before starting the work.

1.13 RESPIRATOR PROGRAM

A. Establish a respirator program by ANSI Z88.2 and 29 CFR 1926.1101 (h), 1926.103, and 1910.134.

1.14 PERSONNEL PROTECTION

A. Prior to commencement of work, workers shall be instructed in and shall be knowledgeable of the hazards of asbestos exposure; use and fitting of respirators; use of showers; entry and exit from work areas, and all aspects of work procedures and protective measures.

B. All asbestos abatement workers shall receive training and shall be accredited per 40 CFR 763.90(g). Training and accreditation shall be in accordance with 40 CFR 763, Appendix C to Subpart E. Training shall also be provided to meet the requirements of OSHA Regulations contained in 29 CFR 1926.

C. Prior to the start of work, the Asbestos Contractor shall provide medical examinations for all employees in accordance with 29CFR 1926.1101 (m). All employees hired by the Asbestos Contractor after start of work shall have medical examinations in accordance with this paragraph before being put to work.

D. Maintain complete and accurate records of employee's medical examinations, during employment and make records of the required medical examinations available for inspection and copying to: The Assistant Secretary of OSHA, the Director of The National Institute for Occupation Safety and Health (NIOSH), authorized representatives of either of them, and an employee's physician upon the request of the employee or former employee.

E. Provide personnel exposed to airborne concentrations of asbestos fibers with fire retardant disposable protective whole-body clothing, head coverings, gloves, and foot coverings. Provide gloves to protect hands. Make sleeves secure at the wrists and make foot coverings secure at the ankles by the use of tape. Asbestos Contractor shall require and monitor the use of complete protective clothing. A competent person designated by the Asbestos Contractor in accordance with 29CFR 1926.1101 shall periodically examine protective clothing worn by employees in the work area for rips or tears. When rips or tears are detected, they shall be immediately mended or replaced.

F. Provide goggles to personnel engaged in asbestos operations when the use of a full-face respirator is not required.

G. Provide authorized visitors with suitable protective clothing, headgear, eye protection and footwear, whenever they are required to enter the work area, to a maximum of 3 changes for 3 visitors per day. One of the sets of protective clothing shall be available for full time use by the Asbestos Project Monitor.

H. Provide all persons with personally issued and marked respiratory equipment approved by NIOSH and OSHA. The appropriate respiratory protection shall be selected according to the most recent Rhode Island regulations.

I. Once all visible asbestos material has been removed during decontamination, cartridge type respirators will be allowed during the final cleanup provided the measured airborne concentrations do not exceed 0.1 fibers per cubic centimeter. Where respirators with disposable filters are employed, provide sufficient filters for replacement to the worker or applicable regulation.

J. If the permissible respirators fail to provide sufficient protection against volatile emitted by any sealant used, the services of a qualified Asbestos Project Monitor will be procured, at the Asbestos Contractor's expense, to determine proper respiratory protection. The Owner and Asbestos Project Monitor will not be liable for the cost of increased respiratory protection.

K. Select respirators from those approved by the Mine Safety and Health Administration (MSHA), the National Institute for Occupational Safety and Health (NIOSH), Department of Health and Human Services. All personnel wearing negative pressure respirators shall have respirator fit tests within the last six months and signed statements shall be available.

1.15 REFERENCE STANDARDS

A. Unless otherwise indicated, all referenced standards shall be the latest edition available at the time of bidding. Requirements of this Section shall in no way invalidate the minimum requirements of the referenced standards. Comply with the provisions of the following codes and standards, except as otherwise shown or specified. Where conflict among requirements or with this Section exists, the more stringent requirements shall apply.

B. U.S. Department of Labor, Occupational Safety and Health Administration, (OSHA) requirements, which govern asbestos abatement work or hauling and disposal of asbestos waste materials.

C. U.S. Environmental Protection Agency (EPA) requirements, which govern asbestos abatement work or hauling and disposal of asbestos waste materials.

D. RIDOH.

1.16 SUBMITTALS

A. No work shall commence until the Contractor submit an emailed completed submittals not less than 10-working days prior to commencement of the work. The submittals shall include the following:

1. Submit all licenses and certification required.
2. Submit written evidence that the landfill to be used for disposal of asbestos is approved for disposal of asbestos by the EPA.
3. Submit all required items previously listed.
4. Secure necessary permits in conjunction with asbestos removal, hauling, and disposition and provide timely notification as may be required by federal, state, regional, and local authorities. Notify the RIDOH and provide copies of the notification.
5. Notify the local fire, police, and Health Departments, in writing, of proposed asbestos abatement work. Advise the fire department of the nature of the asbestos abatement work, and the necessity that all firefighting personnel who may enter the work site in the case of fire wear self-contained breathing apparatus. Provide one copy of the notices.
6. Submit proof that all required permits, site location, and arrangements for transport and disposal of ACM or contaminated materials, supplies, and the like have been obtained.
7. The Contractor shall submit a plan for managing the waste including all collection, storage, disposal, and decontamination practices/waste disposal.
8. Submit medical examinations for all employees in accordance with 29CFR 1926.1101 (m). All employees hired by the Asbestos Contractor after start of work shall have medical examinations in accordance with this paragraph before being put to work.
9. Provide MSDS for all used products on this Project.
10. Submit the negative pressure system. Do not begin work until the Designer approves the submittal. Include in the submittal at a minimum:
    a. Number of negative air machines required and the calculations necessary to determine the number of machines.

b. Description of projected airflow within the work area and methods required providing adequate airflow in all portions of the work area.
c. Location of machines in the work area.
d. Location of pressure differential measurement equipment.
e. Manufacturers product data on equipment used to monitor pressure differential.

11. Submit for approval the form of security and safety log, which will be maintained on the project.
12. Submit written evidence that the landfill to be used for disposal of asbestos is approved for disposal of asbestos.
13. Submit proof that training requirements as specified in 29CFR 1926.1101 (k) (3) and by appropriate state agencies has been complied with.
14. Submit a description of the plans for construction of decontamination enclosure systems and for isolation of the work areas in compliance with this specification and all applicable regulations.
15. Submit a detailed schedule including work dates, work shift time, number of employees, dates of start and completion of all work activities (including mobilization, work area preparation, asbestos abatement, inspection and clearance monitoring, each phase of refinishing, and final inspections). Schedule shall be updated with each partial payment request.

1.17 REPORTING

A. Maintain on site a daily log documenting the dates and time of the following items, as well as other significant events:

1. Minutes of meetings: purpose, attendees, and brief discussion
2. Visitations: authorized and unauthorized
3. Personnel: by name, entering and leaving the work area
4. Special or unusual events
5. Personnel air monitoring tests and results

B. Documentation with confirmation signature of the Asbestos Project Monitor of the following:

1. Inspection of work area preparation prior to start of removal and daily thereafter.
2. Removal of any polyethylene barriers.
3. Removal of waste materials from work area and transport and disposal at approved site.
4. Decontamination of equipment.
5. Waste Shipment Records.

1.18 AIR MONITORING

A. Throughout the entire removal and cleaning operations, air monitoring will be conducted to ensure that the Asbestos Contractor is complying with the RIDOH, EPA and OSHA regulations and any applicable state and local government regulations. Universal Environmental Consultants will be providing monitoring and air sampling.

B. The purpose of the Asbestos Project Monitor’s air monitoring will be to detect faults in the work area isolation such as:

1. Contamination of the building outside of the work area with airborne asbestos fibers,
2. Failure of filtration or rupture in the negative pressure system,

3. Contamination of the exterior of the building with airborne asbestos fibers.
4. Should any of the above occur, the Asbestos Contractor should immediately cease asbestos abatement activities until the fault is corrected! Work shall not recommence until authorized by the Asbestos Project Monitor.

C. The Asbestos Project Monitor will monitor airborne fiber counts in the work area. The purpose of this air monitoring will be to detect airborne fiber counts higher than the Action Level of 0.1- f/cc which may significantly challenge the ability of the work area isolation procedures to protect the balance of the building from contamination by airborne fibers.

D. The Asbestos Contractor shall be responsible for providing his/her own personnel monitoring within the work area in accordance with CFR 1926.1101.

1.19 AIRBORNE FIBER COUNTS

A. If any air sample taken outside of the work area exceeds the base line (background) conducted by UEC? Immediately and automatically stop all work. If this air sample was taken inside the building and outside of critical barriers around the work area, immediately erect new critical barriers to isolate the affected area from the balance of the building.

1. Respiratory protection shall be worn in affected area.
2. Leave critical barriers in place until completion of work and ensure that the operation of the negative pressure system in the work area results in a flow of air from the balance of the building into the affected area.
3. A final inspection after removal of poly shall be completed by the Asbestos Contractor's Supervisor and the Asbestos Project Monitor.

B. The following procedure shall be used to resolve any disputes regarding fiber types when work has been stopped due to excessive airborne fiber counts. "Airborne Fibers" referred to above include all fibers regardless of composition as counted in the NIOSH 7400 Procedure. If work has stopped due to high airborne fiber counts, air samples will be secured in the same area by the Asbestos Project Monitor for analysis by Transmission Electron microscopy (TEM). Airborne Fibers counted in samples analyzed by TEM shall be only asbestos fibers, but of any diameter and length. Subsequent to analysis by TEM the number of "Airborne Fibers" shall be determined by multiplying the number of fibers, regardless of composition, counted by the NIOSH 7400 procedure by a number equal to asbestos fibers counted divided by all fibers counted in the TEM analysis.

C. If TEM is used to arrive at the basis for determining "Airborne Fiber" counts in accordance with the above paragraph, and if the average of airborne asbestos fibers in all samples taken outside the work area exceeds the base line, then the cost of such sampling and analysis will be borne by the Asbestos Contractor.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Plastic Sheet: 6 mil minimum thickness, unless otherwise specified, in sizes to minimize the frequency of joints.

B. Tape: Capable of sealing joints of adjacent sheets of plastic and for attachment of plastic sheet to finished or unfinished surfaces of dissimilar materials and capable of adhering under dry and wet conditions, including use of amended water. Provide tape, which minimizes damage to surface finishes.

C. Cleaning Materials: Use materials recommended by manufacturer of surface to be cleaned. Use cleaning materials only on surfaces recommended by the cleaning material manufacturer.

2.02 EQUIPMENT

A. Supply the required number of asbestos air filtration units to the site in accordance with these specifications.

2.03 DANGER SIGNS AND LABELS

A. Display danger signs at each location where airborne concentrations of asbestos fibers may be in excess of 0.01 fibers/cc. Post signs at such a distance from such a location so that an employee may read the signs and take necessary protective steps before entering the area marked by the signs.

B. The sign shall also contain a pictorial representation of possible danger or hazard, such as a skull and cross bone, or other suitable warning as approved by the Asbestos Project Monitor. Sign shall meet the requirements of 29CFR 1926.200. A sample of the signs to be used shall be submitted to the Asbestos Project Monitor for approval prior to beginning work area preparation.

C. Affix danger labels to all raw materials, mixtures, scrap, waste, debris, and other products containing asbestos fibers, or to their containers.

2.04 PERSONNEL DECONTAMINATION UNIT

A. Prior to any asbestos abatement work, including placement of plastic on walls that will contact or disturb ACM surfaces, or removal of light fixtures or any items on ACM surfaces, construct a Personnel Decontamination Unit consisting of a serial arrangement of connected rooms or spaces, Changing Room, Shower Room, and Equipment Room. Require all persons without exception to pass through this decontamination unit for entry into and exiting from the work area for any purpose.

B. Build suitable framing or use existing rooms, with the Asbestos Project Monitor written approval, connected with framed in tunnels if necessary; line with 6 mil plastic; seal with tape at all lap joints in the plastic for all enclosures and decontamination enclosure system rooms. Decontamination units and access tunnels constructed outside shall be constructed with tops made of 5/8" plywood or approved equal. In all cases, access between contaminated and uncontaminated rooms or areas shall be through an airlock. In all cases, access between any two rooms within the decontamination enclosure systems shall be through a curtained doorway.

C. Provide a changing (clean) room for the purpose of changing into protective clothing. Construct using polyethylene sheeting, at least 6-mil in thickness, to provide an airtight seal between the Clean Room and the rest of the building. Locate so that access to work area from Clean Room is through Shower Room. Separate Clean Room from the building by a sheet polyethylene flapped doorway.

D. Require workers to remove all street clothes in this room, dress in clean disposable coveralls, and don respiratory protection equipment. Do not allow asbestos contaminated items to enter this room. Require workers to enter this room either from outside the structure dressed in street clothes, or naked from the showers.

E. An existing room may be utilized as the changing room if it is suitably located and of a configuration whereby workmen may enter the Clean Room directly from the Shower Room. Protect all surfaces of room with sheet plastic. Authorization for this shall be obtained from the Asbestos Project Monitor in writing prior to start of construction.

1. Maintain floor of changing room dry and clean at all times. Do not allow overflow water from shower to wet floor in Changing Room.
2. Damp wipe all surfaces twice after each shift change with a disinfectant solution.
3. Provide a continuously adequate supply of disposable bath towels.
4. Provide posted information for all emergency phone numbers and procedures.
5. Provide I storage locker per employee.
6. Provide all other components indicated on the Contract drawings.

F. Provide a completely watertight operational shower to be used for transit by cleanly dressed workers heading for the work area from the changing room, or for showering by workers headed out of the Work Area after undressing in the Equipment Room.

G. Construct room by providing a shower pan and 2 shower walls in a configuration that will cause water running down walls to drip into pan. Install a freely draining wooden floor in shower pan at elevation of top of pan.

1. Separate this room from the rest of the building with airtight walls fabricated of 6-mil polyethylene.
2. Separate this room from the Clean and Equipment Rooms with airtight walls fabricated of 6-mil polyethylene.
3. Provide showerhead and controls.
4. Provide temporary extensions of existing hot and cold water and drainage, as necessary for a complete and operable shower.
5. Provide a soap dish and a continuously adequate supply of soap and maintain in sanitary condition.
6. Arrange so that water from showering does not splash into the Clean or Equipment Rooms.
7. Arrange water shut off and drain pump operation controls so that a single individual can shower without assistance from either inside or outside of the work area.
8. Provide flexible hose shower head.
9. Pump wastewater to drain and provide 20 micron and 5-micron wastewater filters in line to drain or wastewater storage. Locate filter hose inside shower unit so that water lost during filter changes is caught by shower pan and pumped to exterior filtering system.

H. Provide equipment room for contaminated area; work equipment, footwear and additional contaminated work clothing are to be left here. This is a change and transit area for workers. Separate this room from the work area by a 6-mil polyethylene flap doorway.

1. Separate this room from the rest of the building with airtight walls fabricated of 6-mil polyethylene.
2. Separate this room from the Shower Room and work area with airtight walls fabricated of 6-mil polyethylene.

I. Separate work area from the equipment Room by polyethylene barriers. If the airborne asbestos level in the work area is expected to be high, add an intermediate cleaning space between the Equipment room and the work area. Damp wipe cleans all surfaces after each shift change.

2.05 EQUIPMENT DECONTAMINATION UNITS

A. In areas with only one access, it may be impossible to utilize a separate Equipment Decontamination Unit. In this case, all equipment and waste materials will exit through the Personnel Decontamination Chambers.

B. When two accesses to the work area are available, provide an Equipment Decontamination Unit consisting of a serial arrangement of rooms, Clean Room, Holding Room, Washroom for removal of equipment and material from work area. Do not allow personnel to enter or exit work area through Equipment Decontamination Unit.

C. Provide an enclosed shower unit located in work area just outside Washroom as equipment, bag, and container cleaning station.

D. Provide Washroom for cleaning of bagged or containered ACM waste materials passed from the work area. Construct Washroom of 2 by 4-inch (minimum) wood framing and polyethylene sheeting, at least 6-mil in thickness and located so that packaged materials, after being wiped clean can be passed to the Holding Room. Separate this room from the work area by flaps of 6-mil polyethylene sheeting, or rigid self-closing doors.

E. Provide Holding Room as a drop location for bagged ACM passed from the Washroom. Construct Holding Room of 2 by 4-inch (minimum) wood framing and polyethylene sheeting, at least 6-mil in thickness and located so that bagged materials cannot be passed from the Washroom through the Holding Room to the Clean Room.

F. Provide Clean Room to isolate the Holding Room from the building exterior. Construct Clean Room of 2 by 4-inch (minimum) wood framing and polyethylene sheeting, at least 6-mil in thickness and locate to provide access to the Holding Room from the building exterior. Separate this room from the exterior by flaps of 6 mil polyethylene sheeting, or rigid self-closing doors.

PART 3 - EXECUTION

3.01 SCOPE OF WORK

It is anticipated that the asbestos abatement project will be performed in one phase. It is the asbestos contractor’s responsibility to comply with the phasing schedule prepared.

IMM Building:		
	Freezers/Coolers	Refer to Drawings
	Roofing Materials	Refer to Drawings
Site	Transite Pipe	1,500 LF

Specific Notes:

1. It is the Asbestos Contractor's responsibility to inspect the site and confirm condition prior to the submission of his/her bid package.
2. Perform all required demolition to access ACM at no additional cost to the owner.
3. Disconnect, remove, and properly dispose of freezers and coolers.
4. Remove and dispose as ACM of transite and ACM insulated pipe and debris that might be found during excavation/demolition. The General contractor will perform excavation as needed to expose the pipe. The asbestos contractor will be required to perform additional excavation (if needed) to remove the ACM.
5. Remove and dispose of ACM roofing material.

3.02 JOB CONDITIONS

A. Do not commence asbestos abatement work until:
   l. Arrangements have been made for disposal of waste at an acceptable site. Submittal shall be made no later than the Document Submission Date.
   2. Arrangements have been made for containing and disposal of wastewater resulting from wet stripping or filtering through a 5-micron filter.

B. All materials resulting from abatement work, except as specified otherwise shall become the property of the Asbestos Contractor and shall be disposed of as specified herein.

C. Pre-clean all areas prior to commencement of any work.

D. Clean all routes used to transport waste.

3.03 INSPECTION AND PREPARATION

A. Examine the areas and conditions under which asbestos will be abated and notify the Asbestos Project Monitor in writing of conditions detrimental to the proper and timely completion of the work.

B. Before any work commences, post danger signs in and around the Work Area to comply with 29 CFR 1926.1101 (k)(l) per federal and state regulations.

3.04 WORK PROCEDURE

A. Perform asbestos related work in accordance with 29CFR 1926.1101 and as specified herein. Personnel shall wear and utilize protective clothing and equipment as specified herein. Personnel of other trades not engaged in the removal and demolition of asbestos shall not be exposed at any time to airborne concentrations of asbestos unless all the personnel protection provisions of this specification are complied with by the trade personnel. Provide and post, in the Equipment Room and the Clean Room, the decontamination and work procedures to be followed by workers, as described hereinafter.

B. Each worker and authorized visitor shall, upon entering the job site, remove street clothes in the Clean Change Room and put on a respirator and clean protective clothing before entering the equipment room or the work area. All workers shall remove gross contamination before leaving the work area. All clothing such as coveralls, head covers, boots shall be removed and properly disposed of before leaving equipment room. With the exception of bathing suites and respirators, the workers shall proceed to the Shower Room. Under the shower, respirators shall be removed and cleaned. Cleaned respirators shall be placed in suitable clean plastic bags and carried by employees to Clean Room. Soap and towels shall be furnished by the Asbestos Contractor. The Asbestos Contractor shall maintain proper sanitary conditions. The Asbestos Contractor's designated competent person shall insure that these practices are being adhered to.

C. Following showering and drying off, each worker and authorized visitor shall dispose of towels as contaminated waste and proceed directly to the Clean Change Room and dress in clean clothes at the end of each day's work, or before eating, smoking, or drinking. Before re-entering the work area from the Clean Change Room, each worker and authorized visitor shall put on the applicable respirator and shall dress in clean protective clothing. Contaminated work footwear shall be stored in the equipment room when not in use in the work area. Upon completion of asbestos abatement, dispose of footwear as contaminated waste.

D. Contaminated work footwear shall be stored in the equipment room when not in use in the work area. Upon completion of asbestos abatement, dispose of footwear as contaminated waste or double bag for use at next site.

E. Workers removing waste containers from the Equipment Decontamination Enclosure shall enter the holding area from outside wearing a respirator and dressed in clean coveralls. No worker shall use this system as a means to leave or enter the washroom or the work area.

F. Workers shall be fully protected with respirators and protective clothing immediately prior to the first disturbance of ACM or contaminated materials and until final cleanup is completed. This includes the removal of any equipment in contact with ACM such as lights, HVAC grills and other related structures.

3.05 PREPARATION OF THE WORK AREA

A. Seal off the work area by sealing large openings such as open doors, elevator doors, and passageways with a critical barrier. The critical barrier shall constitute the outermost boundary of the asbestos abatement project work area. Plastic sheeting on open framing is not a suitable critical barrier. Critical barriers may be erected of a suitable solid construction material such as plywood, sheetrock, gypsum board, or other related materials.

B. Prior to any asbestos abatement work, clean the proposed work areas using HEPA filtered vacuum equipment and wet cleaning methods as appropriate. Methods that raise dust, such as dry seeping or vacuuming with equipment not equipped with HEPA filters will not be permitted. Dispose of all cloths, which are used for cleaning as contaminated waste.

C. Place all tools, scaffolding and staging necessary for the work in the area to be isolated prior to erection of plastic sheeting temporary enclosure.

D. Shut down electric power. Provide temporary power and lighting and ensure safe installation of temporary power sources and equipment per applicable electrical code requirements. Provide 24-volt safety lighting and provide ground-fault interrupter circuits as power source for lights and electrical equipment.

E. Seal off all openings, including but not limited to corridors, doorways, windows, skylights, ducts, grills, diffusers, and any other penetrations of the work areas, with 6-mil plastic sheeting and sealed with tape.

F. Prior to any abatement activities seal all floor and ceiling openings or penetrations that have not already been sealed. This includes penetrations through ceiling and floor slabs, both empty holes and holes accommodating items such as cables, pipes, ducts, conduit and expansion joints in floors and wall and floor slab assemblies.

G. Use combination fire stop foam and fire stop sealant equivalent to Dow Corning Fire Stop Foam and Dow Corning Fire Stop Sealant. Material shall be applied in accordance with manufacturer's recommendations.

H. Maintain emergency and fire exits from the work areas, or establish alternative exits satisfactory to the local fire officials. Coordinate work with local fire and police departments, and Asbestos Project Monitor.

I. Shut down and isolate heating, cooling, ventilating air systems in the contaminated areas to prevent contamination and fiber dispersal to other areas of the structure. During the work, seal vents within the work area with solid barriers, such as plywood and tape and plastic sheeting, or as indicated on the drawings.

J. Remove all HVAC system filters. Pack disposable filters in sealable double 6 mil plastic bags for burial in the approved waste disposal site; replace with new filters after final cleanup. Wet clean permanent filters; reinstall after final cleanup.

K. Before work begins, clean all items, which can be removed without disrupting the asbestos material. Pre-clean movable furniture, [carpeting, clocks, speakers, books, and other objects] within the proposed areas using HEPA filtered vacuum equipment and/or wet cleaning methods as appropriate; remove such objects from work areas to a temporary location.

L. Pre-clean non-removable furniture, book shelving, equipment, heat fans, fire alarms, pipes, ductwork, wires and conduits, lockers, skylights, speakers, and other fixed objects within the proposed work areas, using HEPA filtered vacuum equipment and wet cleaning methods as appropriate prior to abatement activities, and enclose with minimum 6 mil plastic sheeting sealed with tape.

M. Remove and clean all ceiling mounted objects, such as lights, HVAC grills and other items not previously sealed off, that interfere with asbestos abatement. Use localized water spraying or HEPA filtered vacuum equipment during fixture removal to reduce fiber dispersal.

N. The Asbestos Contractor will be required to supply a certified plumber to be available should any questions or problems arise.

3.06 MAINTENANCE OF ENCLOSURE SYSTEMS

A. Ensure that barriers and plastic linings are effectively sealed and taped. Repair damaged barriers and remedy defects immediately upon discovery. Visually inspect enclosures at the beginning of each work period.

B. Use smoke methods to test effectiveness of barriers when directed by the Asbestos Project Monitor.

3.07 CONTROL ACCESS

A. Permit access to the work area only through the Decontamination Unit. All other means of access shall be closed off, warning signs displayed on the clean side of the sealed access.

B. Large openings such as open doorways and passageways shall be sealed as a critical barrier. The critical barrier shall constitute the outmost boundary of the asbestos abatement work area.

C. Plastic sheeting on open framing is not a suitable critical barrier. All cracks, seams, and openings in critical barriers shall be caulked or otherwise sealed, so as to prevent the movement of asbestos fibers out.

3.08 ISOLATION OF WORK AREA

A. Completely separate the work area from other portions of the building and the outside by sheet plastic barriers at least 6 mil in thickness.

B. Individually seal all ventilation openings (supply and exhaust), lighting fixtures, clocks, doorways, windows, convectors and speakers, and other openings into the work area with duct tape alone or with polyethylene sheeting at least 6 mil in thickness, taped securely in place with duct tape. Maintain seal until all work including work area decontamination is completed. All lighting fixtures shall have had power shut off.

C. Provide sheet plastic barriers at least 6-mil in thickness needed to complete seal openings from the work area into adjacent areas. Seal the perimeter of all sheet plastic barriers with duct tape.

3.09 COVERING OF FLOOR AND WALL SURFACES

A. Clean all contaminated furniture, equipment, and or supplies with a HEPA filtered vacuum cleaner or by wet cleaning prior to being moved or covered. All equipment, furniture, stored items in work area is to be deemed contaminated unless specifically declared as uncontaminated on the Drawings or in writing by the Asbestos Project Monitor. Clean all surfaces in work area with a HEPA filtered vacuum of by wet wiping prior to the installation of any sheet plastic.

B. Cover floor of work area with 2 individual layers of clear polyethylene sheeting, each at least 6 mil in thickness, turned up walls at least 12 inches. Form sharp right angle-bend at junction of floor and wall so that there is no radius, which could be stepped on causing the wall attachment to be pulled loose. Duct tape all seams in floor covering. Locate seams in top layer six feet from, or at right angles to, seams in bottom layer. Install sheeting so that top layer can be removed independently of bottom layer.

C. Remove all general construction items such as cabinets, casework, doors and window trim, moldings, ceilings, and trim which cover the surface of the work to prevent interference with the work. Clean, decontaminate and reinstall, unless otherwise indicated, all such materials, upon completion of all removal work with materials, finishes, and workmanship to match existing installations before start of work.

D. Cover all walls in work area with two (2) layers of polyethylene sheeting, at least 6- mil in thickness, mechanically supported and sealed with duct tape. Tape all joints including the joining with the floor covering with duct tape or as otherwise indicated on the Contract documents or in writing by the Asbestos Project Monitor. There shall be no seams in the plastic sheet at wall to floor joints.

E. If the enclosure barrier is breached in any manner that could allow the passage of asbestos debris or airborne fibers, then add affected area to the work area, enclose it and decontaminate it.

3.10 NEGATIVE PRESSURE

A. Establish negative pressure in the work area by installation of High Efficiency Particulate Air (HEPA) filter air-purifying devices. Comply with ANSI Z9.2, Local Exhaust Ventilation Requirements. Maintain system in operation 24 hours per day until decontamination of the work area is completed and area has been certified clean by air monitoring tests and visual inspections. Discharge of asbestos fibers to the outside of the building will not be permitted.

B. Size negative air pressure system(s) to provide a minimum of one air change every l5 minutes for the area under negative pressure. Locate the exhaust unit(s) so that makeup air enters the work area primarily through the decontamination unit and traverses the work area as much as possible. The intent is to provide the air change specified in each work area (room), not just the specified negative pressure. Place the end of the unit or its exhaust duct through an opening in the plastic barrier or wall covering. Seal the plastic around the unit or duct with tape.

C. The system shall maintain an air pressure differential of minus 0.02 inch of water. Test the negative pressure system prior to any abatement actions to ensure that the 0.02-inch differential is present. The Asbestos Project Monitor may require the use of ventilation smoke tubes to check the system performance.

3.11 REMOVAL OF ACM MATERIALS

A. Thoroughly wet ACM to be removed prior to stripping to reduce fiber dispersal into the air. Accomplish wetting by a fine spray (mist) of amended water or removal Encapsulant. Saturate material sufficiently to wet to the substrate without causing excess dripping. Allow time for water or removal Encapsulant to penetrate material thoroughly. If a removal Encapsulant is used, apply in strict accordance with manufacturer's written instructions.

B. Mist work area continuously with amended water whenever necessary to reduce airborne fiber levels.

C. Remove saturated ACM in small sections from all areas. Do not allow material to dry out. As it is removed, simultaneously pack material while still wet into disposal bags. Twist neck of bags bend over and seal with minimum three wraps of duct tape. Clean outside and move to wash down station adjacent to material decontamination unit.

D For the removal of pipe and joint insulation, the density of ACM pipe covering seldom allows the material to be removed in a completely wet state. However, every attempt should be made to keep the insulation material as wet as possible to prevent release of asbestos fibers.

E. Cut the cloth covering on the pipe insulation along the top seam to allow wetting of the asbestos insulation. Do not allow the pipe insulation to fall to the ground or adjacent surfaces. Wet the insulation material and immediately place in a double 6 mil, minimum thickness labeled plastic bag.

F. In certain areas, asbestos pipe insulation will be removed with glove-bags (with prior approval by the Asbestos Project Monitor).
1. Seal all critical barriers.
2. Pre-clean if necessary and place one layer of polyethylene under the pipe to be removed.
3. Negative air machines with HEPA filtration will be used in the area.
4. Glove bags will be smoke tested.
5. Place necessary tools into pouch located inside glove-bag. This will usually include bone saw, utility knife, rags, scrub brush, wire cutters, tin snips, and pre-wetted cloth.
6. Place one strip of duct tape along the edge of the open top slit of glove-bag for reinforcement.
7. Place the glove bag around section of pipe to be worked on and staple top together through reinforcing duct tape. Next, duct tape the ends of glove-bag to pipe itself, where previously covered with plastic or duct tape.
8. Place additional layers of tape along the top of the glove-bag to seal the staple holes and to securely support the bag on the pipe.
9. Fill each bag with 2 inches of water to thoroughly wet the removed insulation.
10. Attach vacuum hose through port in bag and tape tightly to prevent leakage.
11. Insert spray nozzle into bag and tape tightly to prevent leakage.
12. One person places his hands into the long-sleeved gloves while the second person directs garden sprayer at the work.
13. Use bone saw, if required, to cut insulation at each end of the section to be removed. A bone saw is a serrated heavy gauge wire with ring-type handles at each end. Throughout this process, spray amended water or removal Encapsulant on the cutting area to keep dust to a minimum.
14. Remove insulation using putty knives or other tools. Place pieces in bottom of bag without dropping.
15. Using nylon scrub brush, rags, and water scrub and wipe down the exposed pipe.
16. Wipe down the inside of the bag with the rags. Remove the water nozzle and tape shut.
17. Encapsulate the exposed ends and cover any exposed ends of pipe insulation with the re-wettable clothe. This shall be done prior to removing the bag.
18. Place the cleaning tools either into the next glove bag or put them into the glove and pull them out. Twist the glove, tape at least twice and cut through the tape. The tools can be dropped into a bucket of water to clean them.
19. Twist the bag several times and turn on HEPA vacuum to remove the air. Tape the twist several times.
20. Slip a 6-mil disposal bag under the glove-bag and while running the vacuum sufficiently to collapse the bag, cut the glove-bag off.
21. Encapsulate all exposed pipe and elbows to lock down any remaining fibers.
22. Remove disposable suits and place these into bag with waste.
23. Collapse the disposal bag with a HEPA vacuum, twist top of bag, seal with at least 3 wraps of duct tape, bend over and seal again with at least 3 wraps of duct tape.

3.12 DECONTAMINATION OF WORK AREA

A. Maintain premises and public properties free from accumulation of waste, debris, and rubbish, caused by operations. Remove visible accumulations of asbestos material and debris. Wet clean all surfaces within the work area.

B. Remove the plastic sheets from walls and floors only. Take proper care in folding up plastic sheeting to minimize dispersal of residual ACM debris.

C. Leave the windows, doors, and HVAC vents sealed. Maintain HEPA filtered negative air pressure systems, air filtration and decontamination enclosure systems in service.

D. Remove all debris from floor of work area. This includes all trash, scraps of lumber, pipes, and all visible asbestos debris. The asbestos debris is primarily deteriorated pipe insulation that has fallen to the ground. Dispose of all debris removed as asbestos contaminated waste. HEPA vacuum the entire floor.

E. Clean all surfaces in the work area and any other contaminated areas with water and with HEPA filtered vacuum equipment. After cleaning the work area, wait 24 hours to allow for settlement of dust, and again wet clean and clean with HEPA filtered vacuum equipment all surfaces in the work area. After completion of the second cleaning operation, perform a complete visual inspection of the work area to ensure that the work area is free of visible asbestos debris. The negative pressure system may be shut down only after clean air has been achieved.

F. Include sealed drums and all equipment used in the work area in the cleanup and remove from work areas, via the equipment decontamination enclosure system, at an appropriate time in the clean sequence.

G. Conduct cleaning and disposal operations to comply with applicable ordinances and antipollution laws. Do not burn or bury rubbish and waste materials on job site. Do not dispose of volatile wastes in storm or sanitary drains. Do not dispose of wastes into streams or waterways.

H. Store volatile wastes in covered metal containers during work hours and remove it from premises at end of workday. Prevent accumulation of wastes, which create hazardous conditions. Provide adequate ventilation during use of volatile or noxious substances.

I. If the Asbestos Project Monitor, within 24 hours after the second cleaning, finds visible accumulations of asbestos debris in the work area, repeat the wet cleaning until the work area is in compliance, at no additional expense to the Owner.

J. Remove the first layer of plastic sheet from walls and floors only. Take proper care in folding up plastic sheeting to minimize dispersal of residual ACM debris.

K. Leave the windows, doors, and HVAC vents sealed. Maintain HEPA filtered negative air pressure systems, air filtration and decontamination enclosure systems in service.

L. Following the final visual inspection by the IH, after the removal of asbestos-containing materials and decontamination of work areas, and while space enclosures systems remain in place, seal all surfaces from which asbestos-containing material have been removed to assure immobilization of any remaining fibers. Use a colored sealant so that complete coverage may be ensured by a visible inspection by the IH to verify that asbestos-containing material has been adequately removed. Apply sealer in accordance with manufacturer's recommendations using airless spray equipment.

M. Clearance air samples will be taken by the IH using aggressive air sampling. Analysis will be made using Phase Contrast Microscopy or Transmission Electron Microscopy.

N. Clean all access routes used to transport ACM.

3.13 WORK AREA CLEARANCE

A. The work is complete when the work area is visually clean and airborne fiber levels have been reduced to the level specified below. When this has occurred, the Asbestos Contractor will notify the Asbestos Project Monitor that the area is ready for clearance.

B. The number and volume of air samples taken, and analytical methods used by the Asbestos Project Monitor will be in accordance with applicable regulations.

C. **The Owner will pay for the initial testing required for clearance. Should the initial testing fail, the Contractor will reimburse the Owner for the cost of all additional testing based on $90.00 per hour for project monitor, $30.00 per each PCM.**

3.14 DISPOSAL OF ACM AND ASBESTOS CONTAMINATED WASTE

A. To prevent exceeding available storage capacity on site, remove sealed and labeled containers of asbestos waste and dispose of such containers at an authorized disposal site in accordance with the requirements of disposal authority.

B. Comply with 29 CFR 1926.1101.

C. Seal all asbestos and asbestos contaminated waste material with double thickness 6-mil, sealable plastic bags. Label the bags; transport and dispose of all in accordance with the applicable OSHA and EPA regulations. At the conclusion of the job, place all polyethylene material, tape, cleaning material and clothing in the plastic lined drum. Seal, correctly label, and dispose of asbestos waste material.

D. Transport the bags to the approved waste disposal site. Asbestos Contractor shall obtain trip tickets at the landfill to document disposal of ACM materials. A form shall be signed, not initialed, by all parties. Copies of all trip tickets shall be submitted to the Asbestos Project Monitor.

E. If a rental vehicle is used to transport asbestos waste, Asbestos Contractor shall provide to the vehicle's owner a written statement as to the intended use of the vehicle. A copy of such notice, signed by the vehicle owner, shall be provided to the Asbestos Project Monitor prior to transporting materials in the vehicle. Two layers of 6-mil plastic sheet shall be placed on the floor and walls of the rental vehicle prior to loading any containers of asbestos waste.

F. Consider wastewater from showers and sinks to be contaminated waste and disposed of in accordance with this Section unless water has been filtered through a 5-micron filter.

3.15 DISPOSAL OF NON-CONTAMINATED WASTE

A. Remove from the site all non-contaminated debris and rubbish resulting from demolition operations. Transport materials removed from demolished areas and disposed of offsite in a legal manner.

B. During progress of work, clean site and public properties, and dispose of waste materials, debris, and rubbish. Provide on-site containers for collection of waste materials, debris, and rubbish. Remove waste materials, debris, and rubbish from site and legally dispose of at public or private dumping areas off Owner's property.

END OF SECTION

Section 02 41 00
SITE DEMOLITION

PART 1 - GENERAL

1.1 GENERAL PROVISIONS

A. Attention is directed to the CONTRACT AND GENERAL CONDITIONS and all Sections within DIVISION 01 - GENERAL REQUIREMENTS, which are hereby, made a part of this Section of the Specifications.

B. Examine all Drawings and all other Sections of the Specifications for requirements therein affecting the work of this trade.

C. Coordinate work with that of all other trades affecting or affected by work of this Section. Cooperate with such trades to assure the steady progress of all work under the Contract.

D. All demolition shall be in accordance with the RI Department of Transportation Standard Specifications and all other applicable local, state, and federal requirements.

1.2 WORK DESCRIPTION

A. The Contractor shall perform all work and supply all labor, material, tools and equipment necessary to:

1. Demolish, remove, and dispose of items not required for reuse on site and as indicated on Drawings. Demolition is to take place in multiple phases as shown on the plans. This shall include, but is not limited to curbing, bituminous and cement concrete pavement, pads, aprons, slabs, bollards, utility poles, drainage systems including piping and structures, sanitary sewer systems including tanks, piping, filter media soils and membranes, irrigation lines, water mains and water system features including hydrants, valves, and gate boxes.
2. Any portion of the site soils anticipated by the Contractor for reuse on the project shall be stockpiled and tested by the Contractor for source investigation of potential reuse of material. Soil materials to be reused onsite may require amendment including blending of onsite and imported soil materials.
3. Disposal of items to an approved off-site disposal facility.
4. Cleaning of catch basins and drain manholes.
5. Filling voids and excavations resulting from the work.
6. Removing above- and below-grade site features.
7. Take inventory of, remove, store and relocate or turn over all memorial plaques and trees as specified on the demolition plans.
8. Removal of existing utility structures (including but not limited to underground tanks, catch basins, manholes) and piping (sewer, water and drainage) as indicated on the Site Demolition Plan.
9. Removal from the site and legal disposal of all materials resulting from the demolition and construction operations except those specified to be stockpiled or reused.

10. Removal of all additional site items required to complete the work, as shown on the plans.
11. Stockpiling of materials for reuse by the Owner.
12. Investigation of potentially contaminated materials as indicated in the Phase I Environmental Site Assessment prepared for the site.

B. Related Sections include the following:
1. Section 01 50 00 – Temporary Facilities and Control
2. Section 01 56 39 – Tree Protection and Trimming
3. Section 31 00 00 - Earthwork

1.3 SUBMITTALS

A. Submit at least 1 week prior to the start of construction:
1. Permits for transport and disposal of debris.
2. Permits and notices authorizing demolition.
3. Certificates of utility services severances.
4. Demolition procedures and operational sequence.
5. Temporary Sanitary Collection and Disposal Plan.

B. Documentation of investigation of potentially contaminated areas as identified in the Phase I Environmental Site Assessment prepared for the site shall be submitted to the Architect.

1.4 PERMITS AND CODES

A. All work shall comply with all codes, rules, regulations, laws and ordinances for the City of Central Falls, the State of Rhode Island, and all other authorities having jurisdiction. All work necessary to make site demolition comply with such requirements shall be provided without additional cost to the Owner.

B. The Contractor shall procure and pay for all permits and licenses required for work under this Section.

C. The Contractor shall not close or obstruct any streets or passageways, unless and until the Contractor shall have first secured all necessary municipal, State, or other permits thereof. No material whatsoever shall be placed or stored nor shall parking be permitted in streets or passageways. The Contractor shall conduct operations to interfere as little as possible with the use ordinarily made of both on-site and off-site roads, driveways, sidewalks or other facilities near enough to the work to be affected thereby.

1.5 DISPOSITION OF EXISTING UTILITIES

A. Active utilities existing on the site shall be carefully protected from damage and relocated or removed as necessitated by the work. When an active utility line is exposed during construction, its location and elevation shall be recorded, and both the Architect and the Owner notified in writing.

B. Active utilities to be abandoned once new utility is installed shall be removed and disposed once Contractor has completed the proposed work. Contractor is responsible for maintaining existing utility performance throughout construction.

C. Inactive or abandoned utilities encountered during construction operations shall be removed. The location of such utilities shall be noted and reported in writing to the Architect.

1.6 QUALITY ASSURANCE

A. Pre-installation Conference: Conduct conference at Project site to comply with Project Meeting Requirements in Section 010000 Summary.

1.7 PROJECT CONDITIONS

A. Traffic: Minimize interference with adjoining roads, streets, walks, and other adjacent occupied or used facilities during site-clearing operations.

1. Do not close or obstruct streets, walks, or other adjacent occupied or used facilities without permission from the Architect and authorities having jurisdiction.
2. Provide alternate routes around closed or obstructed traffic ways if required by authorities having jurisdiction.

B. Utility Locator Service: Notify utility locator service for area where Project is located before commencing any site work.

C. Do not commence site clearing operations until temporary erosion and sedimentation control measures are in place and all permits are obtained.

D. Contractor is responsible for all construction phase permits including but not limited to: RIPDES Construction Permit, utility permits, municipal permits and all other applicable permits, registrations, notifications, and applications.

E. The contractor is responsible for investigation of all areas identified in the Phase I Environmental Site Assessment for the site as potential sources of contamination. Investigations shall be performed by qualified personnel.

1. During demolition of any and all drainage structures found to have open leaching bottoms, surrounding soil should be screened and analyzed for petroleum contamination.
2. Documentation of investigations and conclusions shall be provided to the Architect. In the event that contamination is encountered, notify the Architect immediately. All material shall be disposed of in accordance with applicable local, state, and federal regulations. Documentation of disposal shall be provided to the Architect.

PART 2 - PRODUCTS

2.1 DEMOLITION TECHNIQUES

A. Contractor shall not use any explosives for demolition.

PART 3 - EXECUTION

3.1 WORKMANSHIP

A. Before beginning demolition work, coordinate with utility companies and disconnect all utility service lines to the structures shown to be demolished. Notify the proper local authorities and utility companies, in writing before work commences. Remove all utility and service lines in accordance with the authorities and/or companies having jurisdiction over such work. Identify the location and size of all caps and plugs to the Architect in writing.

B. Take all possible precautions to avoid damaging those materials, which are to remain.

C. Demolition work shall be carried out in a careful and orderly manner. Provide adequate protection to persons and property inside and outside of the site.

D. Do not commence work until trees and other items to be saved have been protected as directed by the Architect in the field. Protection shall remain for the duration of the work.

E. Burn no material or debris on the site.

F. Take all possible precautions to avoid damaging those materials which are to be salvaged or reused on the site.

G. Sanitary filter media, materials within sanitary tanks, materials within sanitary structures, and all other existing sanitary disposal features shall be removed within the work area and legally disposed. Sanitary materials shall be reused onsite.

3.2 TITLE, SALVAGE AND REUSE

A. Property belonging to public bodies or public service companies shall not become the property of the Contractor unless written authorization is given by the Architect.

B. All other salvage and materials resulting from the Demolition work shall become the property of the Contractor unless otherwise directed by the Architect or specified herein or on the Contract Drawings to be stockpiled and shall be removed from the site.

C. The existing condition of all materials specified to be: Removed and Reset, Removed and Stockpiled, or Removed and Stockpiled for the Owner; shall be recorded in a video provided in electronic format to the Architect for approval. Any damage or condition not noted in the recorded video approved by the Architect will be deemed damage caused by the Contractor and the Contractor shall replace the feature at no additional cost to the Owner.

3.3 REMOVAL

A. Demolish and remove the aforementioned items in their entirety, including footings and underground structures.

B. Remove and legally dispose of, at no cost to the Owner, all materials and debris resulting from the Demolition work except those specified herein to be stockpiled. Leave the site in safe and clean condition.

3.4 RESTORATION OF SITE ITEMS

A. Wherever streets, lawns or other items outside the Contract Limit Lines have been excavated in fulfilling the work required under this Contract, the Contractor shall furnish and install all material at no cost to the Owner to bring finish surfaces level with the existing adjacent conditions. All work shall be installed to match the existing conditions. Notify the proper authorities prior to restoring surfaces outside the Limit of Work to assure conformance to existing requirements.

3.5 GENERAL

A. Protect and maintain benchmarks and survey control points from disturbance during construction.

B. Depressions, excavations and voids resulting from demolition shall be filled with suitable material as outlined in Section 31 00 00.

C. Conduct demolition operations in a manner that will prevent damage to adjacent structures, utilities, pavements and other facilities to remain.

D. Cease operations immediately if any damage, settlement or other adverse effect on adjacent structures occurs. Immediately notify the Architect and regulatory authorities. Do not resume operations until conditions are corrected, damage repaired, and approval received from the Architect.

E. Provide hoses and water connections. Spray water onto demolition to prevent dust.

F. Grade site and stockpile material to prevent runoff from leaving the site.

G. Clean neighboring properties and improvements of dust, dirt, and debris caused by demolition operations. Return properties to conditions prior to start of work.

H. Demolition limits of existing pavement shall be saw-cut along straight lines resulting in clean vertical edges.

I. Protect existing site improvements to remain from damage during construction.

1. Restore damaged improvements to their original condition, as acceptable to Architect.

3.6 UTILITIES

A. Notify all corporations, companies, individuals, or local authorities owning or having jurisdiction over utilities running to, though, or across areas to be affected by demolition operations.

B. The Contractor shall mark locations of underground utilities prior to initiating site work; Dig-Safe clearance shall be obtained.

C. The Contractor shall exercise reasonable care to verify locations of existing subsurface structures and utilities.

D. Have all discontinued utility services disconnected in accordance with the requirements of the utility owner. Utilities shall be abandoned in accordance with details shown on the Drawings.

3.7 SITE IMPROVEMENTS

A. Remove existing above- and below-grade improvements as indicated and as necessary to facilitate new construction.

B. Remove slabs, paving, curbs, gutters, and aggregate base as indicated.

1. Unless existing full-depth joints coincide with line of demolition, neatly saw-cut length of existing pavement to remain before removing existing pavement. Saw-cut faces vertically.

3.8 DISPOSAL

A. Disposal: Remove surplus soil material, unsuitable topsoil, unsuitable soils, obstructions, demolished materials, and waste materials including trash and debris, and legally dispose of them off property.

1. Separate recyclable materials produced during site clearing from other non-recyclable materials. Store or stockpile without intermixing with other materials and transport them to recycling facilities.

3.9 REMOVE AND DISPOSE FLEXIBLE PAVEMENT, CURBING, CONCRETE, CONCRETE WALKS, AND FENCE

A. All pavement, base course, sidewalks, curbs, gutters, of whatever nature designated to be removed shall be so removed and legally disposed of. When specified, ballast, gravel, bituminous material or other surfacing or pavement materials shall be removed and stockpiled. Otherwise, such material shall be legally disposed. Where the remainder of the existing pavement or sidewalks is to remain undisturbed, a clean saw cut shall be made to separate the remaining pavement from that being removed.

End of Section

Section 02 41 17

BUILDING DEMOLITION

PART 1 – GENERAL

1.1 SUMMARY

A. Demolition, clearing, removal and legal disposal, which includes:

1. Existing designated structures, piles, pile caps, beams, foundations, slabs on grade and hard masonry objects.
2. Removal of unsuitable or extraneous materials not marked for salvage, such as abandoned furnishings and equipment (including but not limited to all loose and fixed furniture, tables, chairs, stools, desks, file cabinets, lockers, fixed and loose gym equipment, auditorium curtains/lighting and associated rigging, bleachers, computers, printers, copiers, shop machinery, kitchen equipment), and debris such as rotted wood, rusted materials and deteriorated concrete. General Contractor shall assume all existing furnishings and equipment will be required to be removed and legally disposed of. Any and all costs associated with the demolition, removal and disposal shall be included within the General Contractor's base bid. The Owner will not accept any additional costs associated with the demolition, removal and disposal scope of work.
3. Cut, cap and seal-off abandoned utility lines at property line.

B. Salvage removed indicated materials for re-use as shown in the Drawings.

1.2 RELATED REQUIREMENTS

A. Utility shutoffs by respective trades.

B. Section 01 74 19 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL: Procedural and administrative requirements for construction and demolition recycling.

C. Division 31 - EARTHWORK:

1. Erosion and sediment control.
2. Backfilling of open pits remaining after demolition.

1.3 REFERENCES

A. Referenced Standards: Comply with applicable requirements of the following standards and those others referenced in this Section, under the provisions of Section 01 42 00 - REFERENCES. The standards referenced herein are included to establish recognized minimum quality only. Where these standards conflict with other specified requirements, the most restrictive requirements shall govern. Equivalent quality and testing standards will be acceptable, subject to their timely submission, review and acceptance by the Architect.

1. ANSI A10.6 – Safety Requirements for Demolition Operations.
2. NFPA 241 – Standard for Safeguarding Construction, Alteration, and Demolition Operations.

1.4 ADMINISTRATIVE REQUIREMENTS

A. Coordination:

1. Comply with all requirements of this contract relative to protection, scheduling and coordination with the Owner.
2. Hazardous materials are not expected to be encountered. If hazardous materials are encountered, the CONTRACTOR shall immediately stop work and immediately notify the owner's representative and Architect and wait for further direction. Hazardous materials shall be handled, removed, and disposed of in accordance with all regulatory agency requirements.

B. Pre-Demolition Meeting: At least two weeks prior to commencing the work of this Section, conduct a pre-demolition conference at the Project site. Comply with requirements of Section 01 31 00 - PROJECT MANAGEMENT AND COORDINATION. Coordinate time of meeting to occur prior to installation of work under the related sections named below.

1. Required attendees: Architect, General Contractor's project manager and on-site superintendent, demolition subcontractor's project superintendent, and representatives of related utility trades.
2. Agenda:
   a. Scheduling of demolition operations. Review critical demolition sequencing with other work.
   b. Coordination of utility service requirements and disconnects.
      1) Review functioning utility services which are to remain in service throughout demolition work.
      2) Review requirements for marking location of disconnected utilities, and project record (as-built) requirements.
   c. Review of site use and staging locations.
      1) Review of storage locations for salvaged materials and materials for recycling program.
   d. Procedures for processing field decisions.
   e. Procedures for handling hazardous materials.
   f. Procedures for protection of general public from demolition operations.
   g. Establish weather and working temperature conditions to which Architect and Contractor must agree.
   h. Review potentially hazardous operations and fire protection procedures.
   i. Review general safety regulations and requirements for demolition work.

1.5 SUBMITTALS

A. Information and Review Submittals: Submit the following under provisions of Section 01 33 00 - SUBMITTAL PROCEDURES:

1. Schedule: Within 7 days after receiving the Notice to Proceed and prior to commencement of work, prepare a schedule indicating proposed methods and sequence of operations for demolition work. Include coordination for shut-off, capping, together with details for dust and noise control protection.

a. Provide detailed sequence of demolition and removal work to ensure uninterrupted progress of Owner's ongoing on-site operations. Receive acceptance from Architect prior to commencing work.

b. List all salvageable materials

2. Shop Drawings: Indicate proposed locations to store salvaged materials to ensure uninterrupted operation of Owner's ongoing on-site operations.

3. Design Data: Submit calculations for bracing and shoring, signed and sealed by professional engineer.

4. Permits: Submit copy of permits required by regulatory agencies for demolition and sidewalk and street closings

5. Special Procedure Submittals: Submit copies of written agreements from private landowners, landfill operators, or other agencies accepting disposal of demolished materials at least two weeks prior to commencement of demolition work.

B. Closeout Submittals: Submit the following under provisions of Section 01 78 00 - CLOSEOUT SUBMITTALS.

1. Record Documentation: Indicate actual location of capped site utilities.

2. Sustainable Design Closeout Documentation: Submit all records for material donations, recycling and landfill disposal in accordance with requirements of Section 01 74 19 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL.

1.6 REGULATORY REQUIREMENTS

A. Conform to applicable codes for demolition work, safety of structure, dust control, and disposal of debris. Conform to procedures applicable when discovering hazardous materials or contaminated substances.

1. The Contractor is directed not to disturb or attempt removal of any discovered hazardous materials or contaminated substances. Immediately notify both the Owner and the Architect upon discovery of such conditions.

2. Removal or containment of the hazardous materials or contaminated substances shall be performed by an abatement specialist under separate contract with the Owner.

B. Obtain and pay for required permits and licenses prior to commencing demolition work. Arrange and pay for legal disposal of removed materials and equipment, obtain proper disposal receipts for verification.

C. Notify affected utility companies and Owner before starting work and comply with utility company requirements.

1.7 QUALITY ASSURANCE

A. General: Conduct the work in a manner giving prime consideration to protection of the public; protection from the weather, control of noise, shocks and vibration; control of dirt and dust; orderly access for and storage of materials; protection of existing buildings; protection of adjacent surfaces and property; coordination and cooperation with the Owner at all times.

1. Comply with all requirements of this contract relative to protection, scheduling and coordination with the Owner.

B. Qualifications:

1. Demolition subcontractor: Company specializing in performing work of this section with minimum 3 years documented experience.
2. Refrigerant Recovery Technician Qualifications: Certified by an EPA-approved certification program.
3. Shoring and bracing design: Design shoring, and bracing (if deemed required), under direct supervision of Professional Engineer experienced in design of this Work and licensed at Project location.

1.8 SITE CONDITIONS

A. Comply with wind and weather conditions established at pre-demolition meeting.

1.9 SEQUENCING AND SCHEDULING

A. Coordinate and arrange with mechanical and electrical trades for their disconnecting, rerouting and maintenance of existing services leading to adjacent occupied buildings, as part of the work of this Contract.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 EXAMINATION

A. Pre-Bid Examination: It is recommended that contractors should visit the existing site prior to providing a bid for this work to fully understand the scope of demolition, removal and disposal required.

B. Verification of Conditions: Examine existing conditions and review Contract Documents prior to commencement of demolition.

1. Owner assumes no responsibility for actual condition of areas to be demolished.
   a. Notify both Owner and Architect, if any type of hazardous chemicals, gases, explosives, flammable material, unmarked containers, or similar dangerous substances are discovered. Cease work in affected areas until directed by Architect. Continue work in other areas.
2. Beginning of installation means acceptance of existing substrate and project conditions.

3.2 PREPARATION

A. Provide, erect and maintain temporary barriers as required to protect non-construction related pedestrian and vehicular traffic using the adjacent portions of the site.

1. If the structure to be demolished has been damaged by fire, flood, explosion, or some other cause, appropriate measures, including bracing and shoring of

walls and floors, shall be taken to protect workers and any adjacent structures. It shall also be determined

B. Protect designated materials and equipment to be removed and retained by Owner. Prevent movement of adjacent structures; provide required bracing and shoring.

C. Protect existing landscaping materials, structures, and appurtenances which are not to be demolished.

D. Protect and maintain conduits, drains, sewers, pipes, and similar utilities that are not to be demolished

3.3 DEMOLITION REQUIREMENTS

A. Conduct demolition to minimize interference with adjacent and occupied building areas, in compliance with governing laws and buildings, with prime consideration given to the safety, protection and convenience of the public and Owner's personnel.

B. Carefully observe existing structure during demolition operations, cease operations immediately if structure appears to be in danger. Notify Architect and do not resume operations until directed.

C. Maintain protected egress and access to the Work at all times. Provide safe passage of persons around surrounding demolition area in compliance with safety and regulatory requirements.

3.4 DUST CONTROL

A. Wet down debris to prevent air pollution by dust rising from demolition work. and to prevent fires caused by vandals. Provide hoses and water connections for this purpose.

B. Employ tarpaulins on trucks carrying debris to prevent spreading duct or debris. Clean up loose debris daily to prevent the wind spreading debris.

3.5 DEMOLITION

A. Disconnect, cap and identify designated utilities within demolition areas.

1. Cap and remove abandoned existing utilities back to locations indicated, or to limit line of Contract where terminations are not indicated.

a. Pipes to be demolished that require a connection shall be removed to the extent required to install the new connection. Remove ripe sections by saw-cutting, removing a complete pipe section to an existing joint, or other adequate means which results in a clean joint.

B. Carefully salvage and provide safe storage for equipment and materials designated for reuse, as indicated on the Drawings, as specified herein, or as requested by Owner for reuse on the project, or to be stored for Owner's future use. Take particular care with finished items and items requiring special handling.

C. Demolish in an orderly and careful manner. Conduct demolition to minimize interference with adjacent structures

1. Blasting operations for demolition is not permitted under this Contract.
2. Cease operations immediately if adjacent structures appear to be in danger. Notify Architect, do no resume operations until directed.
3. Conduct operations with minimum interference to public or private accesses. Maintain protected egress and access at all times.
4. Obtain written permission from adjacent property owners when demolition equipment will traverse, infringe upon or limit access to their property.

D. Remove foundation walls and footings to a minimum of two feet beyond area of new construction.

E. Break up concrete slabs-on-grade to permit natural moisture drainage.

F. Remove designated at-grade paving, curbs, gutters, sidewalks, access ramps, and driveways. Remove entirely to limits indicated, provide saw-cut where abutting existing-in-situ paving designated to remain.

1. Where adjacent pavement or concrete designated to remain is broken or deteriorated sufficiently to prohibit a sound replacement, remove the entire deteriorated section to limit determined by the Architect/Engineer.

G. As work progresses, regularly remove demolished materials from site, except salvaged materials as noted. Do not burn or bury materials on site, arrange for legal disposal of the same.

3.6 BACKFILL

A. Backfill areas excavated, open pits and holes caused as a result of demolition in accordance with Division 31 - EARTHWORK.

B. Rough grade and compact areas affected by demolition to meet adjacent site grades and contours, and to provide water flow to existing surface drainage structures, or as otherwise shown on the Drawings.

3.7 DISPOSAL OF DEMOLISHED MATERIALS

A. General: Except for items or materials indicated or specified to be recycled, reused, salvaged, reinstalled, or otherwise indicated to remain Owner's property, remove demolished materials from Project site and legally dispose of them in an EPA-approved landfill.

1. Comply with requirements of Section 01 74 19 - Construction Waste Management and Disposal, and specified waste diversion goals.
2. As work progresses, regularly remove demolished materials from site. Do not allow demolished materials to accumulate on-site, except as required for materials determined to be reused, salvaged, or as required for waste segregation and diversion for recycling.
3. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.

4. Liquid Waste Management: Dispose of liquid waste in accordance with all applicable regulations. Consult all regulations (federal, provincial, state, local,.) or a qualified waste disposal firm when characterizing waste for disposal. Contact manufacturer for MSDS sheets for product information, and recommendations for proposal disposal. Utilize licensed waste disposal companies as may be required, the following phone numbers for national companies are provided for the Contractor’s convenience only.
   a. Safety Kleen 1-888-217-7859.
   b. Clean Harbors 1-800-444-4244.
   c. Phillip Services 1-888-655-4331.

B. Do not burn or bury demolished materials on site, arrange for legal disposal of the same.

C. Disposal: Transport demolished materials off Owner's property and legally dispose of them.
   1. Comply with waste management reporting requirements on forms acceptable to the Owner.
   2. Record the amount (in tons or cubic yards) of material landfilled from the Project, the identity of the landfill, the total amount of tipping fees paid, transportation costs (if separate) and the total disposal cost. Include manifests, weight tickets, receipt, and invoices

3.8 CLEANING

A. Daily cleaning: Sweep all street and roads affected by demolition operations.

B. Upon completion of the work of this Section; remove unused tools and equipment, surplus materials, rubbish, debris, and dust. Leave area in raked or broom-clean condition, as appropriate.

C. Upon completion of the work of this Section; clean adjacent structures and facilities of dust, dirt and debris caused by demolition work to the satisfaction of Owner, owner(s) of adjacent properties, and authorities having jurisdiction.

End of Section

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Section 03 05 13

CONCRETE SEALERS

PART 1 - GENERAL

1.1 SUMMARY

A. Furnish and install concrete sealers/coatings on exposed-to-view concrete floors where shown and as scheduled on the Drawings.

1.2 RELATED REQUIREMENTS

A. Section 01 74 19 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL: Procedural and administrative requirements relating to recycling goals, waste management program and reporting.

B. Section 01 81 13 - SUSTAINABLE DESIGN REQUIREMENTS: Procedural and administrative requirements relating to required *Northeast CHPS Verified Program, Version 4.0* (NE-CHPS) Certification.

C. Section 03 30 00 - CAST-IN-PLACE CONCRETE:

1. Placing and finishing concrete slabs.
2. Dustproofing concrete slabs exposed to view and substrate for carpet.

1.3 REFERENCES

A. Referenced Standards: Comply with applicable requirements of the following standards and those others referenced in this Section, under the provisions of Section 01 42 00 - REFERENCES. The standards referenced herein are included to establish recognized minimum quality only. Where these standards conflict with other specified requirements, the most restrictive requirements shall govern. Equivalent quality and testing standards will be acceptable, subject to their timely submission, review and acceptance by the Architect.

1. ASTM C156 – Water Retention by Liquid Membrane-Forming Curing Compounds for Concrete.
2. ASTM C309 – Liquid Membrane-Forming Compounds for Curing Concrete.
3. ASTM C1315 - Liquid Membrane-Forming Compounds, having Special Properties for Curing and Sealing Concrete

B. Sustainability Requirement Reference: The following sustainability requirements are hereby made a part of this Section by reference thereto:

1. High Performance Schools Exchange, Northeast Energy Efficiency Partnerships NE-CHPS, Version 4.0, May 2022 Edition (referred to herein as “NE-CHPS”).

1.4 ADMINISTRATIVE REQUIREMENTS

A. Pre-installation Meetings: Installer of the Work of this Section is required to attend pre-installation conference specified under Section 09 05 60 - COMMON WORK RESULTS FOR FLOORING.

1.5 SUBMITTALS

A. Submit the following under provisions of Section 01 33 00 - SUBMITTAL PROCEDURES:

1. Literature: Manufacturer's product data sheets, specifications, performance data, physical properties, material compositions, and application instructions for all finishing products to be applied hereunder.
    a. Include certification of data indicating Volatile Organic Compound (VOC) content of all coatings.
2. Samples of each level of slip resistance, aggregate, and pattern available in the specified products from the proposed manufacturer.
3. Sustainable Design Submittals: As required by NE CHPS, version 4.0.
4. Qualification Submittals.

1.6 QUALITY ASSURANCE

A. Use an applicator approved by the manufacturer, experienced in the approved materials, and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.

1.7 ENVIRONMENTAL CONDITIONS

A. Work shall be done only under optimum conditions as recommended by manufacturer. Surfaces over which sealer is to be applied shall be completely dry (minimum 30 days since concrete placement) and thoroughly clean. Maximum moisture content is 8 percent. Substrate and ambient temperature shall be between 60 and 90 degrees Fahrenheit (15 to 32 degrees Celsius).

1.8 DELIVERY, STORAGE AND HANDLING

A. Delivery and Acceptance Requirements:

1. Do not deliver items to the site, until all specified submittals have been submitted to, and approved by, the Architect.
2. Deliver materials in original unopened packages, containers or bundles bearing brand name, and identification of manufacturer, with labels and package seals intact and legible.

B. Storage and Handling Requirements:

1. Store and handle materials following manufacturer's recommended procedures, and in accordance with material safety data sheets.
2. Protect materials from damage due to moisture, direct sunlight, excessive temperatures, surface contamination, corrosion and damage from construction operations and other causes.

C. Packaging Waste Management: Comply with packaging requirements specified under Section 01 60 00 - PRODUCT REQUIREMENTS.

1. Shipping materials: Manufacturer shall utilize to the greatest extent possible packaging materials which are biodegradable an recyclable.
2. Jobsite packaging waste management: Recycle packaging materials coordinated with general construction waste management specified under Section 01 74 19 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL

PART 2 - PRODUCTS

2.1 MATERIALS

A. Transparent non-yellowing water-based acrylic sealer having a minimum of 25 percent solids, with a maximum VOC limit of 100 g/L. Subject to compliance with ASTM C309, Type 1, Class A, ASTM C1315 Type 1, Class A, and requirements specified herein.

1. Products which may be incorporated in the work include the following, or approved equal:
   a. Laticrete International Inc., Bethany CT, (L&M Construction Chemicals Brand), Omaha NE, product “Dress & Seal WB25”.
   b. Dayton-Superior, Miamisburg OH, (Symons Brand), Des Plaines, IL, product “Cure & Seal 1315EF”.
   c. Euclid Chemical Company, Cleveland OH., product “Super Aqua-Cure VOX.”
   d. Nox-Crete Inc., Omaha NE, product “Cure & Seal 250E”.
   e. WR Meadows Inc., Hampshire, IL. product “VoComp-25

PART 3 - EXECUTION

3.1 SURFACE PREPARATION

A. Upon acceptance of completed substrate surfaces, thoroughly remove all dust and debris by sweeping or vacuum cleaning.

B. Remove laitance, curing sealers, existing adhesives and other foreign matter from concrete surfaces with necessary techniques such as shot blasting, Muriatic acid etching, surface freezing and power scarification.

C. Surface preparation required if a curing compound has been applied to substrate surfaces.

1. Thoroughly etch concrete surfaces using well mixed solution consisting of two parts by volume water diluted with one part by volume 30 percent commercial grade hydrochloric acid at a rate of one quart per ten square feet. Apply evenly to thoroughly saturated areas and scrub into surfaces using stiff-bristled broom. Allow solution to activate undisturbed for not less than five minutes or for duration of boiling effect.
2. Thoroughly remove etching solution by washing down surfaces with clean water; flooded at least three separate times at a rate of two gallons per ten

square feet; thoroughly remove all contaminates that may be engrained or latent in surfaces.

3. Perform a test application of a square foot in three locations, such as beneath casework. Allow to set for 72 hours, and test adhesion as recommended by the manufacturer.

3.2 APPLICATION

A. Apply sealer with manufacturer's recommended sprayer, at recommended rate of 400 square feet per gallon. Apply second coat when sealer is dry to touch. Allow sealer to cure undisturbed for a minimum period of 6 hours. Maintain temperature at 60 degrees Fahrenheit minimum until floor surfacing has completely dry.

End of Section

Section 03 11 00

CONCRETE FORMWORK

PART 1 - GENERAL

1.1 GENERAL PROVISIONS

A. All of the Contract Documents, including General and Supplementary Conditions apply to the Work of this Section.

1.2 SCOPE

A. This section specifies requirements for concrete formwork to produce cast-in-place concrete structures as shown on the Drawings and as specified herein. The work shall consist of designing, furnishing, constructing and removing formwork for all cast-in-place concrete structures.

B. Use forms, wherever necessary, to confine the concrete and shape it to the required lines, and to provide the specified finish. Construct forms with sufficient strength to structurally support the work, and withstand the pressure resulting from placement and vibration of the concrete, and maintain forms rigidly in position. Construct forms sufficiently tight to prevent loss of mortar from the concrete.

1.3 REFERENCES

A. American Concrete Institute (ACI):

1. ACI 117: Standard Specification for Tolerances for Concrete Construction and Materials.
2. ACI 301: Standard Specification for Structural Concrete.
3. ACI 347: Guide to Formwork for Concrete.

B. Rhode Island State Building Code.

1.4 DESIGN REQUIREMENTS

A. Design formwork to support vertical loads and lateral pressures resulting from placement and vibration of concrete in accordance with the requirements of ACI 301 and ACI 347, and as specified herein.

B. Camber the formwork to compensate for anticipated deflections due to the weight and pressure of the fresh concrete and due to construction loads.

C. Provide shores and struts with positive means of adjustment capable of taking up formwork settlement during concrete placing operations. Use wedges or jacks, individually or in combination for adjustment.

D. Design forms and falsework to include assumed values of live loads, dead load, weight of moving equipment operated on formwork, concrete mix, height of drop, vibrator frequency, ambient temperature, lateral stability, and other factors pertinent to the safety of the structure during construction.

E. Provide and design forms to conform with expansion and construction joint locations.

1.5 SUBMITTALS

A. Submittals for the following items shall be made in accordance with the requirements as specified. Refer to Section 01 33 00 SUBMITTAL PROCEDURES for provisions and procedures.

B. Submit the following at least 30 days before the first concrete placement:

1. Manufacturer's data and installation instructions for proprietary form accessories, form coatings, pipe sleeves and seals, form ties and manufactured form systems if used.
2. Certification that form coatings comply with the requirements of this Section.

1.6 QUALITY ASSURANCE

A. Provide in accordance with the requirements as specified.

B. Tolerances:

1. Permissible surface irregularities for the various classes of concrete surface finish as specified in Section 03 30 00, Cast-in-Place Concrete, are defined as "finishes", and are to be distinguished from tolerances as specified herein. Deviations from the established lines, grades, and dimensions will be permitted to the extent set forth herein.
2. The tolerance limits specified in this Section and the surface finish irregularities permitted in Section 03 30 00, Cast-in-Place Concrete, are not the limits to which forms may be built or by which damaged from sheathing may be used. These limits are provided only for the occasional slight misalignment or irregularity of surface, which may occur despite a serious effort to build and maintain the forms accurately and securely with an even surface. These limits will be allowed only for inadvertent or relatively infrequent irregularities of the degree mentioned, but practices and form materials will be prohibited which without doubt will result in the creation of additional irregularities, even though these would be within the limits specified.
3. Where specific tolerances are not stated herein or shown on the Drawings for a structure, portion of a structure, or other feature of the work, permissible deviations will be interpreted conforming to the tolerances stated herein for similar construction. Specific maximum or minimum tolerances as shown on the Drawings in connection with any dimension shall be considered as supplemental to the tolerances specified herein and shall govern. Concrete forms shall be set and maintained within the tolerance limits necessary to ensure that the completed work will be within the tolerances specified. Concrete construction that exceeds the tolerance limits specified or as shown on the Drawings shall be remedied or removed and replaced by the Contractor at no cost to the Owner.
4. Tolerances shall be as specified in ACI 117, Standard Specifications for Tolerances for Concrete and Materials.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Forms for Exposed Finish Concrete: Construct formwork for exposed concrete surfaces with smooth faced undamaged plywood or metal, metal-framed plywood faced or other acceptable panel-type facing materials approved by Engineer, to provide continuous, straight, smooth as-cast surfaces, and produce a uniform and consistent texture and pattern on the surfaces. Metal patches on forms for these surfaces will not be permitted. Furnish in largest practicable sizes to minimize number of joints and to conform to joint system shown on the drawings.

1. Use overlaid plywood complying with U.S. Product PS-1 “A-C or B-B High Density Overlaid Concrete Form”, Class I.
2. Use plywood complying with U.S. Product Standard PS-1 “B-B (Concrete Form) Plywood”, Class I, Exterior Grade or better, mill-oiled and edge-sealed, with each piece bearing legible inspection trademark.

B. Forms for Unexposed Finish Concrete: Plywood, lumber, metal, or other acceptable material. Provide lumber dressed on at least 2 edges and one side for tight fit.

C. Tubular Fiber Forms:

1. Provide forms with spirally constructed laminated plies of fiber.
2. Provide forms with wall thickness as recommended by the manufacturer to meet load requirements of the various uses and sizes.
3. Provide forms with wax coated outside surfaces for moisture resistance.
4. Provide forms with inside surface coated with bond-breaker compound.

D. Form Ties:

1. Form Ties: For concrete structures, which will not be in view or buried below finish grade, use carbon steel factory-fabricated, removable or stay in place snap-off type form ties, designed to prevent form deflection and to prevent spalling concrete upon removal. Provide units, which will leave no metal closer than 1-1/2” to surface. Provide ties which, when removed, will leave holes not larger than 1” diameter in concrete surface. Patch all holes with non-shrink grout.
2. Form ties and spreaders for walls in areas exposed to view shall be Stainless Steel Cone–Tight Tyscru by Richmond Screw Anchor Co.; Dayton Sure-Grip and Shore Co.; or substitute approved by Engineer with Plastic cone-tight type cones having a 1” setback and a taper from 1” to 1-1/4”. Tyscru cone holes shall be sealed with plastic set back plugs, color as selected by Engineer from manufacturer’s standard color selection or filled with non-shrink grout. Tyscru ties shall be sized to satisfy loading requirements.
3. In lieu of form ties specified above, fiberglass form tie systems shall be used. Fiberglass form ties shall be standard gray color. The concrete structure shall be finished by grinding the fiberglass form tie flush with the finish surface of the concrete structure.
    a. If tapered architectural holes are required, dummy tapered cones having a 1” setback and a taper from 1” to 1-1/4 shall be fastened to

the interior of the formwork to achieve the specified pattern on the finish structure.

E. Form Releasing Agents: Provide commercial formulation form-releasing agents that will not bond with, stain, nor adversely affect concrete surfaces requiring bond or adhesion, nor impede the wetting of surfaces to be cured with water or curing compounds. Volatile organic compound emissions of form coating agent shall not exceed 2.09 pounds per gallon (250 grams per liter).

F. Chamfer Strips: Provide 1-inch triangular fillets, unless noted otherwise on drawings, to form all exposed concrete corners. Material shall be rubber or polyvinyl chloride type, or smooth clear, sealed softwood.

PART 3 - EXECUTION

3.1 INSPECTIONS

A. Examine the substrate and conditions under which work of this Section is to be performed, and correct unsatisfactory conditions, which would prevent proper and timely completion of the work. Do not proceed until unsatisfactory conditions have been corrected.

3.2 FORM CONSTRUCTION

A. General:

1. Construct forms as designed and in accordance with Contractor's approved working drawings conforming to ACI 347, to the exact sizes, shapes, lines, and dimensions shown, and as required to obtain accurate alignment, location, grades, level, and plumb work in finished structures.
2. Provide for openings, offsets, keyways, recesses, moldings, chamfers, blocking, screeds, bulkheads, anchorages, inserts, and other features required. Use selected materials to obtain required finishes.
3. Forms for concrete which accommodate work of other trades, fabricated before the opportunity exists to verify the measurements of adjacent construction, shall be accurately sized and located as dimensioned on the Drawings. In the event that deviation from the Drawing dimensions results in problems in the field, the Contractor shall be responsible for resolution of the conditions as approved by the Engineer, at no cost to the Owner.

B. Fabrication:

1. Fabricate forms for easy removal without hammering or prying against concrete surfaces. Provide crush plates or wrecking plates where stripping may damage concrete surfaces.
2. Provide temporary openings where interior area of formwork is inaccessible for cleanout, for inspection before concrete placement, and for placement of concrete. Brace temporary closures and set tightly to temporary openings on forms in as many inconspicuous locations as possible, commensurate with design requirements. Form intersecting planes to provide true, clean cut corners.

C. Falsework:

1. Erect falsework and support, brace, and maintain it to safely support vertical, lateral, and asymmetrical loads applied until complete structure has

attained design strength. Construct falsework so that adjustments can be made for take-up and settlement, and access is provided for inspection.

2. Provide wedges, jacks or chamfer strips to facilitate vertical adjustments. Carefully inspect falsework and formwork during and after concrete placement operations to determine abnormal deflection or signs of failure; make necessary adjustments to product work of required dimensions.

D. Forms for Exposed Concrete:

1. Drill forms to suit ties used and to prevent leakage of concrete mortar around tie holes. Do not splinter forms by driving ties through improperly prepared holes
2. Provide sharp clean corners at intersecting planes, without visible edges or offsets. Back joints with extra studs or grits to maintain true, square intersections.
3. Use extra studs, walers, and bracing to prevent bowing of forms between studs and to avoid bowed appearance in concrete. Do not use narrow strips of form material, which will produce bow.

E. Corner Treatment:

1. Unless shown otherwise, form chamfers with 1-inch by 1-inch strips, accurately formed and surfaced to produce uniformly straight lines and tight edge joints on exposed concrete. Extend terminal edges to required limits and miter chamfer strips at changes in direction.

F. Control Joints: Locate as indicated on the Drawings.

G. Provision for Other Trades: Provide openings in concrete formwork to accommodate work of other trades. Verify size and location of openings, recesses and sleeves with the trade requiring such items. Accurately place and securely support items to be built into forms.

H. Cleaning and Tightening: Thoroughly clean forms and adjacent surfaces to receive concrete. Remove encrusted mortar and grout, chips, wood, sawdust, dirt, and other debris just before concrete is placed. Retighten forms immediately after concrete placement as required to eliminate mortar leaks.

3.3 FORM COATINGS

A. Coat form contact surfaces with form-releasing agent before reinforcement is placed. Do not allow excess form coating material to accumulate in the forms or to come into contact with surfaces that will be bonded to fresh concrete. Apply in strict compliance with manufacturer’s instructions.

B. Remove surplus coating on form surfaces before placing concrete.

3.4 INSTALLATION OF EMBEDDED ITEMS

A. Set and build into the forms, anchorage devices and other embedded items required for other work that is attached to, or supported by, cast-in-place concrete. Use setting drawings, diagrams, instructions and directions provided by suppliers of the items to be attached thereto.

B. Set edge forms or bulkheads and intermediate screed strips for slabs, to obtain required elevation and contours in the finished slab surface. Provide and secure units to support types of screeds required.

3.5 REMOVAL OF FORMS

A. Formwork not supporting concrete, such as sides of walls, columns, and similar parts of the Work, may be removed after cumulatively curing at not less than 50 degrees F for 72 hours after placing concrete, provided concrete is sufficiently hard to not be damaged by form removal operation, and provided that curing and protection operations are maintained.

B. Formwork supporting weight of concrete, such as elevated beams, joists, slabs and other structural elements may not be removed until concrete has attained 70% of its design minimum 28-day compressive strength, and has cumulatively cured for no less than 7 days. Concrete shall have sufficient strength to safely support its own weight and construction live loads and lateral pressures. Determine potential compressive strength of in-place concrete testing field-cured specimens representative of the concrete location or members, as specified in Section 03 30 00, Cast-in-Place Concrete.

C. Form facing material may be removed one day after placement, only if shores and other vertical supports have been arranged to permit removal of form facing material without loosening or disturbing shores and supports.

D. Form ties: The concrete structure shall be finished by grinding the fiberglass form ties flush with the finish surface of the concrete structure.

3.6 REUSE OF FORMS

A. Clean and repair surfaces of forms to be reused in the work. Split, frayed, delaminated or otherwise damaged form facing material will not be acceptable. When forms are reused for successive concrete placement, thoroughly clean surfaces, remove fins and laitance, and tighten forms to close all joints. Align and secure joints to avoid offsets. Apply new form releasing agent to all form areas that will be in contact with concrete.

B. Do not reuse forms if there is any evidence of surface wear and tear, splits, fraying, delamination or other damage which would impair the quality of the concrete surface or prevent obtaining the specified concrete finish.

End of Section

Section 03 15 10

CONCRETE CONTROL, CONSTRUCTION, AND EXPANSION JOINTS

PART 1 - GENERAL

1.1 GENERAL PROVISIONS

A. All of the Contract Documents, including General and Supplementary Conditions apply to the Work of this Section.

1.2 SCOPE

A. Section includes: All work necessary to provide construction joints, expansion joints, and control joints in structural or plain concrete as indicated and specified.

1.3 REFERENCES

A. American Society for Testing and Materials (ASTM) Publications:
   1. C 920: Specification for Elastomeric Joint Sealants.
   2. C1193: Guide for Use of Joint Sealants.
   3. D1751: Specification for Preformed Expansion Joint Fillers for Concrete Paving and Structural Construction (Non-extruding and Resilient Bituminous Types).
   4. D1752: Specification for Preformed Sponge Rubber and Cork Expansion Joint Fillers for Concrete Paving and Structural Construction.

1.4 SUBMITTALS

A. Shop Drawings: Submit the following in accordance with the requirements as specified in Section 01 33 00, SUBMITTAL PROCEDURES.
   1. Manufacture’s printed data and literature for all specified materials and locations where materials are to be used.
   2. Manufacturer’s printed instruction for:
      a. Treatment of cut surfaces of premolded expansion joint filler.
      b. Preparation of concrete for joint sealant.

B. Samples of joint fillers.

C. Color samples or charts for joint sealants.

1.5 QUALITY ASSURANCE

A. Provide in accordance with the requirements as specified in Section 01 45 00, QUALITY CONTROL.

B. Do not omit control, construction, or expansion joints.

C. Do not add or relocate control, construction, or expansion joints without written authorization from the Engineer.

D. Cast slabs and beams monolithically without horizontal joints.

E. Do not use horizontal joints within foundation mats, base slabs, footings, pile caps, slabs on grade or elevated beams and slabs.

F. Provide control, construction, and expansion joints in concrete fills and toppings at the same location as the control, construction and expansion joints in the supporting concrete.

G. Reject material exceeding expiration date for use.

H. Insure that concrete surfaces to receive joint sealant are cleaned in accordance with the printed instructions of the joint sealant manufacture.

1.6 DELIVERY AND STORAGE

A. Transport, handle and deliver materials to the job site in the manufacturer's sealed bags, unopened containers or banded pallets.

B. Store materials off the ground on a platform or skids and protect with covers from snow, rain and ground splatter.

C. Store joint sealants in a dry warm location to prevent freezing.

D. Store plastic products under cover in a dry cool location, out of direct sunlight.

PART 2 - PRODUCTS

2.1 PREMOLDED JOINT FILLER

A. Provide premolded–joint filler conforming to ASTM D1752, Type I or Type II.

B. Provide Type III self-expanding cork where specifically indicated.

C. Provide joint filler of same thickness as expansion joint width indicated.

D. Provide maximum length filler manufactured to minimize field splicing.

2.2 JOINT SEALANT

A. Horizontal Expansion and Construction Joints: Provide one-component, self-leveling, polyurethane-base joint sealant for expansion joints in horizontal surfaces and surfaces inclined less than 30 degrees from the horizontal. Acceptable products:

1. Sikaflex-1CSL by Sika Corporation
2. Approved equivalent.

B. Provide joint sealant for expansion joints in walls and surfaces inclined greater than 30 degrees from the horizontal conforming to ASTM C920, Type S or M, Grade NS, Class 25.

C. Horizontal Control Joints: Provide 2-component, self-leveling 100% solids, flexible, control joint resin. Acceptable products:

1. Sikadur 51 SL by Sika Corporation
2. Approved equivalent.

D. Provide compatible joint sealants as recommended by manufacturer when they abut each other.

E. Provide sealant intended for continuous submergence in liquid containing structures.

2.3 BOND BREAKER FOR JOINT SEALANTS

A. Provide polyethylene tape, coated tape or metal foil.

2.4 BACK-UP MATERIAL FOR JOINT SEALANTS

A. Provide polyethylene foam or polychloroprene foam rubber.

B. Do not use material impregnated with oil, bitumen or similar substances.

C. Provide back-up material as recommended by joint sealant manufacturer that is compatible with the joint sealant and has the same expansion/contraction capability as joint sealant.

PART 3 - EXECUTION

3.1 CONSTRUCTION JOINTS

A. Locate and install construction joints as indicated or, if not indicated, locate so as not to impair the strength and appearance of the structure. Submit proposed construction joint locations for approval.

B. Place construction joints perpendicular to main reinforcement. Continue reinforcement across construction joints.

C. Key groove all construction joints unless otherwise indicated. Wall horizontal joints need not be keyed except where specifically indicated.

D. Key grooves shall be one-third the thickness of the thinner member and 1-1/2-in. deep unless otherwise indicated.

E. Use tapered key groove forms to permit form removal without damage to the groove. Taper not to exceed 2 inches per foot.

F. Center waterstops in construction joints unless otherwise indicated. Secure waterstops in position by tie wire to adjacent reinforcing every 12 inches.

G. Consolidate concrete during placement in the vicinity of key groove without damaging or dislodging waterstop.

H. Remove all key groove forms.

I. Clean key groove of laitance, curing sealant, foreign materials and protrusions of hardened concrete. Roughen by bush hammer or lightly sandblast to expose coarse aggregate. Blow out debris and dust with oil-free compressed air.

J. Protect exposed key groove and waterstop from damage.

3.2 EXPANSION JOINTS

A. Install expansion joints in accordance with the manufacturers printed instructions and as indicated.

B. Center waterstops in expansion joints unless otherwise indicated. Secure waterstops in position by tie wire to adjacent reinforcing every 12 inches.

C. Consolidate concrete during placement in vicinity of expansion joint without damaging premolded joint filler and waterstop.

D. Prepare joint to receive sealant by sand-blasting then blowing out the joint with clean, dry, compressed air.

3.3 PREMOLDED JOINT FILLER

A. Treat cut surface of premolded joint filler in conformance with manufacturer's printed instructions.

B. Place premolded joint filler against the bulkhead form and fasten to the inside of the form with noncorrosive fasteners. Remove all fasteners when bulkhead form is removed.

C. Prevent disturbance of or damage to premolded joint filler.

D. Fill expansion joint completely with premolded joint filler, except as specified below.

E. Secure wood strips to expansion joint surfaces, which are to receive joint sealant.

F. Use tapered wood strips with the smaller width being the same width as the expansion joint and of depth necessary to install the joint sealant and back-up materials.

G. Use materials to secure the premolded joint filler and wood strips that will not harm concrete or affect the joint sealant bond to concrete.

H. Do not remove wood strips until forms are removed as specified in the Concrete Formwork section.

I. Clean groove of laitance, curing sealant, foreign materials and protrusions of hardened concrete. Blow out debris and dust with oil-free compressed air.

3.4 CONTROL JOINTS

A. Saw-cut control joints at locations indicated on the Drawings or at locations approved by the Engineer of Record if not shown on the Drawings.

B. Saw cut joints to ¼ of the depth of the slab or concrete member immediately after slab finishing.

C. All control joints shall be made within 8 hours of concrete placement.

D. Prepare all control joints to receive sealant by high-pressure washing after saw-cutting, sand-blasting after the joints are dry, and then blowing out the joints with clean, dry, compressed air.

3.5 JOINT SEALING

A. Seal the dry clean concrete in joints in conformance with manufacturer's printed instruction.

B. Install back-up and bond breaker materials where required or recommended by the manufacturer.

C. Prime concrete, fill flush with joint sealant to required thickness, tool to concave shape and seal in conformance with manufacturer's printed instructions and ASTM C1193.

D. Prevent spilling joint sealant over adjoining surfaces. Use tape adjacent to joint as required. Remove all tape completely from concrete surface after installing joint.

E. Do not prime concrete or install joint sealant when sealant, air or concrete temperature is less than 40 deg. F. or as required by manufacturer.

End of Section

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Section 03 15 15
POLYVINYL CHLORIDE WATERSTOPS

PART 1 - GENERAL

1.1 GENERAL PROVISIONS

A. All of the Contract Documents, including General and Supplementary Conditions apply to the Work of this Section.

1.2 SCOPE

A. Provide polyvinyl chloride waterstops as indicated and specified.

1.3 REFERENCES

A. American Society for Testing and Materials (ASTM) Publications:
1. D570: Test Method for Water Absorption of Plastics
2. D624: Test Method for Shear Strength of Conventional Vulcanized Rubber Thermoplastic Elastomers
3. D638: Test Method for Tensile Properties of Plastic
4. D746: Test Method for Brittleness Temperature of Plastics and Elastomers by Impact
   D747: Test Method for Apparent Bending Modulus of Plastics by Means of a Cantilever Beam
5. D1149: Test Method for Rubber Deterioration – Surface Ozone Cracking in a Chamber
6. D1203: Test Methods for Volatile Loss from Plastics Using Activated Carbon Methods
7. D2240: Test Method for Rubber Property – Durometer Hardness

B. Corps of Engineers Specification CRD-C572: Specification for Polyvinyl Chloride Waterstop.

1.4 SUBMITTALS

A. Shop Drawings: Submit the following in accordance with requirements as specified in Section 01 33 00, SUBMITTAL PROCEDURES.
1. Manufacturer’s printed data and literature for all specified materials and locations where materials are to be used.

B. Samples of waterstops.

C. Certification that materials proposed for use is non-toxic and has no effect on the quality or appearance of potable water.

1.5 QUALITY CONTROL

A. Provide in accordance with the requirements as specified in Section 01 45 00, QUALITY CONTROL.

B. Reject waterstops containing scrap or reclaimed material or pigment.

C. Require a manufacture's service representative to visit the job site before any waterstops are installed to demonstrate the correct installation and splicing procedures.

D. Correctly position waterstops in construction and expansion joints.

E. Spark test waterstop splices before installation.

F. Use factory made and tested crosses, tees and ells at corners and intersections.

1.6 DELIVERY, STORAGE AND HANDLING

A. Transport, handle and deliver materials to the job site in the manufacturer's sealed bags, unopened containers or banded pallets.

B. Store materials off the ground on a platform or skids and protect with covers from snow, rain and ground splatter.

C. Store plastic products under cover in a dry cool location, out of direct sunlight.

PART 2 - PRODUCTS

2.1 POLYVINYL CHLORIDE WATERSTOP

A. Provide polyvinyl chloride waterstops conforming to Corps of Engineers Specification CRD-C572.

B. Provide waterstops manufactured from virgin polyvinyl chloride plastic compound has a minimum tensile strength of 1750 psi.

C. Provide waterstops of type, shape and size indicated with looped galvanized steel wire along both edges.

1. 9 in. waterstops shall be center bulb ribbed type.
2. 6 in. waterstops shall be center bulb ribbed type.

D. Provide factory-made and spark tested crosses, tees and ells fabricated by the waterstop manufactured using thermostatically controlled electric heat source.

E. Provide waterstops which meet or exceed the criteria in Table 03255-1.

TABLE 03255-1

Property	Test Method	Limit
Water Absorption	ASTM D 570	0.15% maximum
Tear Resistance	ASTM D 624	300 #/inch minimum
Ultimate Elongation	ASTM D 638	300% minimum
Tensile Strength	ASTM D 638	2000 psi minimum
Low Temperature Brittleness	ASTM D 746	No Failure at -35°F
Stiffness in Flexure	ASTM D 747	600 psi minimum
Specific Gravity	ASTM D792	1.38 +/- 0.05
Ozone Resistance	ASTM D 1149	No Failure

Property	Test Method	Limit
Volatile Loss	ASTM D 1203	0.50% maximum
Hardness, Shore A	ASTM D 2240	70 to 85
Tensile strength after accelerated extraction	CRD C 572	1600 psi minimum
Elongation after accelerated extraction	CRD C 572	300%
Effect of Alkalis after 7 days-Weight Change	CRD C 572	0.10% to +0.25%
Effect of Alkalis after 7 days-Hardness Change	CRD C 572	+5 maximum

F. Manufacturers:
   1. 9 in. waterstops:
      a. No. 708 as manufactured by Greenstreak Plastic Products Company, St. Louis, MO.
      b. RCB-938 as manufactured by Bo Metals, Inc. Carrolton, GA.
      c. Catalog No. RB938 as manufactured by Vinylex Waterstop & Accessories St. Louis, MO.
      d. Or approved equal.
   2. 6 in. waterstops:
      a. No. 703 as manufactured by Greenstreak Plastic Prducts Company, St. Louis, MO.
      b. RCB-938 as manufactured by Bo Metals, Inc. Carrolton, GA.
      c. Catalog No. RB6316 as manufactured by Vinylex Waterstop & Accessories St. Louis, MO.
      d. Or approved equal.

PART 3 - EXECUTION

3.1 FABRICATION

A. Make all splices on a bench following manufacture's printed instructions and splicing procedures.

B. Use miter guide and portable power saw to cut spliced ends.

C. Maintain continuity of characteristic features of waterstop cross section, including ribs and center bulb, through splice.

D. Remove looped steel wire along both edges of waterstop adjacent to saw cut prior to splicing.

E. Make splices by heat-sealing adjacent surfaces using a thermostatically controlled electric heat source in conformance with manufacturer's printed instructions.

F. Reform waterstop at splices using a remolding iron having a pattern matching the waterstop.

G. After splice has cooled, spark test all splices in conformance with manufacture's printed instructions. If splice shows any separation or lack of fusion, reject the splice, re-cut back at least one inch from rejected splice each side, re-weld and retest.

H. Replace or repair damaged or punctured waterstops in conformance with manufacture's printed instructions at no additional cost to the Owner.

I. Clean waterstops of curing compound, foreign materials and protrusions of hardened concrete and mortar.

3.2 INSTALLATION

A. Place waterstop to form a continuous watertight diaphragm in joints.

B. Center waterstops in joints unless otherwise indicated.

C. Install waterstops in continuous lengths to minimize field splices.

D. Maintain 2-in. minimum clearance between waterstop and reinforcement and embedded items.

E. Do not bend waterstops in forms. Use factory-made and spark tested crosses, tees and ells at all corners and intersections.

F. Do not fold waterstops against bulkhead forms.

G. Secure waterstops in position with tie wire from loops to adjacent reinforcement on both sides every 12 in. along each edge.

H. Consolidate concrete during placement in vicinity of waterstop without damaging or dislodging waterstop.

I. Protect exposed waterstop from damage.

J. Do not install split waterstops unless specifically indicated.

End of Section

Section 03 15 20
HYDROPHILIC RUBBER WATERSTOPS

PART 1 - GENERAL

1.1 GENERAL PROVISIONS

A. All of the Contract Documents, including General and Supplementary Conditions apply to the Work of this Section.

1.2 SCOPE

A. Provide as an alternative to polyvinyl chloride waterstops, hydrophilic rubber waterstops as indicated and specified.

1.3 REFERENCES

A. American Society for Testing and Materials (ASTM) Publications:
   1. D638: Test Method for Tensile Properties of Plastics
   2. D1149: Test Method for Rubber Deterioration – Surface Ozone Cracking in a Chamber
   3. D1203: Test Methods for Volatile Loss from Plastics Using Activated Carbon Methods
   4. D2240: Test Method for Rubber Property – Durometer Hardness

1.4 SUBMITTALS

A. Shop Drawings: Submit the following in accordance with the requirements as specified in Section 01 33 00, SUBMITTAL PROCEDURES.
   1. Manufacture’s printed data and literature for all specified materials and locations where materials are to be used.

B. Samples of waterstops.

C. Certification that materials proposed for use are non-toxic and have no effect the quality or appearance of potable water. Materials shall be NSF approved for contact with potable water.

1.5 QUALITY CONTROL

A. Provide in accordance with the requirements as specified in Section 01 45 00, QUALITY CONTROL.

B. Reject and replace waterstops that have become wet or exhibit swelling prior to concrete placement.

C. Require a manufacture’s service representative to visit the job site before any waterstops are installed to demonstrate the correct installation and splicing procedures.

D. Correctly position waterstops in joints.

E. Provide waterstops in maximum practical lengths to minimize joints.

F. Use adhesives manufactured by or recommended by the waterstop manufacturer for attachment of the waterstop to concrete.

G. Waterstops shall be positioned to provide a minimum of 3” concrete cover.

1.6 DELIVERY, STORAGE AND HANDLING

A. Transport, handle and deliver materials to the job site in the manufacturer’s sealed bags, unopened containers or banded pallets.

B. Store materials off the ground on a platform or skids and protect with covers from snow, rain and ground splatter.

C. Store hydrophilic watertops under cover in a dry cool location, out of direct sunlight. Waterstops shall be maintained in a dry condition until concrete placement

PART 2 - PRODUCTS

2.1 HYDROPHILIC GASKET WATERSTOPS

A. Provide hydrophilic rubber gasket waterstops fabricated of non-vulcanized rubber, chloroprene rubber, urethane polymers, vinylester polymers or combinations of these materials.

B. Provide waterstops as recommended by manufacturer for specific installation.

C. Waterstops containing bentonite shall not be used.

D. Provide hydrophilic gasket waterstops that meet or exceed the criteria in Table 03256-1.

TABLE 03256-1

Property	Test Method	Limit
Ultimate Elongation	ASTM D 412	550% minimum
Tensile Strength	ASTM D 412	350 psi minimum
Specific Gravity	ASTM D 792	1.18 to 1.38
Hardness, Shore A	ASTM D 2240	40 to 60

E. Provide hydrophilic rubber gasket waterstops as manufactured by:

1. Hydrotite as manufactured by Greenstreak Plastic Products Company, St. Louis, MO.
2. Swellseal 2010 manufactured by De Neef Construction Chemicals, Inc., Waller, TX.
3. Or approved equal.

2.2 HYDROPHILIC PASTE WATERSTOPS

A. Provide hydrophilic rubber paste waterstops of urethane paste, thixotropic vinyl monomer or similar materials.

B. Hydrophilic rubber paste shall be compatible with waterstop material.

C. Hydrophilic paste shall be 100% solids.

D. Provide hydrophilic paste waterstops that meet or exceed the criteria in Table 03256-2.

TABLE 03256-2

Property	Test Method	Limit
Ultimate Elongation	ASTM D 412	100% minimum
Tensile Strength	ASTM D 412	25 psi [170 kPa] minimum
Ozone Resistance	ASTM D 1149	No Failure
Volatile Loss	ASTM D 1203	0.50% maximum
Hardness, Shore A	ASTM D 2240	30 to 60

E. Provide hydrophilic rubber paste as manufactured by:
1. Leak Master manufactured by Greenstreak, St. Louis, MO.
2. Swellseal Cartridge manufactured by De Neef Construction Chemicals, Inc.,Waller, TX;
3. Or approved equal.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Provide hydrophilic rubber gasket and paste waterstops where specifically indicated. Provide ribbed center bulb polyvinyl chloride waterstops in expansion joints unless otherwise indicated.

B. Center waterstops in joints unless otherwise indicated. Provide the minimum clear coverage specified by the manufacturer.

C. Consolidate concrete during placement in vicinity of waterstop without damaging or dislodging waterstop.

D. Clean joint surface of dirt, dust, debris and laitance immediately before applying waterstop and remove standing water.

E. Protect waterstops from moisture until concrete is placed. Waterstops that exhibit swelling prior to concrete placement shall be removed and replaced at the Contractor’s expense.

3.2 HYDROPHILIC GASKET WATERSTOPS

A. Install hydrophilic gasket waterstops in continuous lengths to minimize joints. Provide waterstop in one continuous length as practicable. Butt ends at joints of waterstop or overlap a minimum per manufacturer’s instructions.

B. Seal joints in hydrophilic gasket waterstops with a hydrophilic rubber paste compound as recommended by the manufacturer.

C. Do not bend hydrophilic gasket waterstop. Cut square and butt joints at corners.

D. Waterstop shall be in continuous contact with the concrete surface.

E. Attach hydrophilic gasket waterstop to concrete surface by one of the following methods:

1. Fix hydrophilic gasket waterstop to concrete surface with continuous bead of hydrophilic rubber paste or adhesive. Paste or adhesive shall be provided by or as recommended by the waterstop manufacturer.

F. Fix hydrophilic gasket waterstop to concrete surface with masonry or concrete nails or powder activated fasteners at a maximum 12-inch spacing.

G. Provide one fastener one inch from the top and a second fastener four inches from the top of vertical hydrophilic gasket waterstops regardless of which fastening method is used.

H. Do not compress or otherwise deform hydrophilic gasket waterstop when fastening to concrete.

I. Do not wrap hydrophilic gasket waterstops around pipes less than the minimum diameter recommended in the manufacture’s printed instructions.

3.3 HYDROPHILIC PASTE WATERSTOPS

A. Clean dirt and debris from area to receive hydrophilic paste waterstop.

B. Bead of hydrophilic paste waterstop shall be a minimum of 1/4 by 1/2 inches.

C. Apply hydrophilic paste waterstop such that there is no break in the bead.

D. Place hydrophilic paste waterstop bead continuously around pipe near the center of the wall where used for sealing pipe penetrations. Allow hydrophilic paste waterstop to cure for 24 hours before placing concrete to avoid the possibility of tearing the caulk from the pipe during concrete placement.

E. Install hydrophilic paste waterstops in accordance with the manufacture’s printed instructions.

End of Section

Section 03 20 00

CONCRETE REINFORCING

PART 1 - GENERAL

1.1 GENERAL PROVISIONS

A. All of the Contract Documents, including General and Supplementary Conditions apply to the Work of this Section.

1.2 SCOPE

A. This Section specifies all work necessary to provide all concrete reinforcement such as reinforcing steel, welded wire fabric, and concrete inserts as shown on the Drawings and as specified herein.

1.3 REFERENCES

A. American Concrete Institute (ACI)

1. ACI 315: Details and Detailing of Concrete Reinforcement
2. ACI 315R: Manual of Engineering and Placing Drawings for Reinforced Concrete Structures

B. American Society for Testing and Materials (ASTM):

1. A1064: Specification for Steel Welded Wire, Fabric, Plain, for Concrete Reinforcement
2. A 615: Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement
3. A 706/A 706M: Specification for Low-Alloy Steel Deformed Bars for Concrete Reinforcement

C. American Welding Society (AWS):

1. AWS D1.4: American Welding Society, Structural Welding Code, and Reinforcing Steel.

D. Rhode Island State Building Code

1.4 SUBMITTALS

A. Submittal for the following items shall be made in accordance with the requirements as specified.

B. Shop Drawings:

1. Shop drawings for reinforced concrete structures shall be submitted after the concrete pour sequences, construction joint locations, and placement schedules have been approved by the Engineer.
2. At least 30 days before each scheduled concrete placement, submit shop drawings covering the reinforcing steel details, bar lists, support bars and details, locations of reinforcing bar cut-offs, splices, development lengths and placement details. Prepare shop drawings in accordance with ACI 315 and 315R from reinforcement details shown on the drawings.

3. Mill Certificates: Accompanying the shop drawings, submit steel producer's certification of mill analysis, tensile, and bend tests for reinforcing steel.
4. Welder's certification in conformance with AWS D1.4, when welding is indicated or specified. Testing of welds shall be conducted and witnessed by an independent testing laboratory prior to welding of reinforcement. Maintain qualification and certification records at the job site, readily available for examination of test results.

C. Manufacture's literature, including installation instructions for the following.

1. Supports

1.5 QUALITY ASSURANCE

A. Provide in accordance with the requirements of the Quality Control section and as specified.

B. Do not fabricate reinforcement until shop and placement drawings have been approved by the Engineer.

C. Tolerances:

1. Tolerances shall be as specified in ACI 315R.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Delivery: Deliver reinforcement to the job site bundled, tagged, and marked. Use metal tags indicating bar size, lengths, and other information corresponding to markings shown on shop drawings.

B. Storage: Store reinforcement at the job site in a manner to prevent damage and accumulation of dirt and excessive rust.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Reinforcing bars shall be newly rolled deformed bars conforming to ASTM A615 Grade 60, unless otherwise indicated on the Drawings.

1. Bars to be welded shall conform to ASTM A706 deformed, Grade 60.
2. Provide mill bent reinforcing bars, bent cold to the dimensions indicated and conforming to the requirements of ACI SP-66.

B. Welded wire fabric shall conform to ASTM A 1064, with a minimum ultimate tensile strength of 70,000 psi. Provide in sizes indicated. Provide support bars and reinforcing bar supports as specified to obtain the concrete cover.

C. Bar support and accessories shall be galvanized or plastic coated and shall conform to ACI 315. Provide minimum size number 5 support bars.

D. Provide 3-in. by 3-in. plain precast concrete blocks and precast concrete doweled blocks for reinforcing bar supports in foundation mats, base slabs, footings, pile caps, grade beams and slabs on grade. Provide block thickness to produce concrete cover of reinforcement as indicated. Provide blocks of Type II cement

with 3000 psi minimum compressive strength in conformance with the Section 03 30 00, Cast-in-Place Concrete.

E. Wire for tying reinforcement in place shall be No. 16 AWG or heavier black soft-annealed wire

2.2 FABRICATION

A. Fabricate reinforcement only after shop drawings have been returned by the Engineer marked “Approved”.

B. Provide reinforcing bars that have been cut and bent before shipment. If bars must be bent on site, bend reinforcing steel cold, and do not straighten or rebend in a manner which will damage the material. Bend in conformance with requirements of ACI SP-66 or with ASTM A767 when reinforcement is to be galvanized.

C. Splices:

1. Provide standard reinforcement splices by lapping ends, placing bars in contact, and tightly wire tying for the full length of the splice. All lap splices shall be ACI 318, Class B, unless indicated otherwise on the Drawings.
2. Adjacent splices shall be staggered whenever possible.

PART 3 - EXECUTION

3.1 GENERAL

A. General: Comply with Concrete Reinforcing Steel Institute’s recommended Practice for “Placing Reinforcing Bars”, for details and methods of reinforcement placement and supports, and as herein specified.

3.2 PLACEMENT

A. Comply with the specified standards for details and methods of reinforcement placement and supports, and as herein specified. Comply with concrete protective cover requirement indicated on the Drawings.

B. Clean reinforcement to remove loose rust and mill scale, earth, and other materials that would reduce or destroy bond with concrete.

C. Position, support, and secure reinforcement against displacement by formwork, construction, or concrete placement operations. Locate and support reinforcing by metal chairs, runners, bolsters, spacers, and hangers, as required.

D. Place reinforcement to obtain the specified coverage for concrete protection. Arrange, space, and securely tie bars and bar supports together with wire, to hold reinforcement accurately in position during concrete placement operation. Set wire ties so that twisted ends are directed away from exposed concrete surfaces.

E. Install welded wire fabric in lengths as long as practicable. Lap adjoining pieces at least one full mesh.

F. Provide supports of sufficient numbers and strengths to carry reinforcement. Do not place reinforcing bars more than 2 inches beyond the last leg of any

continuous bar support. Do not use supports as bases for runways for conveying equipment and similar construction loads.

G. Bars may be moved as necessary to avoid interference with other reinforcing steel, conduits or embedded items. Bars moved more than three inches are subject to approval of Engineer. Place required number of bars.

H. Position dowels accurately, rigidly support, and securely tie. Align dowels normal to concrete surface before concrete placement. Setting dowels into wet concrete is prohibited.

I. Provide and place safety caps on all exposed ends of vertical reinforcement.

J. Tie a minimum of 25 percent of all intersecting bars in foundation mats, base slabs, footings, pile caps, slabs on grade and elevated slabs.

K. Do not splice reinforcement steel in foundation mats, base slabs, beams, girders, slabs and walls at points of maximum stress unless otherwise indicated.

L. Lap splice welded wire fabric reinforcement at least one full mesh. Stagger splices to avoid continuous laps in either direction and wire tightly together. Straighten rolled welded wire fabric reinforcement into flat sheets before use.

M. Provide continuous reinforcement through construction joints.

End of Section

Section 03 30 00
CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.1 GENERAL PROVISIONS

A. All of the Contract Documents, including General and Supplementary Conditions apply to the Work of this Section.

1.2 SCOPE

A. This Section specifies requirements for furnishing, placement, finishing, curing and protecting of all concrete, plain and reinforced as shown on the Drawings and as specified herein. Review and approval of the Contractor's Working drawings by the Engineer does not relieve the Contractor of the responsibility for the adequacy of Work.

1.3 REFERENCES

A. General: Where the language in any of the documents referred to herein be in the form of a recommendation or suggestion, such recommendations or suggestions shall be deemed to be mandatory for these Specifications.

B. American Concrete Institute (ACI):
1. ACI 117: Standard Tolerances for Concrete Construction and Materials (except as modified in this Specification Section for anchor rod placement).
2. ACI 211.2: Standard Practice for Selecting Proportions for Structural Lightweight Concrete
3. ACI 213: Guide for Structural Lightweight Aggregate Concrete
4. ACI 301: Specifications for Structural Concrete
5. ACI 302: Guide for Concrete Floor and Slab Construction
6. ACI 304R: Guide for Measuring, Mixing, Transporting and Placing Concrete.
7. ACI 305R: Hot Weather Concreting
8. ACI 306: Cold Weather Concreting
9. ACI 308: Standard Practice for Curing Concrete
10. ACI 309R: Guide for Consolidation of Concrete
11. ACI 318: Building Code Requirements for Structural Concrete

C. American Society for Testing and Materials (ASTM):
1. C31 Making and Curing Concrete Compression and Flexural Strength Test-Specimens in the Field
2. C33 Specification for Concrete Aggregates
3. C39 Test Method for Compressive Strength of Cylindrical Concrete Specimens
4. C94 Specifications for Ready Mixed Concrete
5. C127 Standard test method for Density, Relative Density (Specific Gravity) and Absorption of Coarse Aggregate

6. C136 Sieve Analysis of Fine and Coarse Aggregate
7. C138 Unit Weight, Yield, and Air Content of Concrete
8. C143 Test for Slump of Portland Cement Concrete
9. C150 Specification for Portland Cement
10. C171 Sheet Materials for Curing Concrete
11. C172 Sampling Fresh Concrete
12. C173 Standard test Method for Air Content of Freshly Mixed Concrete by the Volumetric Method
13. C595 Standard Specifications for Portland Blast Furnace Slag Cement
14. C231 Test for Air Content of Freshly Mixed Concrete by the Pressure Method
15. C260 Specification for Air-Entraining Admixtures for Concrete
16. C309 Specification for Liquid Membrane Forming Compounds for Curing Concrete
17. C330 Specification for Lightweight Aggregates for Structural Concrete
18. C340 Standard Specifications for Portland-Pozzolan Cement
19. C494 Specification for Chemical Admixtures for Concrete
20. C618 Standard Specifications for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete
21. C827 “Test Method for Change in Height at Early Ages of Cylindrical Specimens from Cementitious Mixtures
22. C845 Standard Specifications for Expansive Hydraulic Cement
23. C989 Specification for Ground Iron Blast-Furnace Slag for Use in Concrete and Mortars
24. C1017 Standard Specifications for Chemical Admixtures for Use in Producing flowing Concrete
25. C1064 Test Method for Temperature of Freshly Mixed Portland-Cement Concrete
26. C1107: Specification for Packaged Dry, hydraulic Cement Grout (Non-Shrink)
27. C1157 Standard Performance Specifications for Silica Fume in Cementitious Mixtures
28. C1240 Standard Specification for Silica Fume for Use in Hydraulic-Cement Concrete
29. D1751: Specification for Preformed Expansion Joint Fillers for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types).
30. E154 Test Methods for Water Vapor Retarders Used in Contact with Earth Under Concrete Slabs, on Walls, or as Ground Cover

D. Federal Specifications (Fed. Spec.):

1. TT-S-00230: Sealing Compound: Elastomeric Type, Single Component (for Caulking, Sealing, and Glazing in Buildings and Other Structures)

1.4 DESIGN REQUIREMENTS

A. Codes: Building concrete shall be in conformance with the requirements of ACI 318, and the Rhode Island State Building Code.

B. Coordinate use of curing compounds with floor coatings, sealers, and hardeners.

C. Air-entrain all exterior exposed concrete and lightweight concrete.

1.5 SUBMITTALS

A. Product Data: Submit design mix including color additives as applicable. Submit manufacturer's product data with application and installation instructions for proprietary materials and items, including reinforcement and forming accessories, synthetic fibers, admixtures, color additives, patching compounds, waterstops, joint systems, curing compound, and others as requested by the Engineer.

B. Shop Drawings: Submittals included in the Section shall be in accordance with the requirements specified. Submit Working drawings for all Work under this Section to the Engineer for approval. Show location of joints, concrete pouring sequence, schedule dates, rate of placement and methods. All concrete mix designs shall conform to ACI-318, Chapter 5 and as specified. All concrete mix designs and concrete material tests shall be signed and sealed by a Professional Engineer in the State of Rhode Island.

C. Samples: Submit samples of materials as specified, including names, sources and descriptions.

D. Laboratory Test Reports: Submit laboratory test reports for concrete, concrete materials, and mix design tests.

E. Material Certificates: Provide materials certificates in lieu of materials laboratory test reports when permitted. Material certificates shall be signed by manufacturer and Contractor, certifying that each material item complies with, or exceeds, specified requirements.

F. Submit prior to start of Work written reports of each proposed mix for each class of concrete. Do not begin concrete production until mixes have been approved by the Engineer.

G. Batch Ticket Information: Provide concrete delivery tickets showing job name and location, date and time of delivery, quantity of concrete, quality and type of concrete, admixtures, amount of water added, and all other relevant information as described in ASTM C 94. Submit original batch tickets and 2 copies at the end of each week.

1.6 QUALITY ASSURANCE

A. Provide in accordance with the requirements as specified.

B. Concrete Testing Service: The Contractor shall employ and pay an independent testing laboratory to perform material evaluation tests and to design concrete mixes and provide copies of recently made material tests and mix designs.

C. Materials and installed Work may require testing and retesting at any time during progress of Work. Allow free access to material stockpiles and facilities. All tests, including retesting of rejected materials and installed Work, shall be done at Contractor's expense.

D. Workmanship: The Contractor is responsible for correction of Work that does not conform to the specified requirements, including strength, tolerances and finishes. Correct deficient concrete as directed at no additional cost to the Owner.

1.7 DELIVERY, STORAGE AND HANDLING

A. Order concrete from batching plant so that trucks arrive at discharge locations when concrete is required. Avoid excessive mixing of concrete or delays in placing successive layers of concrete in forms.

B. Deliver concrete to discharge locations in watertight agitator or mixer trucks without altering the water-cement ratio, slump, air entrainment, temperature and homogeneity.

C. Concrete not conforming to specification, unsuitable for placement, exceeding the time or temperature limitations or not having a complete delivery batch ticket will be rejected.

1.8 JOB SITE

A. Weather: Protect concrete from damage and reduce strength or performance due to weather extremes during mixing, placing and curing.

B. Cold Weather: Unless special precautions are taken to protect concrete, do not Work when temperatures are below 40°F or when temperatures are expected to fall below 40°F within 72 hours after placing concrete.

1. Comply with ACI 306 in cold weather.
2. Maintain concrete temperature of at least 60°F. Reinforcement, forms and ground in contact with concrete shall be free of frost.
3. Keep concrete and formwork at least 50°F for at least 96 hours after placing concrete.
4. The use of calcium chloride in any form is not permitted. Non-chloride accelerator shall be used when ambient temperature is below 50°F.
5. Admixture manufacturer shall provide technical assistance at no additional cost. A manufacturer's representative shall be available for consultation by phone or on site upon 72-hour notice.

C. Hot Weather: Concrete, when deposited, shall be less than 85°F. Cool the mix in a manner acceptable to the Engineer if the concrete temperature is higher.

1. Comply with ACI 305 in hot weather.
2. Retarder shall be used when ambient temperature exceeds 80°F.

D. Schedule delivery of colored concrete to provide consistent mix times from batching until discharge.

PART 2 - PRODUCTS

2.1 CONCRETE MATERIALS

A. Portland Cement: ASTM C 150, Type II for all Work unless otherwise specified. Use one brand of cement throughout project.

B. Fly Ash and Ground Granulated Blast-Furnace Slag: Fly Ash shall conform with ASTM C 618, Type F or C. Ground Granulated Blast-Furnace Slag shall conform with ASTM C 989, Grade 100 or 120. Products used shall be of the same type, brand, and source throughout the Project. Limit percentage, by weight, of cementitious materials other than portland cement in concrete as follows:

1. Fly Ash: 25 percent.
2. Ground Granulated Blast-Furnace Slag: 50 percent.
3. Combined Fly Ash and Ground Granulated Blast-Furnace Slag: 50 percent portland cement minimum, with fly ash not exceeding 25 percent.

C. Normal Weight Aggregates: ASTM C 33, and as herein specified. Use ¾" maximum size for all concrete, except for concrete fill at metal pan stairs use 3/8" maximum. Provide aggregates from a single source for exposed concrete.

D. Lightweight Aggregates: ASTM C 330, ¾" nominal maximum aggregate size.

E. Water: Clean, potable and free from foreign materials such as oils, acids, alkalis, and organic materials in amounts harmful to concrete and embedded steel. Provide water which meets ACI/ASTM requirements for concrete mix water.

F. Air-Entraining Admixture: ASTM C 260, certified by manufacturer to be compatible with other required admixtures.

1. Products: Subject to compliance with requirements, products which may be incorporated in the Work include the following
   a. "Air-Mix"; Euclid Chemical Co.
   b. "Sika AeA-14"; Sika Corp.
   c. "MasterAir VR 10 or MasterAir AE 90"; Master Builders
   d. "Darex AEA" or "Daravair"; W.R. Grace
   e. Or equal.

G. Water Reducing Admixture: ASTM C 494, Type A, and containing not more than 0.1% chloride ions. Follow manufacturer's recommendations for amount of admixture to be added to the concrete. Admixture shall be compatible with air-entraining admixtures.

1. "WRDA with Hycol"; W. R. Grace.
2. "Eucon WR-75"; Euclid Chemical Co.
3. "Master Pozzolith" Master Builders
4. "Sikament 686"; Sika Chemical Corp.
5. Or equal.

H. High-Range Water Reducing Admixture (SuperPlasticizer): ASTM C 494, Type F or Type G and containing not more than 0.1% chloride ions. Follow manufacturer's recommendations.

1. Products: Subject to compliance with requirements, products which may be incorporated in the Work include the following:
   a. "ADVA CAST 585"; W. R. Grace.
   b. "Super P"; Anti-Hydro.
   c. "Sikament 686"; Sika Chemical Corp.
   d. "Master Rheobuild 1000"; Master Builders.

e. Or equal.

I. Water Reducing, Non-Chloride Accelerator Admixture: ASTM C 494, Type E or C, and containing not more than 0.1% chloride ions.

1. Products: Subject to compliance with requirements, provide one of the following:
   a. ”Accelguard 80”; Euclid Chemical Co.
   b. “MasterSet FP 20”; Master Builders, Inc.
   c. “PolarSet”; Grace Construction Products.
   d. Or equal.

J. Water Reducing, Retarding Admixture: ASTM C 494 Type D, and containing not more than 0.1% chloride ions.

1. Products: Subject to compliance with requirements, products that may be incorporated in the Work include the following:
   a. “MasterPozzolith-80”; Master Builders.
   b. “Eucon Retarder 75”; Euclid Chemical Co.
   c. “Daratard 17”; W. R. Grace.
   d. “Plastiment”; Sika Chemical Co.
   e. Or equal.

K. Prohibited Admixtures: Calcium chloride thyocyanates or admixtures containing more than 0.1% chloride ions are not permitted.

2.2 RELATED MATERIALS

A. Reglets: Where resilient or elastomeric sheet flashing or bituminous membranes are terminated in reglets, provide reglets of not less than 26 gauge galvanized sheet steel. Fill reglet or cover face opening to prevent intrusion of concrete or debris.

B. Absorptive Cover: Burlap cloth made from jute or kenaf, weighing approximately 9 oz. Per sq. yd., complying with AASHTO M 182, Class 2.

C. Moisture-Retaining Cover: One of the following, complying with ASTM C 171.

1. Waterproof paper.
2. Polyethylene film.
3. Polyethylene-coated burlap.

D. Joint Sealants shall be provided in color to match color of concrete.

E. Liquid Membrane-Forming Curing Compound: Liquid type membrane-forming curing compound complying with ASTM C 309, Type I, Class A. Moisture loss not more than 0.055 gr./sq. cm. when applied at 200 sq. ft./gal.

1. Products: Subject to compliance with requirements, products which may be incorporated in the Work include, but are not limited to, the following:
   a. “MasterKure”; Master Builders.
   b. “A-H 3 Way Sealer WB”; Anti-Hydro Waterproofing Co.
   c. “Kurez DR VOX”; Euclid Chemical Co.

d. “Clear Seal”: A.C. Horn, Inc.
e. “Sealco 309”; Gifford-Hill/American Admixtures.
f. “Cure & Seal LV 25% J20UV”; Dayton Superior.

F. Underlayment Compound: Free flowing, self-leveling, pumpable cementitious base compound.
1. Products: Subject to compliance with requirements, products which may be incorporated in the Work include, but are not limited to, the following:
a. “Ardex K-15”; Ardex Engineered Cements.
b. “Silflo 230”; Silpro Masonry Systems.
c. “Ultraplan”; Mapei.

G. Bonding Compound: Polyvinyl acetate or acrylic base.
1. Products: Subject to compliance with requirements, products which may be incorporated in the Work include, but are not limited to, the following:
a. Acrylic or Styrene Butadiene:
(1) “J-40 Bonding Agent”; Dayton Superior Corp.
(2) “Everbond”; L & M Construction Chemicals.
(3) “Hornweld”; A. C. Horn, Inc.
(4) “Daraweld C”; W. R. Grace.

H. Adjustable inserts: Adjustable inserts shall be hot-dip galvanized in conformance with ASTM A123 and A153. Adjustable insets shall be:
1. Ductile iron wedges inserts, Type F-7 manufactured by Dayton Sure-Grip & Shore Co.
2. Malleable iron peerless wedge inserts, insert as manufactured by Richmond Screw, Anchor Co., Inc.
3. Malleable iron wedge inserts, Type HW as manufactured by Hohmann & Barnard Inc.

I. Vapor barrier shall be Stego Wrap Vapor Barrier (15 mil) or equivalent, in accordance with ASTM E 1745. Use caution to avoid perforations in the vapor barrier material. Install barrier in accordance with ASTM E 1643 and ASTM F 710 guidelines.

J. Concrete Moisture Vapor Reduction Admixture (MVRA): MVRA shall be provided at all interior slabs-on-grade.
1. MVRA Basis-of-Design Product: “MVRA 900” by ISE Logik, Inc. or equal Other admixtures must be compatible with the MVRA.

2.3 PROPORTIONING AND DESIGN OF MIXES

A. Prepare design mixes for each type and strength of concrete by either laboratory trial batch or field experience methods as specified in ACI 301. If trial batch method used, use an independent testing facility acceptable to the Engineer for preparing and reporting proposed mix designs. The testing facility shall not be the same as used for field quality control testing.

B. Submit written reports for review of design mix for specified strength of concrete within 15 days prior to start of Work. Do not begin concrete production until mixes have been reviewed.

C. Normal weight concrete mixes: Provide normal weight concrete having the following minimum compressive strength at 28 days. For lightweight concrete mixes, refer to Paragraph 2.3.D.

1. Class 4000 – 3/4” normal weight concrete: Typical, unless noted otherwise.
2. Class 4000 – 3/8” normal weight concrete: Concrete fill at metal pan stairs (only)
3. Class 3000 – 3/4” normal weight concrete: Exterior rooftop equipment pads on composite metal deck (only)

The concrete quality, mixing and placing shall conform to ACI-318, Chapter 5.

Design mixes to provide normal weight concrete with the following properties, as indicated:

Minimum Design Compressive Strength	Minimum Strength fc 7 days	Laboratory Testing Age 28 day	Minimum ** Cement Content/cu.yd.	Maximum* W/C Ratio
4,000 (3/4") psi	2,400 psi	4,000 psi	565	.45
4,000 (3/8") psi	2,400 psi	4,000 psi	611	.45
3,000 (3/4") psi	1,800 psi	3,000 psi	505	.48

*Maximum: Decrease if possible
**Minimum: Increase as necessary to meet all other stated requirements.

D. Lightweight concrete mixes (slabs on composite metal deck where indicated on the Drawings): Proportion structural lightweight concrete mixture as follows:

1. Minimum Compressive Strength: 3,500 psi at 28 days (2,100 psi at 7 days).
2. Calculated Equilibrium Unit Weight: 115 lb/cu. ft., plus or minus 3 lb/cu. ft. (48.1 kg/cu. m) as determined by ASTM C 567.

E. Adjustment to Concrete Mixes: Mix design adjustments may be requested by the Contractor when characteristics of materials, job conditions, weather, test results, or other circumstances warrant; at no additional cost to Owner and as accepted by the Engineer. Laboratory test data for revised mix design and strength results must be submitted to and accepted by the Engineer before using in Work.

F. Admixtures:

1. Use water-reducing admixture or high range water reducing admixture (super plasticizer) in all concrete in strict accordance with the manufacturer’s printed instructions.

2. Use non-chloride accelerating admixture in concrete slabs placed at ambient temperatures below 50°F in strict accordance with the manufacturer's printed instructions.
3. Use high-range water-reducing admixture in pumped concrete required to be watertight, and concrete with water/cement ratios below 0.40.
4. Use air-entraining admixture in all concrete, unless otherwise indicated. Do not air-entrain interior slabs-on-grade or slabs-on-metal deck that utilize normal weight concrete (concrete fill at metal pan stairs). Lightweight concrete slabs shall be air-entrained. Add air-entraining admixture at manufacturer's prescribed rate to result in concrete at point of placement having total air content as follows:
   a. ¾" aggregate normal weight concrete: 6.0% with a tolerance of ±1%
   b. ¾" aggregate lightweight concrete: 4% to 7%.

G. Consistency:
1. The consistency shall be uniformly maintained within the allowable range of slump for the job materials. Ordinarily the slump shall not be less than 1-1/2" inch nor more than 4 inches, unless in the opinion of the Engineer, job conditions warrant exceeding these limits. The consistency shall be determined by the AASHTO Method T-119. This range of slump is to be maintained for all concrete including pumped concrete.
2. Concrete containing HRWR admixture (super-plasticizer): Not more than 7" after addition of HRWR to site-verified 1-1/2" to 4" slump concrete.
3. Ramps, slabs and sloping surfaces: Not more than 3 inches, except lightweight slabs not more than 5 inches.
4. Reinforced foundation systems: Not less than 1-1/2" inch nor more than 4 inches.

H. Concrete Moisture Vapor Reduction Admixture (MVRA) shall be used in strict accordance with the manufacturer's printed instructions. The MVRA manufacturer shall provide a minimum 10-year warranty effective from the date of substantial completion. In order to qualify for the warranty, the following items must be implemented prior to placement of the concrete:
1. Concrete mix design is submitted to MVRA manufacturer for review and comment.
2. Concrete supplier must verify in writing that strict water/cement ratio compliance has been met for all concrete batches utilizing the waterproofing admixture.
3. Concrete supplier must verify in writing that manufacturer's instructions for use at batch plant were strictly followed for batches provided for the job.

2.4 CONCRETE MIXING

A. Ready-Mix Concrete: Comply with requirements of ASTM C 94, and as herein specified. Delete references for allowing additional water to be added to batch for material with insufficient slump. Addition of water to the batch will not be permitted.
1. During hot weather, or under conditions contributing to rapid setting of concrete, a shorter mixing time than specified in ASTM C94 may be required. When air temperature is between 85°F (30° C) and 90°F (32° C), reduce mixing and delivery time from 1-1/2 hours to 75 minutes, and when air

temperature is above 90°F (32°C), reduce mixing and delivery time to 60 minutes.

2. During cold weather heat water, sand and cement materials per recommendations of ACI 306.

B. High Early Strength Concrete: Follow manufacture's product specific installation guidelines. Cement shall be added to a pre-measured amount of water that does not exceed the manufacturer's maximum recommended water content. Material can be extended up to 60% using pea gravel.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Batch, mix and deliver Portland cement concrete in conformance with ASTM C 94. Batch all constituents at central batching or mixing plant. Produce concrete in conformance with ACI 301 and as specified.

B. Seasonal Conditions:

1. Conform to ACI 305R and as specified for hot weather concreting. Do not add retarder admixture to any concrete.
2. Conform to ACI 306R and as specified for cold weather concreting. Do not add accelerator admixture to any concrete.

3.2 INSTALLATION OF EMBEDDED ITEMS

A. Set and build into Work, anchorage devices and other embedded items required for other Work that is attached to, or supported by, cast-in-place concrete. Use setting drawings, diagrams, instructions, and directions provided by suppliers of items to be attached thereto. Embedded items, including column anchor rods and concrete reinforcement, shall be set prior to the placement of concrete. Embedded items shall not be "wet-set" without prior written approval from the Engineer of Record.

B. Install anchor rods, accurately located, to elevation required and complying with the following tolerances (acceptable deviation from rod locations shown on the Drawings):

1. 3/4" and 7/8" diameter rods: +/- 1/4"
2. 1", 1-1/4", and 1-1/2" diameter rods: +/- 3/8"
3. 1-3/4", 2", and 2-1/2" diameter rods: +/- 1/2"

C. Clean embedded items of oil, ice, dirt and all other foreign items.

D. For embedded pipes, complete all necessary testing requirements prior to placing concrete.

3.3 PLACING CONCRETE

A. General:

1. Concrete formwork shall satisfy the requirements of Section 03 11 00, Concrete Formwork. Do not place concrete until the depth, character and adequacy of forms, falsework, embedments, and the placing of the steel reinforcement have been approved by the Engineer. The method and manner

of placing the concrete shall be such as to avoid segregation of aggregate and displacement of the reinforcement. Troughs, pipes and chutes may be used as aids in placing concrete when necessary. Dropping the concrete a distance of more than five feet, or depositing a large quantity at one point, will not be permitted. Concrete shall be placed upon clean, damp surfaces, free from running water, or upon properly consolidated soil.

2. Do not add water to concrete during delivery, at the Project site, or during placement, unless approved by the Engineer of Record. Amount of water to be added at the project site shall be indicated on the mix design and batch tickets submitted by the contractor. Water shall be added prior to on-site testing of the concrete mix.
3. Before placing concrete, and if agreed upon by the Engineer of Record, water may be added at the Project site, subject to the limitations of ACI 301.
    a. Do not add water to concrete after adding high-range water-reducing admixtures.
4. Retempering of concrete by adding water or any other material shall not be permitted.
5. Concrete placement, finishing and curing, and all other pertinent construction practices shall be in accordance with ACI 117 and ACI 301. In addition to the requirements of ACI 117 and ACI 301, the following shall apply:
    a. Concrete shall be placed so that a uniform appearance of surfaces will be obtained.
    b. Concrete shall be placed and consolidated free of rock pockets, honeycombs, and voids.
    c. Concrete shall be deposited as nearly as practicable in its final position, to avoid segregation due to rehandling or flowing, and shall not be subjected to any procedure that will cause segregation.
    d. Concrete shall be placed and consolidated in walls in approximately 18-inch layers, proceeding at a uniform rate or per the form designer’s recommendation.
    c. Subgrade shall be slightly moist when the concrete is placed for floor slabs, to prevent excessive loss of water from the concrete mix.

B. Consolidating:

1. Consolidate concrete with suitable mechanical vibrators operating within concrete. When necessary, vibrating shall be supplemented by hand spading with suitable tools to assure proper and adequate consolidation. Vibrators shall be manipulated so as to Work the concrete thoroughly around the reinforcement and embedded fixtures and into corners and angles of the forms. The vibration at any joint shall be of sufficient duration to accomplish consolidation but shall not be prolonged to the point where segregation occurs.
2. Employ as many vibrators and tampers as necessary to secure the desired results. For every two vibrators required for the job, an additional standby vibrator shall be kept on the site. Do not place subsequent layers of concrete until the previous layer has been consolidated as specified. Internal vibrators shall have a minimum frequency of 8000 vibrations per minute when immersed in concrete and shall have sufficient amplitude to effectively consolidate the concrete.
3. Prevent the following practices:

a. Pushing of concrete with vibrator.
b. External vibration of forms.
c. Allowing vibrator to vibrate against reinforcing steel where steel projects into green concrete.
d. Allowing vibrator to vibrate against the contact faces of forms.

C. Cold Weather: Do not place concrete when the ambient temperature is below 40°F, unless specifically authorized by the Engineer. Conform to the requirements of ACI 306R during cold weather.

D. Hot Weather: Do not place concrete with a mix temperature exceeding 90°F, unless specifically authorized by the Engineer. Conform to the requirements of ACI 305R during hot weather.

E. Construction Joints :

1. When the placing of concrete is suspended, necessary provisions shall be made for joining future Work before the placed concrete takes its initial set. For the proper bonding of old and new concrete, such provisions shall be made for grooves, steps, keys, dovetails, reinforcing bars or other devices as may be prescribed. Before depositing new concrete against concrete which has hardened, the surface of the hardened concrete shall be cleaned by a heavy steel broom, roughened slightly, wetted, and covered with a neat coating of cement paste or grout. Install joint sealant where shown on the Drawings, in accordance with manufacturer's instructions.
2. Joints shall be perpendicular to the main reinforcement.
3. Construction joints in floors shall be located within the middle third spans of slabs, beams, and girders.

F. Expansion and Control Joints: Expansion and control joints shall be constructed in the locations and to the dimensions and details shown on the Drawings.

G. Defective Work:

1. All defective Work disclosed after the forms have been removed shall be immediately removed and replaced. If dimensions are deficient, or if the surface of the concrete is bulged, uneven, or shows honeycomb, which in the opinion of the Engineer cannot be repaired satisfactorily, the entire Section shall be removed and replaced at no cost to the Owner.
2. Other Work considered to be defective includes, but is not limited to, the following:
   a. Concrete in which defective or inadequate steel reinforcement has been placed.
   b. Concrete incorrectly formed, or not conforming to details and dimensions on the Drawings or with the intent of these documents, or the concrete surfaces of which are out of plumb or level beyond specified tolerances.
   c. Concrete below specified strength.
   d. Concrete containing wood, cloth, or other foreign matter, rock pockets, voids, honeycombs, cracks or cold joints not scheduled or indicated on the Drawings.

3.4 CONCRETE FINISHING

A. Exposed concrete surfaces shall be true, smooth, and free from open or rough spaces, depressions, or projections. The concrete in horizontal plane surfaces shall be brought flush with the finished top surface at the proper elevation and shall be struck off with a straightedge and floated. Mortar finishing will not be permitted, nor shall dry cement or sand-cement mortar be spread over the concrete during the finishing of horizontal plane surfaces.

B. Following placement of concrete for slabs and floors, tamp to force coarse aggregate away from surface, bull float, and steel trowel. Floor areas designated to receive a floor coating shall receive a finish as recommended by the coating manufacturer. Steel trowel finish shall be provided for surfaces that will receive flooring and all exposed floor areas.

C. Overall conformance to design grade shall be within ¾" of design elevation.

D. The following requirements shall govern concrete finishes so indicated on the Drawings.

1. Float Finish: Force coarse aggregate away from surface; float to a smooth and even surface.
2. Trowel Finish:
    a. After floating, begin the first trowel finish operation using a power-driven trowel; begin final troweling when the surface produces a ringing sound as the trowel is moved over the surface.
    b. Do not over-trowel or start troweling late.
    c. Consolidate the concrete surface by the final hand troweling operation, free from trowel marks, uniform in texture and appearance, and with a surface plane tolerance not exceeding 1/8" in 10'-0" when tested with a 10'-0" straight–edge.
3. Apply nonslip broom finish to exterior concrete as specified, immediately after trowel finishing; roughen the concrete surface by brooming in the direction perpendicular to the main traffic route.
    a. Use a fiber bristle broom.
    b. Frequently clean broom to avoid deep brooming.
4. Finishing Formed Surface:
    a. Rough-Formed Finish: Provide a rough-formed finish on formed concrete surfaces not exposed to view in the finished Work or Concealed by other construction. This is the concrete surface having texture imparted by form-facing material used, with tie holes and defective areas repaired and patched, and fins and other projections exceeding ¼ inch in height rubbed down or chipped off.
    b. Smooth-Formed Finish: Provide a smooth-formed finish on formed concrete surfaces exposed to view or to be covered with a coating material applied directly to concrete, or a covering material applied directly to concrete, such as waterproofing, dampprooofing, veneer plaster, painting, or another similar system. This is an as-cast concrete surface obtained with selected form-facing material, arranged in an orderly and symmetrical manner with a minimum of seams. Repair and patch defective areas with fins and other projects, completely removed and smoothed.

c. Smooth-Rubbed Finish: Provide smooth-rubbed finish on scheduled concrete surfaces that have received smooth-formed finish treatment not later than one (1) day after form removal.

(1) Moisten concrete surfaces and rub with carborundum brick or another abrasive until producing a uniform color and texture. Do not apply cement grout other than that created by the rubbing process.

d. Grout-Cleaned Finish: Provide grout-cleaned finish on scheduled concrete surfaces that have received smooth-formed finish treatment.

(1) Combine one part Portland Cement to one and one-half parts fine sand by volume, and a 50:50 mixture of acrylic or styrene butadiene-based bonding admixture and water to form the consistency of thick paint. Blend standard Portland Cement and white Portland Cement in amounts determined by trial patches so that final color of dry grout will match adjacent surfaces.

(2) Thoroughly wet concrete surfaces, apply grout to coat surfaces, and fill small holes. Remove excess grout by scraping and rubbing with clean burlap. Keep damp by fog spray for at least thirty-six (36) hours after rubbing.

e. Related Unformed Surfaces: At tops of walls, horizontal offsets, and similar uniformed surfaces adjacent to formed surfaces, strike-off smooth and finish with a texture matching adjacent formed surfaces. Continue final surface treatment of formed surfaces uniformly across adjacent uniformed surfaces unless otherwise indicated.

E. Monolithic Slab Finishes: Apply finishes as indicated below. Finish surface FF and FL tolerances indicated below shall be considered minimum requirements. Where more stringent tolerances are provided in the specifications or construction documents for floor coverings and coatings or required by the manufacturer/installer of the floor covering or coating, the more stringent tolerance shall govern.

1. Scratch Finish: Apply scratch finish to monolithic slab surfaces to receive concrete floor topping or mortar setting beds for tile, portland cement terrazzo, and other bonded applied cementitious finish flooring material, and where indicated.

a. After placing slabs, finish surface to tolerances of F(F) 15 (floor flatness) and F(L) 13 (floor levelness) measured according to ASTM E 1155. Slope surfaces uniformly to drains where required. After leveling, roughen surface before final set with stiff brushes, brooms, or rakes.

2. Float Finish: Apply float finish to monolithic slab surfaces to receive trowel finish and other finishes as specified; slab surfaces to be covered with membrane or elastic waterproofing, membrane or elastic roofing, or sand-bed terrazzo; and where indicated.

a. After screeding, consolidating, and leveling concrete slabs, do not work surface until ready for floating. Begin floating, using gloat blades or float shoes only, when surface water has disappeared, or when concrete has stiffened sufficiently to permit operation of power-driven floats or by hand-floating if area is small or inaccessible to power units. Finish surfaces to tolerances of F(F) 18 (floor flatness) and F(L) 15 (floor levelness) measured according to ASTM E 1155. Cut down high spots and fill low spots. Uniformly slope surfaces to drains. Immediately after leveling, refloat surface to a uniform, smooth, granular texture.

3. Trowel Finish: Apply a trowel finish to monolithic slab surfaces exposed to view and slab surfaces to be covered with resilient flooring, carpet, ceramic or thinset quarry tile, paint, or another thin film-finish coating system.
    a. After floating, begin first trowel-finish operation using a power-driven trowel. Begin final toweling when surface produces a ringing sound as trowel is moved over surface. Consolidate concrete surface by final hand-toweling operation, free of trowel marks, uniform in texture and appearance, and finish surfaces to tolerances of F(F) 30 (floor flatness) and F(L) 25 (Floor levelness) measured according to ASTM E 1155. Grind smooth any surface defects that would telegraph through applied floor covering system.
4. Trowel and Fine Broom Finish: Where ceramic or quarry tile is to be installed with thin-set mortar, apply a trowel finish as specified, then immediately flow by slightly scarifying the surface with a fine broom.
5. Non-slip Broom Finish: Apply a non-slip broom finish to exterior concrete platforms, steps, and ramps, and elsewhere as indicated.
    a. Immediately after float finishing, slightly roughen concrete surface by brooming with fiber-bristle broom perpendicular to main traffic route. Coordinate required final finish with Architect before application.
6. Non-slip Aggregate Finish: Apply non-slip aggregate finish to concrete stair treads, platforms, ramps, sloped walks.
    a. After completing float finishing and before starting trowel finish, uniformly spread 25 lbs. Of dampened non-slip aggregate per 100 sq. ft. of surface. Tamp aggregate flush with surface using a steel trowel, but do not force below surface. After broadcasting and tamping, apply trowel finishing as specified.
    b. After curing, lightly work surface with a steel wire brush or an abrasive stone, and water to expose non-slip aggregate.

3.5 CURING AND PROTECTION

A. Initial Curing: All concrete shall be properly cured and protected in accordance with ACI 308. Maintain concrete above 50 degrees F during first seven days after placing. The Work shall be protected from the elements, flowing water, and from defacement of any nature, during construction. The concrete shall be cured as soon as it has sufficiently hardened, by covering with an approved material. Water-absorptive coverings shall be thoroughly saturated when placed and kept saturated for a period of at least seven days. Curing mats or blankets shall be sufficiently weighted or tied down to keep the concrete surface covered and to prevent the surface from being exposed to air currents. Where wooden forms are used, they shall be kept wet at all time until removed, to prevent the opening of joints and drying out of the concrete. Membrane curing compounds shall be coordinated with the surface to be painted, covered with plaster, covered with sealer, and other surfaces which curing compound would adversely affect subsequent construction.

B. Duration of Curing: The final curing shall continue until the cumulative number of days or fractions thereof, not necessarily consecutive, during which the temperature of the air in contact with the concrete is above 50°F, has totaled 7 days beyond the initial curing period.
    1. If high-early strength concrete has been used, the final curing shall continue for a total of 3 days beyond the initial curing period.

2. Rapid drying at the end of the curing period shall be prevented.

C. Formed Surfaces: Steel forms heated by the sun and all wood forms in contact with the concrete during the curing period shall be kept wet.
   1. If forms are to be removed during the curing period, one of the specified curing materials or methods shall be employed immediately.
   2. Such curing shall be continued for the remainder of the curing period.

3.6 CONCRETE SURFACE REPAIRS

A. General: Any defective Work disclosed after removal of forms shall be immediately removed and replaced. If in the opinion of the Engineer, the surface of the concrete cannot be repaired satisfactorily, the entire Section shall be removed and replaced at no additional expense to the Owner.

B. Patching Defective Areas: Repair and patch defective areas with cement mortar immediately after removal of forms, when acceptable to the Engineer.
   1. Cut out honeycomb, rock pockets, voids over 1” in any dimension, and holes left by tie rods and bolts, down to solid concrete but, in no case to a depth of less than 1”. Make edges of cuts perpendicular to the concrete surface. Thoroughly clean, dampen with water, and brush coat the area to be patched with specified bonding agent. Place patching mortar after bonding compound has dried.

C. For exposed-to-view surfaces, blend white Portland cement and standard Portland cement so that, when dry, patching mortar will match color surrounding. Provide test areas at inconspicuous location to verify mixture and color match before proceeding with patching. Compact mortar in place and strike-off slightly higher than surrounding surface.

D. Repair of Formed Surfaces: Remove and replace concrete having defective surfaces if defects cannot be repaired to the satisfaction of the Engineer. Surface defects, as such, include color and texture irregularities, bulges, uneven surfaces, air bubbles, honeycomb, rock pockets; fins and other projections on surface; and stains and other discolorations that cannot be removed by cleaning. Flush out form tie holes, fill with dry pack mortar, or precast cement cone plugs secured in place with bonding agent.

E. Repair concealed formed surfaces, where possible, that contain defects that affect the durability of concrete. If defects cannot be repaired, remove and replace concrete.

F. Repair of Unformed Surfaces: Test unformed surfaces, such as monolithic labs, for smoothness and verify surface plane to tolerances specified for each surface and finish. Correct low and high areas as herein specified. Test unformed surfaces sloped to drain for trueness of slope, in addition to smoothness using a template having required slope.

G. Repair defective areas, except random cracks and single holes not exceeding 1” diameter, by cutting out and replacing with fresh concrete. Remove defective areas to sound concrete with clean, square cuts and expose reinforcing steel with at least ¾” clearance all around. Dampen concrete surfaces in contact with patching concrete and apply bonding compound. Mix patching concrete of same materials to provide concrete of same type or class as original concrete. Place,

compact, and finish to blend with adjacent finished concrete. Cure in same manner as adjacent concrete.

H. Repair isolated random cracks and single holes not over 1" in diameter by dry-pack method. Groove top of cracks and cutout holes to sound concrete and clean of dust, dirt, and loose particles. Dampen cleaned concrete surfaces and apply bonding compound. Mix dry-pack, consisting of one part Portland cement to 2-1/2 parts fine aggregate passing a No. 16 mesh sieve, using only enough water as required for handling and placing. Place dry pack after bonding compound has dried. Compact dry-pack mixture in place and finish to match adjacent concrete. Keep patched area continuously moist for not less than 72 hours.

I. Perform structural repairs with prior approval of the Engineer for method and procedure, using specified epoxy adhesive and mortar.

J. Repair methods not specified above may be used, subject to acceptance of the Engineer.

3.7 QUALITY CONTROL TESTING DURING CONSTRUCTION

A. A statement of special inspections will be established by the Registered design professional in responsible charge who will prepare a schedule of tests to be carried out by an independent testing agency. All costs for inspection and testing shall be borne by the Owner. Materials and workmanship shall be subjected to inspection and testing in mill, shop, and/or filed by the Registered design professional in responsible charge and/or Testing Agency. Such inspection and testing shall not relieve the Contractor of his responsibility to provide his own inspection, testing, and quality control as necessary to furnish materials and workmanship in accordance with requirements of Contract Documents.

B. The General Contractor shall notify the Registered design professional in responsible charge and the Testing Agency prior to start of any phase of concrete work so as to afford them reasonable opportunity to inspect the work. Such notification shall be made at least 24 hours in advance.

C. Sampling Fresh Concrete: ASTM C 172, except modified for slump to comply with ASTM C 94.

1. Slump: ASTM C 143; one test at point of discharge for each day's pour of each type of concrete; additional tests when concrete consistency seems to have changed.
2. Air Content: ASTM C 173, volumetric method for lightweight or normal weight concrete; one for each day's pour of each type of air-entrained concrete.
3. Concrete Temperature: Test hourly when air temperature is 40°F and when 80°F and above; and each time a set of compression test specimens are required.
4. Unit Weight: ASTM C 567, fresh unit weight of structural lightweight concrete; one test for each composite sample, but not less than one test for each day's pour of each concrete mixture.
5. Compressive Strength Tests: ASTM C39; one set for each day's pour exceeding 5 cu. yds. plus additional sets for each 50 cu. yds. over and above the first 25 cu. yds. of each concrete class placed in any one day; one specimen tested at 7 days, two specimens tested at 28 days, and one specimen retained in reserve for later testing if required.

a. When frequency of testing will provide less than 5 strength tests for a given class of concrete, conduct testing from at least 5 randomly selected batches if fewer than 5 are used.

b. When total quantity of a given class of concrete is less than 50 cu. yds, strength test may be waived by the Engineer if, in his judgment, adequate evidence of satisfactory strength is provided.

c. When strength of field-cured cylinders is less than 85 percent of companion laboratory-cured cylinders, evaluate current operations and provide corrective procedures for protecting and curing the in-place concrete.

d. Strength level of concrete will be considered satisfactory if both of the following requirements are met:

(1) Every arithmetic average of any three consecutive strength tests equals or exceeds the specified 28-day compressive strength (f'c).

(2) No individual strength test results falls below the specified 28-day compressive strength (f'c) by more than 500 psi when f'c is 5000 psi or less; or by more than 0.1 x f'c when f'c is greater than 5000 psi.

D. Test results will be reported in writing to the Engineer and Contractor within 24 hours after tests. Reports of compressive strength tests shall contain the project identification name and number, date of concrete placement, name and location of concrete batch in structure, design compressive strength at 28 days, concrete mix proportions and materials; compressive breaking strength and type of break for both 7-day tests and 28-day tests.

E. Nondestructive Testing: Impact hammer, sonoscope, or other nondestructive device may be permitted but shall not be used as the sole basis for acceptance or rejection.

F. Additional Tests: The Contractor's Independent testing service shall make additional tests of in-place concrete when test results indicate specified concrete strengths and other characteristics have not been attained in the structure, as directed by the Engineer. Testing service may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C42, or by other methods as directed.

G. Concrete Moisture Vapor Reduction Admixture (MVRA) Requirements: A representative or agent of the MVRA manufacturer must be present at the jobsite during placement of all MVRA treated concrete. Do not proceed without this representative being present. The General Contractor is to notify the manufacturer and make available to the site and batching plant for tests, inspection, and recommendations pertaining to the product.

End of Section

Section 03 45 00

PRECAST ARCHITECTURAL CONCRETE

PART 1 - GENERAL

1.1 SUMMARY

A. Design and structural engineering of panels, panel connections, structural members and supporting hardware.

B. Furnish and install finished and cured, reinforced, plant cast architectural concrete panels, copings, caps, structural lintels, and trim elements.

C. Installation of items furnished by other Sections (such as anchors, bolts and plates), flashing reglets and to be cast into concrete.

D. Make provisions in forms for proper location and installation of pipe sleeves, duct openings, keys, chases, electrical boxes, bolts, anchors, inserts, and similar items, as required by other trades. Notify appropriate trades when items noted are ready for installation.

1.2 RELATED REQUIREMENTS

A. Section 01 74 19 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL: Procedural and administrative requirements relating to recycling goals, waste management program and reporting.

B. Section 01 81 13 - SUSTAINABLE DESIGN REQUIREMENTS: Procedural and administrative requirements relating to required *Northeast CHPS Verified Program,* (NE-CHPS) Certification.

C. Section 03 30 00 - CAST-IN-PLACE CONCRETE: Structural concrete and concrete housekeeping pads.

D. Section 04 20 00 - UNIT MASONRY:

1. Concrete block and brick masonry work.
2. Installation of precast concrete units furnished under this Section 03 45 00.

E. Section 05 12 00 - STRUCTURAL STEEL FRAMING: Structural steel framing.

F. Section 05 31 00 - STEEL DECKING: Metal roof decking.

G. Section 05 50 00 - METAL FABRICATIONS: Loose lintels, light iron and other miscellaneous metal work.

H. Section 07 92 00 - JOINT SEALANTS: Sealant and back-up materials.

1.3 REFERENCES

A. Referenced Standards: Comply with applicable requirements of the following standards and those others referenced in this Section, under the provisions of Section 01 42 00 - REFERENCES. The standards referenced herein are included to

establish recognized minimum quality only. Where these standards conflict with other specified requirements, the most restrictive requirements shall govern. Equivalent quality and testing standards will be acceptable, subject to their timely submission, review and acceptance by the Architect.

1. ACI 318 - Building Code Requirements for Reinforced Concrete.
2. ASTM A36/A36M - Standard Specification for Carbon Structural Steel.
3. ASTM A307 - Standard Specification for Carbon Steel Bolts, Studs, and Threaded Rod 60 000 PSI Tensile Strength.
4. ASTM A563/A563M - Standard Specification for Carbon and Alloy Steel Nuts.
5. ASTM A615/A615M - Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement.
6. ASTM A666 – Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar.
7. ASTM C31/C31M – Standard Practice for Making and Curing Concrete Test Specimens in the Field.
8. ASTM C33/C33M – Standard Specification for Concrete Aggregates.
9. ASTM C88/C88M - Standard Test Method for Soundness of Aggregates by Use of Sodium Sulfate or Magnesium Sulfate.
10. ASTM C143/C143M - Standard Test Method for Slump of Hydraulic-Cement Concrete.
11. ASTM C150/C150M – Standard Specification for Portland Cement.
12. ASTM C171 – Standard Specification for Sheet Materials for Curing Concrete.
13. ASTM C272/C272M - Standard Test Method for Water Absorption of Core Materials for Sandwich Constructions.
14. ASTM C260/C260M – Standard Specification for Air-Entraining Admixtures for Concrete.
15. ASTM C309 - Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete.
16. ASTM C494/C494M – Standard Specification for Chemical Admixtures for Concrete.
17. ASTM C578 - Standard Specification for Rigid, Cellular Polystyrene Thermal Insulation.
18. ASTM C641 - Standard Test Method for Iron Staining Materials in Lightweight Concrete Aggregates.
19. ASTM C979 – Standard Specification for Pigments for Integrally Colored Concrete.
20. ASTM C1107 - Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Nonshrink).
21. ASTM D412 - Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers—Tension.
22. ASTM D1621 – Standard Test Method for Compressive Properties of Rigid Cellular Plastics.

23. ASTM D2240 - Standard Test Method for Rubber Property—Durometer Hardness.
24. ASTM E96 – Standard Test Methods for Water Vapor Transmission of Materials.
25. ASTM E165/E165M - Standard Practice for Liquid Penetrant Testing for General Industry.
26. ASTM E709 - Standard Guide for Magnetic Particle Testing.
27. ASTM F568M - Standard Specification for Carbon and Alloy Steel Externally Threaded Metric Fasteners.
28. ASTM F3125/F3125M - Standard Specification for High Strength Structural Bolts and Assemblies, Steel and Alloy Steel, Heat Treated, Inch Dimensions 120 ksi and 150 ksi Minimum Tensile Strength, and Metric Dimensions 830 MPa and 1040 MPa Minimum Tensile Strength.
29. AWS - D1.1 - Structural Welding Code.
30. PCI - Manual For Structural Design of Architectural Precast Concrete.
31. PCI MNL-117 - Manual for Quality Control for Plants and Production of Architectural Precast Concrete Products.
32. PCI MNL-120 - Design Handbook - Precast and Prestressed Concrete.
33. All applicable federal, state and municipal codes, laws and regulations for structural concrete

B. Sustainability Requirement Reference: The following sustainability requirements are hereby made a part of this Section by reference thereto:
   1. High Performance Schools Exchange, Northeast Energy Efficiency Partnerships NE-CHPS, (referred to herein as “NE-CHPS”).

1.4 ADMINISTRATIVE REQUIREMENTS

A. Coordination:
   1. General: Coordinate the work of this Section with the respective trades responsible for installing interfacing and adjoining work for proper sequence of installation, and ensure that the work performed hereunder is acceptable to such trades for the installation of their work.

B. Pre-installation Meetings: Installer of the Work of this Section is required to attend pre-installation conference specified under the following:
   1. Section 04 20 00 - UNIT MASONRY.
   2. Section 05 40 00 - COLD FORMED METAL FRAMING.

C. Sequencing:
   1. Field Measurements
      a. Take field measurements before preparation of shop drawings and fabrication, where possible, to ensure proper fitting of Work.
      b. Allow for adjustments within specified tolerances wherever taking of field measurements before fabrication might delay Work.

1.5 SUBMITTALS

A. Information and Review Submittals: Submit the following under provisions of Section 01 33 00 - SUBMITTAL PROCEDURES:

1. Literature: Manufacturer’s complete product data specifications for portland cement, each admixture proposed to be used, integral colorants, curing compounds, compressible fillers, and other manufactured items.
2. Shop drawings:
    a. Reinforcement Drawings show: elevations dimensions of concrete, reinforcement clearances; brackets, openings, sleeves or other items furnished by other Sections; and shapes, dimensions, and details of reinforcement and accessories.
    b. Except as otherwise noted, approval of shop drawings will be for size and arrangement of components. Errors in dimensions shown on shop drawings shall be responsibility of contractor. Check and coordinate cast-in-place concrete work with work of other trades before submitting shop drawings.
    c. Do not proceed with fabrication of material or performance of work until corresponding item on shop drawing has been approved by the Engineer.
3. Samples:
    a. Manufacturer’s standard samples of integral colorant material, for initial selections by the Architect.
    b. After receipt of initial approval of the submittals required hereunder, and selections of integral colorants, submit one 12 by 12 by 2 inch piece of each type and finish of architectural concrete for preliminary approval of the Architect.
4. Test Reports: Submit preliminary rest results for the Architect's approval at least three weeks prior to the beginning of the work. In addition to the test reports specified under “Quality Control”, submit the following from the testing laboratory through the contractor to the Architect:
    a. Preliminary Design Mix Reports (ACI 301).
    b. Aggregate Soundness Test Reports (ASTM C88).
    c. Aggregate Staining Test Reports (ASTM C641).
    d. Air Entrainment Test Reports (ASTM C260).
5. Sustainable Design Submittals: As required by NE CHPS.

B. Closeout Submittals: Submit maintenance data under provisions of Section 01 78 00 - CLOSEOUT SUBMITTALS; indicate surface cleaning instructions.

1.6 QUALITY ASSURANCE

A. Perform Work in accordance with PCI MNL-116, PCI MNL-120, PCI Manual For Structural Design of Architectural Precast Concrete,

B. Welding: ANSI/AWS D1.1.

C. Design reinforcement under direct supervision of a Professional Structural Engineer experienced in design of this work and licensed in the State of Rhode Island.

D. Qualifications

1. Fabricator Qualifications: A firm that complies with the following requirements and is experienced in producing architectural precast concrete units similar to those indicated for this Project and with a record of successful in-service performance.
2. Participates in PCI's Plant Certification program (at the time of bidding) and is designated "at a minimum" a PCI Certified plant for the following Groups:
   a. Group A1 (Architectural Precast Products).
   b. Group AT (Architectural Trim Units).
3. Participates with annual standard reviews per PCI MNL-117.
4. Erector Qualifications: A precast concrete erector with erecting crews experienced and qualified to erect Architectural Precast Concrete with a minimum of 5 years of Architectural Concrete Erecting experience.
5. Welders: Employ only experienced welders who are certified for the specific weld processes and positions required and who have been qualified within the preceding 12 months under AWS standard qualification procedure for the type of work required.

1.7 MOCKUP

A. Provide mock-up under provisions of Section 01 43 39 – MOCK-UPS.

B. Mockup panel to include window, caulking and control joint .

C. Locate where directed.

D. Mockup may [not] remain as part of the Work.

1.8 DELIVERY, STORAGE AND HANDLING

A. Handle precast units to position, consistent with their shape and design. Lift and support only from support points.

B. Lifting or handling equipment: Capable of maintaining units during manufacture, storage, transportation, erection, and in position for fastening.

C. Blocking and lateral support during transport and storage: Clean, non-staining, without causing harm to exposed surfaces. Provide temporary lateral support to prevent bowing and warping.

D. Protect units to prevent staining, chipping, or spalling of concrete.

E. Mark units with date of production in location not visible to view when in final position in structure.

F. Packaging Waste Management: Comply with packaging requirements specified under Section 01 60 00 - PRODUCT REQUIREMENTS.

1. Shipping materials: Manufacturer shall utilize to the greatest extent possible packaging materials which are biodegradable and recyclable.
2. Jobsite packaging waste management: Recycle packaging materials coordinated with general construction waste management specified under Section 01 74 19 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL.

PART 2 - PRODUCTS

2.1 DESIGN REQUIREMENTS

A. Design units and all connections and embedded items to design loads as calculated in accordance with Rhode Island State Building Code, and erection forces.
   1. Precast concrete fabricator shall prepare design calculations in accordance with PCI Manual 121, "Manual for Structural Design of Architectural Precast Concrete". The calculations shall be certified, stamped and signed by a Structural Engineer registered in the State where project is located.
   2. Design Loads: Design panels and connections to support total loads including dead loads, live loads, earthquake loads, thermal loads, wind loads and other loads as prescribed by applicable building codes for this project location and by reference standards.
   3. Connection Points: Connect precast to building structure only at locations approved by building structural engineer and as indicated on the approved shop drawings.

B. Design units to accommodate construction tolerances, deflection of building structural members and clearances of intended openings.

C. Design component connections to accommodate building movement and thermal movement. Provide adjustment to accommodate misalignment of structure without unit distortion or damage.

2.2 CONCRETE MIX

A. Concrete materials:
   1. Cement: ASTM C 150, Portland Type III - High Early Strength, white color. Use only one brand throughout project.
   2. Fine Aggregate: Washed, inert, sand of with color characteristics which when combined with other constituents will produce concrete of specified color. Fine aggregate shall conform to ASTM C33.
   3. Coarse Aggregate: Provide aggregate conforming to ASTM C 33. Hard, durable, carefully selected and graded; free of material causing staining or reacting with cement. 3/8 inch and 3/4 inch stone of color, type and size gradation to Architect approved sample.
   4. Air Entraining Admixture: ASTM C260, approved by Architect.
   5. Water-Reducing Admixture: ASTM C494, Type A, unless otherwise approved by Architect.
   6. Water: Clean and not detrimental to concrete.

B. Design of Concrete Mix

1. Prepare design mixes for each type of concrete required, and obtain the Architect's approval of the proposed design mix. Provide cement and aggregate control to provide two uniform colors of precast concrete.
2. Proportion mixes either by laboratory trial batch or field experience methods, using materials to be employed on the Work for each type of concrete required, and complying with ACI 211.1.
3. Concrete mix: Provide separate back-up and facing mixes or only face mix at fabricator's option.
    a. General: Comply with ANSI/ACI 301.
    b. Minimum compressive strength: 5,000 psi (28 day strength)
    c. Air entrainment: 5 to 7 percent.
    d. Concrete slump: 3 to 4 inches.
    e. No calcium chloride will be permitted in mix.

C. Reinforcing Steel: As engineered by fabricator:

1. ASTM A615, 60 ksi yield grade; deformed billet steel, unfinished, of sizes shown on the approved shop drawings.
2. ANSI/ASTM A 185, welded steel wire fabric; in flat sheets, unfinished, of sizes shown on the approved shop drawings.
3. Tie wire, minimum 16 gage annealed type.

D. Color Additives:

1. Specified color: Precast concrete elements shall match Northern Design “ALT-W”.
2. Materials: Color additives shall contain pure, concentrated mineral pigments specially processed for mixing into concrete, resistant to alkalis and complying with ASTM C979.
    a. Color additives containing carbon black are not acceptable.
    b. Provide color as selected by the Architect matching approved samples.
3. Admixtures: Do not use calcium chloride admixtures.

2.3 SUPPORT DEVICES

A. General: Connecting hardware shall be engineered and designed by the fabricator to accommodate all loads to which it will be subject both in the permanent condition and due to handling. Connection details indicated on the drawings shall be considered minimum required and shall be strengthened as necessary in accordance with design calculations.

B. Connecting and Support Devices: ASTM A 36 weldable steel, hot dipped galvanized.

1. Surface preparation prior to galvanizing: Pickle steel prior to galvanizing in conformance with SSPC-SP8. Remove all rust, dirt, weld flux, weld spatter, and other foreign matter.

2. Hot-dip galvanizing: Comply with ASTM A 123. Provide thickness of galvanizing specified in referenced standards.
    a. Touch-up all breaks on hot-dip surfaces caused by cutting, welding, drilling or undue abrasion with liquid zinc coating as specified herein above. Apply liquid zinc by brush or spray on all damaged areas in two coats to a total dry film thickness of not less than 3 mils. Apply first coat within two hours after damage to hot-dip film to prevent undue oxidation of exposed surface. On all welds remove weld spatter by power wire brushing or equivalent before applying liquid zinc coating. Repair material should extend at least 3 inches beyond all edges of the damaged galvanized area as possible to assure continuity of galvanic protection.
    b. Touch-up of galvanized surfaces with aerosol spray, silver paint, bright paint, or aluminum paints is not acceptable.

C. Bolts, Nuts, and Washers: ASTM A 307, high strength steel chromium nickel steel alloy, except hot dip galvanize those to be embedded into concrete.

2.4 ACCESSORIES

A. Bearing Pads: High density plastic, or neoprene (Chloroprene) minimum 1/8 inch thick, having a durometer hardness of 70, smooth both sides.
    1. Shims at connections subject to thermal movement or other movement shall be separated with friction reducing pads. Pads shall sufficiently reduce friction to permit movement, shall resist wear, and shall be positively retained in position (open ended slots are not acceptable). Pads shall not be subject to heat damage from welding or cutting, or excessive pressure from over-tightening of bolts.

B. Precast Concrete Anchor: Pos-I-Tie Split Bend and Pos-I-Tie L-Type anchors by Heckmann Building Products or approved equal.

2.5 FABRICATION

A. Fabrication procedure to conform to PCI MNL-117.

B. Maintain plant records and quality control program during production of precast units. Make records available upon request.

C. Use rigid molds, constructed to maintain precast unit uniform in shape, size and finish.

D. Maintain consistent quality during manufacture.

E. Fabricate connecting devices, plates, angles, items fit to steel framing members, inserts, bolts, and accessories. Fabricate to permit initial placement and final attachment.

F. Embed reinforcing steel, anchors, inserts plates, angles, and other cast-in items as indicated on approved shop drawings.

G. Locate hoisting devices to permit removal after erection.

H. Cure units to develop concrete quality, and to minimize appearance blemishes such as non-uniformity, staining, or surface cracking.

I. Minor patching in plant is acceptable, providing structural, adequacy and appearance of units is not impaired.

2.6 FINISH - PRECAST UNITS

A. Honed Finish: Use continuous mechanical abrasion with fine grit, followed by filling and rubbing procedures.

2.7 FABRICATION TOLERANCES

A. Maximum Out of Square: 1/8 inch in 10 feet, non-cumulative.

B. Variation from dimensions Indicated on approved shop drawings: Plus or minus 1/8 inch.

C. Maximum Misalignment of Anchors, Inserts, Openings: 1/8 inch .

D. Maximum Bowing of Units: Length of bow/360.

E. Location of Reglets: 1/4 inch from true position.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Installation of Precast concrete unit trim elements, is included under Section 04 20 00 - UNIT MASONRY.

3.2 EXAMINATION

A. Inspect all surfaces and verify that they are in proper condition to receive the work of this Section.

B. Verify that building structure, anchors, devices, and openings are ready to receive work of this Section.

C. Beginning of installation means acceptance of existing site conditions.

3.3 PREPARATION

A. Provide for erection procedures and induced loads during erection. Maintain temporary bracing in place until final support is provided.

B. Prepare existing concrete with steel brush cleaning, remove all loose and chipped existing concrete and applying bonding agent in accordance with manufacturer's instructions.

C. In locations where concrete is dowelled into existing work, drill holes in existing concrete, insert steel dowels and pack solid with non-shrink grout.

3.4 ERECTION

A. Install clips, hangers, bearing pads, and other accessories required for connecting architectural precast concrete units to supporting members and backup materials.

B. Erect architectural precast concrete level, plumb, and square within specified allowable tolerances. Provide temporary supports and bracing as required to maintain position, stability, and alignment as units are being permanently connected.

1. Maintain horizontal and vertical joint alignment and uniform joint width as erection progresses.
2. Unless otherwise indicated, provide for uniform joint widths of 3/4 inch (19 mm).

C. Connect architectural precast concrete units in position by bolting, welding, grouting, or as otherwise indicated on Shop Drawings. Remove temporary shims, wedges, and spacers as soon as practical after connecting and grouting are completed.

D. Welding: Comply with applicable AWS D1.1/D1.1M and AWS D1.4 for welding, welding electrodes, appearance, quality of welds, and methods used in correcting welding work.

E. At bolted connections, use lock washers, tack welding, or other approved means to prevent loosening of nuts after final adjustment.

F. Grouting Connections: Grout connections where required or indicated. Retain grout in place until hard enough to support itself. Pack spaces with stiff grout material, tamping until voids are completely filled. Place grout to finish smooth, level, and plumb with adjacent concrete surfaces. Keep grouted joints damp for not less than 24 hours after initial set. Promptly remove grout material from exposed surfaces before it affects finishes or hardens.

G. Erect architectural precast concrete units level, plumb, square, true, and in alignment without exceeding the noncumulative erection tolerances of PCI MNL 117, Appendix I, and the following:

1. Maximum Variation from Plane of Location: 1/4 inch in 10 feet and 3/8 inch in 100 feet, non-cumulative.
2. Maximum Offset from True Alignment Between Two Connecting Units: 1/4 inch.
3. When units require adjustment beyond design or tolerance criteria, discontinue affected work; advise Architect/Engineer.

H. Exposed Joint Dimension: 3/4 inch, or as otherwise indicated on Drawings.

3.5 PATCHING

A. Excessive honeycomb or embedded debris in concrete is not acceptable. Notify Architect upon discovery upon delivery at job site.

B. Patch imperfections as directed, in accordance with ACI 301.

3.6 DEFECTIVE CONCRETE

A. Defective Concrete: Concrete not conforming to required lines, details, dimensions, tolerances or specified requirements.

B. Repair or replacement of defective concrete will be determined by the Architect/Engineer.

C. Do not patch, fill, touch-up, repair, or replace exposed concrete except upon express direction of Architect/Engineer for each individual area.

3.7 FIELD QUALITY CONTROL

A. Special Inspections: Owner will engage a qualified special inspector to perform the following special inspections and prepare reports:

1. Erection of precast concrete members.

B. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections and prepare test reports.

C. Field welds will be subject to visual inspections and nondestructive testing according to ASTM E165 or ASTM E709. High-strength bolted connections will be subject to inspections.

D. Testing agency will report test results promptly and in writing to Contractor and Architect.

E. Repair or remove and replace work where tests and inspections indicate that it does not comply with specified requirements.

F. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

G. Inspect all surfaces and verify that they are in proper condition to receive the work of this Section.

H. Verify that building structure, anchors, devices, and openings are ready to receive work of this Section.

I. Beginning of installation means acceptance of existing site conditions.

3.8 REPAIRS

A. Repair damaged architectural precast concrete units if permitted by Architect. The Architect reserves the right to reject repaired units that do not comply with requirements.

B. Mix patching materials and repair units so cured patches blend with color, texture, and uniformity of adjacent exposed surfaces and show no apparent line of demarcation between original and repaired work, when viewed in typical daylight illumination from a distance of 20 feet (6 m).

C. Prepare and repair damaged galvanized coatings with galvanizing repair paint according to ASTM A780.

D. Wire brush, clean, and paint damaged prime-painted components with same type of shop primer.

E. Remove and replace damaged architectural precast concrete units when repairs do not comply with requirements.

3.9 CLEANING

A. Clean surfaces of precast concrete units exposed to view.

B. Clean mortar, plaster, fireproofing, weld slag, and other deleterious material from concrete surfaces and adjacent materials immediately.

C. Clean exposed surfaces of precast concrete units after erection and completion of joint treatment to remove weld marks, other markings, dirt, and stains.

1. Perform cleaning procedures, if necessary, according to precast concrete fabricator's recommendations. Clean soiled precast concrete surfaces with detergent and water, using stiff fiber brushes and sponges, and rinse with clean water. Protect other work from staining or damage due to cleaning operations.
2. Do not use cleaning materials or processes that could change the appearance of exposed concrete finishes or damage adjacent materials.

End of Section

Section 03 60 00
GROUTING

PART 1 - GENERAL

1.1 GENERAL PROVISIONS

A. All of the Contract Documents, including General and Supplementary Conditions apply to the Work of this Section.

1.2 SCOPE

A. This Section specifies the furnishing and installing non-shrink grout for pump, motor, and equipment base plates or bedplates; column base plates and miscellaneous base plates; and other uses of non-shrink grout as indicated on the Drawings. Unless otherwise specified, all grouting shall be done with non-shrinking grout.

B. This section also specifies furnishing and installing two-component epoxy-based adhesive anchoring systems for anchor bolts, threaded rod anchors, and reinforcing bars to be installed in hardened concrete and masonry.

1.3 SUBMITTALS

A. Submit Certificate of Compliance of products with these specifications.

B. Submit the following in accordance with the requirements as specified in Section 01 33 00, SUBMITTAL PROCEDURES.

1. Manufacturer’s printed data and literature for all specified materials and locations where materials are to be used.
2. Manufacturer’s installation/application instructions.

1.4 QUALITY ASSURANCE

A. Provide in accordance with the requirements as specified in Section 01 45 00, QUALITY CONTROL.

B. Ensure surfaces to be grouted are clean and sound and are not feathered at edges.

C. Handle grout as concrete with regard to temperature and curing as specified in Section 03 30 00, Cast-in-Place Concrete.

D. Observe safety precautions as outlined in the manufacturer’s literature and as printed on containers and labels.

PART 2 - PRODUCTS

2.1 NON-SHRINK CEMENT

A. Provide non-shrink, non-metallic cement-based grout requiring only addition of water with a minimum 28-day compressive strength of 8,000 psi.

B. Provide shrinkage and compensation characteristics in both the plastic and hardened states, conforming to ASTM C-1107, Grade C.

C. Grout shall exhibit small but predictable amount of expansion sufficient to counteract the normal shrinkage of cement.

D. The expansion shall occur after initial set to insure maximum contact between grout and base plates, beams, concrete, masonry, or other surfaces.

E. Manufactured by:

1. “Five Star Grout” by Five Star Products Inc.
2. “Sika Grout 212” as manufactured by Sika Corporation.
3. “Masterflow 928” by Master Builders, Inc.
4. Or approved equal.

2.2 EPOXY ADHESIVE FOR REINFORCING BARS AND THREADED ROD ANCHORS

A. Epoxy adhesive shall be a multi-purpose 2 component, 100% solids, moisture tolerant structural epoxy-based adhesive.

B. Manufactured by:

1. “HIT-HY 200” (concrete) and “HIT-HY 270” (masonry) by Hilti, Inc.
2. “SET-XP” by Simpson Strong-Tie Company, Inc.
3. Or approved equal.

PART 3 - EXECUTION

3.1 NON-SHRINKING GROUT

A. Non-shrinking grout shall be furnished factory premixed so that only water is added at the jobsite. Grout shall be mixed in a mechanical mixer. No more water shall be used than is necessary to produce a flowable grout.

B. Preparation

1. The concrete or masonry surfaces to receive non-shrinking grout shall be saturated with water for at least 12 hours preceding grouting unless additional time is required by the grout manufacturer. Remove all standing water or puddles prior to application of grout.
2. Remove dust, laitance, grease, curing compounds, impregnations, waxes, foreign particles and disintegrated materials by mechanical abrasion methods such as sandblasting. Sandblast structural and reinforcing steel to remove loose material and expose sound metal.
3. Construct appropriate sturdy forms to contain grout at the fluidity level at which it will be used.

C. Placement

1. Unless otherwise specified or indicated on the drawings, grout under base plates shall be ¾-inches thick.

2. Grout shall be placed in strict accordance with the directions of the manufacturer so that all spaces and cavities below the top of base plates and bedplates are completely filled, without voids.
3. Forms shall be provided where structural components of base plates or bedplates will not confine the grout.
4. Place grout only from one side of base plates to avoid entrapping air. Provide adequate air vent holes in large base plates. Work or flow into place, filling all cavities.
5. Reinforce grout pads or applications three inches or more in thickness with wire mesh or reinforcement bars.
6. Excessive means of vibration may cause segregation of aggregates and will not be permitted.
7. Edge Finishing
8. In all locations where the edge of the grout will be exposed to view, the grout shall be finished smooth after it has reached its initial set. Except where shown to be finished on a slope, the edges of grout shall be cut off flush at the base plates, bedplates, members, or pieces of equipment.
9. Curing
10. Nonshrinking grout shall be protected against rapid loss of moisture by covering with wet cloths or polyethylene sheets. After edge finishing is completed, the grout shall be wet cured for at least 3 days and then an acceptable membrane-curing compound shall be applied.

3.2 EPOXY ADHESIVE

A. Epoxy adhesive shall consist of a two-component liquid epoxy adhesive of viscosity appropriate to the location and application, and an inert aggregate filler component, if recommended by the adhesive manufacturer. Components shall be packaged separately at the factory and shall be mixed immediately before use. Proportioning and mixing of the components shall be done in accordance with the manufacturer's printed instructions and recommendations.

B. Preparation

1. Where indicated on the drawings, anchor bolts, threaded rod anchors, and reinforcing bars shall be anchored in holes drilled into hardened concrete and masonry using epoxy adhesive. Diameters of holes shall be in accordance with the Manufacturer's Printed Installation Instructions (MPII) included with each adhesive package.
2. The embedment depth for anchor bolts, threaded rod anchors, and reinforcing bars shall be as indicated on the Drawings.
3. Holes shall be prepared and cleaned in accordance with the Manufacturer's Printed Installation Instructions (MPII) included with each adhesive package.

C. Installation

1. Anchor bolts, threaded rod anchors, and reinforcing bars shall be clean, dry, and free of grease and other foreign matter when installed.
2. The bolts, rods, and bars shall be set and positioned, and the adhesive shall be placed and finished in accordance with the recommendations of the manufacturer.

3. Care shall be taken to ensure that all spaces and cavities are filled with adhesive, without voids.
4. During assembly of all threaded stainless-steel components, anti-seize thread lubricant shall be liberally applied to the threaded portion not embedded in concrete.

End of Section

Section 04 20 00
UNIT MASONRY

PART 1 - GENERAL

1.1 SUMMARY

A. Furnish and install the following:

1. Ground-Faced concrete masonry veneer construction for exterior walls backed by structural light gage metal framing.
2. Concrete masonry unit construction for interior partitions.
3. Grout fill for hollow metal steel frames, elevator hoistway frames, and wherever ties or anchorage items occur, and as further indicated in the Drawings.
4. Reinforcing, ties, anchors, and other metal accessories, for anchoring unit masonry together and to other materials.
5. Compressible joint fillers for control joints in unit masonry work and joints with structural steel.
6. Built-into masonry flashing.
7. Control joints in concrete masonry.
8. Reinforcement, anchorage, and accessories.

B. Place. install and build-in, as work progresses, the following products and materials furnished under the indicated Sections:

1. Anchor bolts, wood blocking, and anchorage items furnished or set by other trades as specified in individual Sections.
2. Steel lintels furnished by Section 05 50 00 - METAL FABRICATIONS.
3. Flashing reglets furnished by Section 07 62 00 - SHEET METAL FLASHING AND TRIM.
4. Access door frames furnished by Section 08 31 00 - ACCESS DOORS AND PANELS or by section requiring the same.

C. Build-into place as work progresses, the following products and materials furnished under the indicated Sections:

1. Hollow metal door and window frames set-in-place by Section 06 10 00 - ROUGH CARPENTRY, and furnished by Section 08 11 13 - HOLLOW METAL DOORS AND FRAMES.

D. Clean and point exposed to view surface masonry.

1.2 RELATED REQUIREMENTS

A. Section 01 22 00 - UNIT PRICES: Administrative and procedural requirements for unit prices.

B. Section 01 43 39 - MOCKUPS: Requirements for exterior wall mock-up assembly requiring work of this Section.

C. Section 01 45 00 - QUALITY CONTROL: Perform testing of masonry, mortar and grout specified herein.

D. Section 01 45 29 - TESTING LABORATORY SERVICES: Perform testing of masonry, mortar and grout specified herein.

E. Section 01 74 19 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL: Procedural and administrative requirements relating to recycling goals, waste management program and reporting.

F. Section 01 81 13 - SUSTAINABLE DESIGN REQUIREMENTS: Procedural and administrative requirements relating to required *Northeast CHPS Verified Program,* (NE-CHPS) Certification.

G. Section 03 30 00 - CAST-IN-PLACE CONCRETE: Concrete foundation work, walls and slabs.

H. Section 05 12 00 - STRUCTURAL STEEL FRAMING: Welding of masonry anchors to structural steel.

I. Section 05 40 00 - COLD-FORMED METAL FRAMING: Structural light gage metal framing for support of masonry veneer.

J. Section 05 50 00 - METAL FABRICATIONS: Steel lintels at masonry openings.

K. Section 06 10 00 - ROUGH CARPENTRY: Setting and temporary bracing of hollow metal frames occurring in masonry, and removal of temporary centering when frames have been built into the masonry.

L. Section 06 16 00 - SHEATHING: Wall sheathing at masonry veneer walls.

M. Section 07 21 00 - THERMAL INSULATION.

N. Section 07 27 13 - MODIFIED BITUMINOUS SHEET AIR BARRIERS: Self-adhesive elastomeric sheet membrane air barrier system.

O. Section 07 62 00 - SHEET METAL FLASHING AND TRIM: Counter flashings and cap flashing at roof.

P. Section 07 84 00 - FIRESTOPPING.

Q. Section 07 92 00 - JOINT SEALANTS: Sealant, caulking materials, and compressible joint bead back-up, in conjunction with masonry work.

R. Section 08 11 13 - HOLLOW METAL DOORS AND FRAMES.

S. Section 09 91 00 – PAINTING: Anti-Graffiti Coatings.

1.3 REFERENCES

A. Referenced Standards: Comply with applicable requirements of the following standards and those others referenced in this Section, under the provisions of Section 01 42 00 - REFERENCES. The standards referenced herein are included to establish recognized minimum quality only. Where these standards conflict with

other specified requirements, the most restrictive requirements shall govern. Equivalent quality and testing standards will be acceptable, subject to their timely submission, review and acceptance by the Architect.

1. Masonry Standards Joint Committee (MSJC) [The Masonry Society (TMS)/American Concrete Institute (ACI)/American Society of Civil Engineers (ASCE)]: TMS 602/ACI 530.1/ASCE 6 - “Specifications for Masonry Structures”
2. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
3. ASTM A153 - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
4. ASTM A240/A240M – Standard Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications.
5. ASTM A480/A480M - Standard Specification for General Requirements for Flat-Rolled Stainless and Heat-Resisting Steel Plate, Sheet, and Strip.
6. ASTM A641 - Standard Specification for Zinc-Coated (Galvanized) Carbon Steel Wire.
7. ASTM A767 - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
8. ASTM A951/A951M – Standard Specification for Steel Wire for Masonry Joint Reinforcement.
9. ASTM A1064/A1064M – Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete.
10. ASTM B117 - Standard Practice for Operating Salt Spray (Fog) Apparatus.
11. ASTM B633 - Standard Specification for Electrodeposited Coatings of Zinc on Iron and Steel.
12. ASTM C5 - Standard Specification for Quicklime for Structural Purposes.
13. ASTM C144 - Standard Specification for Aggregate for Masonry Mortar.
14. ASTM C150 – Standard Specification for Portland Cement.
15. ASTM C207 - Standard Specification for Hydrated Lime for Masonry Purposes.
16. ASTM C270 - Standard Specification for Mortar for Unit Masonry.
17. ASTM C387 - Standard Specification for Packaged, Dry, Combined Materials for Concrete and High Strength Mortar.
18. ASTM C518 - Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus.
19. ASTM C578 - Standard Specification for Rigid, Cellular Polystyrene Thermal Insulation.
20. ASTM C595 - Standard Specification for Blended Hydraulic Cement.
21. ASTM C612 - Standard Specification for Mineral Fiber Block and Board Thermal Insulation.
22. ASTM C778 – Standard Specification for Standard Sand.

23. ASTM C780 – Standard Test Methods for Preconstruction and Construction Evaluation of Mortars for Plain and Reinforced Unit Masonry.
24. ASTM C954 - Standard Specification for Steel Drill Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Steel Studs from 0.033 in. (0.84 mm) to 0.112 in. (2.84 mm) in Thickness.
25. ASTM C1019 – Standard Test Methods for Sampling and Testing Grout for Masonry.
26. ASTM C1072 - Standard Test Methods for Measurement of Masonry Flexural Bond Strength.
27. ASTM C1329 – Standard Specification for Mortar Cement.
28. ASTM D412 - Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers—Tension.
29. ASTM D1056 - Standard Specification for Flexible Cellular Materials - Sponge or Expanded Rubber.
30. ASTM D1621 – Standard Test Method for Compressive Properties of Rigid Cellular Plastics.
31. ASTM D1876 – Standard Test Method for Peel Resistance of Adhesives (T-Peel Test).
32. ASTM D1970 – Standard Specification for Self-Adhering Polymer Modified Bituminous Sheet Materials Used as Steep Roofing Underlayment for Ice Dam Protection.
33. ASTM D2000 - Standard Classification System for Rubber Products in Automotive Applications.
34. ASTM E84 – Standard Test Method for Surface Burning Characteristics of Building Materials.
35. ASTM E96 – Standard Test Methods for Water Vapor Transmission of Materials.
36. ASTM E119 – Standard Test Methods for Fire Tests of Building Construction and Materials.
37. ASTM E447 - Standard Test Methods for Compressive Strength of Masonry Prisms.
38. ASTM E488 - Standard Test Methods for Strength of Anchors in Concrete and Masonry Elements.
39. ASTM E518 - Standard Test Methods for Flexural Bond Strength of Masonry.
40. American National Standards Institute Building Code requirements.
41. MCAA – Hot and Cold Weather Masonry Construction.

B. The following reference materials are hereby made a part of this Section by reference thereto:

1. UL Fire Resistance Directory.
2. IMI: Masonry Construction Guide Manual.

C. Sustainability Requirement Reference: The following sustainability requirements are hereby made a part of this Section by reference thereto:

1. High Performance Schools Exchange, Northeast Energy Efficiency Partnerships NE-CHPS, (referred to herein as “NE-CHPS”).

1.4 ADMINISTRATIVE REQUIREMENTS

A. Coordination:

1. General: Coordinate the work of this Section with the respective trades responsible for installing inserts and anchorages furnished by this Section; make arrangements for delivery, receipt and installation of inserts and anchorages to prevent delay of the Work

B. Pre-Installation Meetings: At least two weeks prior to commencing the work of this Section, conduct a pre-installation conference at the Project site. Comply with requirements of Section 01 31 00 - PROJECT MANAGEMENT AND COORDINATION. Coordinate time of meeting to occur prior to installation of work under the related sections named below.

1. Required attendees: Architect, Contractor, Mason’s Project Superintendent, and representatives of other related trades as directed by the Architect or Contractor, and representatives for installers of related work specified under the following Sections:
   a. Section 03 30 00 - CAST-IN-PLACE CONCRETE
   b. Section 03 45 00 - PRECAST ARCHITECTURAL CONCRETE.
   c. Section 05 12 00 - STRUCTURAL STEEL FRAMING
   d. Section 05 40 00 - COLD-FORMED METAL FRAMING
   e. Section 05 50 00 - METAL FABRICATIONS
   f. Section 06 10 00 - ROUGH CARPENTRY
   g. Section 06 16 00 - SHEATHING
   h. Section 07 21 00 - THERMAL INSULATION
   i. Section 07 27 13 - MODIFIED BITUMINOUS SHEET AIR BARRIERS
   j. Section 07 54 19 – POLYVINYL CHLORIDE (PVC) ROOFING
   k. Section 07 62 00 - SHEET METAL FLASHING AND TRIM
   l. Section 07 84 00 - FIRESTOPPING
   m. Section 07 92 00 - JOINT SEALANTS
   n. Section 08 43 13 - ALUMINUM-FRAMED STOREFRONTS
   o. Section 08 44 13 - GLAZED ALUMINUM CURTAIN WALLS
2. Agenda:
   a. Scheduling of masonry operations.
   b. Review of staging and material storage locations.
   c. Coordination of work by other trades.
   d. Protection of completed Work.
   e. Establish weather and working temperature conditions to which Architect and Contractor must agree.

C. Sequencing:

1. Field Measurements
    a. Take field measurements before preparation of shop drawings and fabrication, where possible, to ensure proper fitting of Work.
    b. Allow for adjustments within specified tolerances wherever taking of field measurements before fabrication might delay Work.

1.5 SUBMITTALS

A. Information and Review Submittals: Submit the following under provisions of Section 01 33 00 - SUBMITTAL PROCEDURES:
    1. Literature: Manufacturer's product data sheets, specifications, performance data, physical properties for each item furnished hereunder.
    2. Material certificates: Provide for the following, signed by manufacturer and Contractor certifying that each material complies with requirements.
        a. Provide fabricators UL certificates for rated concrete masonry units, submit for UL-assembly compliance for each indicated fire rating.
        b. Masonry materials: Each different cement product required for mortar and grout, including name of manufacturer, brand, type, and weight slips at time of delivery.
        c. Each material and grade indicated for reinforcing bars.
        d. Each type and size of joint reinforcement.
        e. Each type and size of anchors, ties, and metal accessories.
    3. Material Certificates: Provide test reports from a qualified independent laboratory employed and paid by Contractor indicating and interpreting test results relative to compliance of the following proposed masonry materials with requirements indicated:
        a. Mortar complying with the property requirements of, and tested in accordance with ASTM C270.
        b. Mortar complying with the proportion requirements of ASTM C270 and tested in accordance with ASTM C780.
        c. Grout mixes: Include description of type and proportions of grout ingredients.
        d. Masonry units; report for tests performed within the previous six months.
    4. Certification:
        a. Provide manufacturer's written certification of recycled steel content for reinforcing steel.
        b. Provide manufacturer's written certification of recycled content for concrete masonry units.
    5. Shop drawings:
        a. Provide elevations of masonry work showing jointing patterns and coursing; indicate locations of expansion and control joints.
            1) Provide shop drawings bearing the registration stamp of a Professional Structural Engineer licensed in the State of Rhode Island for all cavity wall construction.

2) Reinforcing Steel: Detail bending and placement of unit masonry reinforcing bars. Comply with ACI 315, "Details and Detailing of Concrete Reinforcement." Show elevations of reinforced walls.

6. Selection samples:
   a. Prefaced concrete units: Color mixes for ground-faced concrete masonry units. Furnish manufacturer's full range of colors for selection by Architect.
   b. Mortar color selection chips. Furnish manufacturer's full range of colors for selection by Architect.
7. Verification samples (submit if requested by Architect):
   a. Samples of each masonry accessory or anchorage item required.
   b. Mortar Components.
      1) Ground face concrete units.
8. Delegated Design Submittals:
   a. Provide calculations for loading and stresses bearing a Professional Structural Engineer's seal. Show how design load requirements and other performance requirements as required by *RHODE ISLAND BUILDING CODE*, Regulation RISBC-1.
      1) Submit load calculations (including anchor loads) to Contractor for forwarding to fabricator responsible for engineering required under Section 05 40 00 – COLD-FORMED METAL FRAMING.
9. Sustainable Design Submittals: As required by NE CHPS.

1.6 QUALITY ASSURANCE

A. General: Notify the Architect where conflicts apply between referenced standards and existing materials, and existing methods of construction.
   1. Engineered Masonry: Design and certify under direct supervision of Professional Engineer, where indicated that the work of this section meets or exceeds the performance requirements specified in this section and as required by *International Building Code*, 2018 edition, as published by the International Code Council, Inc. (I.C.C.), as revised by *RHODE ISLAND BUILDING CODE*, Regulation RISBC-1, effective February 1, 2022.

B. Sole Source:
   1. Facing units: Obtain exposed masonry units of uniform texture and color, or a uniform blend within the ranges accepted for these characteristics, from one manufacturer for each different product required for each continuous surface or visually related surfaces.
   2. Mortar materials: Obtain mortar ingredients of uniform quality, including color for exposed masonry, from one manufacturer for each cementitious component and from one source and producer for each aggregate.
   3. Prepackaged mortar materials: Obtain masonry cement or masonry mortar from a single manufacturer. Where colored mortar is required provide batch tickets confirming all materials are from a single production run to ensure uniformity of the mix.

C. Qualifications:

1. Installer: Company specializing in performing the masonry work of this Section with minimum of 10 years documented experience. Work shall be done by skilled workmen, fully instructed as to the requirements of this Specifications and adequately supervised during the work.
2. Welders Certificates: Utilize only qualified welders employed on the Work. Submit verification that Welder's are AWS D1.1 and D1.4 qualified within the previous 12 months.
3. Testing Agencies: To qualify for performing tests and inspection specified in this Section, an independent testing laboratory must demonstrate to Architect's satisfaction, based on evaluation of laboratory-submitted criteria conforming to ASTM C1093, that it has the experience and capability to conduct satisfactorily the testing indicated without delaying the progress of the Work.
4. Professional Engineer Qualifications: Design structural elements including reinforcement, anchors and supports, under direct supervision of Professional Engineer experienced in design of this Work and licensed in the State of Rhode Island.

D. Preconstruction Testing Service: Owner shall engage a qualified independent testing agency to perform preconstruction testing indicated below. Payment for these services will be made by Owner. Retesting of materials failing to meet specified requirements shall be done at Contractor's expense.

1. Concrete Masonry Unit Test: For each concrete masonry unit indicated, per ASTM C140.
2. Prism Test: For each type of wall construction indicated, per ASTM C1314.
3. Mortar Test: For mortar properties per ASTM C270.
4. Grout Test: For compressive strength per ASTM C1019.

1.7 PERFORMANCE REQUIREMENTS

A. Provide unit masonry that develops the following net-area compressive strengths (f'm) at 28 days. Determine compressive strength of masonry from net-area compressive strengths of masonry units and mortar types according to Tables 1 and 2 in ACI 530.1/ASCE 6/TMS 602.

B. Provide unit masonry that develops the following net-area compressive strengths (f'm) at 28 days. Determine compressive strength of masonry by testing masonry prisms according to ASTM C1314.

1. For Concrete Unit Masonry: f'm = 1,500 psi.
2. For Brick Unit Masonry: f'm = 3,000 psi.

1.8 REGULATORY REQUIREMENTS

A. Fire performance characteristics: Where indicated, provide materials and construction identical to those of assemblies whose fire resistance has been determined per ASTM E119 by a testing and inspecting organization, by equivalent

masonry thickness, or by another means, as acceptable to authorities having jurisdiction.

1.9 DELIVERY, STORAGE, AND HANDLING

A. General: Do not deliver cement, lime, and similar perishable materials to the site until suitable storage is available. Store such materials in weatherproof structures, and ensure that materials are in perfectly fresh condition when brought for use. Protect masonry units and manufactured products of all types from wetting by rain or snow, and keep covered when not in use.

B. Masonry Face Units: Handle all masonry units carefully in transit and on the site, so as to keep units whole, with edges sharp, and faces clean and undamaged. Deliver all masonry units on pallets; or handle units individually, and properly stack same.

C. Aggregates: Deliver, store and handle aggregate materials so as to prevent contamination with earth or other foreign materials.

1. Store cement, lime and similar products under cover and from direct contact with earth or floor slabs.

D. Manufactured items: Deliver manufactured products in original containers plainly marked with product identification and manufacturer's name.

1. Store metal accessories and the like under cover and from direct contact with ground, and in manner to prevent rust.

E. Damaged material: Remove any damaged or contaminated materials from job site immediately, including materials in broken packages, packages containing water marks, or which show other evidence of damage, unless Architect specifically authorizes correction thereof and usage on project.

1.10 ENVIRONMENTAL CONDITIONS

A. Hot and cold weather requirements shall be in accordance with the recommendations of the Masonry Industry Council as contained in the document "*HOT AND COLD WEATHER MASONRY CONSTRUCTION*" published by the MCAA (Masonry Contractor's Association of America). Enforcement for these requirements shall take place under the following conditions which modify those in the referenced document.

1. The recommended hot weather requirements for 100 degrees Fahrenheit (37.8 degrees Celsius) shall be enforced for this project when ambient temperatures are above 90 degrees Fahrenheit (32.2 degrees Celsius) under all wind conditions including zero velocity.
2. Cold weather requirements shall be enforced when ambient temperatures fall below 40 degrees Fahrenheit (4.4 degrees Celsius).

1.11 COORDINATION

A. Coordinate work of this subcontract with that of other trades, affecting or affected by this work, and cooperate with the other trades as is necessary to assure the steady progress of work.

B. Coordinate work with that of other trades which require placement and building-in of, as work progresses, anchor bolts, wood blocking, hollow metal frames, aluminum window units, and anchorage items.

C. Examine all Drawings as to requirements for the accommodation of work of other trades. Provide all required recesses, chases, slots, and cutouts. Place anchors, bolts, sleeves and other items occurring in the masonry work. Take every precaution to minimize future cutting and patching. Closely coordinate the location and placement of such items.

PART 2 - PRODUCTS

2.1 CONCRETE MASONRY UNITS

A. Acceptable Concrete Masonry Fabricators: Subject to compliance with the requirements specified herein, fabricators offering concrete masonry products which may be incorporated in the work include the following, or approved equal:

1. Adolf Jandris and Sons, Inc.; Gardner, MA.
2. Anchor Concrete Products (Oldcastle APG), Cranston RI.
3. Genest Concrete, Sanford ME, distributed by Seacoast Masonry Supply, Warwick, RI, or approved equal distributor.
4. Shouldice Designer Stone, Ontario, CN, distributed by Spaulding Brick Co. Inc., Somerville, MA, or approved equal distributor.
5. Westbrook Concrete Block Company, Westbrook CT.

B. Recycled content: Use maximum available percentage of recycled materials. Concrete masonry units incorporated into the work shall contain not less than 3 percent of recycled content.

C. Non-loadbearing concrete masonry units: Conform to ASTM C129, Type 1, normal light weight, 2-core, 58 percent solid for 2 hour fire resistant construction:

1. Plain-faced units of nominal thickness indicated on the Drawings, nominal 8 by 16 inch face dimension with light gray color and uniform medium-fine texture, sound, true to plane and line, and free from chips, cracks, and other defects.
    a. Recycled content: Use maximum available percentage of recycled materials. Concrete masonry units incorporated into the work shall contain not less than 50 percent of recycled content.
2. Aggregate: sand and gravel,
    a. Normal weight block: conform to ASTM C 33.
    b. Light weight bock: conform to ASTM C 331.
3. Minimum allowable compressive strength for an individual unit of not less than 500 psi (net area); and not less than 600 psi. (net area) for average of 3 units; when tested in accordance with ASTM C 140.
4. Oven dry density:
    a. Normal weight units: 125 pounds per cubic foot
    b. Light weight units: 105 pounds per cubic foot

5. Moisture content for average of 3 units, when delivered, not exceeding 35 percent of the total absorption, when tested in accordance with ASTM C 140.
6. Provide units clearly labeled as non-load-bearing.

D. Concrete Building Brick: ASTM C55 and characteristics indicated below for grade, type, size and weight classification.
1. Grade: N.
2. Type: moisture controlled units, Type 1.
3. Size: modular, 2-1/4" x 3-5/8" x 7-5/8".
4. Weight classification: Same as for concrete block.

E. Concrete masonry grout blocks (bond beams): Open end high strength concrete masonry units and slot type strength concrete masonry units for use at reinforced concrete masonry construction where indicated on the Drawings. Conform to all requirements specified above for standard concrete masonry units, and the following additional requirements:
1. Plain-faced units of nominal thickness indicated on the Drawings, nominal 8 by 16 inch face dimension with light gray color and uniform medium-fine texture, sound, true to plane and line, and free from chips, cracks, and other defects.

F. Integral water-repellent: Factory fabricate all exterior concrete masonry units ground face block units with integral water repellent admixture in concrete mix.
1. Description: Integral liquid polymeric admixture mixed with concrete during production of concrete masonry units, which will cross link and become permanently locked into masonry unit to provide resistance to water penetration to achieve a Class E rating when tested to ASTM E 514-74.
2. Subject to compliance with the requirements specified herein, manufacturers offering concrete masonry products which may be incorporated in the work include the following, or approved equal:
a. Addiment, Inc., Doraville, GA, product “Mortar Tite”.
b. Forrer Industries (W.R. Grace & Company). “Dry-Block”.
c. Master Builders, product “Omnicron”.
3. Fabricate blocks using water-repellent admixture at rate recommended by admixture manufacturer.

2.2 GROUND-FACED CONCRETE UNIT MASONRY

A. Basis of Design (Specified Manufacturer): To establish a standard of quality, design and function desired, Drawings and specifications have been based on Adolf Jandris and Sons, Inc.; Gardner, MA.
1. Acceptable Manufacturers: Subject to compliance with the requirements specified herein, manufacturers offering products which may be incorporated in the work include the following, or approved equal:
a. Adolf Jandris and Sons, Inc.; Gardner, MA.
b. Anchor Concrete Products (Oldcastle APG), Cranston RI.

c. Genest Concrete, Sanford ME, distributed by Seacoast Masonry Supply, Warwick, RI, or approved equal distributor.

d. Shouldice Designer Stone, Ontario, CN, distributed by Spaulding Brick Co. Inc., Somerville, MA, or approved equal distributor.

e. Westbrook Concrete Block Company, Westbrook CT.

B. General:

1. Comply with requirements for concrete masonry units, except units shall have a minimum compressive strength of 3500 psi.
2. Recycled content: Use maximum available percentage of recycled materials. Concrete masonry units incorporated into the work shall contain not less than 3 percent of recycled content.
3. Provide all ground-face concrete units with integral water-repellent.
4. Custom Block Requirements:
   a. Provide smooth faced end units at window and door openings.

C. Ground-face concrete units types and colors:

1. Type 1: 8 by 16 inch face by wythe indicated, Color 1: Jandris Block Ground face CMU 510G-2
2. Type 1: 8 by 16 inch face by wythe indicated, Color 2: Jandris Block Ground face CMU 520G-2
3. Type 1: 4 by 8 inch face by wythe indicated, Color 1: Jandris Block Ground face CMU 510G-2

2.3 MORTAR

A. Prepackaged mortar (ready mix) complying with ASTM C 1142, or site-mixed portland cement mortar complying with ASTM C 270 may be used.

1. Admixtures are not permitted except where expressly specified herein or as otherwise approved by Architect for specific field conditions.
2. Mortar color and texture (split face): Equal to Davis Colors “True Tone MC-54 Sand”.
3. Mortar color and texture (precast watertable): Equal to Davis Colors “True Tone MC-58 Blond”.

B. Mortar materials for site mixed mortar:

1. Portland cement for masonry conforming to ASTM C 150, Type I, non-staining, without air entrainment. Use type III as necessary for laying masonry in cold weather.
   a. For standard concrete masonry, use gray color portland cement.
   b. For ground faced and split faced masonry, use white color Portland cement.
2. Aggregates for mortar: Clean sand, washed uniformly well graded, conforming to ASTM C 144, except for joints 1/4 inch and down use aggregate with 100 percent passing a No. 16 sieve.

3. Aggregates for grout: Conforming to ASTM C 144 for fine aggregate and ASTM C 404, Size 8 or 89.
4. Aggregate for concrete masonry mortar: Clean, washed uniformly well graded sand conforming to ASTM C 144, with the following gradation, and having a fineness modulus between 2.15 and 2.35:

Seive Size	Percentage Passing
#4	100%
#8	95 to 100%
#16	70 to 100%
#30	40 to 75%
#50	10 to 35%
#100	2 to 15%
#200	0 to 5%

5. Mortar pigments: Commercial alkali-resistant, non-fading mortar pigments, oxides of iron where feasible, synthetic type. Subject to compliance with the requirements specified herein, fabricators offering concrete masonry products which may be incorporated in the work include the following, or approved equal:
   a. Davis Colors, Beltsville MD.
   b. Solomon Grind-Chem Service, Inc., Springfield IL.
   c. Landers Segal Color, Inc., Passaic New Jersey.
6. Lime: Approved brand of plastic hydrated lime, conforming to ASTM C 207, Type “S”.
7. Water: Clean and fresh without contaminants.

C. Prepackaged mortar (ready mix)
   1. General: Mortar complying with ASTM C 270 consisting of:
      a. Masonry cement: Comply with ASTM C 91.
      b. Hydrated lime: Type S, complying with ASTM C 207.
      c. Aggregate: Provide clean, sharp, well graded aggregate free from injurious amounts of dust, lumps, shale, alkali, surface coatings, and organic matter, and complying with ASTM C144.
      d. Admixtures: Do not use admixtures unless specifically approved in advance by the Architect.
      e. Water: Provide water free from deleterious amounts of acids, alkalis, and organic materials. Water shall be potable.
      f. Pigments: Chemically inert synthetic iron oxide pigments, lightfast, weather resistant, complying with ASTM C 979.

D. Mortar types:
   1. Mortar for masonry below grade or in contact with earth: ASTM C 270 Type M using the property specification.
   2. Mortar for load bearing masonry: ASTM C 270 Type M or S using the property specification.

3. Mortar for non-load bearing masonry above grade: ASTM C 270 Type N using the property specification.
4. Mortar for pointing, dirt and stain resistant type: ASTM C 270 Type N using the property specification with added aluminum tristearate, calcium stearate, or ammonium stearate to a quantity of 3 percent of Portland cement weight.

E. Integral water-repellent admixture: Integral liquid polymeric admixture mixed with mortar unit to provide resistance to water penetration (must be of same type and manufacturer as used for production of concrete masonry units).
1. Subject to compliance with the requirements specified herein, manufacturers offering concrete masonry products which may be incorporated in the work include the following, or approved equal:
a. W.R. Grace & Company, product “Dry-Block”.
b. BASF Corporation, Florham Park, NJ., product “Omnicron”.
c. Sonneborne, product “Hydrocide Powder”.
d. Addiment, Inc., Doraville, GA, product “Mortar Tite”.

2.4 GROUT MIXES

A. Prepackaged grout (ready mix) complying with ASTM C 1107, or site-mixed Portland cement grout complying with ASTM C 476 may be used.

B. Grout: Ready mixed, non-metallic high-strength controlled expansion grout of flowable consistency, conforming to ASTM C 1107 with minimum compressive strength of 8,000 pounds per square inch (55.2 MPa) at 28 days.
1. Products which may be considered as equal include the following, or approved equal:
a. Five Star Products, Inc., Fairfield CT, product “Five Star Grout.”
b. L&M Construction Chemicals, Omaha NE, Product: “Crystex.”
c. Master Builders, Cleveland, OH (BASF)., product “Masterflow 713”.
d. Sika Corporation, Lyndhurst, NJ., product “SikaGrout 212”.
e. ChemMasters, Madison, OH., product “Conset”.
f. Allied Building Proucrts Corp. product “Sonogrout 10K”.

C. Grout for engineered masonry [core fill]: Course grout having a compressive strength of 2,000 to 2,250 pounds per square inch (13.8 to 15.5 MPa) at 28 days; slump 8 to 10 inches.

D. Grout for bond beams, lintels and hollow metal frames: Fine grout having a compressive strength of 2,500 to 3,000 pounds per square inch (17.2 to 20.6 MPa) at 28 days; slump 8 to 10 inches.

2.5 REINFORCEMENT AND ANCHORAGE MATERIALS

A. Single wythe longitudinal reinforcement for concrete masonry unit walls and partitions: In overall width 1-5/8 inches less than the overall wall thickness, as manufactured by Dur-O-Wal, (A Hohmann & Barnard Co.), Hauppauge, NY, product: AA Wire, or equal.

1. Interior partitions: Truss design, 9 gage ASTM A 641 class 1 galvanized wire.
2. Exterior partitions: Truss design, 9 gage ASTM A 641 class 3 hot dipped galvanized wire.
3. Provide preformed reinforcing sections at intersections of masonry walls and partitions, and whenever walls and partitions change direction.

B. Multi-wythe longitudinal reinforcement for concrete masonry unit walls and partitions: In overall width 1-5/8 inches less than the overall wall thickness, with moisture drip as manufactured by Dur-O-Wal, (A Hohmann & Barnard Co.), Hauppauge, NY., AA Wire, or equal.

1. Interior partitions: Truss design, 9 gage ASTM A 641 class 1 galvanized wire without a moisture drip
2. Exterior partitions: Truss design, 9 gage ASTM A 641 class 3 hot dipped galvanized wire with moisture drip.

C. Reinforcing steel, additional to rods which are embedded in concrete: Solid steel reinforcing bars, conforming to ASTM A 615, Grade 60, hot dipped galvanized in accordance with ASTM 123, B2 finish, of sizes indicated on the Drawings.

1. Recycled content of Steel: Use maximum available percentage of recycled steel. Reinforcing steel incorporated into the work shall contain not less than 60 percent of recycled scrap steel.

D. Masonry anchors to steel columns:

1. Weld-on anchor tie with 1/4 inch plain steel rod and adjustable hot dipped galvanized web-tie (end partition condition). Subject to compliance with the requirements specified herein, manufacturers offering concrete masonry products which may be incorporated in the work include the following, or approved equal:
   a. Dur-o-Wall model number D/A 709 rod with box tie.
   b. Heckmann model number 315 rod with 318 tie.
   c. Hohmann & Barnard model number 359 rod with “318” tie.
   d. Masonry Reinforcing of America (Wire Bond) model number 1000 rod with 1200 tie.
2. Weld-on anchor tie with 1/4 inch plain steel rod and adjustable hot dipped galvanized triangular-tie. Subject to compliance with the requirements specified herein, manufacturers offering concrete masonry products which may be incorporated in the work include the following, or approved equal:
   a. Dur-o-Wall model number D/A 709 rod with DA/701 tie.
   b. Heckmann model number 315 rod with 316 tie.
   c. Hohmann & Barnard model number 359 rod with “Vee” tie.
   d. Masonry Reinforcing of America (Wire Bond) model number 1000 rod with 1100 tie.

E. Veneer anchorage for metal stud curtain wall system: Single self-drilling and tapping steel screw anchor with zinc or polymer coating, flanged and slotted head and resilient washer to receive adjustable ties with hot dipped galvanized finish.

Provide anchor to suit depth of insulation and back-up material to provide positive anchorage.

1. Subject to compliance with the requirements specified herein, manufacturers offering concrete masonry products which may be incorporated in the work include the following, or approved equal:
    a. Heckmann model number “No. 75 Pos-I-Tie with Triangle Wire Tie”.
    b. Wire-Bond model number “SureTie with SureTie Triangles”.
    c. Hohmann & Barnard model number “2-Seal Tie with 2-Seal Byna-Lok Wire Tie”.

F. Masonry ties for veneer construction with concrete masonry backup: Single self-drilling and tapping steel screw anchor with zinc or polymer coating, flanged and slotted head and resilient washer to receive adjustable ties with hot dipped galvanized finish. Provide anchor to suit depth of insulation and back-up material to provide positive anchorage.

1. Subject to compliance with the requirements specified herein, manufacturers offering concrete masonry products which may be incorporated in the work include the following, or approved equal:
    a. Heckmann model number “No. 75 Pos-I-Tie with Triangle Wire Tie”.
    b. Wire-Bond model number “SureTie with SureTie Triangles”.
    c. Hohmann & Barnard model number “2-Seal Tie with 2-Seal Byna-Lok Wire Tie”.

G. Precast architectural concrete anchors: Stainless steel Type 302/304, in configuration and function as recommended by the fabricator.

1. Setting cushions: Clear plastic, 1 inch by 2 inches by thickness of joint.

2.6 PRECAST CONCRETE SUPPORT DEVICES

A. General: Connecting hardware shall be engineered and designed by the fabricator to accommodate all loads to which it will be subject both in the permanent condition and due to handling. Connection details indicated on the drawings shall be considered minimum required and shall be strengthened as necessary in accordance with design calculations.

B. Connecting and Support Devices: ASTM A 36 weldable steel, hot dipped galvanized.

1. Surface preparation prior to galvanizing: Pickle steel prior to galvanizing in conformance with SSPC-SP8. Remove all rust, dirt, weld flux, weld spatter, and other foreign matter.
2. Hot-dip galvanizing: Comply with ASTM A 123. Provide thickness of galvanizing specified in referenced standards.
    a. Touch-up all breaks on hot-dip surfaces caused by cutting, welding, drilling or undue abrasion with liquid zinc coating as specified herein above. Apply liquid zinc by brush or spray on all damaged areas in two coats to a total dry film thickness of not less than 3 mils. Apply first coat within two hours after damage to hot-dip film to prevent undue oxidation

of exposed surface. On all welds remove weld spatter by power wire brushing or equivalent before applying liquid zinc coating. Repair material should extend at least 3 inches beyond all edges of the damaged galvanized area as possible to assure continuity of galvanic protection.

b. Touch-up of galvanized surfaces with aerosol spray, silver paint, bright paint, or aluminum paints is not acceptable.

C. Bolts, Nuts, and Washers: ASTM A 307, high strength steel chromium nickel steel alloy, except hot dip galvanize those to be embedded into concrete.

D. Stone Anchor: Pos-I-Tie Split Bend and Pos-I-Tie L-Type anchors by Heckmann Building Products or approved equal.

2.7 FLASHING MATERIALS

A. Flashing materials: Stainless-Steel Sheet: ASTM A 240/A 240M, Type 304, dead soft, fully annealed; with smooth, flat surface and having 2D Finish (dull, cold rolled, having a minimum thickness: 28 gage (0.016 inch) thick.

1. Provide shop-fabricated preformed and soldered inside and outside corners and end dams where required.
2. Fabricated sheet metal flashing with 45 degree exposed hemmed edge designed to extend beyond the masonry face a minimum of 3/16 inch.
3. Acceptable products, or approved equal:
   a. Hohmann & Barnard product: “FTSA Stainless Steel” or approved equal.

B. Solder for Stainless Steel: ASTM B 32, Grade Sn60, with acid flux of type recommended by stainless-steel sheet manufacturer.

2.8 ACCESSORIES

A. Bearing pads for precast concrete: High density plastic, or neoprene (Chloroprene) minimum 1/8 inch thick, having a durometer hardness of 70, smooth both sides.

1. Shims at connections subject to thermal movement or other movement shall be separated with friction reducing pads. Pads shall sufficiently reduce friction to permit movement, shall resist wear, and shall be positively retained in position (open ended slots are not acceptable). Pads shall not be subject to heat damage from welding or cutting, or excessive pressure from over-tightening of bolts.

B. Compressible filler: Closed cell polyvinyl chloride; oversized 50 percent to joint width; self-expanding, continuous in length, and in width to fill the joint to a point 3/4 inch back from each face of wall or partition.

C. Compressible filler for joints at tops of non-load bearing masonry partitions, and for expansion joints in masonry walls: Closed cell Neoprene or PVC foam board, soft grade, 25 percent thicker than joint width, continuous in length, and in width to fill the joint to a point 3/4 inch back from each face of wall or partition.

D. Premolded control joints for concrete masonry construction: Solid rubber of profile as indicated (to maintain lateral stability of wall), 60-80 shore A hardness.

E. Building paper to maintain joints open for subsequent application of sealant and backer rod: Nº. 15 asphalt saturated felt.

F. Weeps for veneer: Flexible, ultraviolet resistant honeycomb polypropylene weep. In color having close match with mortar mix. Manufacturers offering products which may be incorporated in the work include the following, or approved equal:

1. Heckman Building Products., Norwalk, CT.,product “#85 Cell Vent”
2. Hohmann & Barnard, Inc., Hauppague, NY., product: QV “Quadro-Vent”.
3. Mortar Net Solutions, Portage, IN., product: “Cell Vent”,
4. Wire Bond, Charlotte, NC., product “Cell Vent 3601”,

G. Mortar netting: High Density Polyethylene (HDPE) course geotextile fabric having a 90 percent open weave mesh, with stepped topped edging, shaped in a manner to catch and hold mortar droppings and preventing blockage of weep hole vents, 2 inches thick unless otherwise indicated on the Drawings by 5 feet long by 10 inches high. Subject to compliance with the requirements specified herein, manufacturers offering products which may be incorporated in the work include the following, or approved equal:

1. Hohmann & Barnard, Inc. product “Mortar Net”.
2. Mortar Net USA, Ltd., Highland IN., product “Mortar Net”.
3. Wire-bond, Inc., Charlotte, NC, product “Mortar Net Green”.

H. Cleaning solution: Non-acidic, not harmful to masonry work or adjacent materials.

2.9 MIXING MORTARS AND GROUT

A. General: Mix mortar and grout in accordance with the requirements of ASTM C270, and ASTM C476 as applicable.

1. Control batching procedure to ensure proper proportions by measuring materials by volume. Amount of mixing water and mortar consistency shall be controlled by mason.
2. Control batch sizes to allow for use within manufacturer’s recommended pot life.
3. Retempering will be permitted only within the first two hours of initial mix or shorter times as directed by manufacturers.
4. Discard all mortar and grout which exceeds the time limits allowed by the manufacturer. Discard mortar that has partially set.

B. Maintain sand uniformly damp immediately before mixing process.

C. Add mortar color and admixtures in accordance with manufacturer’s instructions. Provide uniformity of mix and coloration.

D. Do not use anti-freeze compounds to lower the freezing point of mortar or grout.

E. Pouring grout shall be fluid consistency (as fluid as possible for pouring without separation of constituent parts).

2.10 SOURCE QUALITY CONTROL

A. Preconstruction testing: Owner will employ and pay a qualified independent testing laboratory to perform the following preconstruction testing indicated as well as other inspecting and testing services required by referenced unit masonry standard or indicated herein for source and field quality control:

1. Concrete Masonry Unit Tests: For each different concrete masonry unit indicated, units will be tested for strength, absorption, and moisture content per ASTM C 140.
2. Prism tests: For each type of wall construction indicated, masonry prisms will be tested per ASTM E 447, Method B.
3. Mortar properties will be tested per property specification of ASTM C 270.
4. Mortar efflorescence: Test each mortar type which will be exposed to weather for efflorescence in accordance with the “Wick test” procedure in BIA Research Report Number 15, The Causes and Control of Efflorescence in Brickwork”, Section 4.4. Mortar mixes which show efflorescence shall not be used in the Work.
5. Mortar composition and properties will be field evaluated per ASTM C 780 for compressive strength, consistency, mortar aggregate ratio, water content, air content, and splitting tensil strength.
6. Grout compressive strength will be tested per ASTM C 1019 for compressive strength and slump.
7. strength and slump.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that field conditions are acceptable and are ready to receive the work of this Section.

B. Verify built-in and other items provided by separate Sections of the work are properly sized and located.

C. Verify foundation walls supporting masonry is constructed within tolerances required by code

D. Beginning of installation means acceptance of site conditions.

3.2 PREPARATION

A. Direct and coordinate placement of metal anchors supplied to other Sections.

B. Foundations:

1. Do not commence installation until foundations are clean, rough, and level.

2. Sandblast the foundation tops, if necessary, and remove all laitance and foreign material.
3. Verify that the foundation elevation is such that the bed joint thickness shall not vary from specified thickness, and that the foundation edge is true to line with masonry not projecting over more than 1/4”.

C. Provide temporary bracing during installation of masonry work. Maintain in place until building structure provides permanent bracing.

D. Protect surfaces of windows, door frames, louvers and vents as well as similar finish products with painted and integral finishes from mortar droppings and stains.

3.3 INSTALLATION - GENERAL

A. Build chases and recesses as shown or required to accommodate items specified in this and other Sections of the Specifications. Provide not less than 8 inches of masonry between chase recess and jamb of openings and between adjacent chases and recesses.

B. Leave openings for equipment to be installed before completion of masonry. After installation of equipment, complete masonry to match construction immediately adjacent to the opening.

C. Establish lines, levels and coursing indicated. Protect from displacement.

D. Maintain masonry courses to uniform dimension. Form vertical and horizontal joints of uniform thickness.

E. Isolate masonry partitions from vertical structural framing and where indicated on the Drawings. Maintain joints free from mortar, ready to receive sealant and joint bead back-up.

F. Provide compressible filler at tops of interior masonry partitions abutting structural above.

3.4 COURSING, BONDS AND JOINTS

A. Coursing, joints and bond pattern: as indicated on the Drawings.

B. Joints:

1. Exposed to view masonry: except as specified below, fill all joints with mortar, strike off flush, and when mortar is thumb print hard tool joints with a non-staining tool. Joints shall be free of drying crack.
    a. Horizontal joints
        1) Concealed joints at concrete units (inside of cavity wall): Tool joints flush to receive air and vapor barrier.
        2) Interior joints (all): Tool joints flush.
    b. Vertical joints (all):
        1) Brick: Tool joints concave.
        2) Concrete unit masonry: Tool joints flush.

2. Concealed from view masonry, including masonry which will be concealed by flashings and similar materials: Fill joints with mortar and strike joints flush. Concave tool exterior joints below grade.

3.5 CONTROL JOINTS

A. Locate control joints where shown on Drawings, at corners adjacent to openings in masonry, changes in wall height and intersections with structural walls as approved by Architect.

1. Do not continue horizontal joint reinforcement through control joints.

B. Form vertical control joints with a sheet building paper bond breaker fitted to one side of the hollow contour end of the block unit. Fill the resultant core with grout fill. Rake joint at exposed unit faces for placement of backer rod and sealant.

1. Size control joints in accordance with the requirements of Section 07 92 00 - JOINT SEALANTS.

C. Install preformed control joint device in continuous lengths. Seal butt and corner joints in accordance with manufacturers recommendation.

3.6 LAYING MASONRY - GENERAL

A. Build the masonry walls and partitions in the various combinations and thickness as indicated on the Drawings.

B. Erect all masonry work in compliance with the line and level tolerances specified herein. Hold uniform joint sizes. Correct, or replace, as directed by the Architect, non-conforming masonry work at no additional cost to the Contract.

C. Lay out coursing before setting to minimize cutting closures or jumping bond, Avoid the use of less-than-half-size units.

D. Laying masonry units:

1. Lay masonry units in full bed of mortar, with full head joints; uniformly joint with other work.
2. Buttering corners of joints or excessive furrowing of mortar joints are not permitted.
3. Interlock intersections and external corners.
4. Cut all exposed masonry with a motor-driven carborundum blade saw to ensure straight and clean, unchipped edges.
    a. Lay no unit having chipped edges or face defects where such unit would be exposed to view. Remove any such unit, if installed, and replace with an undamaged unit, and bear all costs therefore.
5. Do not spread any more mortar than can be covered before surface of mortar has begun to dry.
6. Do not shift or tap masonry units after mortar has achieved initial set. Where adjustment must be made, remove entirely, clean off mortar, and reset with fresh mortar.

7. Except for cleaning down and repointing, finish all masonry as the walls and partitions are carried up.

E. Build-in reinforcement and anchorage items as the work progresses, grouting for secure anchorage.

F. Provide control joints at 30 feet on center maximum spacing, and keep clean of mortar droppings.

G. Provide complete protection against breakage and weather damage to all masonry work, including substantial wood boxing around door jambs, over the tops of walls and wherever necessary to protect work at all stages of completion. Protect masonry when not roofed over, at all times when masons are not working on the walls. Apply tarpaulins or waterproof paper, properly weighted, or nailed, to assure their remaining in place to protect masonry from all possible hazards.

H. Point and fill all holes and cracks in new mortar joints with additional fresh mortar; do not merely spread adjacent mortar over defect or use dead mortar droppings. Do all pointing while mortar is still soft and plastic. If hardened, chisel defect out and refill solidly with fresh additional mortar, and tool or rake joints as specified herein.

I. Protect all masonry from rain prior to, and during the installation thereof. If the temperature is in excess of 80 degrees Fahrenheit at time of installation, lightly moisten contact surfaces of masonry units by brushing with water.

J. Cold/Hot Weather Procedures: No masonry work shall be laid in temperatures below 40 degrees Fahrenheit without the submittal to and review by the Architect of cold weather procedures.

1. In ambient temperatures below 40 degrees Fahrenheit make provisions to adequately protect the masonry materials and the finished work from frost by heating of masonry materials, enclosing the work or heating the enclosed spaces.
2. No frozen work shall be built upon nor shall anti-freeze admixtures be permitted in the mortar mix.
3. Any completed work found to be affected by frost shall be taken down and rebuilt at no additional expense to the Owner.

3.7 FLASHING INSTALLATION

A. Provide and build-in through-wall flashings at lintels, heads and sills of openings and infill openings. Additionally provide flashing where indicated on the Drawings, as specified herein and all conditions which may be considered similar to those indicated on the Drawings.

1. Install flashing with a hemmed 45 degree drip edge extending beyond face of masonry. Ensure through-wall flashing is in proper position in wythe without forming pockets.
2. Extend flashing to back up wall, turn up a minimum of 8 inches and terminate as follows, coordinated with air and vapor barrier system:
   a. Concrete - terminate into reglet.

b. Masonry - terminate into horizontal joint of masonry, extending to 1/2” of interior face of wall, turning back 1” on itself.

c. Metal stud and gypsum sheathing - terminate at sheathing, securing top of sheathing screwed into studs with type S-12 screws. Seal top of flashing and screw heads with specified Type PE sealant.

3. Form end dams at horizontal terminations; turn flashing, fold and solder at corners, bends and interruptions.

4. Carry head flashing 6 inches beyond both ends of lintels. At steel lintels, apply a heavy bed coat of compatible adhesive mastic isolating flashing and steel.

5. Seal all punctures with an elastic cement mastic recommended by flashing manufacturer.

3.8 WEEP HOLES

A. Provide weep holes in head joints in first course of veneer immediately above all through-wall flashing, shelf angles, lintels and bottoms of walls.

B. Install specified pre-fabricated weeps in head joint.

1. Space weep holes:

a. In brick: 24 inches on center maximum.

b. In concrete masonry: 32 inches on center maximum

c. In stone work: 24 inches on center maximum.

C. Keep weep holes and area above flashing free of mortar droppings.

3.9 FIELD QUALITY CONTROL

A. Field inspection will be performed under the provisions of Division 1 – GENERAL REQUIREMENTS (Section 01 45 00 - QUALITY CONTROL, or Section 01 45 29 – TESTING LABORATORY SERVICES, as applicable).

B. Testing frequency: Tests and evaluations listed in this article shall be performed during construction for each 5000 square feet of wall area or portion thereof.

C. Evaluation of Quality Control tests: In absence of other indications of noncompliance with requirements, masonry will be considered satisfactory if results from source quality control tests comply with minimum requirements indicated.

3.10 PROTECTION OF WORK

A. Protection of Masonry: During erection, cover tops of walls, projections, and sills with waterproof sheeting at end of each day’s work. Cover partially completed masonry when construction is not in progress.

1. Extend cover a minimum of 24 inches down both sides and hold cover securely in place.

2. Where one wythe of multi-wythe masonry walls is completed in advance of other wythes, secure cover a minimum of 24 inches down face next to un-constructed wythe and hold cover in place.

B. Stain prevention: Provide protection and prevent grout, mortar, and soil from staining the face of exposed masonry and building finishes. Protect base of walls from rain-splashed mud and mortar splatter.

1. Remove immediately all grout, mortar, and soil that come in contact with such masonry.

3.11 TOLERANCES

A. Maximum variation from true surface level for exposed to view walls and partitions:

1. Unit-to-unit tolerance: 1/16 inch.
2. Surface, overall tolerance: 1/4 inch in 10 feet in any direction and 1/2 inch in 20 feet or more.
    a. Where both faces of single wythe wall or partition will be exposed to view, request and obtain decision from the Architect as to which face will be required to conform to the specified surface level tolerance.

B. Maximum variation from plumb: For lines and surfaces of walls do not exceed 1/4 inch in 10 feet, 3/8 inch in any story up to 20 feet maximum. At expansion joints and other conspicuous lines, do not exceed 1/4 inch in 20 feet.

C. Maximum variation from level: For lines of sills, tops of walls and other conspicuous lines, do not exceed 1/8 inch in 3 feet, or 1/4 inch in 10 feet and 1/2 inch in 30 feet.

D. Maximum variation of linear building line: For position shown in plan relating to columns, walls and partitions, do not exceed 1/2 inch in 20 feet or 3/4 inch in 40 feet.

E. Maximum variation in specified height: 1/2 inch per story.

F. Maximum variation of joint thickness: 1/8 inch in 3 feet.

G. Maximum horizontally projected unsupported masonry unit: 1-1/8 inches

3.12 MASONRY WASTE DISPOSAL

A. Comply with requirements of Section 01 74 19 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL for handling and disposition of all construction and demolition waste.

B. Salvageable Materials: Unless otherwise indicated, excess masonry materials are Contractor's property. At completion of unit masonry work, remove from Project site.

C. Waste Disposal as Fill Material: Dispose of clean masonry waste, including excess or soil-contaminated sand, waste mortar, and broken masonry units, by crushing and mixing with fill material as fill is placed.

1. Crush masonry waste to less than 4 inches (100 mm) in each dimension.
2. Mix masonry waste with at least two parts of specified fill material for each part of masonry waste. Fill material is specified in Division 31."

3. Do not dispose of masonry waste as fill within 18 inches (450 mm) of finished grade.

D. Masonry Waste Recycling: Return broken CMUs not used as fill to manufacturer for recycling.

E. Excess Masonry Waste: Remove excess clean masonry waste that cannot be used as fill, as described above or recycled, and other masonry waste, and legally dispose of off Owner's property.

3.13 CLEANING

A. Progress Cleaning:

1. General: Maintain site free of waste materials, debris, and rubbish resulting from the work of this Section.
    a. Remove from work areas surplus and waste materials resulting from the work of this Section. Remove on a continual on-going basis through-out the term of construction.
2. During the progress of the work, keep the exposed surfaces of masonry clean at all times, and protected against damage. As each segment of the masonry is erected, dry-brush the surfaces free from mortar spots and droppings.

B. Prior to performing the final cleaning work, examine all face joints in exposed masonry to locate cracks, holes or other defects in the mortar; and point up all such defects and fill with mortar as specified herein. Where necessary, in the opinion of the Architect, cut out defective joints in masonry and replace with new materials, exercising extreme care to match original work.

C. At a time approved by the Architect, perform final cleaning operations on all masonry as specified herein .

1. Perform the final cleaning work only when the ambient temperature is above 40 degrees Fahrenheit, and rising.
2. Do not use wire brushes or other abrasive tools in the cleaning operations.
3. Perform final cleaning operations from the top down. If masonry cleaning work is performed after windows, doors, frames, and other work has been installed, provide complete protection for said items; be fully responsible for any damage due to the cleaning operations.
4. Remove large mortar particles by hand with wooden paddles and non-metallic scrape hoes or chisels.
5. Perform final cleaning of masonry units by scrubbing with stiff bristle fiber brushes and clear water, changing the water frequently.

D. Provide suitable protective coverings for all other surfaces and materials during the final cleaning procedures, and bear full responsibility for correcting any damage caused by these operations, to the satisfaction of the Architect.

End of Section

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Section 05 12 00

STRUCTURAL STEEL FRAMING

PART 1 - GENERAL

1.1 GENERAL PROVISIONS

A. All of the Contract Documents, including General and Supplementary Conditions apply to the Work of this Section.

1.2 SCOPE

A. Provide structural steel and related appurtenances as indicated and specified. The term “Structural Steel” is used as defined in accordance with the AISC Code of Standard Practice. For steel decking systems, refer to the steel decking specification.

1.3 REFERENCES

A. American Institute of Steel Construction AISC:
1. Specification for Structural Steel Buildings
2. AISC Manual of Steel Construction, Allowable Strength Design.
3. AISC Code of Standard Practice for Steel Buildings and Bridges
4. AISC Specification for Structural Joints using High Strength Bolts approved by the Research Council on Structural Connections.
5. AISC Structural Steel Detailing Manual

B. American Welding Society AWS.
1. AWS D1.1: Structural Welding Code - Steel

C. Steel Structures Painting Council (SSPC) Surface Preparation Specifications

D. American Society for Testing and Materials (ASTM) Publications:
1. A 6/A 6M: Specification for General Requirements for Rolled Structural Steel Bars, Plates, Shapes, and Sheet Piling.
2. A 36/A36M: Specification for Carbon Structural Steel.
3. A 194/A 194M: Specification for Carbon and Alloy-Steel Nuts for Bolts for High-Pressure and High-Temperature Service
4. A 307: Specification for Carbon Steel Bolts and Studs, 60,000 psi Tensile Strength
5. F3125: Specification for High Strength Structural Bolts, Steel Heat Treated, 120/150 ksi Minimum Tensile Strength
6. A 449: Specification for Quenched and Tempered Steel Bolts and Studs
7. A 563: Specification for Carbon and Alloy Steel Nuts
8. F 436: Specification for Hardened Steel Washers

1.4 DESIGN REQUIREMENTS

A. Structural Performance: Engineer structural steel connections required by the Contract Documents to be selected or completed by the fabricator to withstand design loadings indicated. Engineering Responsibility: Engage a fabricator who utilizes a qualified professional engineer registered in the State of Rhode Island to prepare calculations, Shop Drawings, and other structural data for structural steel connections. Calculations shall be sealed by a professional engineer registered in the state of the project's location.

1.5 SUBMITTALS

A. Submit the following shop drawings:

1. Manufacturer's Literature: Provide manufacturer's literature describing standard items.
2. Shop drawings prepared under the supervision of a licensed Structural Engineer registered in Rhode Island, showing materials, sizes, finishes, locations, attached hardware and fittings, designs of connections not specifically shown on the drawings, and details for manufactured items and fabricated metalwork, including field erection details showing cuts, copes, connections, holes, thread fasteners and welds. Indicate welds, both shop and field, by symbols conforming to AWS standards. Indicate coatings or other protection against corrosion.
3. Setting diagrams, erection plans, templates, and directions for installation of backing plates, anchors, and other similar items.
4. Material compliance certification with standards designated.
5. Samples of materials proposed for use.
6. Test reports conducted on shop and field bolted and welded connections. Include data on type(s) of tests conducted and test results.
7. Certified copy of each survey conducted by a licensed Land Surveyor showing elevations and locations of base plates and anchor bolts to receive structural steel and final elevations and locations of major structural elements. Indicate discrepancies between actual installation and contract drawings.
8. Mill Certificates: Provide certificates signed by manufacturers certifying compliance of materials with standards designated.
9. Welding Certificates: Submit copies of certificates for welding personnel and procedure for each type of weld prior to welding.
10. The Contractor shall maintain records of test results of welding procedures and records of welders employed, date of qualification, and identification symbol or mark. Such records shall be available for examination by the Structural Engineer of Record and testing agency or submit certified copies.

1.6 QUALITY ASSURANCE

A. Tolerances:

1. Maintain tolerances conforming to AISC Code of Standard Practice.
2. Permissible variation tolerances conforming to ASTM A 6.

B. Tension Calibrator:

1. Employ an independent testing laboratory to calibrate and confirm the accuracy of the tension-measuring device when slip-critical connections and connections subject to direct tension are being used.
2. The calibrating device for setting calibrated torque wrenches shall be checked for accuracy by quality personnel not more than 30 days prior to its first use on the project, and at intervals not more than six months thereafter.
3. If the Engineer has reason to question the accuracy of the calibrating device, he may require that it be returned to the manufacturer for certification of its accuracy.
4. Provide tension calibrator measuring device at the job site when high-strength bolts in slip-critical connections and connections subject to direct tension are being installed and tightened.
5. Frequency and number of confirmation tests to be performed and the test procedure to be employed to conform to the AISC/RCSC Specification for Structural Joints using High Strength Bolts.
6. Return tension calibrator measuring device to the independent laboratory for certification if the Engineer questions its accuracy.
7. Use the tension calibrator-measuring device to tighten high-strength bolts in slip-critical connections and connections subject to direct tension in conformance with Table 051200-1 (Section 8 AISC/RCSC Specification for Structural Joints using High Strength Bolts).

Table 051200-1.

Fastener Tension Required for Slip-Critical Connections and Connections

Subject to Direct Tension

	Minimum Tension	
Nominal Bolt Size (inches)	Grade A325 Bolts (kips)	Grade A490 Bolts (kips)
½	12	15
5/8	19	24
¾	28	35
7/8	39	49
1	51	64
1 1/8	56	80
1 ¼	71	102
1 3/8	85	121
1 ½	103	148

C. Fabricator Qualifications:

1. Engage a firm experienced in fabricating structural steel similar to that indicated for this project and with a record of successful in-service performance, as well as, sufficient production capacity to fabricate structural steel without delaying the work.
2. Fabricator must participate in the AISC Quality Certification Program and be designated an AISC-Certified Plant as follows:
    a. Category: Standard for Steel Building Structures (STD).
    b. Fabricator shall be registered with and approved by authorities having jurisdiction.

D. Welding Qualification and Certification

1. Furnish written welding procedure for all welds in conformance with AWS Structural Welding Code.
2. Each welder, tacker and welding operator shall be certified by test within the past six months to perform type of work required in conformance with AWS Structural Welding Code. Testing shall be conducted and witnessed by an independent testing laboratory.
3. Maintain duplicate qualification and certifications records at the job site readily available for examination.

E. Test and Inspection

1. Inspection, Testing and Quality Control: A statement of special inspections will be established by the registered design professional in responsible charge who will prepare a schedule of tests to be carried out by an independent testing agency. All costs for inspection and testing shall be borne by the Owner.
2. The materials and workmanship to be finished under this Section shall be subject to inspection and testing in the mill, shop, and field by the Registered design professional in responsible charge and/or Testing Agency. Such inspection and testing shall not relieve the contractor of his responsibility to perform his own inspection and quality control and to furnish materials and workmanship in accordance with the requirements of the contract documents.
3. The Contractor and Testing Agency shall examine the contract documents and become thoroughly acquainted with detailed inspection and testing requirements as outlined by the Registered design professional in responsible charge.
4. The Contractor shall cooperate with and facilitate inspection and testing by the Registered design professional in responsible charge and/or Testing Agency. The Contractor shall, at his own expense, furnish the registered design professional in responsible charge and/or the Testing Agency upon request, with the following:
    a. A complete set of reviewed erection drawings, detailed shop drawings, schedules, and corrective work procedures at the fabricating shop or shops in the field.
    b. Cutting list, order lists, material bills, and shipping lists.
    c. Information as to time and place of all rollings and shipment of material to shops.

d. Representative sample pieces requested for testing.

e. Assistance for testing materials and proper facilities for inspection of the work, in the mill, shop, and field.

5. The Testing Agency shall inspect and test, as required by the registered design professional in responsible charge, all welded and bolted work.

a. Shop-Bolted Connections: Inspect or test in accordance with AISC Specifications.

b. Shop Welding: Inspect and test during fabrication of structural steel assembled, as follows:

1) Certify welders and conduct inspections and tests as required. Record types and locations of defects found in work. Record work required and performed to correct deficiencies.

2) Perform visual inspections of all welds.

3) Perform test welds as follows. Inspection procedures listed are to be used at Contractor's option.

a) Liquid Penetrate Inspection: ASTM E 165

b) Magnetic particle Inspection: ASTM E 709; performed on root pass and on finished weld. Cracks or zones of incomplete fusion or penetration are not acceptable.

c) Radiographic Inspection: ASTM E94; minimum qualify level "2-2T."

d) Ultrasonic Inspection ASTM E 164.

6. Weldments and bolted connections that are required by the registered design professional in responsible charge and/or the Testing Agency to be corrected shall be corrected without delay at the Contractor's expense and to the satisfaction of the registered design professional in responsible charge of the Testing Agency shall require drawings showing proposed corrective work to be submitted for review.

7. Any material or workmanship which is rejected by the registered design professional in responsible charge and/or the Testing Agency either in the mill, shop, or field shall be replaced promptly by the Contractor to the satisfaction of the registered design professional in responsible charge and/or the Testing Agency.

8. The fact that steel work has been accepted at the shop shall not prevent its final rejection at the job site, even after it has been erected, if found to be defective in any way.

1.7 DELIVERY, STORAGE AND HANDLING

A. Provide in accordance with the general equipment stipulations section and as specified herein.

B. The General Contractor, Sub-Contractors, and suppliers are all individually to furnish their own staging, scaffolding, and hoisting equipment necessary to get workers, materials, and equipment from the point of delivery at the project site to the point of use or installation within the building and project site. All crane and rigging services are the responsibility of each individual trade.

C. Identify and match-mark, materials, items and fabrications, for installation and field assembly.

D. Deliver items to job site as complete units, wherever practicable, ready for installation or erection, with anchors, hangers, fasteners and miscellaneous metal items required for installation. Items shall be delivered at such intervals to ensure uninterrupted progress of work.

E. Carefully handle and store materials, protected from weather, high heat, rusting corrosion and other damage.

F. Store material off the ground using pallets, platforms, or other useable supports with webs of flanged shapes vertical. Materials shall be stored to allow easy access for inspection and identification. Cover and protect steel from erosion and deterioration from snow, rain, and ground splatter.

G. Ship small parts, such as rivets, bolts, nuts, washers, pins, fillers, and small connecting plates and anchors, in boxes crates, or barrels. Pack separately each length and diameter of bolt and each size of nut and washer. Plainly mark and itemized list and description of the contents on the outside of each container. If bolts and nuts become dry and rusty, clean and relubricate before use.

PART 2 - PRODUCTS

2.1 STRUCTURAL STEEL

A. Structural Steel Shapes:
1. High-Strength, Low-Alloy Steel: ASTM A 992 (ASTM A992M), Grade 50.

B. Miscellaneous Plates and Bars:
1. Carbon Steel: ASTM A 36 (ASTM A36M).

C. Cold-Formed Steel Tubing: ASTM A500, Grade B.
1. Items to be galvanized shall be hot-dip galvanized after fabrication in accordance with ASTM A123 or ASTM A153 as applicable.

2.2 FASTENERS

A. Carbon Steel Bolts, Nuts and Washers: ASTM A 307, Grade A.

B. High-Strength Carbon Steel Bolts, Nuts and Washers: ASTM F3125, Grade A325, Type 1.

C. Hot-Dipped Galvanized Bolts, Nuts, and Washers in conformance with ASTM A 153 and A 385.
1. High-strength carbon steel bolts, Type 1.
2. Grade DH, ASTM A 563 or Grade 2H, ASTM A 194 nuts.
3. Hardened washers in conformance with ASTM F 436.
4. Bees wax lubrication for threaded parts of bolts and nuts.
5. Purchase bolts, nuts and washers from a single supplier.

D. Do not use high-strength tension control bolts when bolts are galvanized.

2.2 WELDING

A. Class E70XX electrodes.

B. Provide equipment for welding, electrodes, welding wire and fluxes capable of producing indicated welds when used by certified welders under AWS welding procedures. Provide welding materials that comply with requirements of AWS Structural Welding Code.

2.3 PRIMERS

A. Coordinate selection of shop primers with topcoats to be applied over them. Comply with paint and coating manufacturers' recommendations to ensure that shop primers and topcoats are compatible with one another. GC shall submit certification demonstrating compatibility.

B. Primer: Comply with Division 9 painting Sections. Apply in accordance with manufacturer's written instructions and recommendations.

2.3 GALVANIZING REPAIR PAINT

A. Galvanizing Repair Paint: SSPC-Paint 20 or MIL-P-21035B, with dry film containing a minimum of 94 percent zinc dust by weight.

PART 3 – EXECUTION

3.1 FABRICATION

A. Fabricate each element and connection as indicated on the fabrication shop drawings approved by the Engineer. Fabricate and shop assemble work to the greatest extent practical in conformance with the following publications:
   1. AISC Manual
   2. AISC Specification for Structural Joints
   3. AISC Detailing Manual
   4. AWS Structural Welding Code

B. Properly mark and match-mark materials for field assembly. Fabricate for delivery sequence that will expedite erection and minimize field handling of materials.

C. Where finishing is required, complete assembly, including welding of units, before start of finishing operations. Provide finish surfaces of members exposed in final structure free of markings burrs, and other defects.

D. Insure that shearing, manual flame cutting with mechanically guided torch and chipping will not induce residual stress in metal being cut the Radii of re-entrant corners shall not be less than ¾ inch and perform flame cutting so that metal being cut is not carrying stress. Finish exposed edges.

E. Fabricate bearing stiffeners and stiffeners intended as supports for concentrated loads as indicated. Mill or grind bearing surfaces at stiffener ends.

F. Insure full cross section bearing on milled ends of columns, crane rails, monorails and bearing stiffeners.

G. Connections: Weld or bolt shop connections, as indicated. Bolt field connections, except where welded connections or other connections are indicated.

1. Provide high strength threaded fasteners for principal bolted connections, except where unfinished bolts are indicated.
2. Provide unfinished threaded fasteners for only bolted connections of secondary framing members to primary members (including purlins, girts, and other framing members taking only nominal stresses) and for temporary bracing to facilitate erection.

H. Connect all members with ASTM F3125 Grade A325 high strength bolts unless otherwise indicated or specified. Install in accordance with AISC/RCSC "Specification for Structural Joints using High Strength Bolts". Provide holes without torn or ragged edges and remove all outside burrs.

I. Welded Connections:

1. Connections indicated or specified shall be welded in accordance with AWS D1.1.
2. Provide complete weather seal weldments made with 1/16-inch minimum continuous fillets to all members having Type S and E service and to all welded connections that will be galvanized.

J. Weld or bolt shop connections in conformance with specified AWS Structural Welding Code and AISC publications.

K. Provide ASTM A 36 anchor bolts with washer and heavy hex nuts. Provide hot-dip galvanized anchor bolts, washers and heavy hex nuts with galvanized steel.

L. Holes for Other Work: Provide holes required for securing other work to structural steel framing and for passage of other work through steel framing members, as shown on final shop drawings.

M. Provide threaded nuts welded to framing and other specialty items as indicated to receive other work.

N. Cut, drill or punch holes perpendicular to metal surfaces. Do not flame-cut holes or enlarge holes by burning. Drill holes for bearing plates.

O. Corrective Work: Structural steel members or assemblages having fabrication errors, which exceed permissible tolerances, shall be corrected only if permitted by the SER. All corrective work shall be in accordance with AISC and AWS requirements. When requested by the SER or Testing Agency, the Contractor shall submit to the Architect and/or SER for approval, drawings showing details of proposed corrective work and shall receive approved drawing prior to performing the corrective work. All corrective work shall be solely at the Contractor's expense.

3.2 ERECTION

A. Survey: GC shall employ a licensed Land Surveyor for accurate erection of structural steel. Check elevations of concrete and masonry bearing surfaces, and locations of anchor bolts and similar devices, before erection work proceed. Report any discrepancies to the Architect and do no proceed with erection until corrections have been made or until adjustments to the structural steel work has been agreed upon the Architect.

B. Prior to setting column bases and bearing plates, clean concrete and masonry bearing surfaces of bond-reducing materials and roughen to improve bond to surfaces. Clean bottom surface of base and bearing plates. Align column bases and bearing plates for beams and similar structural members with steel wedges or shims. Tighten anchor bolts after alignment and positioning members and fill entire area under bearing plates with non-shrink, non-metallic grout in accordance with grout section. Do not remove steel wedges or shims but if protruding, cut off flush with edge of base or bearing plate prior to grounding voids solids.

C. Provide anchor bolts and anchors with templates for correct placement into concrete, masonry or other supporting materials.

D. Hold steelwork securely in place with temporary bracing and stays to resist all vertical and lateral loads, until members are permanently fastened and floors and roofs completed. Provide temporary guy lines to achieve proper alignment of structures as erection proceeds. Provide temporary planking or working platforms as necessary to effectively complete the work.

E. Use only calibrated wrenches for tensioning high-strength bolts for slip-critical joints and connections subjected to direct tension.

F. Inspect and torque test field-assembled bolted construction in conformance with AISC Specification for Structural Joints.

G. High-strength tension control bolting may be substituted for calibrated wrench bolting of slip-critical joints and connections subject to direct tension. Do not use high-strength tension control bolts when bolts are galvanized.

H. Set structural frames accurately to lines and elevations indicated. Align and adjust members forming parts of a complete assembly before permanent fastening. Clean bearing surfaces and other surfaces that will be in permanent contact before assembly. Perform necessary adjustments to compensate for discrepancies in elevations and alignment.

I. Fasten splices (only where indicated and accepted on shop drawings) of compression members and members having milled ends after the abutting surfaces have been brought completely into contact.

J. Report errors in shop fabrication or deformation resulting from handling or transpiration immediately to Engineer. Replace and remove from job site incorrect fabricated or deformed material at no additional cost to the Owner.

K. Perform temporary bracing and bolting of work to support construction live load and combined dead, wind, earthquake and erection loads as erection progresses. Comply with AISC Specifications for bearing, adequacy of temporary connections, alignment, and removal of paint on surfaces adjacent to field welds. Leave bracing in place as long as necessary to provide safety.

L. Insure that holes are not enlarged and that metal in vicinity of holes is not damaged by drift pins during assembly.

M. Enlarge holes to admit bolts for connections only if approved in writing by the Engineer. Make enlargements only by drilling, avoid burning or hand reaming.

Refinish enlarged holes with paint to match the shop coat. Use specific galvanize touch-up for galvanized members.

N. Flame cut bolt holes are not permitted.

O. Where erection bolts are abandoned in place, remove bolts, completely plug weld holes, grind smooth with adjacent surfaces and paint to match shop coat.

3.3 HIGH STRENGTH BOLTING

A. Provide workmanship and techniques for bolted construction in conformance with requirements of AISC/RCSC “Specifications for Structural Joints using High Strength Bolts” and as indicated or specified.

B. Install ASTM F3125 Grade A325 bolts with hardened washer under element being turned in tightening. Install plate washers in both outer plies when using oversize and slotted holes. Install galvanized washer under bolt head and nut when using galvanized bolts.

C. Do not reuse high-strength bolts, nuts and washers.

3.4 WELDING

A. Provide workmanship and techniques for welded construction to conform to requirements of AWS Structural Welding Code and as indicated or specified.

B. No field welding permitted unless indicated on Engineer approved fabrication shop drawings.

C. No field welding permitted on galvanized steel.

3.5 REPAIRS AND PROTECTION

A. Touchup Painting: Immediately after erection, clean exposed areas where primer is damaged or missing and paint with the same material as used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.

1. Clean and prepare surfaces by SSPC-SP 2 hand-tool cleaning or SSPC-SP 3 power-tool cleaning.

B. Touchup Painting: Cleaning and touchup painting are specified in Division 09 painting Sections. Use specific galvanize touch-up for galvanized members.

End of Section

Section 05 21 10
STEEL FRAMED ROOF DECK

PART 1 – GENERAL

1.1 CONDITIONS

A. Drawings and General Provisions of Contract, including General and Supplementary Conditions and Division 01 Specification section, apply to work of this section.

B. Related Sections: The following sections contain requirements that relate to this section.
1. Division 05 – Metals
2. Section 06 20 13 – Exterior Finish Carpentry
3. Section 07 71 00 – Roof Specialties
4. Section 07 72 00 – Roof Accessories
5. See Item 1.7 for Sustainable Requirements

C. Review all relevant Construction Documents before submitting bid including referenced Drawings and Specifications, as well as overall Contract Construction Documents.

D. Review existing conditions on site before submitting bid. Extra time or compensation due to actual conditions being inconsistent with those assumed, except those conditions described in General Contract Terms and Conditions shall not be granted.

E. Review and coordinate work with General Contractor and all building and site utilities prior to commencement of Work.

F. Ordinances, Permits, and Permit Fees

1. Comply with all ordinances and regulations of authorities having jurisdiction.
2. Obtain and pay for any and all permits, tests and certifications required for Work.
3. Furnish copies of Permits, Certifications and Approval Notices to Owner's Representative prior to requesting payment.
4. Bid shall include any charges by local departments, utilities, or other fees.

G. Qualifications submissions required with bid:

1. Documented Experience (4 Years Minimum)
2. Documented References (3 Minimum) with:
   a. Contact Person Name, Role, and Project
   b. Telephone Number and/or E-Mail Address
3. Qualifications shall be reviewed by Owner’s Representative for approval.

1.2 WORK DESCRIPTION

A. Work of this performance specification entails the installation of a wood deck on the rooftop terrace of the high school building. The deck shall have three main components:
1. Upper flat deck. The upper deck shall be comprised of steel hollow joist which shall be connected to the structural steel beams that will be installed above the rooftop. The steel joists shall have ipe decking boards attached using hidden clip fasteners, such as Hulk Stainless Steel Hidden Clip with Screw for Metal assembly. Upper deck shall be level and shall meet just below threshold of the building as shown in the construction drawings. The structural beams will have protrusions that the posts for guardrails will slide over and attach to. The ipe decking shall be laid around said posts in a clean

manner without any small pieces or structurally unsound connections. Decking will maintain spacing of no more than ¼" and no less than 1/8". Joists shall be spaced at 16" on-center with lesser spacing as needed.

2. Ramp. Ramping will be required for ADA access from the upper deck area down to the main roof deck space. The ramps are not to exceed 8% in slope and shall meet all ADA standards. Beams and joists shall be installed to meet two level landings at each corner of the space – angled beams and beams for landings will be installed as part of the building's infrastructure. Joists shall be same material and manufacturer as the joists required for the upper deck area and shall be attached to all beams as such. The outside handrail will be attached to the building façade and the inside handrail system will be attached in a similar manner to the upper deck guardrails. The decking surface will be ipe which should be run perpendicular to the ramp run. Ipe decking shall be from the same source as the upper decking and shall be installed using the same hidden hardware as described above. The bottom of the ramp will cantilever over the building joint and will need to come to rest and be attached to a steel sleeper on the opposite side of the joint where the finished elevation of the ramp shall meet and match (not to exceed ¼" in any direction) the finished elevation of the concrete unit pavers on pedestals.
3. Bleacher Seats. The intent of the bleacher seats is to provide students with informal seating that can also double as stairs while not being meant as the main means of travel. The bleacher seats are meant to be approximately 1' in height and approximately 18" in depth. The bleacher seats shall use the same construction as the above components with steel joists connecting to structural beams and ipe decking attached with hidden fasteners to the steel joists. Ipe decking on the steps and risers shall run longitudinally. The bottom step will be cantilevered over the building joint utilizing the structural steel and will not have any connection to the main roof deck space. The riser on the bottom step shall be built in a manner whereas the riser extends below the finished elevation of the concrete unit pavers in such a way that no visible gap or space is visible to the underside of the deck.
4. Additional Notes:
    a. Fascia boards made of ipe with hidden fasteners shall be installed on all portions of the upper deck where visibility to the underside of the deck is possible – this will be the case for the length of the ramp. The fascia boards need only to prevent access and views into the underside of the deck and the bottom elevation may vary depending on the ramp elevation.
    b. Structural components designed by the structural engineers will be the base for the deck system. Vertical steel posts with horizontal members will act as the posts and beams of the deck. The elevations of these components should allow for the additional framing and decking required without the finished elevation of deck exceeding the threshold of the building.
    c. Handrails on both sides of the ramp and stairs will be required as well as guardrail along the back and side of the upper deck area – reference the construction drawings for handrail and guardrail details.
    d. The deck structure may not attach to the building façade. The structural steel will act as the main source of attachment to the building. A gap of approximately ½" shall be maintained along all edges of the deck construction so that at no point will the decking touch the building façade.

B. Provide all final design, layout, materials, labor, installation equipment, and technical service necessary for installation of the design intent per these performance specifications.

C. Provide all decking carpentry, metal work, and associated hardware and materials for all system components.

D. Provide all testing and final adjustment of completed system.

E. Provide Record Drawing with standards outlined in this performance specification (see section 3.3).

F. Provide and install all products and materials to meet performance criteria intent described below whether specifically outlined or not. Apparent discrepancies or questions of intent shall be directed in writing to Owner's Representative for final, conclusive and binding decision.

G. All work and finished installation shall comply with all building codes and the Americas with Disabilities Act (ADA) to ensure safety and compliance to any and all regulations.

H. Installation work shall be performed in efficiently, timely, and completely toward full design intent of these specifications within timeframe of General Conditions.

I. Guarantees

1. Guarantee entire decking system, parts and labor, for one (1) year from official written date of acceptance by Owner's Representative. Written warranty showing date of completion and period of warranty shall be provided at completion and prior to final payment.
2. System malfunctions occurring during guarantee period due to defective materials, poor workmanship, or improper adjustment shall be corrected to satisfaction of Owner's Representative at no additional expense to Owner.
3. Obtain standard written manufacturer warranty of all products and materials provided where such warranties are offered in published product data. These warranties shall be in addition to, and not in lieu of, other binding warranties or guarantees.

1.4 WORK OF OTHER TRADES

A. Coordinate with other project trades and refer to overall project Construction Documents drawings and specifications by section including, but not limited to:
1. Division 01 – General Requirements
2. Division 02 – Existing Conditions
3. Division 05 – Metal
4. Division 06 – Wood, Plastics, and Composites
5. Division 07 – Thermal and Moisture Protection
6. Division 32 – Exterior Improvements
7. Division 33 – Utilities

1.5 APPLICABLE STANDARDS AND CODES

A. Work shall comply with applicable requirements and accepted practice as established in recognized standards and codes published by following bodies (capitalized abbreviations used through Specifications):
1. American Society for Testing and Materials (ASTM)
2. Underwriters Laboratories, Inc. (UL)
3. Occupational Safety and Health Administration (OSHA)
4. Americans with Disabilities Act (ADA)

B. All local standards and codes that are more stringent than standards and codes referenced above shall take precedent on project (see section 1.1F).

1.6 SUBMITTALS

A. Contractor to provide design drawings and details stamped and signed by a structural engineer to include but, not limited to:
   1. Layout of entire deck including ramp, stairs, and railings. Connections shall be made to steel structural members per structural engineering drawings
   2. Connection details for all members (joists to beams, decking, fascia boards, handrails, etc.)

B. Prior to commencement of work, provide electronic copies of specification sheets and catalog cuts on all product proposed for installation as described in Specifications to Owner's Representative for approval as per Division 1.

C. Work shall not commence until all products specified are submitted and approved by Owner's Representative. Work shall commence only after written notification from Owner's Representative.

D. Product submittals shall be concise (no extraneous pages or sections) and clearly marked to show submitted product model, type, size, etc. Submittals with extraneous pages and not marked clearly are subject to rejection by Owner's Representative.

E. All product installed shall be new, without flaws or defects, and of quality and performance as specified and meeting requirements of system.

F. Products to be submitted for approval shall include, but not be limited to:
   1. See Section 05 – Metal for all railings.
   2. See Section 06 – Woods, Plastics, and Composites for all wooden components
   3. Connectors
   4. Steel Joists
   5. Miscellaneous Materials

1.7 NE-CHPS GENERAL REQUIREMENTS

A. The work of this Section is required to comply with general requirements and procedures for compliance with certain prerequisites and credits needed for the Project to obtain CHPS Verified certification based on Northeast Collaborative for High Performance Schools Criteria Version 3.2 (NE-CHPS) and as outlined in Division 01 Section "Sustainable Design Requirements."
   1. The General Contractor is responsible to coordinate with the work of other Sections and comply with all NE-CHPS requirements in accordance with the Contract Documents such that the work carried out by this Section does not compromise the achievement of any other NE-CHPS prerequisites and credits applicable to the entire Project.

B. Related Sections for Sustainable Design Requirements:
   1. Division 01 Section "Substitution Procedures" for NE-CHPS substitution procedures.
   2. Division 01 Section "Submittal Procedures" for NE-CHPS submittal requirements.
   3. Division 01 Section "Construction Controls and Temporary Facilities" for requirements for temporary facilities.
   4. Division 01 Section "Product Requirements" for additional NE-CHPS submittal requirements.
   5. Division 01 Section "Construction Waste Management and Disposal" for waste management, recycling and disposal.
   6. Division 01 Section "Sustainable Design Requirements" for general procedures for compliance with NE-CHPS prerequisites and credits.
   7. Division 01 Section "Construction Indoor Air Quality (IAQ) Management Plan" for

material and procedure requirements.

1.8 ON-SITE MATERIALS MANAGEMENT

A. Store and handle all products and materials in compliance with manufacturer instructions and recommendations.

B. Protect from all possible damage while on-site from other trades, while staged for installation, and during installation.

C. Minimize on-site storage where possible. Coordinate with site supervisor for storage options.

D. All material overages at installation completion shall be removed from site.

1.9 ON-SITE INSTALLATION COORDINATION

A. Coordinate work closely with Owner's Representative to expeditiously install system.

B. Written (electronic form is acceptable) notifications shall be given to Owner's Representative prior to work commencement, regularly for progress report, proposed changes to proposed system design, and upon system installation completion.

C. Coordinate with and inform all hired subcontractors of site parameters and design intentions.

D. Adhere to all security and check-in procedures with on-site project supervisor.

E. Assume responsibility and compensate Owner for all damage to other work caused by decking system work, workers, or subcontractors. Repairing of such damage shall be done by personnel as directed by Owner's Representative.

F. Where applicable, notify all municipal departments and utilities as to time and location of any work affecting those entities. Cooperate and coordinate in protecting or repairing such infrastructure.

G. Provide and install temporary support, adequate protection, and maintenance of all structures, drains, sewers, and other obstructions encountered. Where grade or alignment is obstructed, obstruction shall be permanently supported, relocated, removed or reconstructed as directed by Owner's Representative.

H. All questions of design intent, proposed design changes, field notifications, and product substitution after installation commences shall be in writing to Owner's Representative as Request for Information (RFI).

PART 2 – PRODUCTS

2.1 Any manufacturer's names and/or model numbers identified herein are intended to assist in establishing a general level of quality, configuration, functionality, and appearance required. This is NOT a proprietary specification and it should be noted that "or equivalent" applies to all products denoted herein. It is understood that all manufacturers will have minor variations in configuration,

appearance, and product specifications and such minor variations shall not eliminate such manufacturers as an equivalent. It is the intent of this specification to encourage open and competitive involvement from multiple manufacturers that are able to supply similar products.

2.2 STEEL JOIST

A. Steel joists meeting Class A fire rating shall be attached to structural steel framing and ipe decking will be installed on top. Joists shall be code approved. Joists shall have a warranty of 25 years or longer. Joists shall be made with 50,000 PSI Carbon structural steel with galvanized finish (powder-coat finish is not required. Example of an approved steel joist is, but is not limited to:
1. Fortress Building Products - Evolution Steel Deck Framing
2. Approved alternative

PART 3 – EXECUTION

3.1 GENERAL

A. Verify dimensions and grades at job site prior to work.

B. Suspend installation of decking system when obstructions or elevation differences exist or if conflicts in construction documents and actual conditions exist. Bring to attention of Owner's Representative for resolution.

C. Make field measurements as necessary noting relationship to other trades. Coordinate with other trades.

D. Locations of steel structural posts and beams are contingent upon and subject to integration with all other building components. Contractor shall employ all data contained in Contract Documents and shall verify this information at construction site to confirm manner by which it relates to installation.

E. Coordinate installation of decking system with all other nearby trades to avoid conflict with building materials.

F. At all times during installation, competent superintendents and assistants shall be on site. All shall be subject to satisfaction of Owner's Representative. Superintendent changes shall not be allowed without consent of Owner's Representative. Superintendent shall represent firm as directions given shall be binding.

G. At all times, protect doors, windows, walls, roofing, structures, utilities, etc. from damage. Any inadvertent damage to work of another trade shall be reported at once. Replace, or repair to satisfaction of Owner, all existing paving disturbed during course of work with same type, strength, texture, and finish as original paving.

3.2 PRE-ACCEPTANCE ADJUSTMENTS

A. Notify Owner's Representative when work is near completion so that a walk-through can occur to review all work prior to workers and material leaving the site.

B. Ensure that all trash, extra materials, and spillages are cleaned and that adjacent finishes or surfaces are clean.

3.3 RECORD DRAWINGS

A. Maintain and update record drawings with red lines markings as project progresses. These shall be kept and submitted with both the construction document drawings and the stamped and signed structural engineering drawings required.

B. Record drawings shall document every change from original design Drawings.

C. Record drawings shall denote all materials installed.

D. Record drawings shall include all connection types (brackets, welds, bolts, power actuated fasteners, etc.) at all connection points.

E. Prints of original Drawings may be obtained from Owner's Representative at cost (0% markup).

F. Record drawings shall be on-site at all times. Note following as project progresses:
1. Permits (state whether or not required)
2. Materials Approved and approval date
3. Test results, testing personnel and testing date.
4. Materials Delivered, Accepted, and Installed by whom and date.

G. Record drawings shall be used as basis of payment for work completed. Provide copies of red-lined set to Owner's Representative along with payment request.

H. Make all notes legible as work progresses. Any new equipment added shall use distinct symbols denoting location. Record location of new equipment via swing ties and/or GPS.

I. Prior to final punchlist, provide complete electronic and hard copy files of Record Drawings to Owner's Representative as part of contract completion. All information must be complete and shall be added to submitted documents prior to acceptance.

3.4 SITE CLEANUP

A. After installation and adjustments remove all unused materials and equipment from project site safely and efficiently. Dispose of all unused materials legally including construction debris and general trash.

B. Ensure levelness and plumbness of all components. Ensure that no rough edges, chips, scratches, cracks, checking, or physical deformity of any material or finish part of or adjacent to the decking system is apparent.

3.5 FINAL OWNER ACCEPTANCE

A. Final Owner Acceptance of Decking System is predicated on:
1. Complete system installation, adjustment, testing, and instructional overview
2. Punchlist items are completed and approved by Owner's Representative

B. Owner and/or Owner's Representative shall provide written notice (hard copy and/or electronic) for Final Acceptance. Date of Final Acceptance notice shall serve as start of 1-Year Guarantee as described above.

End of Section

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Section 05 31 00

STEEL DECKING

PART 1 - GENERAL

1.1 GENERAL PROVISIONS

A. All of the Contract Documents, including General and Supplementary Conditions apply to the Work of this Section.

1.2 SCOPE

A. This Section specifies furnishing and installing roof decking and composite steel deck as indicated on the drawings.

1.3 REFERENCES

A. American Iron and Steel Institute (AISI):

1. Specifications for the Design of Cold-Formed Steel Structural Members published by American Iron and Steel Institute

B. Steel Deck Institute SDI: Publication No. 29:

1. Design Manual for Composite Decks, Forms Decks, Roof Decks and Cellular Deck Floor Systems with Electrical Distribution

C. American Society for Testing and Materials (ASTM) Publications:

1. ASTM A 1003: Standard Specification for Steel Sheet, Carbon, Metallic and Nonmetallic-Coated Cold-Formed Framing Members.

D. ASTM A 653/A 653M:

1. Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by Hot-Dip Process

E. ASTM A 780:

1. Standard Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings

F. American Welding Society AWS:

1. AWS D1.3: Structural Welding Code – Sheet Steel

G. Factory Mutual Engineering Corporation

1. FM 1-28: Loss Prevention Data

1.4 DESIGN REQUIREMENTS

A. Design Criteria:

1. Section properties of steel decking shall be calculated in conformance with AISI Specification for the Design of Cold-Formed Steel Structural Members.

B. Material and steel deck profiles shall conform to the applicable requirements of the Steel Deck Institute specifications.

C. Steel decking shall be capable of supporting a construction load of 200 pounds distributed over a one-foot width at midspans and at the ends of cantilevers with a maximum fiber stress of 26,000 psi and a maximum deflection of L/240.

1.5 SUBMITTALS

A. Submittals shall be provided in accordance with the requirements as specified in Section 01 33 00, SUBMITTAL PROCEDURES.

B. Manufacturer: The designations of deck used on the drawings and specified herein are those from the catalog of Canam. The designations are used for convenience only and other manufacturers, who make the same profile of deck and conform to the design standards, may be acceptable.

C. Submit the following shop drawings:

1. Erection drawings for all steel decking and accessories shall be approved by the Engineer prior to fabrication. Show support framing, openings, length, type, gage, zinc coating, markings of deck units and accessories, weld size, type, location and sequence.
2. Welding procedure for each type of weld prior to welding.
3. Qualification test reports bearing witness certification by an independent testing laboratory for each welder, welding operator, and tacker to be employed in the Work.
4. Manufacturer’s literature indicating steel deck load capacity for various deck styles, gages, spans, and depth indicated or specified.
5. Product data for mechanical fasteners to be used.

1.6 QUALITY CONTROL

A. Welding Qualification and Certification

1. Furnish written welding procedure for all welds in conformance with AWS Structural Welding Code.

2. Each welder, tacker and welding operator shall be certified by test within the past six months to perform the type of Work required in conformance with AWS Structural Welding Code. Testing shall be conducted and witnessed by an independent testing laboratory.

3. Maintain duplicate qualification and certifications records at the job site readily available for examination.

B. Steel decking shall comply with the specifications and tolerances of the Steel Deck Institute.

C. Roof decking to comply with tests and approvals as a component for Class 1 roofs in accordance with Factory Mutual FM-1-28.

D. Replace or repair damaged galvanized material as directed by the Engineer at no additional cost to the Owner.

1.7 TESTING AND INSPECTION

A. Inspection, Testing and Quality Control: A statement of special inspections will be established by the registered design professional in responsible charge who will prepare a schedule of tests to be carried out by an independent testing agency. All costs for inspection and testing shall be borne by the Owner.

B. The materials and workmanship to be furnished under this Section shall be subject to inspection in the shop and field by the registered design professional in responsible charge and/or the testing agency. Such inspection shall not relieve the Contractor of his requirements to furnish materials and workmanship in accordance with requirements of the Contract Documents.

C. Access shall be provided for inspection of all facilities by the registered design professional in responsible change and/or the testing agency and the fabricator shall, when requested, aid the inspectors in carrying out their duties.

D. The testing agency will report test results promptly and in writing to Contractor, Owner, and Architect/registered design professional in responsible charge.

E. Remove and replace work that does not comply with specified requirements.

F. Additional testing will be performed to check compliance of corrected work with specified requirements.

1.8 DELIVERY, STORAGE AND HANDLING

A. Provide in accordance with the general equipment stipulations Section and as specified herein.

B. Protect steel deck panels from damage at all times.

C. Use care during loading, transportation and unloading to prevent damage and injury to ends, sides and faces of panels.

D. Use nylon slings or padded cables for handling steel deck. Do not drop or drag materials.

E. Store steel deck and accessories off ground on platform or skid supports and protect from snow, rain and ground spatter.

1.9 USE OF DECK DURING ERECTION

A. Do not use steel deck for storage or Working platforms until permanently secured in position.

1.10 QUALITY CONTROL

A. Do not allow construction loads to exceed carrying capacity of deck.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Provide steel deck, ridge plates, valley plates, closures, flashing and sump pans manufactured from galvanized steel sheet conforming to requirements of ASTM A

653 with a minimum yield stress of 40,000 psi for composite floor deck (and composite deck used on roofs) and roof deck.

B. Decking thickness shall be as indicated.

C. Anchor clips, vent clips, flexible closure strips, welding washers, flashing, saddle plates, sump pans, and other accessories shall be those types, sizes, and configurations recommended by the decking manufacturer, and shall be of the same material and finish as the deck units.

D. Flexible Cell Closures: Rubber, manufacturers standard.

E. Galvanizing Repair Paint: SSPC-Paint 20 or MIL-P-21035B, with dry film containing a minimum of 94 percent zinc dust by weight.

F. Primer Repair Paint: Manufacturer's standard rust-inhibitive primer of same color as primer.

2.2 STEEL DECK

A. Composite Steel Deck:

1. Fabricate deck units with integral embossing or raised pattern to provide mechanical bond with concrete slabs.
2. Fabricate open-beam deck units with fluted section having interlocking side laps.
3. Material: Galvanized steel sheet conforming to ASTM A653, G-60.
4. The formed floor decking shall have section properties not less than the following:

Type Deck	Section Modulus (Sp/Sn)	Moment of Inertia (Ip)
1.5" Lok-Floor (18 gauge)	0.361 $in.^3$/0.371 $in.^3$	0.289 $in.^4$
2" Lok-Floor (18 gauge)	0.480 $in.^3$/0.480 $in.^3$	0.517 $in.^4$

B. Steel Roof Deck:

1. Roof decking to be furnished and installed shall be formed of 1-1/2 in. deep 20 gauge fluted, Type B decking or 3 in. deep 18 gauge fluted, Type N decking as indicated on the drawings. All decking shall be galvanized steel sheet conforming to ASTM A653, G-60.
2. The formed roof decking shall have section properties not less than the following:

Type Deck	Section Modulus (Sp/Sn)	Moment of Inertia (Ip/In)
1.5" B (20 gauge)	0.23 $in.^3$/0.24 $in.^3$	0.20 $in.^4$/0.23 $in.^4$
3" N (20 gauge)	0.36 $in.^3$/0.40 $in.^3$	0.61$in.^4$/0.82 $in.^4$

3. The above values are per foot of width and shall be determined by computing in accordance with the American Iron and Steel Institute's "Specifications" for the design of light gage cold-formed steel structural members.

2.3 FABRICATION

A. Fabricate steel deck units in three span lengths or longer, except where one or two span lengths are necessitated due to interruptions at roof openings. Lap ends of units a minimum of 2 inches. Provide joints and laps shall be made over supporting members.

B. Roof deck end laps shall have die set ends for positive welding to achieve diaphragm action and flush top for adhesion of insulation. Deck sheets without die set ends will be rejected.

C. Locate openings for penetrating where indicated and provide support framing and edge reinforcement for all openings.

PART 3 - EXECUTION

3.1 PREPARATION

A. Check all supporting elements for correct layout and alignment. Inform Contractor of any deficiencies and corrections required before securing deck units.

B. Do not place deck panels on concrete supporting structure until concrete has cured.

C. Remove debris from all surfaces to support steel deck.

D. Wire brush and paint any abraded or otherwise damaged areas of steel deck units with one coat of accepted galvanized repair paint such as SSPC-Paint 20 or MIL-P-21035, with a dry film containing a minimum of 94 percent zinc dust by weight.

3.2 INSTALLATION

A. Install decking and accessories on structural supports in conformance with Steel Deck Institute specifications, the Steel Deck Institute Manual of Construction with Steel Deck, in accordance with placement plans, manufacturer’s printed installation instructions, and as indicated and specified.

B. Install temporary shoring before placing deck panels when required to meet deflection limitations.

C. Place deck panels on steel supports and adjust to final position with ends lapped over structural supports with a minimum end bearing of 1-½ inches. Do not stretch or contract side lap interlocks.

D. Permanently fasten deck panels to the structural supports immediately after placement.

E. Cut and neatly fit decking and accessories around openings and other penetrations.

F. Provide additional reinforcement and closure pieces at openings as required for strength, continuity of decking, and support of other work.

G. Comply with AWS requirements and procedures for manual shielded metal arc welding, appearance and quality of welds, and methods used in correcting welding work.

H. Mechanical fasteners may be used in lieu of welding to fasten deck where approved by the Engineer of Record. Locate mechanical fasteners and install according to deck manufacturer's instructions.

3.3 ROOF DECK INSTALLATION

A. Fasten roof deck panels to steel supporting members by arc spot (puddle) welds of the surface diameter indicated or arc seam welds with an equal perimeter, but not less than 1-1/2 inches long, and as follows:

1. Weld Diameter: 5/8 inch, nominal.
2. Weld Pattern: 36/7 pattern – 1.5" deep deck; 24/4 pattern – 3" deep deck.

B. Fasten composite metal deck installed on roofs (e.g. mechanical equipment pads) to steel supporting members by arc spot (puddle) welds of the surface diameter indicated or arc seam welds with an equal perimeter, but not less than 1-1/2 inches long, and as follows:

1. Weld Diameter: 5/8 inch, nominal.
2. Weld Pattern: 36/7 pattern

C. Side Lap and Perimeter Edge Fastening: Fasten side laps and perimeter edges of panels between supports, at intervals not exceeding 6 inches (152 mm), using #10 TEK Screws.

D. End Bearing: Install deck ends over supporting framing with a minimum end bearing of 1-1/2 inches (38 mm), with end joints lapped 2 inches.

E. Roof Sump Pans and Sump Plates: Install over openings provided in roof decking, and fasten flanges to top of deck.

F. Space fasteners not more than 12 inches (305 mm) apart with at least one at each corner.

G. Miscellaneous Roof Deck Accessories: Install ridge and valley plates, finish strips, cover plates, end closures, and reinforcing channels according to deck manufacturer's recommendations. Fasten to substrate to provide a complete deck installation.

H. Flexible Closure Strips: Install flexible closure strips over partitions, walls, and where indicated on the architectural drawings. Install with adhesive according to manufacturer's instructions to ensure complete closure.

3.4 FLOOR DECK INSTALLATION

A. Fasten floor deck panels to steel supporting members by arc spot (puddle) welds of the surface diameter indicated as follows:

1. Weld Diameter: ¾ inch (19 mm), nominal.
2. Weld Pattern: 36/4 pattern.

B. Side Lap and Perimeter Edge Fastening: Fasten side laps and perimeter edges of panels between supports, at intervals not exceeding 24 inches (910 mm), with 1-½ -inch (38 mm) long minimum welds.

C. Composite metal deck installed on roofs (e.g. mechanical equipment pads) shall be installed in accordance with Sections 3.3.B and 3.3.C above.

3.5 CUTTING AND FITTING

A. Steel deck erector shall perform all cutting and fitting of units as may be required.

B. Do not make holes that are not indicated on manufacturer's erection shop drawing without prior written approval of Engineer.

3.6 ACCESSORIES

A. Close open ends of all cell runs with cell closures at columns, openings, walls, etc. and where cells change direction.

B. Provide special end and side closures at pour stops and openings to act as edging.

C. Provide and weld flashings into position to close opening between steel deck units and columns, beams and girder.

D. Provide all other closures and flashings required for a complete installation and as recommended by deck manufacturer.

E. Fasten all closures, flashings, and sump pans by tack welding at a maximum spacing of 24 inches on center, but not less than one weldment on each corner.

3.7 PROTECTION

A. During installation, do not use the metal deck as a storage platform nor a working platform, until deck units have been fastened in position.

B. Do not overload the surface of installed metal decking during entire construction period.

C. Do not hang mechanical equipment or other loads, either temporarily or permanently, from decking.

D. Galvanizing Repairs: Prepare and repair damaged galvanized coatings on both surfaces of deck with galvanized repair paint according to ASTM A 780 and manufacturer's written instructions.

E. Repair Painting: Wire brush and clean rust spots, welds, and abraded areas on both surfaces of prime-painted deck immediately after installation and apply repair paint. Apply repair paint, of same color as adjacent shop-primed deck, to bottom surfaces of deck exposed to view.

3.8 CLEANING

A. Remove oil, grease, dirt and debris from deck and leave ready for work of next trade.

End of Section

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Section 05 40 00

COLD-FORMED METAL FRAMING

PART 1 - GENERAL

1.1 SUMMARY

A. Design, engineer, furnish and install metal framing and support system for the following applications:

1. Load bearing formed steel stud exterior wall and parapet framing.
2. Framing for exterior soffits and ceilings.
3. Interior wall framing at double-height spaces, and as additionally indicated.
4. Support framing for mock-ups.
5. Metal plate blocking in conjunction with framing of this Section 05 40 00.
6. Include all connections, bracing, bridging and accessories.

B. Furnish the following products to be installed under the designated Sections:

1. Placement of anchors securing the work of this section: Section 03 30 00 - CAST-IN-PLACE CONCRETE.
2. Placement of anchors securing the work of this section: Section 04 20 00 - UNIT MASONRY.

1.2 RELATED REQUIREMENTS

A. Section 01 74 19 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL: Procedural and administrative requirements relating to recycling goals, waste management program and reporting.

B. Section 01 81 13 - SUSTAINABLE DESIGN REQUIREMENTS: Procedural and administrative requirements relating to required *Northeast CHPS Verified Program,* (NE-CHPS) Certification.

C. Section 04 20 00 - UNIT MASONRY: Veneer masonry supported by wall stud metal framing.

D. Section 05 12 00 - STRUCTURAL STEEL FRAMING: Structural building framing.

E. Section 05 31 00 - STEEL DECKING: Metal floor decking, metal roof decking.

F. Section 06 10 00 - ROUGH CARPENTRY: Wood blocking and curbing.

G. Section 06 16 00 - SHEATHING: Exterior wall sheathing.

H. Section 07 21 00 - THERMAL INSULATION: Insulation within framing members.

I. Section 07 92 00 - JOINT SEALANTS.

J. Section 09 22 16 - NON-STRUCTURAL METAL FRAMING: Light weight, non- load bearing metal stud framing.

1.3 REFERENCES

A. Referenced Standards: Comply with applicable requirements of the following standards and those others referenced in this Section, under the provisions of Section 01 42 00 - REFERENCES. The standards referenced herein are included to establish recognized minimum quality only. Where these standards conflict with other specified requirements, the most restrictive requirements shall govern. Equivalent quality and testing standards will be acceptable, subject to their timely submission, review and acceptance by the Architect.

1. AISI S211 – North American Standard for Cold-Formed Steel Framing, Wall Stud Design.
2. AISI S212 - North American Standard for Cold-Formed Steel Framing, Header Design.
3. AISI S213 - North American Standard for Cold-Formed Steel Framing, Lateral Design.
4. AISI S902-02, Stub-Column Test Method for Effective Area of Cold-Formed Steel Columns, American Iron and Steel Institute, Washington, DC.
5. AISI S905-02, Test Methods for Mechanically Fastened Cold-Formed Steel Connections, American Iron and Steel Institute, Washington, DC.
6. ANSI - Cold-Formed Steel Design Manual.
7. ASTM A36/A36M - Standard Specification for Carbon Structural Steel.
8. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
9. ASTM A153/A153M – Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
10. ASTM A645/A645M - Standard Specification for Pressure Vessel Plates, 5 % and 51 2 % Nickel Alloy Steels, Specially Heat Treated.
11. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process
12. ASTM A780/A780M - Standard Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings.
13. ASTM A792/A792M - Standard Specification for Steel Sheet, 55 % Aluminum-Zinc Alloy-Coated by the Hot-Dip Process.
14. ASTM A1003/A1003M - Standard Specification for Steel Sheet, Carbon, Metallic- and Nonmetallic-Coated for Cold-Formed Framing Members.
15. ASTM A1008/A1008M - Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, Required Hardness, Solution Hardened, and Bake Hardenable.
16. ASTM C955 - Standard Specification for Cold-Formed Steel Structural Framing Members.
17. ASTM C1007 – Standard Specification for Installation of Load Bearing (Transverse and Axial) Steel Studs and Related Accessories.

18. ASTM C1513 - Standard Specification for Steel Tapping Screws for Cold-Formed Steel Framing Connections.
19. ASTM D520 – Standard Specification for Zinc Dust Pigment.
20. ASTM E488/E488M – Standard Test Methods for Strength of Anchors in Concrete Elements.
21. ASTM E1190 – Standard Test Methods for Strength of Power-Actuated Fasteners Installed in Structural Members.
22. ASTM F1554 – Standard Specification for Anchor Bolts, Steel, 36, 55, and 105-ksi Yield Strength.
23. ASTM G60 – Standard Practice for Conducting Cyclic Humidity Exposures.
24. ASTM G90 - Standard Practice for Performing Accelerated Outdoor Weathering of Materials Using Concentrated Natural Sunlight.
25. AWCI: Specifications Guide for Cold Formed Steel Structural Members.
26. AWS A 2.0 - Standard Welding Symbols.
27. AWS D 1.3 - Light Steel Welding Code.
28. SSPC Steel Structures Painting Manual.
29. SSMA: Cold Formed Steel Details.

B. Inclusionary References: The following reference materials are hereby made a part of this Section by reference thereto:

1. AISI S100 – North American Specification for the Design of Cold-Formed Steel Structural Members.
2. ANSI S200 – North American Standard for Cold-Formed Steel Framing.
3. ANSI S202 – Code of Practice for Cold-Formed Structural Framing.
4. ANSI S220 – North American Standards for Cold-Formed Steel Framing – Non-Structural Members.
5. ASCE 7 (Including Supplements) - Minimum Design Loads for Buildings and Other Structures.

C. Sustainability Requirement Reference: The following sustainability requirements are hereby made a part of this Section by reference thereto:

1. High Performance Schools Exchange, Northeast Energy Efficiency Partnerships NE-CHPS, (referred to herein as “NE-CHPS”).

1.4 ADMINISTRATIVE REQUIREMENTS

A. Coordination:

1. General: Coordinate the work of this Section with the respective trades responsible for installing interfacing and adjoining work for proper sequence of installation, and ensure that the work performed hereunder is acceptable to such trades for the installation of their work.

B. Pre-Installation Meetings: At least two weeks prior to commencing the work of this Section, conduct a pre-installation conference at the Project site. Comply with requirements of Section 01 31 00 - PROJECT MANAGEMENT AND COORDINATION.

Coordinate time of meeting to occur prior to installation of work under the related sections named below.

1. Required attendees: Owner, Architect, General Contractor, Installer's Project Superintendent, and representatives of other related trades as directed by the Architect or Contractor, and representatives for installers of related work specified under the following Sections:
   a. Section 03 45 00 - PRECAST ARCHITECTURAL CONCRETE.
   b. Section 04 20 00 – UNIT MASONRY.
2. Agenda:
   a. Scheduling of framing operations.
   b. Review of staging and material storage locations.
   c. Coordination of work by other trades. Review materials and systems which will be supported by the work of this Section 05 40 00.
   d. Installation procedures for ancillary equipment.
   e. Protection of completed Work.
   f. Establish weather and working temperature conditions to which Architect and Contractor must agree.
   g. Emergency rain protection procedure.
   h. Discuss process for manufacturer's inspection and acceptance of completed Work of this Section.

C. Sequencing:
   1. Field Measurements:
      a. Take field measurements before preparation of shop drawings and fabrication, where possible, to ensure proper fitting of Work.
      b. Allow for adjustments within specified tolerances wherever taking of field measurements before fabrication might delay Work.

1.5 SUBMITTALS

A. Information and Review Submittals: Submit the following under provisions of Section 01 33 00 - SUBMITTAL PROCEDURES:
   1. Literature: Manufacturer's product data sheets, specifications, performance data, physical properties and limitations on standard framing members and other products furnished hereunder.
   2. Engineering Calculations: Provide calculations for loadings and stresses for all framing under the Professional Structural Engineer's seal. Show how design load requirements and other performance requirements have been satisfied.
   3. Manufacturer's installation instructions: Indicate special procedures, and conditions requiring special attention.
   4. Shop drawings:
      a. Large scale design details showing component details, framed openings, bearing, anchorage, loading, welds, type and location of fasteners, and accessories or items required of related work.

1) Provide detail of building up sections required to accommodate fireproofing.
2) Indicate all products which interface with framing. Indicate reinforcing channels, opening framing, supplemental framing, strapping, bracing, bridging, splices, accessories, connection details, and attachment to adjoining work.
3) Indicate resilient hangers, and imposed loading. Coordinate resilient hanger with framing design and imposed loading conditions.

b. Show profile, size and location of custom punches for MEP distribution.
c. Detail all conditions which deviate from Contract Documents.
d. Describe method for securing studs to tracks and for bolted and welded framing connections.
e. Show loads applied to framing, indicate differential of movement.
f. Provide elevations showing framing layout. Coordinate framing locations with cladding systems.

5. Prior to prefabrication of framing, submit fabrication and erection drawings for approval. All calculations and details are to be submitted for all members and connections.
6. Sustainable Design Submittals: As required by NE CHPS.
7. Qualification Submittals:

1.6 QUALITY ASSURANCE

A. General:
1. Calculate structural properties of framing members in accordance with AWCI, MF/SLA and AWS D I.3 requirements.
2. Notify the Architect where conflicts apply between referenced standards and existing materials, and existing methods of construction.

B. Qualifications:
1. Manufacturers: Company specializing in manufacturing the products specified in this section with minimum 3 years documented experience.
2. Installer/Applicator: Company with a minimum of 3 years documented experience demonstrating previously successful work of the type specified herein, and approved by product manufacturer.
3. Welders Certificates: Utilize only qualified welders employed on the Work. Submit verification that Welder’s are AWS D1.1 and D1.4 qualified within the previous 12 months.
4. Professional Engineer Qualifications: Design structural elements under direct supervision of Professional Engineer experienced in design of this Work and licensed in State of Rhode Island.

1.7 DELIVERY, STORAGE AND HANDLING

A. Delivery and Acceptance Requirements:

1. Do not deliver items to the site, until all specified submittals have been submitted to, and approved by, the Architect.
2. Deliver materials in original unopened packages, containers or bundles bearing brand name, and identification of manufacturer, with labels and package seals intact and legible.

B. Storage and Handling Requirements:
1. Store and handle materials following manufacturer's recommended procedures, and in accordance with material safety data sheets.
2. Protect materials from damage due to moisture, direct sunlight, excessive temperatures, surface contamination, corrosion and damage from construction operations and other causes.

C. Packaging Waste Management: Comply with packaging requirements specified under Section 01 60 00 - PRODUCT REQUIREMENTS.
1. Shipping materials: Manufacturer shall utilize to the greatest extent possible packaging materials which are biodegradable and recyclable.
2. Jobsite packaging waste management: Recycle packaging materials coordinated with general construction waste management specified under Section 01 74 19 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Acceptable Manufacturers: Subject to compliance with the requirements specified herein, manufacturers offering products which may be incorporated in the work include the following, or approved equal:
1. ClarkDietrich Building Systems, LLC, West Chester, OH.
2. Marino-Ware Industries Corp., South Plainfield NJ.
3. Steel Elements, Gorham NH.
4. The Steel Network (TSN), Las Vegas NV.
5. Telling Industries, Willoughby, OH.

2.2 PERFORMANCE/DESIGN CRITERIA

A. Structural performance: Design, engineer and provide a complete metal framing and support system having deflection limits as specified herein under the full inward and outward lateral load prescribed by applicable codes for this project location. Deflection and structural calculations shall not include any structural benefit from the veneer(s), and curtain wall systems; metal framing alone shall carry the loads. Where a member supports more than one finish, the most restrictive deflection shall govern.
1. Design wall system to provide for movement of components without damage, failure of joint seals, undue stress on fasteners, or other detrimental effects when subject to seasonal or cyclic day/night temperature ranges.
2. Design wall system to carry all loads transmitted from window systems, including eccentrically applied dead loads at sills.

3. Design system to accommodate construction tolerances, deflection of building structural members, and clearances of intended openings. Comply with the following cold-formed steel framing design standards:
    a. Wall Studs: AISI S211.
    b. Headers: AISI S212.
    c. Lateral Design: AISI S213.
4. Deflection limits
    a. Exterior Wall Framing: Horizontal deflection of 1/360 of the wall height except as specified otherwise herein below, or as indicated otherwise on Structural Drawings.
        1) Masonry veneer: L/600 where L is the length of the steel member. Design wall framing to accommodate horizontal deflection without regard for contribution of sheathing materials.
        2) Terra cotta rain screen systems: L/360 where L is the length of the steel member, with maximum movement not greater than 5/8 inch.
        3) Exterior insulation and finish system (EIFS): L/360 where L is the length of the steel member.
    b. Interior load-bearing wall framing: Horizontal deflection of 1/360 of the wall height.
        1) Ceiling and soffit framing: Horizontal deflection of 1/240 of the span.

B. Wind Loading:
1. Comply with specified requirements on Structural Drawings.
2. Conform to the 2018 International Building Code with Rhode Island Building Code Regulation RISBC-1.
    a. Basic Wind Speed (V.ult.): 143 miles per hour (three second gust).
    b. Risk Category: III
    c. Exposure: “B.”

C. AISI Specifications and Standards: Unless more stringent requirements are indicated, comply with AISI S100 and AISI S200.

D. Welding: Employ experienced welders who are certified in compliance with AWS Standard Qualification Procedures.

E. Engineering: Provide the services of a Professional Engineer, registered in the State of Rhode Island to design and certify that the work of this section meets or exceeds the performance requirements specified in this section and as required by *International Building Code*, 2018 edition, as published by the International Code Council, Inc. (I.C.C.), as revised by *RHODE ISLAND BUILDING CODE*, Regulation RISBC-1, effective February 1, 2022.

2.3 MATERIALS

A. Recycled content of Steel: Use maximum available percentage of recycled steel. Steel framing products incorporated into the work shall contain not less than 30 percent of recycled steel.

B. Steel Sheet: ASTM A1003/A1003M and ASTM A653/A 653M, structural steel, of grade as follows and having G90 (Z275) galvanized coating:

1. Framing

a. Grade: As required by structural performance but in no case less than 18 gauge.

C. Steel Sheet for Connectors: ASTM A1011/A1101M, hot rolled or ASTM A1008/A1008M, cold rolled; cleaned, pretreated, and primed with manufacturer's baked-on, lead- and chromate-free, rust-inhibitive primer complying with performance requirements in FS TT-P-664.

1. Grade: As required by structural performance but in no case less than 18 gauge.

a. Coating: G90 (Z275) galvanized coating.

2.4 FRAMING MEMBERS

A. Studs: Manufacturer's standard C-shaped steel studs complying with ASTM C955. Formed of ASTM A653/653M steel, G90 (Z275) galvanized, channel shaped with lipped flanges, punched web, size as shown on Drawings, thickness and grade as required by structural design calculations but in no case less than 18 gauge, 0.0428 inch (1.09 mm).

B. Z-shape span connectors: Manufacturer’s standard and custom formed Z-shape framing connectors, complying with ASTM C955. Formed of ASTM A653/653M steel, G90 (Z275) galvanized, having opposing lipped flanges. Sizes as shown on drawings, thickness and grade as required by structural design calculations but in no case less than 14 gauge, 0.0677 inch (1.72 mm).

C. Tracks: Manufacturer's standard U-shaped steel track complying with ASTM C955. Formed of ASTM A653/653M steel, same designation, coating, and thickness as studs except as otherwise noted, channel shaped, solid web, depth compatible with studs, size, thickness and grade as required by structural design calculations but in no case less than 18 gauge, 0.0428 inch (1.09 mm).

D. Rafters: Manufacturer's standard C-shaped steel joists, of web depths indicated, complying with ASTM C955. Formed of ASTM A653/653M steel, G90 (Z275) galvanized, channel shaped with lipped flanges, solid web, size as shown on Drawings, thickness and grade as required by structural design calculations.

E. Trusses: Manufacturer's standard C-shaped steel studs complying with ASTM C955. Formed of ASTM A653/653M steel, G90 (Z275) galvanized. Provide manufacturer’s standard chord and web member profiles with mechanical properties as required by structural design calculations. Shop fabrication required.

1. Built-up Members: Built-up members of manufacturer's standard C-shaped steel section, with stiffened flanges, nested into a U-shaped steel section joist track, with unstiffened flanges; unpunched; of web depths indicated; complying with ASTM C955,

2. Design trusses in accordance with AISI “Design Guide for Cold-Formed Steel Trusses, Publication RG-9518.”

F. Drift and Vertical Deflection Clips: Manufacturer's standard bypass and head clips as required, capable of isolating wall stud from upward and downward vertical displacement of primary structure using mechanical fasteners.

1. Provide clips with step bushings. Mechanical attachment to structure and screw attachment to stud web using step-bushings to permit frictionless vertical movement. 68 mils (1.72 mm) minimum thickness. Size of clips shall be as required by structural design calculations performed by clip manufacturer, and reviewed by specified Professional Licensed Engineer responsible for stamped shop drawings. Clips shall be fabricated/designed for the following conditions:
   a. Exterior head of wall.
   b. Exterior head of wall pre-assembled with track.
   c. By-pass structural pour stop at floor slab.
   d. By-pass floor slab or structure.
   e. By-pass structure.

2.5 ANCHORS AND FASTENERS

A. Steel Shapes and Clips: ASTM A36/A36M, zinc coated by hot-dip process according to ASTM A123/A123M.

B. Anchor Bolts: ASTM F1554, Grade 36, threaded carbon-steel hex-headed bolts and carbon-steel nuts; and flat, hardened-steel washers; zinc coated by hot-dip process according to ASTM A153/A153M, Class C.

C. Mechanical Fasteners: Corrosion-resistant-coated, self-drilling, self-threading steel drill screws.

1. Head Type: Low-profile head beneath sheathing, manufacturer's standard elsewhere.

D. Sound isolation hangers: precompressed neoprene rubber and spring isolation hanger; designed for high frequency sound waves and low frequency vibrations. Size hangers as recommended by manufacturer for anticipated ceiling load.

1. LD Peters & Sons, Inc., New Rochelle NY, type W30N
2. Mason Industries, Inc., Hauppauge NY, W30N series
3. Kinetics Noise Control, Inc., Dublin, OH, type SRH series.

E. Welding Electrodes: Comply with AWS standards.

2.6 MISCELLANEOUS MATERIALS

A. Liquid zinc coating, for touch-up of welds, scratches, and abrasions in galvanized steel: Low VOC organic zinc-rich coating containing 92% metallic zinc, by weight in the dried film (ASTM D520, Type III) and conforming to SSPC Paint 20, Type II, Level 1. Liquid zinc coating shall be recognized under the Component Program of Underwriter's Laboratories, Inc. as an equivalent to hot-dip galvanizing; conforming to MIL-P-21035B and SSPC Paint 29, Type II, Level I, for repair of hot-dip galvanizing and meeting the requirements for Zinc-Rich Paints.

1. VOC limit: not more than 250 g/L.

2.7 PRE-ERECTION FABRICATION

A. Framing components may be pre-assembled into panels prior to erecting. Fabricate panels square with framing members fitted, reinforced, and braced to suit design requirements; attach components in a manner to prevent racking.

B. Fit and assemble in largest practical sections for delivery to site, ready for installation.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Inspect previous work, related work, and conditions under which this work is to be performed and notify Contractor in writing of all deficiencies and conditions detrimental to the proper completion of this work.

B. Beginning of installation means acceptance of existing substrates, previous work and conditions.

3.2 PREPARATION

A. Do not disturb or remove fireproofing on adjacent structural steel. If removal is required to accommodate installation of work of this Section coordinate necessary repairs with the Architect, Contractor, and subcontractor responsible for work under Section 07 81 00 - APPLIED FIREPROOFING.

3.3 ERECTION - GENERAL

A. Cold-formed metal framing may be shop or field fabricated for installation, or it may be field assembled.

B. Install cold-formed metal framing according to ASTM C1007, unless more stringent requirements are indicated.

C. Install cold-formed metal framing and accessories plumb, square, and true to line, and with connections securely fastened, according to manufacturer's written recommendations and requirements in this Section.

1. Cut framing members by sawing or shearing; do not torch cut.
2. Fasten cold-formed metal framing members by welding or screw fastening, as indicated on approved Shop Drawings, or where not indicated, as standard with fabricator. Wire tying or clip fasteners of framing members is not permitted.
    a. Where welding is indicated or required on approved Shop Drawings: Comply with AWS D1.3 requirements and procedures for welding, appearance and quality of welds, and methods used in correcting welding work.

b. Locate mechanical fasteners and install according to approved Shop Drawings, with screw penetrating joined members by not less than three exposed screw threads.

D. Install framing members in one-piece lengths, unless splice connections are indicated for track or tension members.

E. Install temporary bracing and supports to secure framing and support loads comparable in intensity to those for which structure was designed. Maintain braces and supports in place, undisturbed, until entire integrated supporting structure has been completed and permanent connections to framing are secured.

F. Do not bridge building expansion and control joints with cold-formed metal framing. Independently frame both sides of joints.

G. Fasten hole reinforcing plate over web penetrations that exceed size of manufacturer's standard punched openings.

H. Accurately align and attach runners in strict compliance with manufacturer’s recommendations and approved shop drawings. Allow for main structure deflection at top runner to avoid transferring load stud system.

1. Frame wall openings with additional framing members at perimeter of openings as needed.
2. Align holes in framing members to facilitate electrical conduit and piping work.
3. Provide all needed connections and accessories provide a complete structural system.
4. Provide all needed members for proper fastening interior gypsum wallboard.

I. Bracing: Provide continuous 1-1/2 inch cold-rolled channel horizontal bracing within 10 to 12 inches of tops of stud. Connect bracing to each stud as indicated on approved shop drawings. Provide additional bridging and bracing as recommended by manufacturer, as necessary, and as indicated on approved shop drawings. Provide kick-back bracing perpendicular to plane of framing system and securely anchored to building structure needed to create a complete structural system meeting specified performance requirements.

J. Touch-up damaged metal coatings and cut ends, with specified liquid zinc coating.

3.4 ERECTION OF STUDDING

A. Install components in accordance with manufacturer’s instructions and in accordance with approved shop drawings, referenced standards and codes.

B. Align floor and ceiling tracks; locate to wall and partition layout. Secure in place as indicated on approved engineered shop drawings, at maximum 24 inches on center.

C. Squarely seat studs against webs of top and bottom tracks. Fasten both flanges of studs to top and bottom tracks. Space studs as indicated on approved shop drawings; not more than 2 inches from abutting walls and at each side of openings.

D. Construct corners using minimum three studs. Double stud wall openings, door and window jambs.

E. Erect load bearing studs one piece full length. Splicing of studs is not permitted.

F. Erect load bearing studs, brace, and reinforce to develop full strength, to achieve design requirements.

G. Install intermediate studs above and below openings to align with wall stud spacing.

H. Provide deflection allowance in stud track, directly below horizontal building framing at non-load bearing framing. Install double deep leg deflection track or specified clip system for vertical deflection of primary building structure.

I. Attach cross studs, furring channels to studs for attachment of fixtures anchored to walls.

J. Install framing between studs for attachment of mechanical and electrical items, and to prevent stud rotation.

K. Touch-up field welds and damaged galvanized and primed surfaces with primer.

3.5 ERECTION (WIND LOAD ONLY)

A. Handling and lifting of prefabricated panels shall be done in a manner as to not cause distortion in any member.

B. Tracks shall be securely anchored to the supporting structure as shown on the plans.

C. At track butt joints, abutting pieces of track shall be securely anchored to a common structural element or they shall be butt-welded spliced together.

D. Studs shall be plumbed, aligned and securely attached to the flanges or webs of both upper and lower tracks.

E. Jack studs or cripples shall be installed below window sills, above window and door heads, at first standing stair rails, and elsewhere to furnish support and shall be securely attached to supporting members.

F. Wall stud bridging shall be attached in a manner to prevent stud rotation. Bridging rows shall be spaced according to the following schedule. Wall up to 10 foot height; one row at mid-height. Wall exceeding 10 feet in height; bridging rows spaced not to exceed 5 feet on-center.

3.6 ERECTION (AXIAL LOAD-BEARING)

A. Handling and lifting of prefabricated frame panels shall be done in a manner as to not cause distortion in any members.

B. Tracks shall be securely anchored to the supporting structure as shown on the plans, and as designed and detailed on approved shop drawings.

C. Complete uniform and level bearing support shall be provided for the bottom track.

D. At track butt joints, abutting pieces of track shall be securely anchored to a common structural element or they shall be butt welded or spliced together,

E. Studs shall be plumbed, aligned and securely attached to the flanges or webs of both upper and lower tracks.

F. Framed wall openings shall include headers and supporting studs as shown on the plans, and as designed and detailed on approved shop drawings.

G. Jack studs shall be installed below window sills, above window and door heads, at free standing stair rails and elsewhere to furnish support and shall be securely attached to supporting members.

H. Temporary bracing shall be provided until erection is completed.

I. Wall stud bridging shall be installed in a manner to provide resistance to both minor axis bending and rotation. Bridging rows shall be equally spaced not to exceed 4 feet on-center.

J. Provide stud walls at locations indicated on plans as “shear walls” for frame stability and lateral load resistance. Such stud walls shall be braced as indicated on plans and specifications.

K. Splices in axially loaded studs are not be permitted.

L. Provide insulation equal to that specified elsewhere in all doubled jamb studs and double header member which will not be accessible to the insulation contractor.

3.7 TOLERANCES

A. The following allowable installed tolerances are allowable variations from locations and dimensions indicated by the Contract Documents and shall not be added to allowable tolerances indicated for other work.

1. Allowable variation from true plumb, Level, and Line: 1/8 inch in 20 feet.
2. Allowable variation from true wall thickness: 1/8 inch in 20 feet.
3. Allowable variation from true plane of adjacent surfaces: 1/8 inch in 10 feet.

End of Section

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Section 05 50 00

METAL FABRICATIONS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes shop fabricated metal items.

1. Lintels.
2. Restraining angles at top of masonry walls.
3. Ledge and shelf angles.
4. Elevator sill angles and hoist beam.
5. Ladders.
6. Structural supports for miscellaneous attachments.
7. Anchor bolts for sill plates and miscellaneous items indicated on Drawings.
8. Sensory swing heavy duty steel hanger.
9. Suspended black pipe lighting grid with flange and malleable iron slip on connector fittings for lighting and accessories.
10. Wire mesh partition with hinged door at Stair 5.
11. All other non-specified metal work generally performed by the miscellaneous metals trade, and which are not otherwise provided under Section 05 12 00 - STRUCTURAL STEEL and Section 05 40 00 - COLD FORMED METAL FRAMING.

1.2 RELATED REQUIREMENTS

A. Section 01 74 19 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL: Procedural and administrative requirements relating to recycling goals, waste management program and reporting.

B. Section 01 81 13 - SUSTAINABLE DESIGN REQUIREMENTS: Procedural and administrative requirements relating to required *Northeast CHPS Verified Program,* (NE-CHPS) Certification.

C. Section 03 30 00 - CAST-IN-PLACE CONCRETE: Installation of anchors into concrete, pouring concrete stair treads and landings.

D. Section 04 20 00 - UNIT MASONRY:

1. Installation of loose lintels furnished by this Section 05 50 00.
2. Building in of anchors into masonry walls.

E. Section 05 12 00 - STRUCTURAL STEEL FRAMING: Structural steel framing members not otherwise specified hereunder.

F. Section 05 31 00 - STEEL DECKING: Metal roof deck and floor decking.

G. Section 05 40 00 - COLD-FORMED METAL FRAMING: Structural stud framing.

H. Section 06 10 00 - ROUGH CARPENTRY: Wood framing, blocking, subflooring and underlayment.

I. Section 06 40 00 - ARCHITECTURAL WOODWORK: Countertops requiring fabricated steel supports.

J. Section 08 33 26 - OVERHEAD COILING GRILLES: Steel framing for coiling grilles.

K. Section 09 22 16 - NON-STRUCTURAL METAL FRAMING: Non-loadbearing metal framing systems for interior partitions and ceilings.

L. Section 09 91 00 - PAINTING: Applied finish coatings other than those specified herein.

M. Section 09 96 00 - HIGH PERFORMANCE COATINGS: Applied high build coatings.

N. Section 11 40 00 - FOODSERVICE EQUIPMENT: Stainless steel hoods, through-wall tray and food service equipment.

O. Section 14 22 00 - COMPACT TRACTION ELEVATORS:

1. Elevator guide rails
2. Hoist way entrance door sills.

1.3 REFERENCES

A. Referenced Standards: Comply with applicable requirements of the following standards and those others referenced in this Section, under the provisions of Section 01 42 00 - REFERENCES. The standards referenced herein are included to establish recognized minimum quality only. Where these standards conflict with other specified requirements, the most restrictive requirements shall govern. Equivalent quality and testing standards will be acceptable, subject to their timely submission, review and acceptance by the Architect.

1. ASTM A36/A36M - Standard Specification for Carbon Structural Steel.
2. ASTM A53/A53M – Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless.
3. ASTM A108 - Standard Specification for Steel Bar, Carbon and Alloy, Cold Finished.
4. ASTM A240/A240M – Standard Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications.
5. ASTM A283/A283M - Standard Specification for Low and Intermediate Tensile Strength Carbon Steel Plates.
6. ASTM A307 - Standard Specification for Carbon Steel Bolts, Studs, and Threaded Rod 60 000 PSI Tensile Strength.
7. ASTM A312/A312M - Standard Specification for Seamless, Welded, and Heavily Cold Worked Austenitic Stainless Steel Pipes.
8. ASTM A380/A380M – Standard Practice for Cleaning, Descaling and Passivation of Stainless Steel Parts, Equipment and Systems.

9. ASTM A386 (Withdrawn Standard) – Specification for Zinc Coating (Hot-Dip) on Assembled Steel Products.
10. ASTM A480/A480M – Standard Specification for General Requirements for Flat-Rolled Stainless and Heat-Resisting Steel Plate, Sheet, and Strip.
11. ASTM A500/A500M - Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes.
12. ASTM A501/A501M - Standard Specification for Hot-Formed Welded and Seamless Carbon Steel Structural Tubing.
13. ASTM A554 – Standard Specification for Welded Stainless Steel Mechanical Tubing.
14. ASTM A575 - Standard Specification for Steel Bars, Carbon, Merchant Quality, M-Grades.
15. ASTM A576 - Standard Specification for Steel Bars, Carbon, Hot-Wrought, Special Quality.
16. ASTM A666/A666M – Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar.
17. ASTM A743/A743M – Standard Specification for Castings, Iron-Chromium, Iron-Chromium-Nickel, Corrosion Resistant, for General Application.
18. ASTM A947M – Standard Specification for Textured Stainless Steel Sheet [Metric].
19. ASTM A967/A967M – Standard Specification for Chemical Passivation Treatments for Stainless Steel Parts.
20. ASTM A999/A999M – Standard Specification for General Requirements for Alloy and Stainless Steel Pipe.
21. ASTM A1011/A1011M – Standard Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength.
22. ASTM A1016/A1016M – Standard Specification for General Requirements for Ferritic Alloy Steel, Austenitic Alloy Steel, and Stainless Steel Tubes.
23. ASTM B117 - Standard Practice for Operating Salt Spray (Fog) Apparatus.
24. ASTM B506 – Standard Specification for Copper-Clad Stainless Steel Sheet and Strip for Building Construction.
25. ASTM B209 – Standard Specification for Aluminum and Aluminum Alloy Sheet and Plate.
26. ASTM B221 – Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.
27. ASTM F593 - Standard Specification for Stainless Steel Bolts, Hex Cap Screws, and Studs.
28. ASTM F594 – Standard Specification for Stainless Steel Nuts.
29. ASTM F3125/F3125M - Standard Specification for High Strength Structural Bolts and Assemblies, Steel and Alloy Steel, Heat Treated, Inch Dimensions 120 ksi and 150 ksi Minimum Tensile Strength, and Metric Dimensions 830 MPa and 1040 MPa Minimum Tensile Strength.

30. AISC - Code of Standard Practice for Steel Buildings and Bridges.
31. AISC - Specifications for the Design, Fabrication and Erection of Structural Steel for Buildings.
32. AWS - Standard Code for Arc and Gas Welding in Building Construction.
33. FS QQ-A-250d - Aluminum and Aluminum Alloy, Plate and Sheet.
34. NAAMM publication AMP 500 – Metal Finishes Manual.
35. NAAMM publication AMP 510 – Metal Stairs Manual.
36. NAAMM publication AMP 521 – Pipe Railing Manual.
37. NAAMM publication AMP 555 – Code of Standard Practice for The Architectural Metal Industry.
38. SSPC standards referenced herein, and the following:
    a. SSPC-SP1, Surface Preparation – Solvent Cleaning.
    b. SSPC-SP2, Surface Preparation – Hand Tool Cleaning.
    c. SSPC-SP3, Surface Preparation – Power Tool Cleaning.
    d. SSPC-SP8, Surface Preparation - Pickling.
    e. SSPC-Paint 20, Zinc-Rich Coating (Type 1) Inorganic and (Type II) Organic.
    f. SSPC-Paint 29, Zinc Dust Sacrificial Primer Performance.

B. Sustainability Requirement Reference: The following sustainability requirements are hereby made a part of this Section by reference thereto:
    1. High Performance Schools Exchange, Northeast Energy Efficiency Partnerships NE-CHPS, (referred to herein as “NE-CHPS”).

1.4 ADMINISTRATIVE REQUIREMENTS

A. Coordination:
    1. Coordinate work of this subcontract with that of other trades, affecting or affected by this work, and cooperate with the other trades as is necessary to assure the steady progress of work.
    2. Be responsible for establishing locations and levels for all work of this Section, except such parts as may be delivered to others and set by them. In such cases assist them in properly locating said parts.

B. Pre-Installation Meetings: At least two weeks prior to commencing fabrication work of this Section, conduct a pre-installation conference at the Project site. Comply with requirements of Section 01 31 00 - PROJECT MANAGEMENT AND COORDINATION. Coordinate time of meeting to occur prior to installation of work under the related sections named below.
    1. Required attendees: Architect, Contractor, Installer’s Project Superintendent, and representatives of other related trades as directed by the Architect or Contractor.
    2. Agenda:
        a. Scheduling of metal fabrications operations.

b. Review of staging and material storage locations.

c. Coordination of work by other trades.

d. Installation procedures for ancillary equipment.

e. Protection of completed Work.

C. Sequencing:

1. Field Measurements

a. Take field measurements before preparation of shop drawings and fabrication, where possible, to ensure proper fitting of Work.

b. Allow for adjustments within specified tolerances wherever taking of field measurements before fabrication might delay Work.

D. Scheduling:

1. Coordinate the work of this Section with the respective trades responsible for installing inserts and anchorages furnished by this Section; make arrangements for delivery, receipt and installation of inserts and anchorages to prevent delay of the Work.

1.5 SUBMITTALS

A. Information and Review Submittals: Submit the following under provisions of Section 01 33 00 - SUBMITTAL PROCEDURES:

1. Product Data: Manufacturer's complete product data and specifications for all prefabricated items, shop primer paints, liquid zinc coating, and hydraulic cements, to be furnished hereunder.

a. For epoxy anchoring systems: Furnish ICC-ES Code approvals and performance data that includes recommended loading for each application.

2. Shop Drawings, bearing registration stamp of a Professional Structural Engineer registered in State of Rhode Island.

a. General requirements:

1) Include large scale details of items of all metal fabrications to be furnished hereunder, showing proposed methods of anchorage to surrounding structure and conditions.

2) Indicate on the shop drawings all erection marks for various places of miscellaneous metals, and ensure that the actual field pieces bear corresponding marks.

3) Indicate shop built components, and field-built components.

4) Indicate and detail all field installation connections.

5) Indicate weld types and length.

6) Indicate blocking locations.

b. Include large scale details of metal fabrications supporting work of other trades.

3. Selection Samples:

a. Sample card indicating Manufacturer's full range of colors of shop applied finishes available for selection by Architect.

4. Verification Samples: Accepted samples will be used to establish the quality standard for fabrication, workmanship and finish.
    a. Factory/shop finishes: 3 inch by 6 inch samples of factory-applied coatings and colors proposed for use for approval prior to coating application.
    b. Provide minimum 24 by 24 inch (or equivalent for shapes) of fabricated and finished ornamental metal components, demonstrating the quality of fabrication work, and finish.
5. Certificates:
    a. Certificate of Compliance from Galvanizer: Submit notarized Certificate of Compliance with application for payment for galvanizing, signed by galvanizer, indicating compliance with requirements of specifications. Include scope of services provided, and quantity and itemized description of items processed.
    b. Welder's certificates as specified under Article entitled "QUALITY ASSURANCE".
6. Delegated Design Submittals: Provide calculations for loading and stresses for the work of this section, bearing the Professional Structural Engineer's seal. Show how design load requirements and other performance requirements as required by the Rhode Island State Building Code have been satisfied.
    a. Work scope requiring loading and stress calculations includes, but is not limited to the following:
        1) Stairs, intermediate landings and railings.
        2) Metal fabrications supporting work of other trades.
        3) Seismic restraints.
        4) Access ladders and roof-top ladders.
        5) Overhead supports.
        6) Areaway gratings.
7. Sustainable Design Submittals: As required by NE CHPS.

B. Closeout Submittals: Submit the following under provisions of Section 01 78 00 - CLOSEOUT SUBMITTALS.
1. Special Inspections: Submit prior to request for Certificate of Occupancy, to both Architect and local Building Official having jurisdiction, the following:
    a. All certifications, reports and programs required by the Rhode Island State Building code for work engineered by Contractor's Professional Engineer under the requirements of this Section.

1.6 QUALITY ASSURANCE

A. General: Notify the Architect where conflicts apply between referenced standards and existing materials, and existing methods of construction.

B. Exposed Fabricated Steel Elements including stairs, railings, ornamental fabrications and exposed to view fabrications shall be fabricated and finished as

Architectural Exposed Structural Steel (AESS) meeting tolerances and fabrication requirements as specified herein.

C. Qualifications:

1. Fabricator/Installer: Minimum of 5 years documented experience demonstrating previously successful work of the type specified herein, and approved by product manufacturer.
2. Welders: Utilize only qualified welders employed on the Work. Submit verification that Welder's are AWS D1.1 and D1.4 qualified within the previous 12 months.
3. Licensed Professionals: Provide the services of a Professional Structural Engineer, registered in the State of Rhode Island to design and certify that the work of this section meets or exceeds the performance requirements specified in this section and as required by the 2018 International Building Code with Rhode Island Building Code Regulation RISBC-1.
    a. Prepare Shop Drawings for under direct supervision of a same Engineer experienced in design of this work.

1.7 DELIVERY, STORAGE AND HANDLING

A. Delivery and Acceptance Requirements:

1. Do not order or deliver any materials until all submittals, required in the listed Specification Sections included as part of this Subcontract, have been received and approved by the Architect.

B. Storage and Handling Requirements:

1. Handle and store materials under cover in a manner to prevent defacement, deformation, or other damage to the materials and to shop finishes, and to prevent the accumulation of foreign matter on the metal work. All such work shall be repaired and cleaned prior to erection.

1.8 WARRANTY

A. General: Submit the following warranties under provisions of Section 01 78 00 - CLOSEOUT SUBMITTALS, and in compliance with Section 01 78 36 – WARRANTIES.

1. Warranties shall be effective starting from Date of Project Substantial Completion and are effective for specified term lengths.

B. Manufacturer's Warranty (for factory prefabricated products): In addition to the specific guarantee requirements of the GENERAL CONDITIONS and SUPPLEMENTAL GENERAL CONDITIONS, the Contractor shall obtain in the Owner's name the standard written manufacturer's guarantee of all materials furnished under this Section where such guarantees are offered in the manufacturer's published product data. All these guarantees shall be in addition to, and not in lieu of, other liabilities which the Contractor may have by law or other provisions of the Contract Documents.

C. Shop Finish Warranties:

1. General Shop-Applied-Coating Warranty: 1 year warranty coverage for flaking and blistering. Warranty excludes fabrication flaws, welding flaws, and nicks, cuts and scratches occurring after Project Substantial Completion.
2. Galvanized Steel Warranty: Provide galvanizer's standard warranty that materials will be free from 10 percent or more visible rust for 20 years.
3. Shop finished galvanized steel: Provide galvanized steel warranty plus additional 10 year gloss and color finish warranty, which includes:
    a. Fade Warranty: Loss of gloss shall not exceed 35 units of gloss which shall be measured in accordance with ASTM D523 with 60 degree geometry.
    b. Color Shift Warranty: Shall not exceed 15 Delta E CIE LAB units for whites and light colors. Dark colors shall not exceed 25 Delta E CIE Lab units as measured by ASTM D2244. (Yellows, Oranges and Reds are excluded.)

PART 2 - PRODUCTS

2.1 MATERIALS

A. General: All materials shall be new stock, free from defects impairing strength, durability or appearance, and of best commercial quality for each intended purpose. Unless specifically called for otherwise, work shall be fabricated from the following:

1. Aluminum: Provide alloy and temper recommended by aluminum producer or finisher for the type of use and finish indicated
    a. Extruded bar and shapes: ASTM B 221, alloy 6063--T6 or alloy 6463--T52.
    b. Plate and sheet: ASTM B209, alloy 6063--T6 or Alloy 3003-H14
2. Steel shapes, plates and bars: ASTM Designation A 36.
3. Steel pipe: ASTM A53, grade A, seamless pipe, black finish unless otherwise noted.
4. Stainless steel pipe: ASTM A312/A312M, Grade TP304.
5. Structural steel tubing, square and rectangular shapes: ASTM A500, Grade B.
6. Stainless steel tubing: ASTM A554, Grade MT304.
7. Steel tubular shapes: ASTM A 501.
8. Steel plates to be bent or cold-formed: ASTM A283, grade C.
9. Steel bars and bar-size shapes: ASTM A36.
10. Cold-finished steel bars: ASTM A108.
11. Galvanized carbon steel sheets: ASTM A526, with G90 zinc coating in accordance with ASTM A525.
12. Stainless steel plate and sheet: ASTM A666, Type 304.
13. Stainless steel castings: ASTM A743, Grade CF 8 or CF 20.

B. Recycled content of Ferrous Metals: Use maximum available percentage of recycled steel. Steel incorporated into the work shall contain not less than 25 percent of recycled steel.

C. Steel materials: to be hot dip-galvanized: Provide steel chemically suitable for metal coatings complying with the following requirements: Carbon below 0.25 percent, silicon below 0.24 percent, phosphorous below 0.05 percent, and manganese below 1.35 percent. Notify galvanizer if steel does not comply with these requirements to determine suitability for processing.

D. Metal surfaces, general: For metal fabrications exposed to view upon completion of the Work, provide materials selected for their surface flatness, smoothness and freedom from surface blemishes. Do not use materials whose exposed surfaces exhibit pitting, seam marks, roller marks, rolled trade names, roughness, and, for steel sheet, variations in flatness exceeding those permitted by reference standards for stretcher-leveled sheet.

E. Welding rods: AWS E70XX grade, or select in accordance with AWS specifications for the metal alloy to be welded and in accordance with the recommendation of the welding rod manufacturer.

2.2 FASTENERS

A. General: Provide all fasteners and attachments for work specified herein and as indicated on the Drawings.
   1. In general,
      a. Provide all fasteners and attachments of the same material and finish as the metal to which it is applied unless otherwise noted.
         1) Provide Type 304 stainless-steel fasteners for exterior use.
         2) Provide Type 304 stainless-steel fasteners for fastening aluminum.

B. Steel Bolts, Nuts and Washers: ASTM A307, galvanized to ASTM A153 for galvanized components.

C. Stainless-Steel Bolts and Nuts: Regular hexagon-head annealed stainless-steel type 304 bolts, nuts and, where indicated, flat washers; ASTM F 593 for bolts and ASTM F 594 for nuts, Alloy Group 1.

D. Anchor Bolts: ASTM F 1554, Grade 36.
   1. Provide hot-dip or mechanically deposited, zinc-coated anchor bolts where item being fastened is indicated to be galvanized.

E. Eyebolts: ASTM A 489.

F. Machine Screws: ASME B18.6.3.

G. Lag Bolts: ASME B18.2.1.

H. Wood Screws: Flat head, ASME B18.6.1.

I. Plain Washers: Round, ASME B18.22.1.

J. Lock Washers: Helical, spring type, ASME B18.21.1

2.3 STAIR 5 - WIRE MESH PARTITION AND HINGED DOOR

A. Mesh partition system for stairwell security closure with door, as available through Grainger, Item 35W586, model HD478RW, manufactured by Wirecrafters Inc..

1. Acceptable Manufacturers: Subject to compliance with the requirements specified herein, manufacturers offering products which may be incorporated in the work include the following, or approved equal:
   a. Wirecrafters, LLC, Louisville, KY. (Basis of Design)
   b. Alabama Metal Industries Corporation, Birmingham, AL.
   c. Banker Wire, Inc., Mukwonago, WI.
   d. Central Wire and Iron Works, Des Moines IA.
   e. Major Partitions, Tampa FL.
   f. Newark Wire Works, Edison NJ.

B. Wire Mesh Partition: Factory-assembled units that allow expansion without waste of components, complete with all components, accessories, hardware, and fasteners.

1. Style: Full mesh.
   a. Wire Mesh: 10 gauge steel wire woven into 2 inch square mesh.
2. Panel Section Width: 52 inches.
3. Panel frames bolted together and to posts at 12 inches (305 mm) on center vertically.
4. Height: As indicated on Drawings, not less than 100 inches.
5. Finish: Electrostatic sprayed enamel, gray color.
6. Door: Hinged (right or left as indicated on Drawings),
   a. Door width: 48 inches.
   b. Door Height: 87-5/8 inches.
   c. Hinges: 3 butt hinges riveted to door panel and frame.
   d. Panic Hardware and latchset: Provided under Seciton 08 71 00 – Door Hardware.

2.4 ACCESSORIES

A. Adhesive for attaching anchors and for direct pinning: high-modulus, high strength, moisture tolerant, epoxy adhesive. two-component 100 percent solids, epoxy resin complying with ASTM C 881.

1. Minimum performance properties (as cured at 70 degrees F. and 50 percent relative humidity):
   a. Minimum Compressive Strength, tested per ASTM D-695:
      1) at 3 days: 11300 psi (31.0 MPa).
      2) at 7 days: 11800 psi (44.8 MPa).
      3) at 28 days: 12200 psi (58.6 MPa).

b. Shear Strength, tested per ASTM D-732 at 14 days: 6200 psi (43 MPa)

c. Minimum Flexural Strength tested per ASTM D-790 at 14 days: 10700 psi (74 MPa).

d. Minimum Bond Strength tested per ASTM C-882 at 14 days:
   1) Plastic Concrete to Hardened Concrete 2200 psi (13.8 Mpa).
   2) Plastic Concrete to Steel 2000 psi (13.8Mpa).

e. Maximum Water Absorption, tested per ASTM D-570: 24 hour 0.27%

f. Minimum Tensile properties tested per ASTM D-638: Tensile Strength 6900 psi (48 Mpa).

2. Products which may be considered as equal include the following, or approved equal:
   a. Sika Corporation, Lyndhurst NJ., product: “Sikadur 32 Hi-Mod Gel.
   b. Simpson Strong Tie, Pleasanton, CA., product “SET High Strength Epoxy”.
   c. Symons Corporation, Des Plaines, IL., product “Rescon Gel anchor 304”.

B. Grout: Ready mixed, non-metallic high-strength controlled expansion grout of flowable consistency, conforming to ASTM C 1107 with minimum compressive strength of 8,000 pounds per square inch (55.2 MPa) at 28 days.

1. Products which may be considered as equal include the following, or approved equal:
   a. Five Star Products, Inc., Fairfield CT, product “Five Star Grout.”
   b. L&M Construction Chemicals, Omaha NE, Product: “Crystex.”
   c. Master Builders (BASF), Cleveland, OH, product “Masterflow 713”.
   d. Sika Corporation, Lyndhurst, NJ, product “SikaGrout 212”.
   e. ChemMasters, Madison, OH, product “Conset”.
   f. Allied Building Products Corp. product “Sonogrout 10K”.

C. Metal paste filler: 2 component epoxy, high strength, structural adhesive putty:

1. Products which may be considered as equal include the following, or approved equal:
   a. Abatron, Inc. Gilberts IL, product: “Ferrobond-P”.
   b. Dynatron/Bondo Corp., Atlanta, GA, product: “Bondo Plastic Filler”.
   c. U.S. Chemical & Plastics Company., Massillon OH, product “Metal filled epoxy”.

D. Liquid zinc coating, for touch-up of welds, scratches, and abrasions in galvanized steel: Low VOC organic zinc-rich coating containing 92% metallic zinc, by weight in the dried film (ASTM D520, Type III) and conforming to SSPC Paint 20, Type II, Level 1. Liquid zinc coating shall be recognized under the Component Program of Underwriter's Laboratories, Inc. as an equivalent to hot-dip galvanizing; conforming to MIL-P-21035B and SSPC Paint 29, Type II, Level I, for repair of hot-dip galvanizing and meeting the requirements for Zinc-Rich Paints.

1. VOC limit: not more than 250 g/L.

2. Specified manufacturer and product: ZRC Worldwide, Marshfield MA, product “ZRC-221”.

E. Primer for non-galvanized steel surfaces, modified alkyd rust-inhibitive, high solids primer:

1. Products which may be considered as equal include the following, or approved equal:
   a. International (Courtaulds Coatings): Interlac 260HS.
   b. Rust-Oleum: 1069 Heavy Duty Rust Inhibitive Red Primer.
   c. Sherwin Williams: Kem Flash Primer HS, Red Oxide E61R702.
   d. Tnemec: 10-99 Red Primer.
   e. Wibur & Williams (California Products Corporation): 1703 Universal Metal Primer.

2.5 FABRICATION - GENERAL

A. Metal surfaces shall be clean and free from mill scale, flake, rust and rust pitting; well formed and finished to shape and size, true to details with straight, sharp lines, and angles and smooth surfaces. Curved work shall be to true radii. Exposed sheared edges shall be eased.

B. Shop fabricate items wherever practicable, accurately fitting all parts and making all joints tight. Do not fabricate materials until all specified submittals have been submitted to, and approved by, the Architect.

C. Do all cutting, punching, drilling, and tapping required for attachment of anchor bolts and other hardware and for attachment of work by other trades. All such work shall be done prior to hot-dip galvanizing of the various components.

D. Grind all edges of bars and plates completely free from nicks and machine marks, prior to galvanizing and/or shop priming.

E. Weld all permanent connections, make all welds in a continuous manner; tack-weld only where specifically indicated on the Drawings. Grind all exposed-to-view welds completely smooth and flush to the surface plane of the base metals. Perform welding work prior to galvanizing in all cases, except where field welding is necessary, in which case, completely coat all such welds with two coats of specified liquid zinc coating, after performing grinding operations.

F. Use screws and bolts only where welding cannot be performed, of sufficient size to ensure against loosening from normal usage of miscellaneous metal items furnished hereunder.

1. Countersink all screw heads and bolt heads as far as practicable. Use not less than two screw, bolts, or other anchorage items, at each connection point.
2. Draw up all threaded connections tightly, after buttering same with pipe joint compound, to exclude water.

G. Carefully coordinate the installation of metal fabrications with the work of trades responsible for the installation of interfacing work, and for the installation of work

into the various assemblies furnished hereunder, and permit the installation of the related materials to be made at the appropriate times.

H. Fit and assemble metal fabrications in largest practical sections for delivery to site, ready for installation.

1. Galvanized assemblies: Where size of assembly is too large for galvanizing kettle, galvanize components prior to fabrication and assemble after galvanizing.

2.6 FABRICATION - STAINLESS STEEL FABRICATIONS

A. Weld and form edges, ends, and joints, by electric process, with all welded joints ground and polished smooth. Perform all welding so that no mark of any kind shall be noticed on the finished surfaces. Welds and adjoining components shall be homogenous, non-porous, free from pits, cracks, imperfections or discoloration.

1. Hammer and peen flush with adjoining surface wherever materials have been depressed or sunken by a welding operation, and, if necessary re-weld and grind to eliminate low spots.
2. Excessive distortions caused by welding will not be acceptable and shall be cause for rejection and removal from Project Site.

B. Exercise care in grinding operations to avoid excessive heating of metal and discoloration. Use iron-free abrasives, wheels and belts on stainless steel; do not use the same abrasives, wheels or belts for both steel and stainless steel. Provide a uniform and smooth final polishing with a uni-direction grain for total length of materials. Cross grains and random polishing will not be acceptable and shall be cause for rejection.

C. Provide a finish consistent throughout the work of this Section.

1. Brake ends free of open texture or orange peel appearance. Where brake work mars the finish of the materials, remove marks by grinding, polishing and finishing.
2. Shear edges free of burrs, projection or fins to eliminate all danger of laceration.
3. Neatly finish mitre joints and bullnosed corners with under edge of the material neatly ground to a uniform condition and in no case will overlapping materials be acceptable.

D. General exposed to view finish: Number 4, brushed finish.

2.7 FINISHES - HOT-DIP GALVANIZING

A. Surface preparation prior to galvanizing: Pickle steel prior to galvanizing in conformance with SSPC-SP8. Remove all rust, dirt, weld flux, weld spatter, and other foreign matter.

B. Hot-Dip Galvanizing: For steel exposed to the elements, weather or corrosive environments and other steel indicated to be galvanized, provide coating for iron and steel fabrications applied by the hot-dip process.

1. Basis-of-Design: “Duncan Galvanizing, Everett, MA., product “Duragalv.”

2. Comply with ASTM A123 for fabricated products and ASTM A153 for bolts, nuts, washers, and other rough hardware. Provide thickness of galvanizing specified in referenced standards.
3. Wherever possible, perform galvanizing after assembly of items.
4. Galvanized items shall be straightened to remove all warpage and distortion caused by the galvanization process.
5. Fill vent holes after galvanizing (if applicable), and grind smooth. Touch-up with liquid zinc coating.
6. Touch-up all breaks on hot-dip surfaces caused by cutting, welding, drilling or undue abrasion with liquid zinc coating. Apply liquid zinc by brush or spray on all damaged areas in two coats to a total dry film thickness of not less than 3 mils. Apply first coat within two hours after damage to hot-dip film to prevent undue oxidation of exposed surface. On all welds remove weld spatter by power wire brushing or equivalent before applying liquid zinc coating. Repair material should extend at least 3 inches beyond all edges of the damaged galvanized area as possible to assure continuity of galvanic protection.
7. Touch-up of galvanized surfaces with aerosol spray, silver paint, bright paint, brite paint, or aluminum paints is not acceptable.

2.8 FINISHES - SHOP APPLIED COATINGS

A. Schedule: Shop applied coatings as scheduled at end of Section and as indicated on Drawings.

B. For non-galvanized steel surfaces:
1. Surface preparation prior to priming: Thoroughly clean all steel of all loose mill scale by power wire brushing or sandblasting. Remove all rust, dirt, weld flux, weld spatter, and other foreign matter by wire-brushing or scraping (power wire-brushing, if necessary). Grind smooth any sharp projections.
2. Shop apply specified primers thoroughly and evenly on the surfaces and worked into the joints and other open areas on the surfaces. Surfaces inaccessible after assembly shall be given two coats. Dry film thickness of primer shall be not less than 2.4 mils per coat.

C. For hot-dipped galvanized steel items scheduled for field applied painted finish:
1. Touch-up all breaks on hot-dip surfaces caused by cutting, welding, drilling or undue abrasion with liquid zinc coating as specified above under the Article entitle “Hot Dip Galvanizing”.
2. Factory-Applied Primer over Galvanized Steel: Provide factory-applied prime coat, certified OTC/VOC compliant less than 2.8 lbs/gal. and conforming to EPA and local requirements. Apply primer within 12 hours after galvanizing at the same galvanizer’s plant in a controlled environment meeting applicable environmental regulations and as recommended by the primer coating manufacturer. Primer coat shall exhibit a rugosity (smoothness) not greater than 4 rug (16-20 microns of variation) when measured by a profilometer over a 1 inch straight line on the surface of architectural and structural elements that are less than 24 pounds per running foot. Profilometer shall be capable of operating in 1 micron increments. Blast cleaning of the surface is

unacceptable for surface preparation. Primer shall have a minimum two year re-coat window for application of finish coat. Coatings must meet or exceed the following performance criteria as stipulated by the coating's manufacturer:

a. Basis-of-Design: Duncan Galvanizing, Everett, MA., product "PrimerGalv".

b. Abrasion Resistance: ASTM D4060 (CS17 Wheel, 1,000 grams load).1kg load, 200 mg loss.

c. Adhesion: ASTM D4541, 1050 psi.

d. Corrosion Weathering: ASTM D5894, 13 cycles, 4,368 hours; rating 10 per ASTM D714 for blistering and rating 7 per ASTM D610 for rusting.

e. Direct Impact Resistance: ASTM D2794, 160 in. lbs.

f. Flexibility: Method: ASTM D522, 180-degree bend, 1 inch mandrel, passes.

g. Pencil Hardness: ASTM D3363, 3B.

h. Moisture Condensation Resistance: ASTM D4585, 100 degrees F, 2000 hours; passes, no cracking or delamination.

i. Dry Heat Resistance: Method: ASTM D2485, 250 degrees F.

3. Touch-up finish in conformance with manufacturer's recommendations. Provide touch-up such that repair is not visible from a distance of 6 feet.

D. For hot-dipped galvanized steel items scheduled for shop applied coating:

1. Touch-up all breaks on hot-dip surfaces caused by cutting, welding, drilling or undue abrasion with liquid zinc coating as specified above under the Article entitled "Hot Dip Galvanizing", herein above.

2. Finish: Provide factory-applied architectural coating over hot-dip galvanized steel matching approved samples.

a. Basis-of-Design: Duncan Galvanizing, Everett, MA., product "Colorgalv 10".

b. Primer coat shall be factory-applied. Apply primer within 12 hours after galvanizing and within 3 hours of surface preparation at the same facility where the galvanizing is done in a controlled environment meeting applicable environmental regulations and as recommended by the primer coating manufacturer. Primer must meet or exceed the criteria for the following categories as stipulated by the coatings manufacturer:

1) Abrasion Resistance: ASTM D4060 (CS17 Wheel, 1,000 grams load) 1kg load, 200 mg loss.

2) Adhesion: ASTM D4541, 1050 psi.

3) Corrosion Weathering: ASTM D5894, 13 cycles, 4,368 hours; rating 10 per ASTM D714 for blistering and rating 7 per ASTM D610 for rusting.

4) Direct Impact Resistance: ASTM D2794, 160 in. lbs.

5) Flexibility: Method: ASTM D522, 180 degree bend, 1 inch mandrel, passes.

6) Pencil Hardness: ASTM D3363, 3B.

7) Moisture Condensation Resistance: ASTM D4585, 100 degrees F, 2000 hours; passes, no cracking or delamination.
8) Dry Heat Resistance: Method: ASTM D2485, 250 degrees F.

c. Finish coat shall be factory-applied high performance architectural finish. Apply finish coating at the galvanizer's plant, in a controlled environment meeting applicable environmental regulations and as recommended by the finish coating manufacturer. Finish must meet or exceed the criteria for the following categories as stipulated by the coatings manufacturer:
1) Abrasion Resistance: ASTM D 4060, CS17 Wheel, 1,000 cycles 1kg load, 87.1 mg loss.
2) Adhesion: ASTM D4541, 1050 psi.
3) Direct Impact Resistance: ASTM D2794, greater than 28 in. pounds.
4) Indirect Impact Resistance: ASTM D2794, 12-14 in. pounds.
5) Dry Heat Resistance: ASTM D2485, 200 degrees F.
6) Salt Fog Resistance: ASTM B117 9,000 hours, rating 10 per ASTM D714 for blistering.
7) Flexibility: ASTM D522, 180 degree bend, 1/8 inch mandrel, passes.
8) Pencil Hardness: ASTM D3363, 2H.
9) Moisture Condensation Resistance: ASTM D4585, 100 degrees F, 1000 hours, no blistering or delamination.
10) Xenon Arc Test: ASTM D 4798, pass 300 hours.

d. Coatings shall be certified VOC compliant and conform to applicable regulations and EPA standards. Apply the galvanizing, primer and coating within the same facility and provide single-source responsibility for galvanizing, priming and finish coating. Blast cleaning of the galvanized surface is not acceptable.

3. Engage the services of a galvanizing facility which will assume single-source responsibility for galvanizing and finish coating.
a. Touch-up finish in conformance with manufacturer's recommendations. Provide touch-up such that repair is not visible from a distance of 6 feet.

E. For aluminum fabrications: Shop-applied electrostatically-applied thermoset powder coat.
1. Acceptable Manufacturers: Subject to compliance with the requirements specified herein, manufacturers offering products which may be incorporated in the work include the following, or approved equal:
a. Tiger Drylac, Reading PA.
b. PPG Powder Coatings Division, Pittsburgh PA.
c. Powder Technology, Inc., Schofield, WI.
2. Preparation Etch and epoxy prime coat:
a. Sandblast to white metal for removal of scale, oil and debris to create a minimum 2mil etching for proper adhesion.
b. Electrostatic application of epoxy powder primer and heat cure.

3. Finish Coating: Shop-applied. Polyester Triglycidyl Isocyanurate (TGIC) coating powder coating complying with AAMA 2604, in smooth Semi-Gloss finish.
    a. Characteristics and performance criteria:
        1) Gloss: 55-65° (per gardener 60°, ASTM D523).
        2) Cross hatch adhesion test (per ASTM D3359): rated 5B.
        3) Mandrel bending test (per ASTM D522) 4mm (5/32 inch).
        4) Impact test (per ASTM D2794), Up to 120 in-lb.
        5) Pencil Hardness (ASTM B3363) 2H (minimum).
        6) Humidity resistance, maximum blistering (1500 hours, ASTM D2247): 1 mm (0.04 inch).
        7) Acid salt spray resistance, maximum undercutting (1500 hours, ASTM G85): 1 mm (0.04 inch).
    b. Minimum Film Thickness, Finish Coat: 2.5-3.5 mils, dry film thickness.
    c. Color: Custom color to match Architect's control sample.

F. Field touch-up: Shall be the responsibility of the installing contractor and shall include the filling, and touch-up of exposed job made bolt or screw holes, holes for galvanizing process, and refinishing of raw surfaces resulting from job fitting, repair of job inflicted scratches and marks, and final cleaning up of the finished surfaces.
    1. Touch-up finishes shall be fully compatible with, and exactly match shop applied finish, color, texture and sheen.

PART 3 - EXECUTION

3.1 ERECTION - GENERAL

A. General: Accurately set all work to established lines and elevations, and rigidly fasten in place with suitable attachments to the construction of the building. At the completion of the work, check all work, re-adjust as required, and leave in perfect condition. Grind all exposed to view welds smooth to the touch.

B. Setting bearing and leveling plates:
    1. Clean concrete and masonry bearing surfaces of bond-reducing materials, and roughen to improve bond to surfaces. Clean bottom surface of plates.
    2. Set bearing and leveling plates on wedges, shims, or leveling nuts. After bearing members have been positioned and plumbed, tighten anchor bolts. Do not remove wedges or shims but, if protruding, cut off flush with edge of bearing plate before packing with grout.
        a. Use nonshrink grout, either metallic or nonmetallic, in concealed locations where not exposed to moisture; use nonshrink, nonmetallic grout in exposed locations, unless otherwise indicated.
        b. Pack grout solidly between bearing surfaces and plates to ensure that no voids remain.

C. Miscellaneous framing and supports: Install framing and support to comply with requirements of items being supported, including manufacturers' written instructions and additional requirements indicated on Shop Drawings.

1. Anchor supports for operable partitions, and similar products, securely to and rigidly braced to building structure.

3.2 FIELD WELDING

A. Field weld components indicated on approved shop drawings in accordance with AWS D1.1. Weld profile, quality, and finish shall be consistent with approved samples and mock-ups.

1. Welds ground smooth: . For groove welds, the weld shall be made flush to the surfaces of each side and be within + 1/16”, -0” of plate thickness.
2. Contouring and blending of welds: Where fillet welds are indicated to be ground contoured, or blended, oversize welds as required; grind to provide a smooth transition and to match profile on approved mock-up.
3. Continuous Welds: Where noted on the drawings, provide continuous welds of a uniform size and profile.
4. Minimize Weld Show Through: At locations where welding on the far side of an exposed connection occurs, grind distortion and marking of the steel to a smooth profile with adjacent material.

B. Immediately after welding, touch-up welds, burned areas and damaged surface coatings.

1. Thoroughly remove all spatter by power wire-brushing (or if inaccessible, wire brushing) per SSPC, surface preparation specification SP2 or SP3. Allow surface to cool to ambient temperature. Clean surface with solvent wipe to remove oils, grease and dirt in accordance with SSPC surface preparation specification SP1.
2. Apply one coat of liquid zinc to attain a minimum of 1.5 mils dry film thickness. Coating should extend at least two inches beyond either side of weldment to ensure complete coverage of welded area.

3.3 FIELD BOLTING

A. Accurately drive all bolts into holes, protecting the bolt heads so as not to damage the thread during the driving. Ensure that bolt heads and nuts rest squarely against the metal. Where structural members have sloping flange faces, provide approved beveled washers at the bolted connections to afford square seating for bolt heads or nuts. Nick bolt threads for unfinished bolts to prevent the nuts from backing off.

1. Bolt Head Orientation: All bolt heads shall be oriented as indicated on the contract documents. Where bolt-head alignment is specified, the orientation shall be noted for each connection on the erection drawings. Where not noted, the bolt heads in a given connection shall be oriented to one side.

B. Use an approved calibrated manual or power torque wrench to obtain the proper torque and tension as recommended by the bolt manufacturer for all ASTM F3125 bolts.

3.4 TOUCH-UP

A. Touch-up all welds, scratches, abrasions, and other surface damaged on shop-primed or painted metals, using the same coatings as specified under shop applied finishes, herein above.

3.5 SUPPLEMENTAL SCHEDULES

A. General: Items listed herein below provide further description of those already indicated in the Drawings. This list does not represent a complete list of miscellaneous metal components or types required to complete the Work.

1. Carefully review all Drawings and furnish and install metal fabrications required by the various trades, whether or not specifically listed herein, such as miscellaneous clip angles, miscellaneous steel bracketing, and other miscellaneous metal items as indicated on the Drawings, reasonably implied therefrom, or reasonably necessary for the thorough completion of the work.

B. Steel pan stair and related support components, as detailed on the Drawings and specified herein above.

C. Interior railings (guardrails and handrails), as detailed on the Drawings. Connections and sizing to conform to engineering and code requirements specified herein above.

D. Exterior railings: 1-1/4 inch (I.D.) steel pipe as detailed on the Drawings. Fabricated assemblies shall be hot-dipped galvanized, shop primed and shop finished.

1. Pipe railings: To prevent unnecessary damage to the galvanized coating by field welding, provide slip-fit method of connecting pipe railings. Fabricate pipe railing from mechanical steel tubing internally vented with holes 3/4 the size of the pipe's internal diameter.

E. Elevator pit ladders: Stringers 3/8-inch by 1-1/2 inch flat bar, rungs 3/4 inch diameter solid steel rods. Offset ladder from wall surface by 7 inches to centerline of rungs, with brackets.

1. Fabricate ladders in accordance with OSHA requirements, and ANSI A14.3 standards.

F. Exterior areaway and exterior roof access ladders (unless otherwise indicated) shall be 3 by 3/8 inches solid section continuous side rails 18 inches apart with 3/4 inch diameter solid steel bar rungs spaced 12 inches on centers with ends shouldered into side rails.

1. Fabricate ladders in accordance with OSHA requirements, and ANSI A14.3 standards.
2. Provide extended side rails at least 42 inches above top rung and return to wall or structure. Securely anchor each ladder siderail with clip angles at top, bottom and intermediate points spaced not more than 5'-0" on center. Provide 7 inches clearance from walls to centerline of rungs.
3. Fit rungs in holes drilled in side rails. Weld and grind smooth to touch. Provide rungs with non-slip top surface.

G. Elevator Sump Pit Grating: Provide either Welded Steel Grating or Pressure-Locked Steel Grating fabricated by either pressing rectangular flush-top crossbars into slotted bearing bars or swaging crossbars between bearing bars.

1. Grating Characteristics:
    a. Bearing Bar Spacing: 15/16 inches on center.
    b. Bearing Bar Depth: 1 inch.
    c. Bearing Bar Thickness: 3/16 inch.
    d. Crossbar Spacing: 4 inches on center.
    e. Traffic Surface: Plain.
    f. Steel Finish: Hot-dip galvanized with a coating weight of not less than 1.8 oz./sq. ft. of coated surface.
2. Perimeter support angles: Hot dipped galvanized steel, size as indicated on Drawings, furnished to Section 03 30 00 for embedment into concrete.

H. Elevator sill support angles: 4 by 4 inch by 3/8 inch thick, shop primed.

I. Lintels: As scheduled on Structural Drawings.

1. Provide lintels 12 inches longer than masonry openings. Where lintel abuts column, provide structural clip connection.

J. Sensory swing hook: Heavy-duty stainless steel swing hanger bearing swivel hook, with carabiner, and 360 degree movement with ball bearings. Three-hole mounting plate. Manufactured by Seleware, or approved equal.

1. Capacity: minimum 1,000 pounds.

End of Section

Section 05 51 00

METAL STAIRS AND RAILINGS

PART 1 - GENERAL

1.1 SUMMARY

A. Furnish and install:

1. Steel stairs with intermediate landing construction, complete with all supporting members and railings shop primed.
2. Interior steel handrails and guardrails, shop primed, exterior steel handrails and guardrails, galvanized and shop primed, and stainless steel handrails and guardrails.
    a. Exterior railings and guardrails are identified on Civil, Landscape and/or Architectural Drawings.

B. Furnish the following items for installation under related sections:

1. Anchors, bolts, inserts, and sleeves, required to attach miscellaneous metals for embedment into concrete under Section 03 30 00 - CAST-IN-PLACE CONCRETE.

C. Place, install and build-in, as work progresses, the following products and materials furnished under the indicated Sections:

1. Precast concrete stair treads furnished by Section 03 45 00 – PRECAST ARCHITECTURAL CONCRETE.

D. Core drill concrete stairs and ramps; grout into place railing posts.

E. Perform post-erection touch-up of shop prime coat, using the same material as shop-prime coating.

1.2 RELATED REQUIREMENTS

A. Section 01 60 00 - PRODUCT REQUIREMENTS: Listing of VOC requirements for adhesives, cleaning/maintenance materials, paints, coatings, and sealants.

B. Section 01 74 19 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL: Procedural and administrative requirements relating to recycling goals, waste management program and reporting.

C. Section 01 81 13 - SUSTAINABLE DESIGN REQUIREMENTS: Procedural and administrative requirements relating to required *Northeast CHPS Verified Program,* (NE-CHPS) Certification.

A. Section 01 81 19 – CONSTRUCTION INDOOR AIR QUALITY.

B. Section 03 30 00 - CAST-IN-PLACE CONCRETE: Installation of anchors into concrete, pouring concrete stair treads and landings.

C. Section 04 20 00 - UNIT MASONRY: Building in of anchors into masonry walls.

D. Section 05 12 00 - STRUCTURAL STEEL FRAMING: Structural steel framing members not otherwise specified hereunder.

E. Section 05 31 00 - STEEL DECKING: Metal roof deck and floor decking.

F. Section 05 40 00 - COLD-FORMED METAL FRAMING: Structural stud framing.

G. Section 05 50 00 – METAL FABRICATIONS: Decorative gusset plates, rods, clevises and turnbuckles attached to work of this Section.

H. Section 08 80 00 - GLAZING: Glass in guardrails.

I. Section 09 91 00 - PAINTING: Applied finish coatings other than those specified herein.

J. Section 09 96 00 - HIGH PERFORMANCE COATINGS: Applied high build coatings for exterior railings and other interior and exterior surfaces as indicated and scheduled.

1.3 REFERENCES

A. Referenced Standards: Comply with applicable requirements of the following standards and those others referenced in this Section, under the provisions of Section 01 42 00 - REFERENCES. The standards referenced herein are included to establish recognized minimum quality only. Where these standards conflict with other specified requirements, the most restrictive requirements shall govern. Equivalent quality and testing standards will be acceptable, subject to their timely submission, review and acceptance by the Architect.

1. ASTM A283 - Carbon Steel Plates, Shapes, and Bars.
2. ASTM A307 - Carbon Steel Externally Threaded Standard Fasteners.
3. ASTM A500 - Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Round and Shapes.
4. ASTM A53 - Hot-Dipped, Zinc-coated Welded and Seamless Steel Pipe.
5. ASTM A167 (Withdrawn Standard) - Stainless and Heat Resisting Chromium-Nickel Steel Plate, Sheet and Strip.
6. ASTM A276 –Stainless and Heat- Resisting Steel Bars and Shapes.
7. AISC - Code of Standard Practice for Steel Buildings and Bridges.
8. AISC - Specifications for the Design, Fabrication and Erection of Structural Steel for Buildings.
9. AISI - Referenced standards.
10. AWS - Standard Code for Arc and Gas Welding in Building Construction.
11. NAAMM, applicable publications.

B. Sustainability Requirement Reference: The following sustainability requirements are hereby made a part of this Section by reference thereto:

1. High Performance Schools Exchange, Northeast Energy Efficiency Partnerships NE-CHPS, (referred to herein as “NE-CHPS”).

1.4 SUBMITTALS

A. Information and Review Submittals: Submit the following under provisions of Section 01 33 00 - SUBMITTAL PROCEDURES:

1. Literature: Manufacturer's complete product data and specifications for all prefabricated items, shop primer paints, liquid zinc coating, and hydraulic cements, to be furnished hereunder.
2. Shop drawings:
    a. Include large scale details of catwalk, stairs, intermediate landings, railings, and guards bearing registration stamp of a Professional Structural Engineer registered in State of Rhode Island.
    b. Indicate on the shop drawings all erection marks for various places of miscellaneous metals, and ensure that the actual field pieces bear corresponding marks.
3. Provide calculations for loading and stresses for metal stairs, landings, railings and guards bearing the Professional Structural Engineer’s seal. Show how design load requirements and other performance requirements required by the 2018 International Building Code with Rhode Island Building Code Regulation RISBC-1 have been satisfied.
4. Quality standards sample: Fabricate a sample showing a typical handrail section demonstrating component connections. Sample section shall be minimum 18 inches in horizontal length and 12 inches in height and include a corner post. Provide a shop primed finish.
    a. Accepted sample will be used to establish the quality standard for handrail and guardrail fabrication and workmanship.
5. Sustainable Design Submittals: As required by NE CHPS.

1.5 QUALITY ASSURANCE

A. Engineering: Provide the services of a Professional Structural Engineer, registered in the State of Rhode Island to design and certify that the work of this section meets or exceeds the performance requirements specified in this section and required by the 2018 International Building Code with Rhode Island Building Code Regulation RISBC-1.

1. Prepare Shop Drawings for catwalks, stairs, handrails, and handrail brackets under direct supervision of a same Engineer experienced in design of this work.

1.6 COORDINATION

A. Be responsible for establishing locations and levels for all work of this Section, except such parts as may be delivered to others and set by them. In such cases assist them in properly locating said parts.

1.7 DELIVERY, STORAGE AND HANDLING

A. All materials under this Section shall be carefully prepared for delivery, and handled and stored under cover in a manner to prevent defacement, deformation, or other damage to the materials and to shop finishes, and to prevent the accumulation of

foreign matter on the metal work. All such work shall be repaired and cleaned prior to erection.

PART 2 - PRODUCTS

2.1 MATERIALS, GENERAL

A. All materials shall be new stock, free from defects impairing strength, durability or appearance, and of best commercial quality for each intended purpose. Unless specifically called for otherwise, work shall be fabricated from the following:

1. Steel shapes, plates and bars: ASTM Designation A 36.
2. Steel pipe: ASTM A53, grade A, seamless pipe, black finish unless otherwise noted.
3. Structural steel tubing, square and rectangular shapes; ASTM A500, Grade B.
4. Steel bars and bar-size shapes: ASTM A306, grade 65, or ASTM A36.
5. Stainless steel: ASTM A 167, non-magnetic corrosion resistant chromium-nickel steel, Type 302 or 304 (18-8 Alloy) polished to a Nº 4, brushed finish to all exposed to view surfaces, except where specified otherwise.

B. Recycled content of Ferrous Metals: Use maximum available percentage of recycled steel. Steel incorporated into the work shall contain not less than 30 percent of recycled steel.

C. Metal surfaces, general: For metal fabrications exposed to view upon completion of the Work, provide materials selected for their surface flatness, smoothness and freedom from surface blemishes. Do not use materials whose exposed surfaces exhibit pitting, seam marks, roller marks, rolled trade names, roughness, and, for steel sheet, variations in flatness exceeding those permitted by reference standards for stretcher-leveled sheet.

D. Provide all fasteners and attachments of the same material and finish as the metal to which it is applied unless otherwise noted. Provide all fasteners and attachments for work specified herein and as indicated on the Drawings.

E. Welding rods: AWS E70XX grade, or select in accordance with AWS specifications for the metal alloy to be welded and in accordance with the recommendation of the welding rod manufacturer.

2.2 ACCESSORIES

A. Grout: Ready mixed, non-metallic high-strength controlled expansion grout of flowable consistency, conforming to ASTM C 1107 with minimum compressive strength of 8,000 pounds per square inch (55.2 MPa) at 28 days.

1. Products which may be considered as equal include the following, or approved equal:
   a. Five Star Products, Inc., Fairfield CT, product “Five Star Grout.”
   b. L&M Construction Chemicals, Omaha NE, Product: “Crystex.”
   c. Master Builders, Cleveland, OH (BASF)., product “Masterflow 713”.
   d. Sika Corporation, Lyndhurst, NJ., product “SikaGrout 212”.

e. ChemMasters, Madison, OH., product “Conset”.

f. Allied Building Products Corp. product “Sonogrout 10K”.

B. Metal paste filler: 2 component epoxy, high strength, structural adhesive putty:

1. Abatron, Inc. Gilberts IL, product: “Ferrobond-P”.
2. Dynatron/Bondo Corp., Atlanta, GA, product: “Bondo Plastic Filler”.

C. Primer for non-galvanized steel surfaces, modified alkyd rust-inhibitive, high solids primer, equal to the following:

1. Rust-Oleum: 1069 Heavy Duty Rust Inhibitive Red Primer.
2. Sherwin Williams: Kem Flash Primer HS, Red Oxide E61R706.
3. Tnemec: 10-99 Red Primer.
4. California Paints: Prime Line® Primer.

D. Wall brackets (typical): Provide stainless steel wall mounts equal to The Wagner Companies, Milwaukee, WI, Model No. MB 3301W.

E. Post mount brackets (typical): Provide stainless steel post mount brackets equal to The Wagner Companies, Milwaukee, WI, Model No. MB 3301P with adaptors required for post mount.

F. Railing brackets at loading dock: 5/8 inch diameter galvanized steel bar shop primed post bracket. Wall mount bracket shall be equal to The Wagner Companies, Milwaukee, WI, Model No. “Style U”.

G. Flange canopy for post to floor conditions at stainless steel railing systems: Type 304 stainless steel flange cover with No. 4 satin finish designed to accommodate a 1-1/2 inch round tube equal to The Wagner Companies, Milwaukee, WI, Model N. “2614.4”.

H. Flange canopy for post to floor conditions at steel railing systems: Cast steel flange cover with mill finish designed to accommodate a 1 inch square tube equal to King Architectural Metals, Dallas, TX, Model No. “13-SH-1”.

2.3 FABRICATION - GENERAL

A. Metal surfaces shall be clean and free from mill scale, flake, rust and rust pitting; well-formed and finished to shape and size, true to details with straight, sharp lines, and angles and smooth surfaces. Curved work shall be to true radii. Exposed sheared edges shall be eased.

B. Shop fabricate items wherever practicable, accurately fitting all parts and making all joints tight. Do not fabricate materials until all specified submittals have been submitted to, and approved by, the Architect.

C. Do all cutting, punching, drilling, and tapping required for attachment of anchor bolts and other hardware and for attachment of work by other trades.

D. Grind all edges of bars and plates completely free from nicks and machine marks, prior to shop priming.

E. Weld all permanent connections, make all welds in a continuous manner; tack-weld only where specifically indicated on the Drawings. Grind all exposed-to-view welds completely smooth and flush to the surface plane of the base metals.

F. Use screws and bolts only where welding cannot be performed, of sufficient size to ensure against loosening from normal usage of miscellaneous metal items furnished hereunder.

1. Countersink all screw heads and bolt heads as far as practicable. Use not less than two screws, bolts, or other anchorage items, at each connection point.
2. Draw up all threaded connections tightly, after buttering them with pipe joint compound, to exclude water.

G. Carefully coordinate the installation of metal fabrications with the work of trades responsible for the installation of interfacing work, and for the installation of work into the various assemblies furnished hereunder, and permit the installation of the related materials to be made at the appropriate times.

H. Fit and assemble metal fabrications in largest practical sections for delivery to site, ready for installation.

2.4 FABRICATION – STAIRS AND RAILINGS

A. Refer to the Drawings for location and details of steel stairs and handrails to be furnished and installed hereunder.

1. Verify heights shown in Drawings comply with referenced codes and regulations.

B. Stair and railing performance requirements; conform to all requirements of those codes and regulations referenced under Section 01 41 00 - REGULATORY REQUIREMENTS.

1. Stairs: Design, fabricate and install stairs to safely support a minimum live load of 100 pounds per square foot and a concentrated load of 300 pounds on any area of four square inches required under Section 1607 of the *International Building Code*, 2018 edition, with *RHODE ISLAND BUILDING CODE*, Regulation RISBC-1 amendments.
2. Railings: Design, fabricate and install all railings in a manner which will ensure the railings will be capable of withstanding loads as follows and required under Section 1607 of the *International Building Code*, 2018 edition, with *RHODE ISLAND BUILDING CODE*, Regulation RISBC-1 amendments.
    a. Resist a load of 50 pounds per linear foot (0.73 kN/m) applied in any direction at the top and to transfer load through railing supports to structure.
    b. Resist a single concentrated load of 200 pounds (0.89kN) applied in any direction at any point along the top, and to transfer load through railing supports to structure. Concentrated loading requirements are not concurrent with other loading requirements.
    c. Intermediate rails, balusters and panel fillers shall resist a horizontally applied load of 50 pounds (0.89 kN) on an area equal to 1 square foot (.093m2), including openings and space between rails. Reactions due

to this loading are not required to be superimposed with loadings specified for top rail.

C. Sizes of all headers, stringers, and other structural members; and gauges and configurations of all riser tread and landing plates and pans, handrails, stringers, and posts shall be as indicated on the approved shop drawings, and in accordance with the standards of the National Association of Architectural Metal Manufacturers.

2.5 FABRICATION – STAINLESS STEEL

A. Weld and form edges, ends, and joints, by electric process, with all welded joints ground and polished smooth. Perform all welding so that no mark of any kind shall be noticed on the finished surfaces. Welds and adjoining components shall be homogenous, non-porous, free from pits, cracks, imperfections or discoloration.

1. Hammer and peen flush with adjoining surface wherever materials have been depressed or sunken by a welding operation, and, if necessary re-weld and grind to eliminate low spots.
2. Excessive distortions caused by welding will not be acceptable and shall be cause for rejection and removal from Project Site.

B. Exercise care in grinding operations to avoid excessive heating of metal and discoloration. Use iron-free abrasives, wheels and belts on stainless steel; do not use the same abrasives, wheels or belts for both steel and stainless steel. Provide a uniform and smooth final polishing with a uni-direction grain for total length of materials. Cross grains and random polishing will not be acceptable and shall be cause for rejection.

C. Provide a finish consistent throughout the work of this Section.

1. Brake ends free of open texture or orange peel appearance. Where brake work mars the finish of the materials, remove marks by grinding, polishing and finishing.
2. Shear edges free of burrs, projection or fins to eliminate all danger of laceration.
3. Neatly finish mitre joints and bullnosed corners with under edge of the material neatly ground to a uniform condition and in no case will overlapping materials be acceptable.

2.6 SHOP APPLIED COATINGS

A. Thoroughly clean all steel of all loose mill scale by power wire brushing or sandblasting. Remove all rust, dirt, weld flux, weld spatter, and other foreign matter by wire-brushing or scraping (power wire-brushing, if necessary). Grind smooth any sharp projections.

B. Shop apply specified primers thoroughly and evenly on the surfaces and worked into the joints and other open areas on the surfaces. Surfaces inaccessible after assembly shall be given two coats. Dry film thickness of primer shall be not less than 2.4 mils per coat.

C. Hot-Dip Galvanizing:

1. Provide coating for iron and steel fabrications applied by the hot-dip process. Comply with ASTM A 123 for fabricated products and ASTM A 153 for bolts, nuts, washers, and other rough hardware. Provide thickness of galvanizing specified in referenced standards.
    a. Wherever possible, perform galvanizing after assembly of items.
    b. Galvanized items shall be straightened to remove all warpage and distortion caused by the galvanization process.
    c. Touch-up all breaks on hot-dip surfaces caused by cutting, welding, drilling or undue abrasion with liquid zinc coating as specified herein above. Apply liquid zinc by brush or spray on all damaged areas in two coats to a total dry film thickness of not less than 3 mils. Apply first coat within two hours after damage to hot-dip film to prevent undue oxidation of exposed surface. On all welds remove weld spatter by power wire brushing or equivalent before applying liquid zinc coating. Repair material should extend at least 3 inches beyond all edges of the damaged galvanized area as possible to assure continuity of galvanic protection.
    d. Touch-up of galvanized surfaces with aerosol spray, silver paint, bright paint, brite paint, or aluminum paints is not acceptable.
2. Liquid zinc coating, for touch-up of welds, scratches, and abrasions in galvanized steel: Low VOC organic zinc-rich coating containing 92% metallic zinc, by weight in the dried film (ASTM D520, Type III) and conforming to SSPC Paint 20, Type II, Level 1. Liquid zinc coating shall be recognized under the Component Program of Underwriter's Laboratories, Inc. as an equivalent to hot-dip galvanizing; conforming to MIL P 21035B and SSPC Paint 29, Type II, Level I, for repair of hot-dip galvanizing and meeting the requirements for Zinc-Rich Paints.
    a. VOC limit: not more than 250 g/L.

D. Powder coat finishes:
1. Powder coating epoxy coating, as manufactured by TIGER Drylac, Reading PA, Product Special Series 49 in smooth low-semi-gloss finish or approved equal.
    a. Film Thickness: 2.5-3.5 mils, dry film thickness.
    b. Gloss: 36-54° (per gardener 60°, ASTM D523).
    c. Cross hatch adhesion test (per ASTM D3359): rated 5B.
    d. Mandrel bending test (per ASTM D522) 5mm (3/16 inch).
    e. Impact test (per ASTM D2794), Up to 120 in-lb.
    f. Pencil Hardness (ASTM B3363) 2H (minimum).
    g. Humidity resistance, maximum blistering (1500 hours, ASTM D2247): 1 mm (0.04 inch).
    h. Acid salt spray resistance, maximum undercutting (1500 hours, ASTM G85): 1 mm (0.04 inch).
2. Minimum Film Thickness, Finish Coat: 2.5-3.5 mils, dry film thickness.
    a. Color: Custom color to match Architect’s control sample.

b. Field touch-up: Shall be the responsibility of the installing contractor and shall include the filling, and touch-up of exposed job made nail or screw holes, refinishing of raw surfaces resulting from job fitting, repair of job inflicted scratches and marks, and final cleaning up of the finished surfaces.

3. Acceptable Manufacturers: Subject to compliance with the requirements specified herein, manufacturers offering products which may be incorporated in the work include the following, or approved equal:
   a. TIGER Drylac, Reading PA.
   b. PPG Powder Coatings Division, Pittsburgh PA.
   c. Powder Technology, Inc., Schofield, WI.

PART 3 - EXECUTION

3.1 ERECTION

A. Accurately set all work to established lines and elevations, and rigidly fasten in place with suitable attachments to the construction of the building. At the completion of the work, check all work, re-adjust, and leave in perfect condition. Grind all exposed to view welds smooth to the touch.

B. Construct and install stairs in strict accordance with the details, the approved shop drawings, and requirements of all codes, laws, and ordinances bearing on the work.
   1. Pipe rails set in exposed concrete surfaces shall be grouted with expanding grout. Hole to receive pipe shall be formed with galvanized sheet metal sleeve and provide at least 1/2 inch clearance around entire perimeter. Hold expanding grout back 1/2 inch from finish surface and fill void with Portland cement grout to match color and texture of adjacent surface.

3.2 FIELD WELDING

A. Field weld components indicated on Shop Drawings in accordance with AWS D1.1.

B. Immediately after welding, touch-up welds, burned areas and damaged surface coatings.
   1. Thoroughly remove all spatter by power wire-brushing (or if inaccessible, wire brushing) per SSPC, surface preparation specification SP2 or SP3. Allow surface to cool to ambient temperature. Clean surface with solvent wipe to remove oils, grease and dirt in accordance with SSPC surface preparation specification SP1.
   2. Touch-up all welded areas using the same coatings as specified under the Article titled Shop Applied Finishes.

3.3 FIELD BOLTING

A. Accurately drive all bolts into holes, protecting the bolt heads so as not to damage the thread during the driving. Ensure that bolt heads and nuts rest squarely against the metal. Where structural members have sloping flange faces, provide approved

beveled washers at the bolted connections to afford square seating for bolt heads or nuts. Nick bolt threads for unfinished bolts to prevent the nuts from backing off.

3.4 TOUCH-UP

A. Touch-up all scratches, abrasions, and other surface damaged on shop-primed or painted metals, using the same coatings as specified under shop applied finishes, herein above.

End of Section

Section 06 10 00

ROUGH CARPENTRY

PART 1 - GENERAL

1.1 SUMMARY

A. The work of this Section consists of rough carpentry where shown on the Drawings, as specified herein for a complete and proper installation. Work includes, but is not limited to the following.

B. Furnish and install the following:

1. Fire retardant treated plywood backer panels for mounting of electrical panelboards, telephone/data backboards, HVAC and fire control equipment and other equipment.
2. Plywood wall sheathing at interior walls and partitions as blocking for lockers.
3. Wood sleepers and plywood subflooring for stage flooring.
4. Various wood blockings, edgings, nailers, curbs, cants, grounds, furring, sheathing, framing members including wood preservative, for receipt of various finishes and surfacing materials, not described herein above.
    a. Provide wood blocking for all Owner Furnished and Installed (OFI) toilet accessories refer to Section 01 10 00 – SUMMARY for list of OFI accessories
5. Rough installation hardware, including bolts, screws, spikes, nails, clips, and connection assemblies, as needed for installation of the rough carpentry work.

C. Install the following furnished under the designated Sections:

1. Metal door frames furnished under Section 08 11 13 - HOLLOW METAL DOORS AND FRAMES.
    a. Place frames and erect in correct positions within specified tolerances. Additionally provide temporary bracing at locations where frames are indicated to be built-into masonry. Section 04 20 00 - UNIT MASONRY shall grout frames and “build-into” into masonry work.
2. Concealed anchorage devices for handicap handrails in toilet rooms: Section 10 28 13 - TOILET ACCESSORIES and all Owner Furnished and Installed toilet accessories.

D. Coordinate work of this Section with the work of the various trades responsible for applying finish materials and other items to rough carpentry work. Furnish and install furring, blocking, and shims, and other usual items of normal rough carpentry work by the various trades for the proper completion of the project.

1. The applicable requirements specified in Part 1 - GENERAL and Part 3 - EXECUTION of the individual specification sections furnishing materials to be installed under this Section, shall be included in and made a part of this Section.

E. No attempt is made in this Section to list all elements of rough carpentry required on this project or to describe how each element will be installed. It is the responsibility of the Contractor to determine for itself the scope and nature of the work required for a complete installation from the information provided herein and in the Drawings.

1.2 RELATED REQUIREMENTS

A. Section 01 43 39 - MOCKUPS: Requirements for exterior wall mock-up assembly requiring work of this Section.

B. Section 01 60 00 - PRODUCT REQUIREMENTS: Listing of VOC requirements for adhesives, cleaning/maintenance materials, paints, coatings, and sealants.

C. Section 01 74 19 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL: Procedural and administrative requirements relating to recycling goals, waste management program and reporting.

D. Section 01 81 13 - SUSTAINABLE DESIGN REQUIREMENTS: Procedural and administrative requirements relating to required *Northeast CHPS Verified Program,* (NE-CHPS) Certification.

E. Section 04 20 00 - UNIT MASONRY: Building-into masonry hollow metal door frames, placed and braced under this Section 06 10 00 - ROUGH CARPENTRY.

F. Section 06 20 00 - FINISH CARPENTRY: Wood interior and exterior trim.

G. Section 07 62 00 - SHEET METAL FLASHING AND TRIM: Flashing, gutters and miscellaneous sheet metal work.

H. Section 08 11 13 - HOLLOW METAL DOORS AND FRAMES: Furnishing hollow metal framing.

I. Section 09 91 00 - PAINTING: Applied primer and finish coatings to exposed to view rough carpentry work.

J. Section 10 28 13 - TOILET ACCESSORIES: Providing anchorage devices and mounting templates for toilet accessories.

K. Division 26 - ELECTRICAL: Providing and mounting electrical panels and equipment.

1.3 REFERENCES

A. Referenced Standards: Comply with applicable requirements of the following standards and those others referenced in this Section, under the provisions of Section 01 42 00 - REFERENCES. The standards referenced herein are included to establish recognized minimum quality only. Where these standards conflict with other specified requirements, the most restrictive requirements shall govern. Equivalent quality and testing standards will be acceptable, subject to their timely submission, review and acceptance by the Architect.

1. APA - applicable grades and specifications.
2. APA PRB-108 Performance Standards and Policies for Structural-Use Panels.

3. ANSI A250.11 (formerly SDI 105) - Recommended Erection Instructions for Steel Doors and Frames.
4. AWPA Standards and references for preservative treated wood including Standards UC1, UC2, UC3A, UC3B, UC4A, and P5
5. AWPA Standard UCFA – Fire Protection Required by Codes Above Ground Interior Construction.
6. AWPA Standard UCFB – Fire Protection Required by Codes Above Ground Exterior Construction.
7. AWPA M4 – Care Of Preservative Treated Wood Products.
8. FSC (Forest Stewardship Council): “FSC Certification Program”
9. NER-643: ACQ Preserve® and ACQ Preserve Plus® Wood Preservative Treatment, ICBO Evaluation Service.
10. SDI 122 - Installation and Troubleshooting Guide for Standard Steel Doors and Frames.
11. SPIB Grading Rules, current edition.
12. UL - Building Materials Directory.
13. US. Department of Commerce Voluntary Product Standard PS1 for Construction and Industrial Plywood.
14. US. Department of Commerce Voluntary Product Standard PS2 for Wood-Based Structural-Use Panels.
15. US. Department of Commerce Voluntary Product Standard PS-20 - American Softwood Lumber Standard.
16. U.S. Department of Commerce Simplified Practice Recommendation R-16, for sizes and use classifications of lumber.
17. American Lumber Standards Committee, National Lumber Grades Authority for Canadian Lumber, and applicable grading rules and standards of the various lumber associations whose species are being used for grades specified.

B. Sustainability Requirement Reference: The following sustainability requirements are hereby made a part of this Section by reference thereto:
   1. High Performance Schools Exchange, Northeast Energy Efficiency Partnerships NE-CHPS, (referred to herein as “NE-CHPS”).

1.4 ADMINISTRATIVE REQUIREMENTS

A. Coordination:
   1. Coordinate the work of this Section with the respective trades responsible for locating anchorages installed into blocking which is provided under this Section.
   2. Coordinate work of this Section with the work of the various trades responsible for applying finish materials and other items to rough carpentry work, and ensure that the work performed hereunder is acceptable to such trades for the installation of their work.

1.5 SUBMITTALS

A. Information and Review Submittals: Submit the following under provisions of Section 01 33 00 - SUBMITTAL PROCEDURES:

1. Product Data: Manufacturer's product data sheets, specifications, performance data, physical properties and installation instructions for products specified herein.
2. Certificates: Wood products lacking acceptable documentation for the following will be rejected and their removal required.
3. Certificates: Wood products lacking acceptable documentation for the following will be rejected and their removal required.
    a. Chain-of-Custody: Written documentation providing evidence of compliance with Chain-of-Custody supply of wood products, and compliance with FSC standards. (LEED Credit MRc7).
        1) Demonstrate that products are FSC-certified by providing vendor invoices. Invoices will contain the vendor’s chain of custody number and identify each chain of custody certified product on a line-item basis. A “vendor” is defined as the company that furnishes wood products to project contractors and/or subcontractors for on-site installation.
    b. Composite Wood and Agrifiber Products: Include certification indicating compliance with the testing and product requirements of the California Department of Health Services Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers, including 2004 Addenda for all composite wood and agrifiber products. (LEED Credit IEQc4.4).
    c. Written certification from the respective treatment plants indicating types of wood preservative treatment and fire-retardant treatment used, treatments method, applications instructions, and conformance to the requirements specified herein.
        1) Provide certification that fire retardant treatment materials do not contain ammonium phosphate.
        2) Provide report from ICC Evaluation Service on fire retardant treated wood flame spreading, strength, corrosion and hygroscopic properties.
        3) Provide report from ICC Evaluation Service on pressure preservative treated wood strength, corrosion, anti-fungi, and anti-insect properties.
4. Sustainable Design Submittals: As required by NE CHPS.

1.6 QUALITY ASSURANCE

A. General: Notify the Architect where conflicts apply between referenced standards, specified materials, and methods of construction.

1. All lumber shall:
    a. Be new, dressed four sides (S4S), clear and free from warping and other defects.

b. Have a moisture content not exceeding 19 percent when delivered to the project.

c. Be in accordance with the grading rules of the lumber manufacturer's association under whose jurisdiction the lumber is produced and bear the mark of grade and mill identification.

B. Certifications:

1. Plywood: Conform to the requirements of Product Standard PS-1, and bear applicable APA grade trademarks.

a. Plywood for electrical boards treated for retardance, meet Class I or a flame spread rating of 25 or less and bear U.L. label "Classified FRS".

2. All wood products furnished under this Specification Section shall be “FSC Certified” according to the rules of the Forest Stewardship Council (FSC).

a. FSC Certification includes the following certification bodies of forests and forest products:

1) Certification Systems.
2) SmartWood.
3) SGS Qualifor.
4) Soil Association.

1.7 MOCK-UP

A. Provide mock-up elements for field panel in accordance with Section 01 43 39 – MOCKUPS at exterior location where directed by Architect. Mock-up will demonstrate quality of work, construction methods, relationship to other work.

1.8 PRE-INSTALLATION CONFERENCE

A. Installer of the Work of this Section is required to attend pre-installation conference specified under Section 05 40 00 – COLD-FORMED METAL FRAMING.

1.9 DELIVERY, STORAGE AND HANDLING

A. Storage and Handling Requirements:

1. Protect wood materials from damage due to moisture, direct sunlight, excessive temperatures, surface contamination, corrosion and damage from construction operations and other causes.

2. Store materials in an elevated dry location, protected by waterproof coverings.

PART 2 - PRODUCTS

2.1 BOARD AND SHEET MATERIALS

A. Sustainable Forest Certification: All wood shall be “Chain-of-Custody” certified as FSC Certified.

B. Framing lumber for Shop workstations and stage floor sleepers: No. 1 Spruce/Pine/Fir (SPF), or No. 1 Southern Pine, Grade-stamped S-Dry or other

surface dried wood species, Number 2 grade or better having a minimum bending stress Fb of 875 PSI and modulus of elasticity E not less than 1200 KSI.

C. Lumber for blocking, nailers and curbs as indicated or required: Hem-Fir, Douglas Fir, Eastern Spruce, Eastern Hemlock, or Southern Pine, surfaced dried stud or utility grade. Wood members shall be of sizes indicated on the Drawings or of the same size as the members being braced.

1. For blocking and nailers used for attachment of other construction, select and cut lumber to eliminate knots and other defects that will interfere with attachment of other work.
2. For furring strips for installing plywood or hardboard paneling, select boards with no knots capable of producing bent-over nails and damage to paneling.
3. Provide fire retardant treated wood blocking as indicated on the Drawings. At exterior locations provide wood blocking with preservative treatment rated for exterior conditions in addition to fire retardant treatment.

D. Furring: Nominal 1 by 3 inches or 1 by 4 inches Douglas Fir, Eastern Spruce, Eastern Hemlock, or Southern Pine, surfaced dried construction grade.

E. Plywood and sheet products:

1. Plywood sheathing: APA GRADE A-B, 1/4 inch (6.4 mm) thick, 5 ply/5 layer plywood.
2. Plywood sheathing: APA GRADE A-B, 1/2 inch (12.7 mm) thick, 5 ply/5 layer plywood.
3. Plywood sheathing: APA GRADE A-B, 5/8 inch (15.9 mm) thick, 5 ply/5 layer plywood.
4. Plywood sheathing: APA GRADE A-B, 3/4 inch (19.1 mm) thick, 5 ply/5 layer plywood.
5. For wall sheathing behind lockers where indicated: Square edge APA graded CDX EXT, touch-sanded, 5/8 inch thick, except as otherwise indicated on the Drawings
6. Stage floor subflooring: 3/4 inch (19.1 mm) thick having a minimum span rating 48/24, APA RATED SHEATHING, STRUCTURAL 1, exposure durability classified, EXPOSURE 1, touch-sanded.
7. For electric panel board mountings and similar uses: APA graded B-D INT, Group 2 species, touch-sanded, fire-retardant treated, 3/4 inch thick, except as otherwise indicated on the Drawings.
8. For unspecified interior concealed from view locations: APA graded C-D PLUGGED INT, Group 2 species, thickness as indicated on the Drawings.
9. For unspecified exterior locations: APA RATED SHEATHING, STRUCTURAL 1, exposure durability classified, EXPOSURE 1, pressure preservative treated, thickness as indicated on the Drawings.

2.2 WOOD TREATMENTS

A. Treated wood products shall be produced by a single treatment plant, fully licensed by the chemical manufacturers, and conforming to the requirements specified herein.

1. Toxicity and Environmental Quality:
    a. Products containing chromium will not be permitted.
    b. Products containing arsenic will not be permitted.
    c. Fire-retardant-treated wood products shall be free of halogens, sulfates, ammonium phosphate and formaldehyde.
2. Dye wood or otherwise color code all treated wood at treatment plant to clearly distinguish the different treatments in the field.
3. Kiln dry all treated lumber and plywood to the following maximum moisture content after treatment.
    a. Lumber: 19 percent.
    b. Plywood 15 percent.
    c. Discard pieces with defects which might impair quality of work.
4. Quality marks: Each piece of lumber and plywood shall be permanently affixed with a quality mark, containing the following information:
    a. Identification of the inspection agency.
    b. Standard to which material was treated.
    c. Identification of the treating plant.
    d. Fire retardant treated wood shall include: stamp signifying a FR-S rating
    e. Preservative treated wood shall include: Retention and end use for which product is suitable.

B. Fire retardant treated wood. Designated as “FRTW”

1. Chemical Manufacturer: Subject to compliance with the requirements specified herein, Products which may be incorporated in the work include:
    a. Hickson Corporation, product, “Dricon”.
    b. Osmose, Inc., Griffin GA., product “FirePro”.
    c. Hoover Treated Wood Products, Inc., product “PyroGuard”.
    d. Viance, LLC., Charlotte, NC, product: “D-Blaze FRT”.
2. Fire retardant treated wood shall comply with the following requirements:
    a. All fire-retardant lumber and plywood must have an Underwriters Laboratories stamp signifying a FR-S rating certifying a 25 or less flame spread and smoke developed value, when tested in accordance to ASTM E-84, or UBC Standard No. 42-1.
    b. Corrosion rates: Less than one mil per year for carbon steel, galvanized steel, aluminum, copper and red brass in contact with the fire retardant treated wood when tested in accordance with Federal Specification MIL-L-19140E Paragraph 4.6.5.2.

c. The fire retardant treated wood must have an equilibrium moisture content of not more than 25 percent when tested in accordance with ASTM D 3201 procedures at 95 percent relative humidity and 80 degrees Fahrenheit.

d. Fire retardant chemical: Registered for use as a wood preservative by the U.S. Environmental Protection Agency.

e. Testing: Fire performance and strength properties for both lumber and plywood, of the fire retardant treated wood shall be recognized by issuance of an ICC Evaluation Service Report. Fire retardant chemical must not damage the middle lamella of the wood structure when exposed to 170 degrees Fahrenheit and 90 percent relative humidity for 23 days.

C. Pressure preservative treated wood. Designated as “PT”

1. Pressure treatment of wood products shall conform to the requirements of AWPA Standards U1 and T1.

a. Fixation of Chemical: Treated wood shall not be shipped from treatment plant until fixation of the preservative has occurred in the wood.

2. Retention of preservatives: Minimum Retention values pounds per cubic foot (pcf) shall be as prescribed in AWPA Standard U1 for the following Use Categories, (material conforming to a higher AWPA Use Category may be used).

a. UC1: Interior construction - above ground, protected conditions, includes but is not limited to: interior stud framing and baseboards

b. UC2: Interior construction - above ground, damp conditions, includes but is not limited to: interior sills, bottom plates, damp locations, basement framing, bathrooms, and flooring nailers/blocking.

c. UC3A: Exterior construction - above ground ‘protected’, coated and with rapid water runoff, includes but is not limited to: wood blocking related to roofing.

d. UC3B: Exterior construction - above ground ‘exposed’, uncoated or poor water runoff, includes, but is not limited to: wood shakes, exterior stairs, exterior joists, beams, decking, railings and fence boards.

e. UC4A: General purpose soil or fresh water contact - heavy duty above ground, includes, but is not limited to: fencing, decking structural posts, ledgers, retain walls, garden boxes, all wood within 6 inches of soils.

f. UC4B: Heavy duty soil or fresh water contact - critical or difficult to replace components, includes, but is not limited to: in ground posts, retaining walls, wood foundations and supports, freshwater contact, saltwater spray.

g. UC4C: Extreme duty soil or fresh water contact - critical structural components, includes, but is not limited to in ground in direct contact pilings, posts, in direct contact with concrete, freshwater, or extreme weather exposure.

3. Pressure preservative treatment products include the following:

a. Ammoniacal Copper Quaternary Compound (ACQ) Treatment: arsenic-free and chromium-free chemical “ACQ Preservative” in compliance with AWPA Standards. Apply the preservative in a closed cylinder by pressure process in accordance with AWPA Standard C15.
   1) Chemical Manufacturer: Subject to compliance with the requirements specified herein, Products which may be incorporated in the work include:
      a) Osmose, Inc., Griffin GA., product “NatureWood”.
      b) Flameproof Companies., Montgomery, IL, product: “ACQ Preserve”.
      c) Universal Forest Products, Inc., Grand Rapids MI., product “ProWood ACQ”.
      d) Viance, LLC., Charlotte, NC., product “Preserve”

b. Micronized Copper Wood Preservative (MCA, MCA-C) Treatment: arsenic-free and chromium-free chemical, waterborne micronized copper azole or preservative in compliance with AWPA Standards,
   1) Chemical Manufacturer: Subject to compliance with the requirements specified herein, Products which may be incorporated in the work include:
      a) Culpepper, Lancaster, MA., product “Micropro”.
      b) UFP Industries, Auburn, MA., product: ”Prowood.”
      c) Koppers Performance Chemicals, Griffin, GA., product MicroPro.”
      d) Great Souther Wood Preserving, Abbevie AL., product: “Yellawood.”
      e) Arxada, Alpharetta, GA, “Wolmanized” Brand, Product: “Wolman E”.

2.3 ACCESSORIES

A. Adhesives:
   1. General: Provide adhesives approved which are Low-VOC or non-VOC, non-flammable, water resistant after cured, odor free.
   2. Adhesive for lamination and fabrication of wood and plywood items: Exterior adhesives containing no urea formaldehydes, having a VOC limit of 70 g/L.

B. Nails (interior and exterior): Galvanized common nails, of size and type to suit application and required by state and local building codes.

C. Screws:
   1. Screws for interior applications: Flat head electroplated-galvanized wood screws of the appropriate sizes.
   2. Screws for exterior applications:
      a. For pressure preservative treated wood: Flat head stainless steel, wood screws, of the appropriate sizes. Aluminum and coated metals are prohibited.

b. For general application (non-pressure preservative treated wood): Flat head hard aluminum, or stainless steel, wood screws, of the appropriate sizes.

D. Anchor bolts, expansion bolts and lag screws: Hot-dipped galvanized steel, of the following types:

1. For lumber having actual thickness of 1-1/2 inches or greater to masonry and concrete: Anchor bolts or expansion bolts, as most applicable for the specific receiving surface material, 3/8-inch minimum diameter, spaced as shown on drawings, and staggered as far as practicable. Countersink all bolt heads, and provide head washers of matching material.
2. For lumber having actual thickness of greater than 7/8-inch but less than 1-1/2 inches to masonry and concrete: Anchor bolts or expansion bolts, as most applicable for the specific receiving surface material, at least 1/4-inch diameter of the most appropriate lengths for the specific application, spaced as shown, and staggered as far as practicable. Countersink all bolt heads, and provide head washers of matching material.
3. For lumber having actual thickness of 7/8-inch and less: Anchor bolts or expansion bolts, at least 1/4-inch in diameter; or screws, of the most appropriate sizes; in lengths most suitable for the specific application, countersunk, spaced, and staggered.

E. Protection paper: Canadian red-rosen paper or kraft paper.

PART 3 - EXECUTION

3.1 PREPARATION

A. All materials shall be inspected before use, with all checked, split and otherwise deficient stock rejected, or used only for miscellaneous blocking, furring or other incidental use. The Contractor shall be responsible for replacing all lumber which, due to warpage, twist, splitting, or checking, results in unsatisfactory work. Such replacement shall be required at any time, whether before or after application of finish material under other Sections.

B. Verify exact locations of toilet accessories, door stops and similar items with Architect prior to installation of blocking for accessories.

3.2 INSTALLATION - GENERAL

A. Closely coordinate the installation of the rough carpentry work with the work of other trades responsible for the installation of interfacing or overlaying materials, so as not to delay the work of the related trades.

B. Erect all rough carpentry work plumb, level, and true with tight, close fitting joints, securely attached and braced to surrounding construction, all in a first class workmanlike manner. Counterbore for bolt heads, nuts, and washers where required to avoid interference with other materials. Bear complete responsibility for structural integrity, connections, and anchorage of all rough carpentry work.

C. Make provisions for erection loads, and for sufficient temporary bracing to maintain structure safe, plumb, and in true alignment until completion of erection and installation of permanent bracing.

D. Use as long lengths as practicable for wood nailers, blockings, and curbs, to minimize number of joints, and attach the members with the types, and spacing, of fasteners specified herein.

E. Install blocking, grounds and furring, for proper attachment of the work of other trades, in accordance with the requirements provided by the respective related trades.

1. Spacing for furring and strapping shall not exceed 16 inches on center.

F. Field cuts of fire retardant treated lumber: Do not rip or mill fire retardant treated lumber. Only end cuts, drilling holes and joining cuts are permitted.

G. Field cuts of ACQ pressure-treated lumber: Apply solution of copper naphthenate containing a minimum of 2 percent metallic copper in-solution, in accordance with AWPA standard M4. Brush liberally all cuts and holes.

H. Install concealed from view plywood with specified fasteners spaced not more than 10 inches on centers.

I. Install fire-treated plywood backer boards with counter-sunk galvanized fasteners, of specified sizes, spaced not more than 12 inches on centers.

3.3 INSTALLATION - ROOF NAILERS AND BLOCKING

A. General: Provide anchorage for nailers for roof and edging, coordinate requirements with Section 07 53 23 – ETHYLENE PROPYLENE DIENE MONOMER (EPDM) ROOFING.

1. Comply with requirements of Factory Mutual Loss Prevention Data Sheet 1-49 for securement of wood blocking, corner enhancements, fastener layout and spacing as applicable to the work.
2. Secure nailers and blocking to metal deck with electro-galvanized screws at not greater than 12 inch on center spacing, extending a minimum of 3/4-inch below deck.
3. Secure nailers and blocking to wood substrates with electro-galvanized screws at not greater than 12 inch on center spacing, extending a minimum of 1-1/2 inch into board substrates and 3/4 inches into sheet materials.

B. When building up layers of nailers and blocking, fully secure each layer to at least the one below, alternating location of fasteners, spacing at 12 inches on center. Provide fasteners in lengths to penetrate through more than one substrate layer of blocking. Stagger locations of butt ends of boards, such that no two joints are “lined up”.

1. Provide wood shims at fastener locations at all sloped blocking.

C. Ensure finished height of nailers is same as top surface of roof insulation within 1/4-inch, plus or minus.

3.4 INSTALLATION – EQUIPMENT BACKBOARDS

A. Provide panel mounting backboards for HVAC, Fire Prevention, Electrical and telephone/data equipment. Fabricate panels using fire-retardant treated 3/4 inch thick panels mounted to fire-retardant treated 2 by 4's. Provide a nominal space of 3-1/2 inches behind panels to permit wiring.

3.5 INSTALLATION - METAL DOOR FRAMES

A. Place in position all steel frames, furnished under Section 08 11 13 - HOLLOW METAL DOORS AND FRAMES, in accordance with the approved shop drawings and frame schedule.

1. During the installation of metal door frames, after the manufacturer's steel spreader bar has been removed, install wood spreaders at door opening, carefully dimensioned to permit square, true installation of door frames and doors.
2. Spreaders and bracing shall remain in place until doors are installed.

B. Coordinate installation of frames with the various trades installing abutting wall construction for anchor placement.

1. Place, erect and level all frames into correct scheduled locations, including those in masonry partitions.
2. Provide temporary spreaders and bracing for door frames to be installed into masonry partitions. Maintain frame position with temporary bracing until frames are built-into-place under Division 4 - MASONRY.

C. Coordinate installation of frames with installation of hardware under Section 06 20 00 - FINISH CARPENTRY and as furnished under Section 08 71 00 - DOOR HARDWARE.

D. Install frames in accordance with the manufacturer's recommendations, ANSI/SDI-100, SDI-105, and the Door Hardware Institute (DHI) recommendations.

1. Provide rigid temporary bracing for frames to ensure maintenance of positioning, and remove only after frames have been permanently anchored.
2. Where exposed fastener heads occur in frames, fill with automotive body filler and sand smooth.

3.6 TOLERANCES

A. Door frames: Maximum diagonal distortion 1/16 inch measured with straight edge, corner to corner.

3.7 SCHEDULES

A. Wood treatment schedule:

1. Pressure preservative treat all concealed or exposed-to-view:
   a. Lumber and plywood which comes in contact with concrete, masonry, or earth.

b. Lumber and plywood nailers, blocking and curbing directly related to roofing, flashing, skylights, roof hatches, and roof accessories.

c. Lumber and plywood rough-bucks, blocking and nailers directly related to windows, curtainwall and storefront systems.

2. Fire retardant treat all equipment backer boards, additionally provide fire retardant treated lumber and plywood where indicated or noted on Drawings.

B. Wood blocking schedule: The following schedule lists common items for which blocking is required and may not be indicated on the Drawings. It is not the intention of this schedule to list all conditions requiring blocking or limit the extent of blocking required for completion of the Work; provide all wood blocking, edgings, nailers, required for receipt of various finishes and surfacing materials. Securely anchor wood blocking and run continuous between framing.

1. Blocking sizes indicated below are minimum sizes for conditions which not otherwise sized or keynoted on Drawings. In case of conflict, sizes identified on Drawings govern.

Items	Nominal size of blocking with fastener notes
Flag banner hook	2 by 4 inch.
Tack strips	2 by 4 inch.
Acoustical panels	2 by 4 inch.
Display cases	2 by 4 inch.
Signage	2 by 4 inch or ¾ inch plywood.
Mirror and shower rods	2 by 4 inch.
Monitor arms	2 by 6 inch.
Wall mounted monitors (TV's)	2 by 6 inch.
Wall padding	2 by 6 inch.
Soap dispensers	1 by 3 inch.
Paper towel dispensers	1 by 3 inch.
Toilet paper dispensers	2 by 4 inch.
Toilet partitions	2 by 4 inch.
Towel bars	2 by 6 inch, with 1/4 inch dia. toggle bolts.
Grab bars	3/4 inch plywood extending full height from floor to 3 inches above top mounting location. Install grab bars with 1/4 inch diameter toggle bolts.
Lavatories	3/4 inch plywood extending full height from floor to 4 inches above top mounting location. Install lavatories with 1/4 inch diameter toggle bolts.
Cubicle curtain track	2 by 6 inch.
Wall mounted door stops	1 by 3 inch.
Window treatment	2 by 4 inch.

End of Section

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Section 06 16 00

SHEATHING

PART 1 – GENERAL

1.1 SUMMARY

A. The work of this Section consists of exterior sheathing board where shown on the Drawings, as specified herein, and as required for a complete and proper installation. Work includes, but is not limited to the following scope.

B. Furnish and install the following:

1. Exterior sheathing board.

1.2 RELATED REQUIREMENTS

A. Section 01 74 19 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL: Procedural and administrative requirements relating to recycling goals, waste management program and reporting.

B. Section 01 81 13 - SUSTAINABLE DESIGN REQUIREMENTS: Procedural and administrative requirements relating to required *Northeast CHPS Verified Program,* (NE-CHPS) Certification.

C. Section 04 20 00 - UNIT MASONRY: Installation of metal masonry ties.

D. Section 05 40 00 - COLD-FORMED METAL FRAMING: Load bearing wall framing.

E. Section 07 21 00 - THERMAL INSULATION: Cavity wall insulation.

F. Section 07 27 13 - MODIFIED BITUMINOUS SHEET AIR BARRIERS: Self-adhesive elastomeric sheet membrane air barrier system.

G. Section 09 29 00 - GYPSUM BOARD: Gypsum board system installation.

H. Division 23 - HEATING, VENTILATING AND AIR CONDITIONING: Supply, and return air registers.

1.3 REFERENCES

A. Referenced Standards: Comply with applicable requirements of the following standards and those others referenced in this Section, under the provisions of Section 01 42 00 - REFERENCES. The standards referenced herein are included to establish recognized minimum quality only. Where these standards conflict with other specified requirements, the most restrictive requirements shall govern. Equivalent quality and testing standards will be acceptable, subject to their timely submission, review and acceptance by the Architect.

1. ASTM C473 – Standard Test Methods for Physical Testing of Gypsum Panel Products.
2. ASTM C518 – Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus.

3. ASTM C1002 - Standard Specification for Steel Self-Piercing Tapping Screws for Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Steel Studs.
4. ASTM C1177 – Standard Specification for Glass Mat Gypsum Substrate for Use as Sheathing.
5. ASTM D3273 – Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber.
6. ASTM E72 – Standard Test Methods of Conducting Strength Tests of Panels for Building Construction.
7. ASTM E84 – Standard Test Method for Surface Burning Characteristics of Building Materials.
8. ASTM E96/E96M – Standard Test Methods for Water Vapor Transmission of Materials.
9. ASTM E136 – Standard Test Method for Assessing Combustibility of Materials Using a Vertical Tube Furnace at 750°C.
10. ASTM E228 - Standard Test Method for Linear Thermal Expansion of Solid Materials with a Push-Rod Dilatometer.
11. GA 201 - Gypsum Board for Walls and Ceilings.
12. All applicable federal, state and municipal codes, laws and regulations regarding flammability and smoke generation of fire rated assemblies.

B. Sustainability Requirement Reference: The following sustainability requirements are hereby made a part of this Section by reference thereto:
   1. High Performance Schools Exchange, Northeast Energy Efficiency Partnerships NE-CHPS, (referred to herein as “NE-CHPS”).

1.4 ADMINISTRATIVE REQUIREMENTS

A. Coordination:
   1. General: Coordinate the work of this Section with the respective trades responsible for installing interfacing and adjoining work for proper sequence of installation, and ensure that the work performed hereunder is acceptable to such trades for the installation of their work.

B. Pre-installation Meetings: Installer of the Work of this Section is required to attend pre-installation conference specified under Section 04 20 00 - UNIT MASONRY

C. Scheduling:
   1. Do not install sheathing until all pipes, ducts, conduits, and other such items which are to be enclosed thereby, have been permanently installed, inspected and approved.

1.5 SUBMITTALS

A. Information and Review Submittals: Submit the following under provisions of Section 01 33 00 - SUBMITTAL PROCEDURES:

1. Product Data: Manufacturer's product data sheets, specifications, performance data, physical properties for each item furnished hereunder.
2. Shop Drawings: Details of any special conditions associated with fireproofing.
3. Sustainable Design Submittals: As required by NE CHPS.

1.6 QUALITY ASSURANCE

A. Qualifications:
1. Installer: Minimum of 3 years documented experience demonstrating previously successful work of the type specified herein.

1.7 DELIVERY, STORAGE AND HANDLING

A. Delivery and Acceptance Requirements:
1. Do not deliver items to the site, until all specified submittals have been submitted to, and approved by, the Architect.
2. Deliver materials in original unopened packages, containers or bundles bearing brand name, and identification of manufacturer, with labels and package seals intact and legible.

B. Storage and Handling Requirements:
1. Store and handle materials following manufacturer's recommended procedures, and in accordance with material safety data sheets.
2. Protect materials from damage due to moisture, direct sunlight, excessive temperatures, surface contamination, corrosion and damage from construction operations and other causes.
a. Neatly stack board materials flat to prevent sagging.

1.8 WARRANTY

A. General: Submit warranties under provisions of Section 01 78 00 - CLOSEOUT SUBMITTALS.

B. Manufacturer Warranty:
1. Sheathing manufacturer’s 12 month warranty for coverage against in-place exposure damage. Warranty shall commence on date of material purchase.
2. Sheathing manufacturer’s 5 year limited warranty covering materials commencing on date of Project Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Acceptable Manufacturers and products: Subject to compliance with the requirements specified herein, manufacturers offering products which may be incorporated in the work include the following, or approved equal:
1. United States Gypsum Company, Chicago IL. (USG), product “Securock Glass-Mat- Regular” and “Securerock, FireCode X”

2. Georgia Pacific Corporation, Gypsum Division, Atlanta GA, product: “DensGlass Sheathing,” and “DensGlass Fireguard”.
3. National Gypsum Company, Gold Bond Products Division, Charlotte NC. (Gold Bond), product: “e^{2}XP Sheathing,” and “e^{2}XP Sheathing Fire-Shield.”
4. CertainTeed, Saint-Gobain, Malvern, PA, product: "GlasRoc Sheathing" and 5/8 GlasRoc Sheathing Type X”.

2.2 DESCRIPTION

A. Sustainability Requirements:
1. Recycled content of sheathing: Use maximum available percentage of recycled material. Sheathing products incorporated into the work shall contain not less than 4 percent recycled content.

2.3 MATERIALS

A. Sheathing Board: 5/8 inch thick gypsum sheathing board, Type X complying with ASTM C1177 with fiberglass mat surface front and back with silicone-treated gypsum core conforming with the following requirements:

Properties	Test	Results
Surfacing:		Glass mat
Width:		4’-0” nominal
Length:		10’-0” (+/- 1/4 inch) maximum
Flexural Strength, lb/ft parallel (4’-0” weak direction):	ASTM C473	100 pounds
Humidity Deflection, (inches):	ASTM C473	1/8 inch, maximum
Linear Expansion with Change Moisture (in/in % RH):	ASTM C518	6.25 x $10^{-6,}$, maximum
Thermal resistance “R” (in/ft^2°F/Btu):	ASTM C518	0.56 minimum
Weight (per 1,000 sq ft):	ASTM C1177	2,500 pounds minimum
Bending Radius	ASTM C1177	8 feet, minimum
Mold growth:	ASTM D3273	Score 10 with no mold detected
Racking Strength, lbs/ft, dry (ultimate):	ASTM E72	>654 pounds per foot
Surface burning characteristics:	ASTM E84	Flame spread: 10, maximum
Permeance (ng/Pa•s•m^2):	ASTM E96 (dry cup method)	17 perms, maximum
Combustibility:	ASTM E136	Noncombustible
Coefficient of Thermal Expansion (in/in/°F):	ASTM E228 modified	8.5 x $10^{-6,}$, maximum

2.4 ACCESSORIES

A. Fasteners for 5/8 inch thick sheathing: Type S-12 fine thread rust resistant self-drilling screws, for applying single layer sheathing board to light gage metal framing.
   1. Fastener length for layer sheathing application: 1-1/4 inch [32 mm].
   2. Fastener length for double layer sheathing application: 2 inch [50 mm].

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verification of Conditions: Inspect all surfaces and verify that they are in proper condition to receive the work of this Section.
   1. Beginning of installation means acceptance of framing and project conditions.

B. Inspect framing and other substrates; verify that they are in proper condition to receive the work of this Section.
   1. Verify that surface of framing and furring members to receive sheathing does not vary more than 1/4 inch from the placement of faces of adjacent members.

3.2 INSTALLATION

A. Install sheathing in strict compliance with manufacturer's recommended installation instructions and as specified here, comply with all applicable code requirements.
   1. Install specified control joints where indicated on Drawings. Run vertical control joints continuously to top of wall.

B. Secure sheathing with long dimension perpendicular to wall studs with ends over firm bearing, stagger joints where possible. Use maximum lengths possible to minimize number of joints.
   1. Install sheathing with panel edge joints no greater than 1/8 inch (maximum) spacing to abutting sheathing panels and at all sheathing termination edge and end joints.
   2. For metal framing: Install screws with 8 inch on center spacing 1/2 inch in from edge around perimeter of each sheathing board, and 8 inches on center in field.
   3. Drive fasteners tight and flush with surface of sheathing, do not countersink.

3.3 CLEANING

A. General: Clean work under provisions of Section 01 70 00 – EXECUTION.
   1. Daily clean work areas by sweeping and disposing of debris, and scraps.
   2. Upon completion of the work of this Section in any given area, remove tools, equipment and all rubbish and debris from the work area; leave area in broom-clean condition.

End of Section

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Section 06 20 00

FINISH CARPENTRY

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Wall mounted guitar hooks.
2. Button hooks.
3. Metal pegboard panels.
4. Composite decking.
5. Clothes hooks.
6. Heavy duty Adjustable Shelving double slot standards with brackets.
7. Wall-mounted counter support brackets.
8. Flag Hook Standoffs.

B. Install the following furnished under the designated Sections:

1. Plastic laminated countertops, furnished under Section 06 40 00 – ARCHITECTURAL WOODWORK installed under this Section 06 20 00.
2. Reveal trim in wood panels furnished under Section 06 40 00 – ARCHITECTURAL WOODWORK installed under this Section 06 20 00.
3. Wood trim including standing and running trim, pilasters, plinths, handrails, with shop applied transparent finish furnished by Section 06 40 00 - ARCHITECTURAL WOODWORK.
4. Shop milled interior wood paneling designated with shop applied transparent finish furnished by Section 06 40 00 - ARCHITECTURAL WOODWORK

C. Furnish the following items for installation under related sections:

1. Countertop support brackets for installation under Section 12 30 00 - CASEWORK.

1.2 RELATED REQUIREMENTS

A. Section 01 74 19 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL: Procedural and administrative requirements relating to recycling goals, waste management program and reporting.

B. Section 01 81 13 - SUSTAINABLE DESIGN REQUIREMENTS: Procedural and administrative requirements relating to required *Northeast CHPS Verified Program,* (NE-CHPS) Certification.

C. Section 06 10 00 - ROUGH CARPENTRY: Wood blocking, framing, curbs, nailers, and backer boards.

D. Section 06 40 00 - ARCHITECTURAL WOODWORK:

1. Furnishing and installing cabinetry, plastic laminated shelving, and other built-in-place furniture.
2. Plastic laminated countertops.

E. Section 07 92 00 - JOINT SEALANTS: Sealant and backing materials, for joints between casework, countertops and abutting surfaces.

F. Section 09 22 16 - NON-STRUCTURAL METAL FRAMING: Metal framing for drywall construction work, and attachment.

G. Section 09 29 00 - GYPSUM BOARD: Drywall construction work having taped and compounded finish.

H. Section 09 91 00 - PAINTING: Field applied primer (excluding back priming) and finish coatings.

1.3 REFERENCES

A. Referenced Standards: Comply with applicable requirements of the following standards and those others referenced in this Section, under the provisions of Section 01 42 00 - REFERENCES. The standards referenced herein are included to establish recognized minimum quality only. Where these standards conflict with other specified requirements, the most restrictive requirements shall govern. Equivalent quality and testing standards will be acceptable, subject to their timely submission, review and acceptance by the Architect.

1. All applicable federal, state and municipal codes, laws and regulations regarding flammability and smoke generation of interior finishes.
2. APA - applicable grades and specifications.
3. ASTM D6662 – Standard Specification for Polyolefin-Based Plastic Lumber Decking Boards.
4. ASTM D792 - Standard Test Methods for Density and Specific Gravity (Relative Density) of Plastics by Displacement.
5. ASTM D570 - Standard Test Method for Water Absorption of Plastics.
6. ASTM D2240 - Standard Test Method for Rubber Property—Durometer Hardness.
7. ASTM D790 - Standard Test Methods for Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials.
8. ASTM D638 - Standard Test Method for Tensile Properties of Plastics.
9. FS MM-L-736 - Lumber; Hardwood
10. FSC (Forest Stewardship Council): “FSC Certification Program”
11. PS-1 - Construction and Industrial Plywood.
12. PS-20 - American Softwood Lumber Standard.
13. SPIB Grading Rules, current edition.
14. U.S. Department of Commerce Simplified Practice Recommendation R-16, for sizes and use classifications of lumber

15. American Lumber Standards Committee, National Lumber Grades Authority for Canadian Lumber, and applicable grading rules and standards of the various lumber associations whose species are being used for grades specified.

B. Inclusionary References: The following reference materials are hereby made a part of this Section by reference thereto:

1. AWI/AWMAC/WI joint publication: *North America Architectural Woodwork Standards*, version 3.1, as amended by published errata, referenced herein as NAAWS.

C. Sustainability Requirement Reference: The following sustainability requirements are hereby made a part of this Section by reference thereto:

1. High Performance Schools Exchange, Northeast Energy Efficiency Partnerships NE-CHPS, (referred to herein as “NE-CHPS”).

D. Definitions:

1. AWI: American Woodwork Institute
2. AWMAC: Architectural Woodwork Manufacturers Association of Canada, Alberta, Canada
3. FSC: Forest Stewardship Council
4. WI: Woodwork Institute.
5. NAUF: No added Urea Formaldehyde.

1.4 ADMINISTRATIVE REQUIREMENTS

A. Coordination:

1. General: Coordinate the work of this Section with the respective trades responsible for installing interfacing and adjoining work for proper sequence of installation, and ensure that the work performed hereunder is acceptable to such trades for the installation of their work.

B. Pre-installation Meetings: Installer of the Work of this Section is required to attend pre-installation conference specified under Section 06 40 00 - ARCHITECTURAL WOODWORK.

C. Sequencing:

1. Field Measurements
    a. Take field measurements before preparation of shop drawings and fabrication, where possible, to ensure proper fitting of Work.
    b. Allow for adjustments within specified tolerances wherever taking of field measurements before fabrication might delay Work.

1.5 SUBMITTALS

A. Information and Review Submittals: Submit the following in compliance with AWI/AWMAC/WI *NORTH AMERICAN ARCHITECTURAL WOODWORK STANDARDS* (NAAWS), version 3.1, Section 1 – Submittals. and as specified under provisions of Section 01 33 00 - SUBMITTAL PROCEDURES:

1. Literature: Manufacturer's product data sheets, specifications, performance data, installation instructions for hardware, adhesives and accessories furnished hereunder.
2. Certification:
    a. Chain-of-Custody: Written documentation providing evidence of compliance with Chain-of-Custody supply of wood products, and compliance with FSC.
        1) Demonstrate that products are FSC-certified by providing vendor invoices. Invoices will contain the vendor's chain of custody number and identify each chain of custody certified product on a line-item basis. A "vendor" is defined as the company that furnishes wood products to project contractors and/or subcontractors for on-site installation.
        2) Wood products lacking acceptable documentation will be rejected and their removal required.
    b. Certify that all composite wood and agrifiber products used on this Project are NAUF.
        1) Written certification from Millworker, that only "no-added formaldehyde" (NAUF) manufactured composite panel products are to be incorporated into the Work, including all concealed components. NAUF composite panel products include, but are not limited to, particle board (PB), oriented strand board (OSB), and medium density fiberboard (MDF) and similar manufactured products.
3. Shop drawings:
    a. Large scale design details, minimum 1-1/2 inch to one foot scale, showing profiles, jointing and fastening methods; and complete installation details.
    b. Provide full scale drawings of wood trim elements required to match existing, showing all profiles and dimensions.
    c. Provide shop drawings bearing dimensions of actual measurements taken at the project.
4. Samples: Provide samples as requested by Architect for selection of colors and finishes.
5. Sustainable Design Submittals: As required by NE CHPS.
6. Qualification Submittals.

1.6 QUALITY ASSURANCE

A. Quality Standards: All materials, workmanship and finishes shall meet AWI/AWMAC/WI *NORTH AMERICAN ARCHITECTURAL WOODWORK STANDARDS* (NAAWS), version 3.1, as amended by published errata, for the following Quality Grades:
    1. All work to receive transparent finishes: Premium Grade.
    2. All work to receive shop-applied opaque finishes: Premium Grade.
    3. All work to receive field-applied painted (opaque) finishes: Premium Grade.

Wood Products Chain of Custody: All wood products furnished under this Specification Section shall be “FSC certified” according to the rules of the Forest Stewardship Council.

4. FSC Certification includes the following certification bodies of forests and forest products:
    a. SCS Global Services.
    b. SmartWood.
    c. SGS Qualifor.
    d. Soil Association.

B. Wood Products Chain of Custody: Fifty percent of all wood products shall be “Chain of Custody Certified” according to the rules of the Forest Stewardship Council (FSC) or American Forest and Paper Association’s (AFPA) Sustainable Forest Initiative (SFI) Standard SFIS 2005-2009.

C. Discard lengths of material which are unsound, warped, bowed, twisted, improperly treated, not adequately seasoned or too small to fabricate work with minimum of joints or optimum jointing arrangements, or which are of defective manufacture with respect to surfaces, sizes or patterns.

1.7 DELIVERY STORAGE AND HANDLING

A. Delivery and Acceptance Requirements:
    1. Do not deliver items to the site, until all specified submittals have been submitted to, and approved by, the Architect.
    2. Do not deliver finish wood materials to the project until all concrete, masonry, plaster and other wet work has been completed and dry.

B. Storage and Handling Requirements:
    1. Store and handle materials following manufacturer's recommended procedures, and in accordance with material safety data sheets.
    2. Protect materials from damage due to moisture, direct sunlight, excessive temperatures, surface contamination, corrosion and damage from construction operations and other causes.

PART 2 – PRODUCTS

2.1 WOOD MATERIALS – GENERAL REQUIREMENTS

A. General: Materials, as fabricated and installed, shall comply with specified quality grades of AWI/AWMAC/WI *Architectural Woodwork Standards.*
    1. All board products shall be S4S, except as otherwise specified.

B. Sustainable Forest Certification: All wood shall be “Chain-of-Custody” certified as FSC Certified.

C. Panel Products: Composite panel products and plywood shall be “no added urea-formaldehyde”, including all concealed components.

1. Composite panel products include but are not limited to particle board (PB), Medium Density Fiberboard (MDF), wheat board and strawboard and similar manufactured products.

D. Moisture content:

1. Wood for interior use shall have a moisture content between 5 and 10 percent, when delivered to the project.

2.2 BOARD AND PANEL MATERIALS

A. Plywood and panel products:

1. Shelving: 3/4 inch thick Birch veneer plywood (AA) with 3/8 inch hardwood edge banding at all edges.
2. Engineered panels scheduled for veneer finish: Medium Density Fiberboard (MDF) of thickness indicated on the Drawings, conforming to ANSI A208.2 product class MD, fabricated from 100 percent recycled fiber, using formaldehyde free synthetic resin such as methyl diisocyanate (MDI), having a minimum density of 45 pounds per cubic foot (769 kg/m^3).
   a. Primary veneer: White Maple (Acer saccharum), Plain Sliced, AWI Premium Grade.
   b. Manufacturers: Subject to compliance with the requirements specified herein, manufacturers offering products which may be incorporated in the work include, but are not limited to, the following:
      1) SierrePine Inc., Moncure, NC, product “Medite II”.
      2) Plum Creek Timber Company Inc., Seattle, WA, product “Standard MDF”.
      3) Flakeboard, Toronto, Ontario, Canada, product: “Superior MDF”.
3. Particle board: Mattformed three layer medium density wood particle panel, general use grade per ANSI A 208.1 with a minimum density of 48 pounds per cubic foot, fabricated using formaldehyde free synthetic resin such as Rodman Industries, Oconomowoc, WI product: “Rodman Resincore I” or approved equal.

B. Stage flooring: Double (service) tempered hardboard fabricated from inter-felted lingo-cellulosic fibers consolidated under heat and pressure complying with ANSI A135.4, minimum ¼ inch thick fabricated in sheets 4 feet by 4 feet factory primed and finished.

1. Provide products complying with the following minimum characteristics:
   a. Density: 58 lbs./ft^3 when testing in accordance with ASTM D1037.
   b. Modulus of rupture: 5,000 lbs./in^2 when testing in accordance with ASTM D1037.
   c. Water absorption: 28 percent when testing in accordance with ASTM D1037.
2. Subject to compliance with the requirements specified herein, manufacturers offering products which may be incorporated in the work include the following, or approved equal:
   a. Georgia Pacific Building Products, Atlanta, GA.

b. Decorative Panels International, Toledo, OH.

c. Stagelam, Mississauga, Ontario, Canada.

3. Vapor retarder: 6 mil thick black polyethylene sheeting and 2 inch wide waterproof sealing tape for joints.

C. Decking: Cellular PVC (cPVC) core boards with PVC-based capping material for superior stain, fade, and scratch resistance equal to TimberTech “Azek Vintage Collection”.

D. Provide other finish carpentry products, not specifically described, but required for a complete and proper installation, as selected by the Contractor subject to the approval of the Architect.

2.3 CELLULAR PVC TRIM

A. Expanded rigid poly vinyl chloride with a small-cell microstructure, in profiles indicated, and complying with the following:

1. Density: Minimum of 0.50 g/cc per ASTM D792.
2. Water absorption: Less than 1 per cent per ASTM D570.
3. Hardness: At least 50 per ASTM D2240 (Shore D).
4. Flexural strength: At least 3,300 psi per ASTM D790.
5. Tensile strength: At least 2,200 psi per ASTM D638.

B. Acceptable manufacturers include the following:

1. New England Specialty Lumber Inc, W. Springfield MA, product: “Nels-Tek 600”.
2. Vycom Corporation, Moosic PA, product: “Azek”.
3. CertainTeed Corp., Valley Forge, PA, product “Restoration Millwork”.
4. Jen-Weld Corporation, Dubuque, IO., product “Miratec.”
5. Wolfpac Technologies, Inc., Aliquippa, PA, product: “Versatex”.
6. Fypon, LLC., Maumee OH., product “Cellular PVC Trim”.
7. PVC Sheets and Trim: “Celtec550” as distributed by New England Lumber Specialties, Inc., West Springfield, MA.

2.4 PLASTIC LAMINATE

A. Manufacturers: Subject to compliance with the requirements specified herein, manufacturers offering products which may be incorporated in the work include, but are not limited to, the following:

1. Pioneer Plastics Corp. (Pionite), Auburn, ME.
2. Formica Corp., Cincinnati, OH.
3. Laminart, Elk Grove Village, IL.
4. Nevamar Corp., Odenton, MD.
5. Ralph Wilson Plastics Co. (Wilsonart), Temple, TX.

B. Laminate: Plastic laminate, general purpose, conforming to NEMA LD3.1 -1991 Grade GP50, nominal 0.050 inch thickness, in a low non-directional texture in color price group selected by the Architect.

1. General purpose grade laminate shall be used for counter tops.

C. Decorative Color Laminate: Plastic laminate, general purpose, conforming to NEMA LD3.1 -1991 Grade GP50, nominal 0.050 inch thickness, in a low non-directional texture, colors selected from Wilsonart “Virtual Design Library (VDL)”, and “Spectrum” Series.

D. Backing for plastic laminates countertops: APA C-C PLUGGED EXT, fir plywood, sanded.

1. “FSC”: Provide board which is comprised of 75 percent FSC certified wood.

2.5 WALL-MOUNTED COUNTER SUPPORT BRACKETS

A. Counter Support Brackets:

1. Construction: Fabricated from steel or aluminum with vertical leg designed to attach to side of supporting stud and be concealed by gypsum board or other wall finish.
   a. Bracket sizes:
      1) For up to 18 inch deep counters: 12 by 12 inch length legs having load capacity of not less than 450 pounds.
      2) For up to 24 inch deep counters: 18 by 18 inch length legs having load capacity of not less than 450 pounds.
      3) For up to 30 inch deep counters: 18 inch vertical leg and 24 inch length horizontal leg having load capacity of not less than 450 pounds.
      4) For up to 36 inch deep counters: 12 inch vertical leg and 30inch length horizontal leg with supporting pole, having load capacity of not less than 375 pounds.
2. Basis of Design: Rakks Surface Mount Counter Supports by Rakks/Rangine Corp, Needham MA, product: “Surface Counter Supports” with powder coat finish.
   a. Bracket sizes:
      1) Rakks Model EH-1212 for up to 18 inch deep counters.
      2) Rakks Model EH-1818 for up to 24 inch deep counters.
      3) Rakks Model EH-1824 for up to 30 inch deep counters.
      4) Rakks Model EH-1230PS (with support pole), for up to 36 inch deep counters.
   b. Acceptable Manufacturers/products, or approved equal:
      1) Rakks/Rangine Corp, Needham MA.
      2) Federal Brace, Belmont NC.
3. Shop-applied finishes: Exposed surfaces shall be free of scratches and other serious blemishes and be factory/shop finished with:

a. Electrostatically-applied, powder paint coating complying with AAMA 2603 (minimum), in color selected by Architect from manufacturer's full range.

2.6 CLOSET AND SHELVING HARDWARE

A. Metal closet rods and brackets:

1. Closet pole: 0.087 inch (2.21 mm) wall thickness steel tubing, 1-1/16 inch diameter, of custom cut lengths required for full width of closet, chrome finish.
   a. Provide intermediate supports for span lengths greater than 48 inches.

B. Adjustable shelving, heavy duty wall mounted standards and brackets:

1. Acceptable manufacturers, include but are not limited to the following:
   a. Knape & Vogt, Grand Rapids MI. (Basis of Design).
   b. Spur Systems International Limited.
   c. Reeve Store Equipment Company (ReeveCo), Pico Rivera CA.
2. Standards (uprights): 14 gage double tracked uprights, in epoxy powder-coat finish, color as selected by Architect from manufacturer's full range of colors.
   a. Locate uprights no greater than 24 inches on center.
3. Brackets: 14 gage formed brackets, color and finish matching standards,
   a. Depth (typical): 270mm (10-1/2 inch depth), or as otherwise indicated on Drawings.

2.7 METAL PEGBOARD

A. Specified Manufacturer: To establish a standard of quality, design and function desired, Drawings and specifications have been based on Wall Control Industrial Metal Pegboard as distributed by Global Industrial, Port Washington, NY.

B. Metal pegboard:

1. Industrial grade galvanized steel metal pegboard for heavy duty tool storage use with ¼ inch round peg board holes as well as slotted tool board holes to accept both conventional pegboard accessories as well as securely engaging industrial tool board hooks, brackets, shelves, and accessories. Tool board panels shall have a pre-formed flange to space panel face off of the wall, workbench, tool cart, or any other flat vertical surface so no additional spacing is required.
   a. Size: 32 inches by 96 inches in length.

2.8 ACCESSORIES AND HARDWARE

A. Clothes hook in Engineering Classroom, "Double Flat Top Button Hook": Bracket mounted T-shape hook: Symmons Industries, Braintree, MA., model: 35DRH-MB, black finish.

B. Guitar hooks: Auto swivel yoke allowing for multi-angle adjustments while locking instrument in place. Units must accommodate a wide range of instrument neck sizes from 40 mm to 52 mm including classic, acoustic, electric and bass guitars.

Provide narrow Instrument neck adjustment specially designed to increase the thickness of arms to accommodate narrow neck instruments from 28 mm like including banjos and mandolins. Wood base.

1. Specified Manufacturer: To establish a standard of quality, design and function desired, Drawings and specifications have been based on Hercules USA, Mt. Juliet, TN, product “GSP29WB” or approved equal.

C. Flag Hook Standoffs:

1. Basis of Design: CR Lawrence, Los Angeles, CA., item number CAP114CBS, 1-1/4 inch diameter custom standoff cap assembly, with threaded rod. Provide threaded base mounted into blocking.
2. Finish: Brushed Stainless Finish.

D. Reveal trim: Extruded aluminum trim with brushed aluminum finish 1 inch wide recess, millwork reveal.

1. Fry Reglet Corporation, model number: MWR10050.

E. Reveal trim: Extruded aluminum trim with brushed aluminum finish 1 inch wide recess, millwork reveal F.

1. Fry Reglet Corporation, model number: MWRF10050.

F. Adhesive for installation of plastic laminate: Rigid bond Polyvinyl acetate (PVA) type only. Contact cements are only permitted at countertops with sinks or similar “wet condition” areas.

G. Handrail brackets: Ives No. 162, PA28 finish, or brackets manufactured by Rangine Corp., Millis, MA. Furnish with stainless steel 1/4 inch 20 button head socket screws and stainless steel self-locking hex nuts.

H. Grommets and covers: 3 inch diameter, as manufactured by Doug Mockett & Company, Manhattan Beach CA., model number “TM1B“ with “TMLID1” or approved equal. Provide where shown on Drawings, and if not shown, exact locations to be determined in field.

I. Counter support brackets: Equal to Rakks Counter Supports by Rakks/Rangine Corp, Needham, MA.

1. Construction: Fabricated from horizontal aluminum T section and vertical aluminum T sections, design for surface mounting.
2. Model EH-1818 for 24 inch counters.
3. Model EH-1824 for 30 inch counters.
    a. Refer to Drawings for support spacing at 36 inch deep counters.
4. Factory applied finishes: Exposed aluminum surfaces shall be free of scratches and other serious blemishes and be factory finished with:
    a. Electrostatically applied, powder paint coating complying with AAMA 605.2, custom color selected by Architect.

J. Glue for lamination and fabrication of wood, plywood and particle board items: Exterior Grade, phenolic resin glue.

K. Nails for interior trim items: 6d and 8d coated or galvanized finish nails, except as otherwise specified herein.

L. Screws: Flat head wood screws of the appropriate sizes, galvanized finish for interior use.

1. Provide flat head stainless steel wood screws at stage flooring countersunk at all locations.

M. Wall base at stage flooring: Vented molded rubber cover base, 4 by 3 inches with premolded outside corners

N. Bolts, nuts, washers, blind fasteners, lags: Galvanized, of size and type to suite application as indicated in the drawings.

O. Sealant, for joints between countertops and dissimilar materials: One component acetoxy silicone rubber, mildew resistant, FS TT-S-001543A, Type Non-Sag, Class A, and FS TT-S-00230C, Type II, Class A and ASTM C 920, Type S, Class 25, Grade NS, use NT, G and A with a minimum movement capability of ±25 percent, and a Shore A hardness of 20, in manufacturer's standard colors as selected by the Architect.

1. Only use sealant and primers that comply with the following limits for VOC content:
   a. Architectural Sealants: 250 g/L.
   b. Sealant primer: 250 g/L
2. Sealants containing aromatic solvents, fibrous talc, formaldehyde, halogenated solvents, mercury, lead, cadmium, chromium and their compounds, are not permitted.
3. Subject to requirements specified herein, the following products are acceptable, or approved equal:
   a. Dow Corning Corporation, Midland MI.; product, "786".
   b. General Electric Company, Waterford NY.; product, "Sanitary SCS1700".
   c. Tremco, Beachwood OH.; product, "Proglaze".

P. Paint for back-priming:

1. California: "Trouble Shooter Acrylic Latex Primer", Nº. 45100
2. ICI / Dulux: Ultra Hide Nº. 2010-1200 Acrylic Primecoat.
3. Moore: "Moore Fresh Start", Nº. 023
4. Pittsburgh: "Sun-Proof Exterior House & Trim Latex Wood Primer", 72-1 Series
5. Sherwin-Williams: "A100 Exterior Latex Wood Primer", Nº. B42W41

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify adequacy of blocking, backing and support framing for all finish carpentry work.

B. Beginning of installation means acceptance of existing substrate and site conditions.

3.2 PREPARATION

A. Back prime with specified primer all exterior wood trim prior to installation.

B. Prime all wood surfaces of items or assemblies to be in contact with cementitious and masonry materials, prior to installation.

3.3 INSTALLATION – GENERAL CARPENTRY

A. Install work in accordance with AWI/AWMAC/WI "*Architectural Woodwork Standards* for specified quality grades*,* except that all standing and running trim joints shall be field mitered and fitted.

B. Dress and sand woodwork until free from machine and tool marks, abrasions, raised grain, or other defects that will show through the finish on surfaces exposed to view. Wherever possible, carry out sanding on a shop belt sander, not in the field. Sandpaper field joints and leave in perfect condition for finishing.

C. Make all joints tight, and form to conceal shrinkage. Glue all miters having a dimension of 4 inches or more from heel to point. Joints shall be glued tight and so formed as to conceal shrinkage. Cope trim at returns and miter at corners to produce tight-fitting joints with full surface contact throughout length of joint.

D. Make a minimum of splices and joints in running trim, and where such splices and joints occur, fasten securely, with all exposed surfaces having smooth, continuous planes. Stagger joints in adjacent or relate members. Use scarf joints for end-to-end joints.

E. Scribe and cut work to fit adjoining work closely. Refinish cut surfaces in prefinished items.

F. All nails in interior finished work shall be blind nailed wherever possible. Nail trim with finish nails only, set using appropriate nail punch and fill with matching wood filler. Sand smooth wood filler. Do not fasten trim with screws or bolts unless otherwise directed, or is to be subsequently covered with smaller trim.

G. Woodwork shall be properly framed, closely fitted and accurately set to the required lines and levels and shall be rigidly secured in place. Shim as required using concealed shims to achieve specified tolerances.

H. Cover exposed edges of plywood shelving with 3/8 inch hardwood edging. Width of edging to match thickness of shelving.

3.4 INSTALLATION - PREFABRICATED PRODUCTS INSTALLED UNDER THIS SECTION

A. Do not commence installation of products until immediately adjacent surfaces have been completely installed and finished.

B. Perform installation work in accordance with the approved shop drawings and the manufacturer's installation instructions.

C. Install products absolutely level and in true line, with units securely anchored to the surrounding construction.

D. Remove all tape and other packing materials; thoroughly clean and polish all exterior and interior surfaces.

E. Touch-up all scratches and other surface defects, using same materials and colors as shop finish.

3.5 INSTALLATION – CELLULAR PVC TRIM

A. General: Install cellular PVC trim in strict accordance with manufacturer's written instructions. Review installation procedures with Architect. Prepare not less than 3 field sample installations, each minimum 10 foot length having varying profiles. Each sample shall be reviewed by Architect for approval, prior to proceeding with installation. Perform modifications as requested and request review of work. Proceed with installation of trim only after receipt of Architect's acceptance. Approved installation may remain as part of the work.

1. Install using #8 trim screw stainless steel fasteners or other stainless steel fasteners designed for wood trim and wood siding. Fasteners should be long enough to penetrate wood blocking substrate a minimum of 1-1/4 inches. Do not use staples, brads, or wire nails for installation of cellular PVC trim.
    a. Nails fasteners should slightly penetrate the surface, take care when using pneumatic tools.
    b. Use 2 fasteners per every framing member for trim board applications. Trim boards 12 inches or wider will require additional fasteners, locate not to exceed 8 inches on center.
2. Sheet 3/8 inch thick, and 1/2 inch thick cellular PVC is not to be ripped down and used as trim elements.
3. Glue adhere and fasten (with nails, or screws) profile trim elements to substrate using manufacturer's recommended adhesive.
4. Provide scarfed joints where cellular PVC trim is joined. Glue all end to end cellular PVC trim joints using manufacturer's recommended adhesive.

3.6 TOLERANCES

A. Maximum variation for wood work from true position of 1/8 inch in 8 feet for plumb and level and with a maximum of 1/16 inch offsets in adjoining surfaces intended to be flush.

3.7 CLEANING

A. Daily clean work areas by sweeping and disposing of scraps and sawdust.

B. Upon completion of the work of this Section in any given area, remove tools, equipment and all rubbish and debris from the work area; leave area in broom-clean condition.

C. Remove protective material from pre-finished surfaces.

3.8 PROTECTION

A. During the operation of finish carpentry, protect the work of other trades against undue soilage and damage by the exercise of reasonable care and precautions. Repair or replace any work so damaged and soiled.

End of Section

Section 06 20 13
EXTERIOR FINISH CARPENTRY

PART 1 - GENERAL

1.1 SUMMARY

A. Drawings and General Provisions of Contract, including General and Supplementary Conditions and Division 01 Specification section, apply to work of this section.

B. Related Sections: The following sections contain requirements that relate to this section.
1. Section 05 21 10 – Stee Framed Roof Deck
2. Section 07 71 00 – Roof Specialties
2. Section 07 72 00 – Roof Accessories
3. Section 32 14 00 – Unit Pavers
4. See Item 1.8 for Sustainable Requirements

1.2 REFERENCES

A. American Society for testing and materials ASTM
1. ASTM A653/A653M-09 Standard specification for steel sheet. Zinc coated (Galvanized) or zinc iron Alloy Coated by the hot dip process.

B. FSC Forest Stewardship Council:
1. FSC-STD-01-001 2004 FSC Principal and Criteria for Forest Stewardship
2. FSC-STD-20-002 2004 V2-1 Structure and Content of Forest Stewardship standards

1.3 DESCRIPTION OF WORK

A. The scope of work includes providing all materials, equipment and labor necessary to complete the work as indicated on the drawings and as specified herein.

B. The principal work of this section includes, but may not be limited to, the following:
1. Wood Decking at Roof Terrace and Components
2. Wooden Rail top at Roof Terrace and Components

1.4 WARRANTY

A. Provide Manufacturer's minimum of a two (2) year warranty against structural failure, material failure and manufacturing defects covering all levels of warranty for the equipment and components.

B. Warranty shall spell out what it does not cover.

1.5 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in providing products of the type specified in this section, with minimum of five (5) years documented experience with products and construction.

B. The installation of the Exterior Finish Carpentry shall be by Contractor with a minimum of five (5) years of experience on similar projects. Evidence of this experience shall be submitted to the Owner's Representative for review and approval.

C. Manufacturing Standard: Conform to ANSI/AITC A190.1.

D. Labeling Requirements: Each length of lumber shall be stamped at the mill indicating certification mark, mill identification, grade name, and inspection certificate. All labels shall be placed on surfaces where it will not be exposed to view when installed.

E. Discard lengths of material which are unsound, warped, bowed, twisted, improperly treated, not adequately seasoned or too small to fabricate work with minimum joints or optimum jointing arrangements, or which are of defective manufacture with respect to surfaces, sizes or patterns.

1.6 SUBMITTALS

A. Submit shop drawings and product data under provisions of Division 01 for all manufactured/fabricated items. All submittals must be prior to fabrication and/or field installation work.
   1. Shop drawings shall include plans, details, elevations and specifications and shall indicate profiles, sizes, dimensions, connection attachments, size and type of fasteners, accessories, and color and finish as indicated in these specifications and the plans.
   2. Submit manufacturers printed product literature, specifications and data sheets.
   3. Clearly indicate on the shop drawings any deviations from the plans and specifications.

B. Submit Contractor Qualifications as required under Quality Assurance section stated herein.

C. Submit warranty information of all manufactured/fabricated items as required under Warranty section stated herein.

D. Submit samples showing texture, finish and range of colors of all materials. Samples will establish the standard by which materials provided will be judged.

E. Submit drawings and instructions of manufacturers/fabricators installation requirements.

F. Certificates: Wood products lacking acceptable documentation for the following will be rejected and their removal required.
   1. Chain-of-Custody: Written documentation providing evidence of compliance with Chain-of-Custody supply of wood products, and compliance with FSC standards.
      a. Demonstrate that products are FSC-certified by providing vendor invoices. Invoices will contain the vendor's chain of custody number and identify each chain of custody certified product on a line-item basis. A "vendor" id defined as the company that furnished wood products to project contractors and/or subcontractors for on-site installation.

G. Submit (2) copies of WHMIS MSDS Material Safety Data sheets in accordance with section 01 33 00 Submittal procedures. Indicate VOC's for:
   1. Wood Preservative
   2. Adhesives

H. Submit stamped shop drawings by a Structural Engineer currently registered in the state where the project is located for live and dead loads showing that shop drawings meet all State and Local regulations. for all work in this Section. Drawings shall indicate approved materials in this Section.

I. Sustainability Submittals if applicable.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Store all materials specified herein as to not impact, damage or otherwise corrupt other work. Contractor shall be responsible for corrective measures as a result of incorrect storage.

B. Deliver to site, store and protect products under provisions of Division 1.

C. Store materials on raised supports. Cover materials with waterproof covering. Provide adequate air circulation and ventilation.

D. Do not store materials in wet or damp areas.

E. Store and dispose of solvent-based materials, and materials used with solvent-based materials, in accordance with requirements of local authorities having jurisdiction.

1.7 SEQUENCING AND SCHEDULING

A. Coordinate the work of this Section with the respective trades responsible for installing interfacing work, and ensure that the work performed hereunder is acceptable to such trades for the installation of their work.

1.8 NE-CHPS GENERAL REQUIREMENTS

A. The work of this Section is required to comply with general requirements and procedures for compliance with certain prerequisites and credits needed for the Project to obtain CHPS Verified certification based on Northeast Collaborative for High Performance Schools Criteria Version 3.2 (NE-CHPS) and as outlined in Division 01 Section “Sustainable Design Requirements.”
   1. The General Contractor is responsible to coordinate with the work of other Sections and comply with all NE-CHPS requirements in accordance with the Contract Documents such that the work carried out by this Section does not compromise the achievement of any other NE-CHPS prerequisites and credits applicable to the entire Project.

B. Related Sections for Sustainable Design Requirements:
   1. Division 01 Section “Substitution Procedures” for NE-CHPS substitution procedures.
   2. Division 01 Section “Submittal Procedures” for NE-CHPS submittal requirements.
   3. Division 01 Section “Construction Controls and Temporary Facilities” for requirements for temporary facilities.
   4. Division 01 Section “Product Requirements” for additional NE-CHPS submittal requirements.
   5. Division 01 Section “Construction Waste Management and Disposal” for waste management, recycling and disposal.
   6. Division 01 Section “Sustainable Design Requirements” for general procedures for

compliance with NE-CHPS prerequisites and credits.

7. Division 01 Section “Construction Indoor Air Quality (IAQ) Management Plan” for material and procedure requirements.

PART 2 - PRODUCTS

2.1 SUSTAINABILITY CHARACTERISTICS

A. Provide materials that have been extracted, harvested, recovered and processed locally within minimum distances required to the final point of manufacture. Provide materials from a manufacturing facility within minimum distance required from Project site by acceptable transportation method.

2.2 MATERIALS

A. Wood Decking and Railing

1. Wood decking shall be Grade A (Premium Grade) Ipe in accordance with Green Dex Specifications. Decking must be air dried to a moisture content of 10-14%. All decking shall be pre-grooved to accommodate standard hidden fasteners as defined under accessories.
2. Decking Size: Decking size shall be a nominal 5/4” x6” and actual size shall be 1x 5 ½” or as specified on drawings. Min length shall be 6’ max length shall be 12’. 50% of decking shall be greater than 8’.

B. Fasteners and Support

1. All fastening materials shall be stainless steel of the appropriate size for exterior use. All fasteners and hardware shall be stainless steel and accordance with the manufacturer’s specifications.
2. Brackets and steel member supports shall be supplied at the dimensions shown on the Plans. Steel member supports shall be coated with zinc rich epoxy and finished with polyester powder coating. Color shall be **Silver**.

PART 3 - EXECUTION

3.1 GRADE

A. All Ipe shall be premium grade only knots less than 3” in diameter shall be admitted.

3. 2 PATTERN

A. Pattern shall be controlled random as shown on construction drawings. No butt joints in adjoining courses of decking shall align.

3.3 GENERAL

A. Verify all dimensions in the field and check work by other trades for conformance with the drawings before proceeding with the work. Report any discrepancies to the Owner before proceeding.

B. Prior to fabrication contractor or installation contractor shall provide shop drawings for

approval

3.4 CLEANING

A. Remove tool marks, bruises and scratches after completing deck. Replace damaged wood components if repairs are not approved by the Owner.

3.5 PROTECTION

A. During the operation of finish carpentry, protect the work of the other trades against undue soilage and damage by the exercise of reasonable care and precautions. Repair or replace any work so damaged and soiled.

End of Section

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Section 06 40 00

ARCHITECTURAL WOODWORK

PART 1 - GENERAL

1.1 SUMMARY

A. Furnish and install the following architectural woodwork items:

1. Wood veneer casework.
    a. Administration desk.
    b. Mailbox units.
    c. Library circulation desk, including mobile casework.
    d. Display cases.
    e. Student storage units.
    f. Corridor benches.
    g. Upholstered seating.
2. Plastic laminated countertops for casework.
3. Exposed blocking and blocking concealed by the work of this Section required for the installation of architectural woodwork.
4. Hardware for work of this Section.
5. Fabric faced tackboards.

B. Furnish the following products to be installed under the designated Sections:

1. Plastic laminated countertops, and work surfaces (wall-mounted), to Section 06 20 00 – FINISH CARPENTRY for field installation
2. Wood trim including standing and running trim, pilasters, plinths, handrails, with shop applied transparent finish to Section 06 20 00 – FINISH CARPENTRY for field installation.
3. Shop milled interior wood paneling, and recycling center doors with shop applied transparent finish to Section 06 20 00 – FINISH CARPENTRY for field installation.
4. Provide field supervision of installation of hardwood trim furnished under this Section for AWI certification program compliance.

C. Make all cutouts within casework items to accommodate sinks, piping, conduit, and other mechanical and electrical work, from templates provided by the respective mechanical and electrical trades.

D. No attempt is made in this Section to list all elements of architectural woodwork required on this project or to describe how each element will be installed. It is the responsibility of the Contractor to determine for itself the scope and nature of the work required for a complete installation from the information provided herein and in the Drawings.

1.2 RELATED REQUIREMENTS

A. Section 01 60 00 - PRODUCT REQUIREMENTS: Listing of VOC requirements for adhesives, cleaning/maintenance materials, paints, coatings, and sealants.

B. Section 01 74 19 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL: Procedural and administrative requirements relating to recycling goals, waste management program and reporting.

C. Section 01 81 13 - SUSTAINABLE DESIGN REQUIREMENTS: Procedural and administrative requirements relating to required *Northeast CHPS Verified Program,* (NE-CHPS) Certification.

D. Section 05 50 00 - METAL FABRICATIONS: Supports for countertops.

E. Section 06 10 00 - ROUGH CARPENTRY: Concealed wood blocking and nailers.

F. Section 06 20 00 - FINISH CARPENTRY:

1. Interior wood trim to receive a painted (field applied opaque finish).
2. Installation of interior wood trim with shop applied transparent finish, furnished under this Section 06 40 00.
3. Shop milled interior true divided lite wood windows, wood paneling, and recycling center doors with shop applied transparent finish furnished under this Section 06 40 00

G. Section 09 22 16 - NON-STRUCTURAL METAL FRAMING: Metal framing for gypsum board construction work.

H. Section 09 29 00 - GYPSUM BOARD: Wall board and related trim components.

I. Division 22 - PLUMBING: Plumbing fixtures and piping.

J. Division 26 - ELECTRICAL: Electrical connections for lighting.

1.3 REFERENCES

A. Referenced Standards: Comply with applicable requirements of the following standards and those others referenced in this Section, under the provisions of Section 01 42 00 - REFERENCES. The standards referenced herein are included to establish recognized minimum quality only. Where these standards conflict with other specified requirements, the most restrictive requirements shall govern. Equivalent quality and testing standards will be acceptable, subject to their timely submission, review and acceptance by the Architect.

1. ASTM C209 - Standard Test Methods for Cellulosic Fiber Insulating Board.
2. ASTM C518 - Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus.
3. ASTM D523 - Standard Specification for Specular Gloss.
4. ASTM D1037 - Standard Test Methods of Evaluating Properties of Wood-Base Fiber and Particle Panel Materials.

5. ASTM E84 – Standard Test Method for Surface Burning Characteristics of Building Materials.
6. AWI (Architectural Woodwork Institute) Quality Standards, Eighth Edition.
7. AWI Quality Certification Program.
8. ASTM D635 - Standard Test Method for Rate of Burning and Extent and Time of Burning of Self-Supported Plastics in a Horizontal Position.
9. ASTM D1003 - Standard Test Method for Haze and Luminous Transmittance of Transparent Plastics.
10. FSC (Forest Stewardship Council): “FSC Certification Program”
11. APA Grades and Specifications.
12. National Lumber Grades Authority, American Lumber Standards, and Grading Rules and Standards of the various lumber associations whose species are being used, with grade-marks for same.
13. U.S. Department of Commerce Simplified Practice Recommendation R-16, for sizes and use classifications of lumber; and Product Standard (PS):
    a. PS-1 - Construction and Industrial Plywood Standard.
    b. PS-20 - American Softwood Lumber Standard.

B. Sustainability Requirement Reference: The following sustainability requirements are hereby made a part of this Section by reference thereto:
1. High Performance Schools Exchange, Northeast Energy Efficiency Partnerships NE-CHPS, (referred to herein as “NE-CHPS”).

1.4 ADMINISTRATIVE REQUIREMENTS

A. Sequencing:
1. Field Measurements: Where possible the woodwork manufacturer shall take field measurements before preparation of shop drawings and fabrication to ensure proper fitting of Work.
    a. Allow for adjustments within specified tolerances wherever taking of field measurements before fabrication might delay Work.
2. Field dimensions which are not controlled by Project conditions: The woodwork manufacturer is responsible for details and dimensions not controlled by Project conditions and shall show on his shop drawings all required field measurements beyond his control.
    a. The Contractor shall acknowledge the woodwork fabricator’s need for accurate field dimensions prior to custom fabrication.
    b. The Contractor and the woodwork manufacturer shall cooperate to establish and maintain these field dimensions.

B. Scheduling:
1. Coordinate the work of this Section with the respective trades responsible for installing interfacing work, and ensure that the work performed hereunder is acceptable to such trades for the installation of their work.

1.5 SUBMITTALS

A. Information and Review Submittals: Submit the following under provisions of Section 01 33 00 - SUBMITTAL PROCEDURES:

1. Product Data: Manufacturer's product data sheets, specifications, performance data, for each item furnished hereunder, including, but not limited to: Fastenings, adhesives, hardware, and accessories.
    a. Provide additional information required for fillers and finish products: Include, chemical, functional, and environmental characteristics, limitations and special application requirements. Identify available colors, shades, and gloss.
2. Shop drawings bearing dimensions of actual measurements taken at the project, include at least the following, which are in addition to shop drawing requirements described in AWI Quality Standards:
    a. 1/4 inch scale elevations and plans of each casework item.
    b. Large scale design details of minimum 1-1/2 inch to 1-foot scale, showing abutting materials, installation conditions, clearances. Show woodwork profiles, jointing and fastening methods; details of drawers and doors.
    c. Full size or half-full size sections, showing individual components, profiles and jointing.
3. Selection Samples:
    a. Plastic laminate chips for initial color selection by Architect.
    b. Provide additional samples requested by Architect for initial selection of material colors and finishes.
4. Verification Samples:
    a. 12 by 12 inch samples of wood veneer illustrating maximum range of color variations and applied transparent shop finish.
    b. 12 inch long samples of solid hardwoods illustrating maximum range of color variations and applied transparent shop finish.
    c. 12 by 12 inch samples of plastic laminate (of each color required for project).
5. Certificates: Wood products lacking acceptable documentation for the following will be rejected and their removal required.
    a. Chain-of-Custody: Written documentation providing evidence of compliance with Chain-of-Custody supply of wood products, and compliance with FSC standards.
        1) Demonstrate that products are FSC-certified by providing vendor invoices. Invoices will contain the vendor’s chain of custody number and identify each chain of custody certified product on a line-item basis. A “vendor” is defined as the company that furnishes wood products to project contractors and/or subcontractors for on-site installation.
    b. Composite Wood and Agrifiber Products: Include certification indicating compliance with the testing and product requirements of the California

Department of Health Services Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers, including 2004 Addenda for all composite wood and agrifiber products.

6. Sustainable Design Submittals: As required by NE CHPS.

1.6 QUALITY ASSURANCE

A. Fabricator/Installer: Work of this section shall be performed by a firm licensed by the AWI Quality Certification Program.

1. Woodwork fabricator/installer is required to be licensed by AWI as competent to perform the work specified. Certification shall be evidenced through the application of AWI Quality Certification labels and issuance of an AWI letter of licensing for the project. AWI certification labels shall be applied to each item of work.

B. Quality Standards: All work performed under this Section shall be of quality grades, indicated below, as defined in the referenced AWI “Quality Standards, as modified herein by this Specification Section.

1. All work having a transparent wood finish: Premium grade.
2. All work having an opaque wood finish: Custom grade.
3. All plastic laminated work: Custom grade.

C. Delivery and Acceptance Requirements:

1. General: The woodwork manufacturer, woodwork installer and the Contractor are jointly responsible to make certain that woodwork is not delivered until the building and storage areas are sufficiently dry so that the woodwork will not be damaged by excessive changes in ambient humidity and relative moisture content.
2. Concrete, masonry, plaster, tile and marble setting and polishing and other wet work shall be completed and dry before delivery, storage and installation of woodwork items.
3. Sequence deliveries to avoid delays and to minimize on-site storage.

D. Storage and Handling Requirements:

1. Ship and handle all materials and fabricated items in a manner which will prevent damage thereto, and store all materials and fabricated items at a dry, elevated, ventilated, and protected interior location.

E. Sustainability Standards Certifications:

1. Chain of Custody wood products: All wood products furnished under this Specification Section shall be “FSC certified” according to the rules of the Forest Stewardship Council (FSC).
    a. FSC Certification includes the following certification bodies of forests and forest products:
        1) Certification Systems.
        2) SmartWood.

3) SGS Qualifor.
4) Soil Association.

b. Wood products lacking acceptable documentation for Chain of Custody, will be rejected and their removal required.

1.7 SITE CONDITIONS

A. Temperature: Maintain ambient temperature above 55 degrees Fahrenheit for 5 calendar days before, and during installation of architectural woodwork; maintain temperature after installation until Owner's Final Acceptance.

B. Relative Humidity: Maintain a relative humidity between 25 and 55 percent for a minimum period of 5 calendar days before, and during, installation of architectural woodwork: maintain relative humidity after installation until Owner's Final Acceptance.

1.8 FIELD MEASUREMENTS

A. Field dimensions: The woodwork manufacturer is responsible for details and dimensions not controlled by Project conditions and shall show on his shop drawings all required field measurements beyond his control.

1. The Contractor shall acknowledge the woodwork fabricator's need for accurate field dimensions prior to custom fabrication.
2. The Contractor and the woodwork manufacturer shall cooperate to establish and maintain these field dimensions.

1.9 SEQUENCING AND SCHEDULING

A. Coordinate the work of this Section with the respective trades responsible for installing interfacing work, and ensure that the work performed hereunder is acceptable to such trades for the installation of their work.

PART 2 - PRODUCTS

2.1 LUMBER MATERIALS

A. General requirements: New, dressed four sides (S4S), and free from warping and other defects.

1. Sustainable Forest Certification: All wood shall be "Chain-of-Custody" certified as FSC Certified.
2. Moisture Content:
   a. Solid hardwood(s) scheduled for transparent finish: Moisture content shall not exceed 8 percent when delivered to Project.
   b. Typical (hardwood and softwoods): Moisture content of wood shall be between 5 and 10 percent when delivered to the project.

B. Exposed wood scheduled for transparent finish (including but not limited to wood trim, casework frames, shelves, fillers, edge trim door and drawer construction; and trim at wainscot):

1. White Maple (Acer saccharum), Plain Sawn, AWI Grade I.
2. Wood shall color match specified veneer, and be clear without knots, and other natural defects.

C. Exposed plywood panels scheduled for opaque finish, cubbies and mailboxes: medium density overlay plywood, in thicknesses indicated in Drawings.

D. Concealed supports for edge and corner backing shall be kiln dried birch or poplar, meeting AWI Premium Grade Standards.

E. Blocking and furring at base and walls shall comply with American Softwood Lumber Standard PS 20-70 and with specific grading requirements of SPIB: Kiln dried (KD15), Structural Light Framing, Nº. 2 grade, free of warping and large knots.

F. Internal concealed framing for casework: Kiln-dried, (KD15), eastern pine, poplar, eastern spruce, or southern pine, conforming to AWI Premium grade.

G. Fir plywood for concealed from view applications in conjunction with the various casework items: EWA C-C PLUGGED EXT.

2.2 WOOD VENEERS

A. Veneered panels for transparent finish: The face veneer for transparent finishes shall be minimum 1/28 inch thick on doors, shelves, panels and other exposed surfaces meeting AWI Premium Grade Standards (installed). Each exposed face shall be of tight smooth veneer with joints parallel to vertical edges with no sharp contrasts.

1. Primary wood veneer species: Select White Maple (Acer saccharum), Plain Sliced, Grade A.
2. Matching of adjacent pieces of veneer: Book matched.
3. Panel face assembly: Balanced.
4. Matching of Adjacent Panels: Sequence matched uniform size sets.

2.3 PLASTIC LAMINATE FACING AND BACKING

A. Manufacturers: Subject to compliance with the requirements specified herein, manufacturers offering products which may be incorporated in the work include, but are not limited to, the following:

1. Pioneer Plastics Corp. (Pionite), Auburn, ME.
2. Formica Corp., Cincinnati, OH.
3. Laminart, Elk Grove Village, IL.
4. Nevamar Corp., Odenton, MD.
5. Ralph Wilson Plastics Co. (Wilsonart), Temple, TX.

B. Sole Source: Manufacturer for plastic laminate clad work of this Section shall be same as providing plastic laminate specified in Section 06 20 00 – FINISH CARPENTRY and Section 12 30 00 - CASEWORK.

C. Laminate: Plastic laminate, general purpose, conforming to NEMA LD3.1 -1991 Grade GP50, nominal 0.050 inch thickness, in a low non-directional texture in color price group selected by the Architect.

1. General purpose grade laminate shall be used for counter tops.

D. Decorative Color Laminate: Plastic laminate, general purpose, conforming to NEMA LD3.1 -1991 Grade GP50, nominal 0.050 inch thickness, in a low non-directional texture, colors selected from Wilsonart “Virtual Design Library (VDL)”, and “Spectrum” Series.

2.4 SEATING UPHOLSTERY MATERIALS

A. Fabric:

1. Fabric: Flame retardant treated and stain repellant treated to comply with California Technical Fire Safety Bulletin 117, NFPA 701.
2. Fabric shall have been tested in accordance with California Technical Bulletin No. 133 and certified as passing such tests. All fabric shall be labeled with certification label.
3. Fabric: Basis of Design (Specified Manufacturer): To establish a standard of quality, design and function desired, Drawings and specifications have been based on Guilford of Maine, Product: “Evoke 9883”.
    a. Content: Polyester with acrylic backcoating.
    b. Minimum weight: 15.1 ounces per linear foot.
    c. Width: 54 inches.
    d. Color and pattern: Up to 4 colors as selected by the Architect.
4. Acceptable Manufacturers: Subject to compliance with the requirements specified herein, manufacturers offering products which may be incorporated in the work include the following, or approved equal:
    a. Guilford of Maine.
    b. Wellington Contract Fabrics.

B. Padding: CMHR flame retardant urethane foam, equal to Code Red 2 Foam. Padding material shall comply with the flammability requirements outlined in California Technical Bulletin #117 Resilient Filling Material Test and foam shall pass UL 94HF-1.

1. Seat foam density: 3.0 to 3.2 pounds per cubic foot.
2. Seat back foam density: 2.6 pounds per cubic foot.

2.5 BACKING FOR LAMINATES AND VENEERS

A. Cabinetry case body, doors, drawers, and countertops without sinks: Mattformed three layer medium density wood particle panel (PB), graded M2 per ANSI A 208.1 with a minimum density of 48 pounds per cubic foot or equivalent hardwood plugged plywood complying with PS 51-71.

1. “No Formaldehyde Added”: Provide board which is fabricated using pre-consumer recycled wood fibers and an exterior-grade urea-formaldehyde free

resin binder. Product shall contain no formaldehyde additives. Acceptable manufacturers include:

a. Collins Pine Company (distributed through Panel Source International, Tacoma WA.), product: “PureKor Particleboard Plus”

b. Rodman Industries, Oconomowoc, WI, product: “ResinCore I”

2. Thicknesses:

a. 3/4 inch thick at cases.

b. 1 inch thick at shelves under 30 inches wide.

c. 1 1/8 inch thick at shelves 30 inches or more wide.

d. 1 1/8 inch thick at counters without sinks.

B. Countertops with sinks and similar wet conditions: APA C-C PLUGGED EXT, fir plywood, sanded.

1. “FSC”: Provide board which is comprised of 75 percent FSC certified wood.

2.6 CABINET HARDWARE

A. Manufacturer: To establish a standard of quality, design and function desired, Drawings and specifications have been based on companies and products named under each particular hardware item. Manufacturers offering similar products which may be considered as equal, include the following:

1. Catches and latches

a. H.B. Ives Company, Wallingford CT.

b. Knape & Vogt, Grand Rapids, MI.

c. Stanley Hardware, New Britain CT.

2. Drawer slides:

a. Accuride Corp., Santa Fe Springs, CA.

b. Grass America Inc., Kernersville NC.

c. Häfele America Company, Archdale NC.

d. Knape & Vogt, Grand Rapids, MI.

3. Clothes hooks:

a. (Lamp) Sugatsune America, Inc. Carson, CA.

b. H.B. Ives Company, Wallingford CT.

c. Stanley Hardware, New Britain CT.

4. Hinges:

a. Grass American Inc., Kernersville, NC

b. Julius Blum, Inc., Stanley NC.

c. (Lamp) Sugatsune America, Inc. Carson, CA.

5. Locks

a. Häfele America Company, Archdale NC.

b. National Cabinet Lock, Mauldin SC.

c. Timberline Supply Ltd., Lake Bluff IL.

6. Pulls and knobs:
   a. Engineered Products Company, Flint MI.
   b. H.B. Ives Company, Wallingford CT.
   c. Häfele America Company, Archdale NC.
7. Shelf supports:
   a. Häfele America Company, Archdale NC.
   b. Knape & Vogt, Grand Rapids, MI.
   c. Stanley Hardware, New Britain CT.
8. Keyboard trays and Miscellaneous Specialties:
   a. Fellowes, Inc. Itasca, IL.
   b. Accuride Corp., Santa Fe Springs, CA.
   c. Waterloo Furniture Components, Ontario, Canada
9. Wire grommets and hooks:
   a. Doug Mockett & Company, Inc., Manhattan Beach, CA.
   b. Rockler Companies, Burnsville, MN.
   c. Håfele American Company,, Archdale NC.

B. Door and drawer pulls: Staple-shape wire pull, 4 inches long, solid brass with US26D, brushed chrome finish, with one-inch finger clearance.

C. Locks: Provide at least three keys per keyed alike group.
   1. Locks for drawers and doors: deadbolt type, Equal to Timberline Supply: model CB281, lock plug finish LP-100 (nickel finish).

D. Catches: Magnetic.

E. Casework hinges:
   1. General: Hinges shall be nickel plate over die-cast and formed metal. Assemblies made from plastic parts are not acceptable. Provide face frame adapter plates where face frames are indicated.
   2. Hinge for full overlay cabinet doors: Self closing concealed hinge having maximum 120 degree angle of opening. Hinges shall be equal to Blum “Modul 120 Degree Series”, with straight arm, model Nº. BL-71T5550.

F. Casters: Heavy duty polyurethane casters with brakes.
   1. Locations: As indicated on Drawings and as keynoted.
   2. Basis of Design: To establish a standard of quality, design and function desired, Drawings and specifications have been based on Uline, Pleasant Prairie, WI, Product: “ H-4942SWB”
   3. Capacity: 800 pounds.
   4. Wheels: Polyurethane 6 inch diameter, 2 inch width, non-marking and chemical resistant.

5. Swivel: with hardened double-ball raceways.

G. Pad silencers for doors: 10 mm (3/8 inch) diameter, self-adhesive resilient plastic or nylon buttons, at least 2 per door, in clear color.

H. Drawer Slides (provide one pair per drawer except as noted otherwise):

1. For file cabinets: Full extension type, 150 pounds per pair minimum rated capacity (for drawers over 30 inches, provide 175 pounds rated capacity), steel ball bearing rollers, drawer hold in feature. Finish: clear lacquered zinc. Acceptable slides are limited to:
   a. For drawers up to 24 inches wide:
      1) Accuride Nº. 4032.
      2) Knape and Vogt Nº. 8500.
      3) Häfele Nº. 4034.
   b. For drawers over 24 inches and up to 30 inches wide:
      1) Accuride Nº. 4032.
      2) Knape and Vogt Nº. 8500.
      3) Häfele Nº. No equal.
   c. For drawers over 30 inches wide:
      1) Accuride Nº. 4437.
      2) Knape and Vogt Nº. 8520.
      3) Häfele Nº. No equal.
2. For desk and casework drawers (excluding file drawers): Full extension type, 100 pounds per pair minimum rated capacity, steel ball bearing rollers, lever disconnect, drawer hold in detent feature. Finish: clear lacquered zinc.
   a. Accuride Nº. 3832A.
   b. Knape and Vogt Nº. 8400.
   c. Häfele Nº. 3832.

I. Shelf supports.

1. Shelf supports for 5 mm holes: Rok Hardware, model ROKSPL5NH in nickel finish.

J. Floating Shelf Bracket: Sheppard Brackets, Rigby Idaho, model SB075, floating shelf bracket with 3/4 inch backplate and ½ inch diameter rod, for shelves 1-1/8 to 1-1/2 inch thickness.

1. Shelf lengths, and widths as indicated on Drawings.

K. Clothes hooks and poles:

1. Clothes hooks, “Double Flat Top Button Hook”: Bracket mounted T-shape hook: Symmons Industries, Braintree, MA., model: 35DRH-MB, black finish.
2. Flat Top Button Hook (in cubbies): Kohler product “Purist”, model K-14443 CP, Matte Black Finish.

L. Wire management grommets and covers: 3 inch diameter, as manufactured by Doug Mockett & Company, Manhattan Beach CA, model number “EDP“ or

approved equal. Provide where shown on Drawings, and if not shown, allow the following numbers of grommets; exact locations to be determined in field.

1. For counters 6 feet or less provide 2 wire grommets and covers.
2. For counters over 6 feet provide 1 wire grommet and cover for every 42 inches of counter, or fraction thereof.

M. Wire management track and hook system: 2-3/4 inch by 3-3/8 inch ABS brackets with 35 inch track system, as manufactured by Doug Mockett & Company, Manhattan Beach CA, model number “WM27-90 Track System Wire Manager“ or approved equal. Provide where shown on Drawings, and if not shown, exact locations and configurations to be determined in field.

N. Keyboard trays: Slide out keyboard tray, adjustable height with sliding mouse tray; Waterloo Furniture Components product 4470D, or approved equal.

O. Locks:

1. Swinging wood doors: Equal to Häfele Sliding Door Lock No. 235.59.610.

P. Fabric faced tackboards: Fiberboard, with factory applied fabric facing.

1. Substrate: 3/4 inch thick fiberboard fabricated from 100 percent recycled post consumer waste paper.
   a. Density: 34 to 40 pounds per cubic foot.
   b. NRC: 0.20
   c. R-value: 0.85
   d. Flame Spread: Class 1 (or A
2. Fabric: Guilford of Maine: “Anchorage”

2.7 ACCESSORIES

A. Reveal trim: Extruded aluminum trim with brushed black finish 1 inch wide recess by nominally 3/4 inch deep reveal channel.

1. Fry Reglet Corporation, model number: DRM 75-100.

B. Outside post corner trim: Extruded aluminum corner trim with brushed black finish 1/4 inch wide exposed face.

1. Fry Reglet Corporation, model number: MWPOSC2575 (Basis of Design)

C. Post trim: Extruded aluminum corner trim brushed black finish 1/4 inch wide exposed face,

1. Fry Reglet Corporation, model number: MWPT2575.

D. Display Case Door Hardware: Hafele America Co., model HAWA Junior 80/GS set, top hung system, Hafele item number 940.81.000.

E. Glass Door Concealed Hinges for inset glass cabinet doors: Self closing hinge having maximum 95 degree angle of opening. Hinges shall be nickel plate over formed steel with nylon mounting cup. Hafele America Co., model number 329.21.532.

F. Cable display systems:

1. Manufacturer: To establish a standard of quality, design and function desired, Drawings and specifications have been based on Nova Display Systems, Inc., Eugene, OR product “3.0mm Cable & Fittings.” or approved equal.
2. Adjustable floor to ceiling support system: 1/8 inch (3mm) adjustable floor to ceiling stainless steel cable with top and bottom channel, toggles, plates, flanges and concealed fasteners. Finish: Satin chrome.
3. Accessories: 5/8 inch diameter aluminum supports for support of perforated metal panels with satin chrome finish:

G. Floating shelf bracket: ¾ inch thick backplate with ½ inch diameter rod equal to Sheppard Brackets, Rigby, ID, product: “Floating Shelf Bracket” or approved equal. Finish as selected by Architect.

H. Grommets and covers: 3 inch diameter, as manufactured by Doug Mockett & Company, Manhattan Beach CA., model number “XG“ or approved equal. Provide where shown on Drawings, and if not shown, exact locations to be determined in field. Colors as selected by Architect from manufacturer’s full range.

I. Edging for countertops:

1. Specified Manufacturer: To establish a standard of quality, design and function desired, Drawings and specifications have been based on Wilsonart, Temple TX.
   a. Composition: ABS/PVC extruded fabrication
   b. Width: Equal to or greater than panel thickness
   c. Color and Pattern: Selected from manufacturer’s full range of available selections.

J. Adhesive for installation of plastic laminate: Rigid bond Polyvinyl acetate (PVA) type only. Contact cements are only permitted at countertops with sinks or similar “wet condition” areas.

K. Glue for lamination and fabrication of wood and plywood items: Exterior Grade, phenolic resin glue.

L. Bolts, nuts, washers, lags, pins, and screws: Of size and type to suit application chrome finish in exposed-to-view locations.

1. Concealed joint fasteners: Threaded steel.

M. Sealant, for joints between countertops and dissimilar materials: One component acetoxy silicone rubber, mildew resistant, FS TT-S-001543A, Type Non-Sag, Class A, and FS TT-S-00230C, Type II, Class A and ASTM C920, Type S, Class 25, Grade NS, use NT,G and A with a minimum movement capability of ±25 percent, and a Shore A hardness of 20, in manufacturer’s standard colors as selected by the Architect.

1. Only use sealant and primers that comply with the following limits for VOC content:
   a. Architectural Sealants: 250 g/L.

b. Sealant primer: 250 g/L

2. Sealants containing aromatic solvents, fibrous talc, formaldehyde, halogenated solvents, mercury, lead, cadmium, chromium and their compounds, are not permitted.

3. Subject to requirements specified herein, the following products are acceptable, or approved equal:

a. Dow Corning Corporation, Midland MI; product, “786”.

b. General Electric Company, Waterford NY; product, “Sanitary SCS1700”.

c. Tremco, Beachwood OH; product, “Proglaze”.

2.8 FABRICATION - GENERAL

A. Do not fabricate materials until all specified submittals have been submitted to, and approved by, the Architect.

B. Coordinate the fabrication of casework with that of the various trades responsible for installing materials and items which will be inserted into, or applied to, the casework surfaces. Obtain and verify templates, dimensions, and instructions from the respective trades before making cut-outs, holes, slots, and other cutting in the casework.

C. Shop assemble custom casework for delivery to site. Deliver in assemblies as large as possible for entrance into the designated areas. Provide for concealed job connections of adjacent units.

D. Fabricate, install and finish all work so that both sides of countertops, panels, doors, shelves and other casework are of balanced construction, to prevent warping.

E. Cap exposed plywood with solid hardwood, matching color of wood veneer panels. Apply veneer over hardwood edging in manner to show no visible lines between wood veneer and hardwood edging.

F. Fit corners and joints hairline, secure with concealed fasteners.

G. Finish all solid wood and plywood surfaces smooth, and free from all machine and tool marks that will show through the wood veneer or facing materials.

H. Make all joints tight, and form to conceal shrinkage. Glue all miters having a dimension of 4 inches or more from heel to point.

I. Provide shop fabricated counters, shop mitered components, closure trims with ample allowance for field cutting and fitting. Provide additional trim for scribing and site cutting.

J. Finished work shall be free from visible adhesive and pencil marks.

2.9 FABRICATION - CASEWORK

A. Fabricate casework in accordance with requirements of specified AWI Grade and the following additional requirements:

1. Cabinets shall be in flush overlay construction, with drawer fronts and hinged doors overlapping openings a minimum of 1/4 inch all four sides.
2. Fabricate all casework scheduled for veneer finish with exposed to view grain of wood vertical or horizontal as indicated on Drawings.
3. Fabricate cabinets in integral units, each completely enclosed, without the use of common partitions.
4. Drawers:
    a. Drawer sides and backs 1/2 inch thick solid hardwood of specified species.
    b. Wood veneer drawer fronts: body panel 1/2 inch thick solid hardwood of specified species, face panel same construction as specified for cabinet doors with matching veneer. Drawer fronts shall be applied to separate drawer body component sub-front.
    c. Drawer bottoms (wood veneer casework): 1/4 inch thick hardwood veneer panel housed and glued into front, sides and back.
    d. Underside of drawer to receive continuous hot melt glue at joint between bottom and back/sides/front for sealing and rigidity.
    e. Reinforce drawer bottoms with intermediate spreaders.
5. Doors: Square edge design, 3/4 inch thick, without any profiling and shall fully overlap the cabinet frame.
    a. Wood veneer doors: Fabricate doors with particle board core and front and rear faces grade AA wood veneer, and solid wood edging.
    b. Maintain a maximum 1/8" reveal between pairs of doors, between door and drawer front, or between multiple drawer fronts within the cabinet.
6. Base cabinets: Provide full horizontal top frame with glued and doweled joints, 3/4 inch plywood end panels and bottom. Bottom shall be glued and doweled and let into routed end panels. Provide 4 inch high toe rail, securely screwed to the end panels and to the bottom panel by concealed glue blocks.
7. Wall cabinets: Provide same finishes as base cabinets, with 3/4 inch thick top and bottom veneered plywood panels. Top and bottom panels shall be glued and doweled and let into routed end panels. Back of case shall be recessed and let into routed end panels and further secured with glue blocks.
8. Door and drawer spreaders: Provide minimum 3/4 thick full width cabinet body spreaders immediately behind all door/drawer and multiple drawer horizontal joints to maintain exact body dimensions, and close off reveal. Front edge to be match face of adjacent cabinet doors/drawers.

2.10 FABRICATION OF PLASTIC LAMINATE CLAD ITEMS

A. Specified Manufacturer: To establish a standard of quality, design and function desired, Drawings and specifications have been based on Wilsonart, Temple TX, product “Wilsonart HPL - Virtual Design Library Spectrum Series”.

B. Do not fabricate materials until all specified submittals have been submitted to, and approved by, the Architect.

C. Except as otherwise specified hereunder, fabricate plastic laminate clad items in strict accordance with the details on the Drawings, the approved shop drawings, and workmanship standards set forth in the AWI Quality Standards Section 400, for specified Quality Grade.

2.11 SHOP APPLIED FINISHING

A. Transparent exposed-to-view finish for casework: AWI Premium Grade Factory Finish System Nº TR-4 “Conversion Varnish” system having a Medium rubbed effect with a sheen of 24° to 28° gloss units per ASTM D523. Finish system shall not substantially increase flame spread.

1. One washcoat, reduced conversion varnish.
2. Colorant: As selected by the Architect for wood elements indicated to receive “Color 2”.
3. One coat sealer, conversion varnish.
4. Two coats topcoat: Conversion varnish equal to Sherwin Williams product “V84 series Kem Var”.

B. Concealed surfaces: Thoroughly coat all concealed surfaces of finish woodwork before assembling with two coats of clear wood preservative.

C. Field Touch-up: Shall be the responsibility of the installing contractor and shall include the filling, and touch-up of exposed job made nail or screw holes, refinishing of raw surfaces resulting from job fitting, repair of job inflicted scratches and marks, and final cleaning up of the finished surfaces.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify adequacy of blocking, backing and support framing for all finish carpentry work.

B. Examine pre-fabricated woodwork before installation and verify that back priming has been completed and all packing has been removed.

C. Beginning of installation means acceptance of existing conditions.

3.2 PREPARATION

A. Before installing work under this section, woodwork shall be conditioned to average prevailing humidity conditions in areas of installation.

3.3 INSTALLATION - GENERAL

A. Install work in accordance with the specified AWI quality standards.

B. Woodwork shall be installed plumb, level, true and straight without distortions.

1. Use concealed shims
2. Work shall be installed to a tolerance of 1/8 inch in 8 feet for plumb and levelness, including tops.

3. There shall be no variations in flushness of adjoining surfaces.

C. Tops and woodwork shall be scribed and trimmed to fit adjoining work.
1. Where cuts occur, refinish surfaces and repair damaged finishes

D. Secure woodwork to anchors or built-in blocking or blocking directly attached to substrates.
1. Secure woodwork to grounds, furring, stripping and blocking with countersunk, concealed fasteners and blind nailing performing a complete installation.
2. Use thin gauge finishing nails for exposed nailing, countersunk and filled flush with woodwork finished surface.
a. Match final finish materials where transparent finish is indicated.

3.4 INSTALLATION - CASEWORK AND COUNTERTOPS

A. Install casework without distortion so that doors and drawers fit openings properly and are accurately and evenly aligned.

B. Adjust casework hardware centering the doors and drawers in the openings, and provide unencumbered operation.

C. Complete the installation of hardware and accessory items as indicated.

D. Maintain veneer sequence matching of casework with transparent finish, where so manufactured.

E. Tops: Anchor tops securely to base units and to other support systems.

3.5 FIELD FINISHING

A. Except where expressly noted otherwise on Drawings, shop finish all woodwork. Where field finishing is indicated or scheduled on Drawings, finishing Work shall be as specified under Section 09910 - PAINTS.

3.6 TOLERANCES

A. Maximum variation from true position 1/16 inch with a maximum of 1/32 inch offset from true alignment with adjoining surfaces intended to be flush.

3.7 ADJUSTING

A. To whatever extent work was not completed at shop or prior to installation of woodwork, perform and complete the specified finishing of woodwork.

B. Repair damaged and defective woodwork where possible eliminating defects functionally and visually.
1. Where not possible to repair damaged or defective work, replace with matching new work.
2. Adjust joinery for uniform appearance.

C. Adjust doors and drawers for smooth and balanced movement, lubricate hardware for use.

3.8 CLEANING

A. Comply with requirements of Section 01 74 19 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL for handling and disposition of all construction and demolition waste.

B. Daily clean work areas by sweeping and disposing of scraps and sawdust.

C. Upon completion of the work of this Section in any given area, remove tools, equipment and all rubbish and debris from the work area leave area in broom-clean condition.

D. Clean excess sealant by moderate use of mineral spirits or other solvent acceptable to sealant manufacturer.

E. Remove protective material from pre-finished surfaces, immediately prior to Final Acceptance.

F. Carefully clean exposed and semi-exposed wood surfaces, in strict accordance with fabricator’s instructions. Touch-up shop-applied finishes to restore damaged or soiled areas, matching adjoining finish.

G. Wash down plastic laminate with a solution of mild detergent in warm water, applied with soft clean wiping cloths. Take care to remove dirt from corners. Wipe surfaces clean.

H. Clean and polish hardware, and bright metal trim components.

3.9 PROTECTION

A. Protect installed woodwork and maintain specified conditions, in a manner acceptable to both fabricator and installer. Ensure that work of this Section will not be damaged or soiled, and is completely free of defects at the time of final acceptance of Project by the Architect.

End of Section

Section 06 55 00
SOLID SURFACING

PART 1 - GENERAL

1.1 SUMMARY

A. Furnish and install the following:
   1. Countertops and backsplashes.
   2. Solid surface (solid polymer) chair rail trim where indicated.
   3. Hardware for flip up countertops.
   4. Sealant, for joints between solid surfacing and abutting surfaces.

1.2 RELATED REQUIREMENTS

A. Section 01 60 00 - PRODUCT REQUIREMENTS: Listing of VOC requirements for adhesives, cleaning/maintenance materials, paints, coatings, and sealants.

B. Section 01 73 00 - EXECUTION: Waste Management and Recycling during Final Cleaning.

C. Section 01 74 19 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL: Procedural and administrative requirements relating to recycling goals, waste management program and reporting.

D. Section 01 81 13 - SUSTAINABLE DESIGN REQUIREMENTS: Procedural and administrative requirements relating to required *Northeast CHPS Verified Program,* (NE-CHPS) Certification.

E. Section 06 10 00 - ROUGH CARPENTRY: Wood blocking and nailers.

1.3 REFERENCES

A. Referenced Standards: Comply with applicable requirements of the following standards and those others referenced in this Section, under the provisions of Section 01 42 00 - REFERENCES. The standards referenced herein are included to establish recognized minimum quality only. Where these standards conflict with other specified requirements, the most restrictive requirements shall govern. Equivalent quality and testing standards will be acceptable, subject to their timely submission, review and acceptance by the Architect.

B. Sustainability Requirement Reference: The following sustainability requirements are hereby made a part of this Section by reference thereto:
   1. High Performance Schools Exchange, Northeast Energy Efficiency Partnerships NE-CHPS, (referred to herein as “NE-CHPS”).

1.4 SUBMITTALS

A. Information and Review Submittals: Submit the following under provisions of Section 01 33 00 - SUBMITTAL PROCEDURES:
   1. Literature: Manufacturer's product data sheets, specifications, performance data. Identify available colors, shades, and gloss

2. Shop drawings: Large scale design details of minimum 1-1/2 inch-to-1 foot scale, showing abutting materials, installation conditions, clearances. Show profiles, jointing and fastening methods.
3. Selection samples:
   a. Solid surfacing samples for initial color selection by Architect.
   b. Sealant material: Manufacturer's standard strips of sealant, in all available colors, for selections by the Architect.
   c. Provide additional samples as requested by Architect for initial selection of material colors and finishes.
4. Verification samples:
   a. 3 by 3 inch samples of solid surfacing materials.
5. Sustainable Design Submittals: As required by NE CHPS.

1.5 QUALITY ASSURANCE

A. Fabricator and Installer; with a minimum of 3 years documented experience demonstrating previously successful work of the type specified herein, and approved by product manufacturer.
   1. Fabricator and Installer for solid surfacing products shall be trained and certified by solid surfacing manufacturer.

1.6 DELIVERY, STORAGE AND HANDLING

A. Concrete, masonry, plaster, tile and marble setting and polishing and other wet work shall be completed and dry before delivery, storage and installation of fabricated solid surface items.

B. Ship and handle all materials and fabricated items in a manner which will prevent damage thereto, and store all materials and fabricated items at a dry, elevated, ventilated, and protected interior location.

C. Sequence deliveries to avoid delays and to minimize on-site storage.

1.7 ENVIRONMENTAL REQUIREMENTS

A. Maintain ambient temperature above 55 degrees Fahrenheit for 5 calendar days before, during, and after installation of solid surfacing fabrications; maintain temperature until Owner’s Final Acceptance.

1.8 FIELD MEASUREMENTS

A. Field dimensions: The fabricator is responsible for details and dimensions not controlled by Project conditions and shall show on his shop drawings all required field measurements beyond his control.
   1. The Contractor shall acknowledge the fabricator’s need for accurate field dimensions prior to custom fabrication.
   2. The Contractor and the fabricator shall cooperate to establish and maintain these field dimensions.

1.9 SEQUENCING AND SCHEDULING

A. Coordinate the work of this Section with the respective trades responsible for installing interfacing work, and ensure that the work performed hereunder is acceptable to such trades for the installation of their work.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Acceptable Manufacturers and Products: Subject to compliance with the requirements specified herein, products which may be incorporated in the work include the following, or approved equal:

1. Polymer Solid Surfacing:

a. E. I. du Pont de Nemours and Company, Inc., Wilmington, DE product, “Corian”.

b. Formica Corporation, Cincinnati, OH, product: “Solid Surfacing”.

c. Wilsonart International, Inc. Temple, TX, product “Gibraltar”

2.2 SOLID SURFACING MATERIALS

A. Polymer solid surfacing material: Non-porous surfacing material homogeneously composed of natural minerals and high-performance polymer, fabricated sizes and profiles as shown on the Drawings, in colors and finishes as selected by Architect.

1. Solid surfacing material shall be NSF (National Sanitation Foundation) listed under publication 51 - Plastic Materials and Components used in Food Equipment and bear the “component” mark.

2. Colors and patterns shall be as selected by the Architect.

B. Sheet thicknesses shall be as indicated on Drawings.

1. Trim and backsplashes: One piece monolithic design 1/2 inch thick unless otherwise indicated on the Drawings.

2. Provide cut-outs at recycling centers as indicated on the Drawings bevel all exposed edges.

C. Adhesive for build-up of solid surfacing sheets: color matched two-component seam adhesive as provided by solid surfacing manufacturer.

D. Adhesive for installation of trim components, neoprene panel adhesive or structural silicone glazing sealant, as recommended by solid surfacing manufacturer.

2.3 ACCESSORIES

A. Trash grommets and covers: 12 inch diameter by 3 inches deep stainless steel trash grommet, as manufactured by Doug Mockett & Company, Manhattan Beach CA, model number “TM12B“ or approved equal. Provide where shown on Drawings, and if not shown, allow the following numbers of grommets; exact locations to be determined in field.

B. Flip up counter hardware: Counterbalance system engineered to lift and lower flip-up counters and prevent counter from slamming down and holding counter in place, at any point, within a 0-90 degree range of motion equal to CounterBalance Corporation product: “Counter-A-SYST® Model CAS 328”.

C. Sealant, for joints between solid surfacing and dissimilar materials: One component acetoxy silicone rubber, mildew resistant, FS TT-S-001543A, Type Non-Sag, Class A, and FS TT-S-00230C, Type II, Class A and ASTM C 920, Type S, Class 25, Grade NS, use NT,G and A with a minimum movement capability of ±25 percent, and a Shore A hardness of 20, in manufacturer's standard colors as selected by the Architect, equal to one of the following:

1. Dow Corning Corporation, Midland MI; product, "786".
2. General Electric Company, Waterford NY; product, "Sanitary SCS1700".
3. Tremco, Beachwood OH; product, "Proglaze".

D. Bolts, nuts, washers, lags, pins, and screws: Of size and type to suit application chrome finish in exposed-to-view locations.

2.4 FABRICATION

A. Shop fabricate all solid surfacing items in strict accordance with the details on the Drawings, the approved shop drawings, and recommendations of the solid surfacing manufacturer

B. Fit corners and joints hairline. Make all field joints and miters tight, secure with concealed fasteners.

C. Rout all edges to be butted for a smooth, clean fit. Sand edges with 120 grit sandpaper to rough up surfaces for adhesive bonding. Clean with denatured alcohol.

D. Prepare and apply adhesive in compliance with manufacturer's written instructions. Clamp all components using manufacturer's approved clamping methods at all joints and build-up laminations, maintain clamping until adhesive is set. Avoid over-tightening clamps and squeezing out adhesive.

E. Remove excess adhesive when dry with router. Follow with belt sander using 120 grit, diagonal to joint. After adhesive is leveled and smooth with surface, proceed with final shaping and finishing.

F. After shaping, bring finish of all surfaces equal to manufacturer's original satin finish. Sand surfaces smooth with wet 400 grit sandpaper. Remove superficial scratches and sander markings, buff with nylon buffing pads as recommended by solid surfacing manufacturer. Wipe surfaces clean and dry with cloths.

G. Finished work shall be free from visible adhesive and pencil marks.

H. Field touch-up: Shall be the responsibility of the installer and shall include the filling, and touch-up of exposed job made nail or screw holes, refinishing of surfaces resulting from job fitting, repair of job inflicted scratches and marks, and final cleaning up of the finished surfaces.

PART 3 - EXECUTION

3.1 INSTALLATION - GENERAL

A. General: Install work in accordance with manufacturer's instructions.

B. Solid surfacing shall be installed plumb, level, true and straight without distortions:

1. Use concealed shims.

2. Work shall be installed to a tolerance of 1/8 inch in 8 feet for plumb and levelness.
3. There shall be no variations in flushness of adjoining surfaces.

C. Trim shall be scribed and trimmed to fit adjoining work.
1. Where cuts occur, refinish surfaces and repair damaged finishes

D. Secure solid surfacing fabrications to blocking directly attached to substrates.
1. Secure fabrications using concealed fasteners.
2. Anchor tops securely to base units and to other support systems.

E. After installation and leveling of solid surfacing fabrications has been completed; apply a continuous bead of specified sealant to all joints which abut walls or partitions. Tool the sealant to a uniformly dense surface, level with the edges of the casework. Immediately remove all excess sealant from solid surfacing surfaces.

3.2 TOLERANCES

A. Maximum variation from true position 1/16 inch with a maximum of 1/32 inch offset from true alignment with adjoining surfaces intended to be flush.

3.3 CLEANING

A. Daily clean work areas by sweeping and disposing of scraps.

B. Clean excess sealant by moderate use of mineral spirits or other solvent acceptable to sealant and solid surfacing manufacturers.

C. Wash down exposed surfaces with a solution of mild detergent in warm water, applied with soft clean wiping cloths. Take care to remove dirt from corners. Wipe surfaces clean.

3.4 PROTECTION

A. Protect installed fabrications in a manner acceptable to fabricator and installer, which shall ensure no damage or deterioration at the time of Final acceptance of Project by the Architect.

End of Section

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Section 07 13 24

PRE-APPLIED SHEET WATERPROOFING

PART 1 - GENERAL

1.1 SUMMARY

A. Furnish and install:

1. Pre-applied sheet waterproofing at hydrostic conditions at underside of slabs, footings, elevator pits and exterior face of walls.
2. Molded sheet drainage panels

1.2 RELATED REQUIREMENTS

A. Section 01 74 19 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL: Procedural and administrative requirements relating to recycling goals, waste management program and reporting.

B. Section 01 81 13 - SUSTAINABLE DESIGN REQUIREMENTS: Procedural and administrative requirements relating to required *Northeast CHPS Verified Program,* (NE-CHPS) Certification.

C. Section 03 30 00 – CAST-IN-PLACE CONCRETE.

1.3 REFERENCE STANDARDS

A. Referenced Standards: Comply with applicable requirements of the following standards and those others referenced in this Section, under the provisions of Section 01 42 00 - REFERENCES. The standards referenced herein are included to establish recognized minimum quality only. Where these standards conflict with other specified requirements, the most restrictive requirements shall govern. Equivalent quality and testing standards will be acceptable, subject to their timely submission, review and acceptance by the Architect.

1. ASTM C836 – Standard Test Methods for Crack Cycling
2. ASTM D412 - Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers – Tension
3. ASTM D624 - Standard Test Method for Tear Strength of Conventional Vulcanized Rubber and Thermoplastic Elastomers
4. ASTM D903 - Standard Test Method for Peel or Stripping Strength of Adhesive Bonds
5. ASTM D3767 - Standard Practice for Rubber—Measurement of Dimensions
6. ASTM D1970 - Standard Specification for Self-Adhering Polymer Modified Bituminous Sheet Materials Used as Steep Roofing Underlayment for Ice Dam Protection
7. ASTM D4833 - Standard Test Method for Index Puncture Resistance of Geomembranes and Related Products

8. ASTM D5385/5385M - Standard Test Method for Hydrostatic Pressure Resistance of Waterproofing Membranes
9. ASTM E96/E 96M - Standard Test Methods for Water Vapor Transmission of Materials
10. ASTM D4068 - Standard Specification for Chlorinated Polyethylene (CPE) Sheeting for Concealed Water-Containment Membrane
11. ASTM D5385 - Standard Test Method for Hydrostatic Pressure Resistance of Waterproofing Membranes
12. ASTM D570 - Standard Test Method for Water Absorption of Plastics

B. Sustainability Requirement Reference: The following sustainability requirements are hereby made a part of this Section by reference thereto:

1. High Performance Schools Exchange, Northeast Energy Efficiency Partnerships NE-CHPS, (referred to herein as “NE-CHPS”).

1.4 ADMINISTRATIVE REQUIREMENTS

A. Pre-Installation Meetings: At least two weeks prior to commencing the work of this Section, conduct a pre-installation conference at the Project site. Comply with requirements of Section 01 31 00 - PROJECT MANAGEMENT AND COORDINATION. Coordinate time of meeting to occur prior to installation of work under the related sections named below.

1. Required attendees: Owner or designated representative, Architect, General Contractor, Waterproofing Installer’s/Applicator’s Project Superintendent, waterproofing manufacturer’s technical representative and representatives of other related trades as directed by the Architect or Contractor, and representatives for installers of related work.
2. Agenda:
    a. Scheduling of dewatering and waterproofing operations.
    b. Review of staging and material storage locations.
    c. Coordination of work by other trades.
    d. Installation procedures for ancillary equipment.
    e. Protection of completed Work.
    f. Establish weather and working temperature conditions to which Architect and Contractor must agree.
    g. Emergency rain protection procedure.
    h. Discuss process for manufacturer’s inspection and acceptance of completed Work of this Section.

B. Scheduling:

1. Schedule work so waterproofing applications may be inspected prior to concealment.

1.5 SUBMITTALS

A. Information and Review Submittals: Submit the following under provisions of Section 01 33 00 - SUBMITTAL PROCEDURES:

1. Product Data: For each type of waterproofing product specified, including:
   a. Include construction details, material descriptions, and tested physical and performance properties of waterproofing.
   b. Include manufacturer's written instructions for evaluating, preparing, and treating substrate.
2. Shop Drawings: Show locations for waterproofing system components. Show details for each type of substrate, joints, corners, and edge conditions, including flashings, counter-flashings, penetrations, transitions, and terminations.
3. Samples: For each exposed product and for each color and texture specified, including the following products:
   a. 8-by-8-inch (200-by-200-mm) square of waterproofing and flashing sheet.
   b. 4-by-4-inch (100-by-100-mm) square of drainage panel.
4. Qualification Data: For Installer.
5. Warranty: Sample of special warranties.
6. Field Quality Control Submittals.
7. Sustainable Design Submittals: As required by NE CHPS.

1.6 QUALITY ASSURANCE

A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by waterproofing manufacturer.

B. Mockups: Build mockups to verify selections made under Sample submittals and to set quality standards for installation.

1. Build for each typical waterproofing installation including accessories to demonstrate surface preparation, crack and joint treatment, corner treatment, and protection.
   a. Size: As shown on Drawings.
   b. Description: Each type of wall installation.
2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
3. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.7 FIELD CONDITIONS

A. Environmental Limitations: Apply waterproofing within the range of ambient and substrate temperatures recommended by waterproofing manufacturer.

1. Do not apply waterproofing in snow, rain or fog.

B. Maintain adequate ventilation during preparation and application of waterproofing materials.

1.8 DELIVERY, STORAGE AND HANDLING

A. Delivery and Acceptance Requirements:

1. Do not deliver items to the site, until all specified submittals have been submitted to, and approved by, the Architect.
2. Deliver materials in original unopened packages, containers or bundles bearing brand name, and identification of manufacturer, with labels and package seals intact and legible.

B. Storage and Handling Requirements:

1. Store and handle materials following manufacturer's recommended procedures, and in accordance with material safety data sheets.
2. Protect materials from damage due to moisture, direct sunlight, excessive temperatures, surface contamination, corrosion and damage from construction operations and other causes.

C. Damaged material: Remove any damaged or contaminated materials from job site immediately, including materials in broken packages, packages containing water marks, or show other evidence of damage, unless Architect specifically authorizes correction thereof and usage on project.

1.9 WARRANTY

A. General: Submit the following warranties under provisions of Section 01 78 00 - CLOSEOUT SUBMITTALS, and in compliance with Section 01 78 36 – WARRANTIES.

B. Manufacturer's Warranty: Manufacturer's standard materials-only warranty in which manufacturer agrees to furnish replacement waterproofing material for waterproofing that does not comply with requirements or that fails to remain watertight within specified warranty period.

1. Warranty Period: Ten years from date of Substantial Completion.

C. Installer's Special Warranty: covering Work of this Section, for warranty period of two years.

1. Warranty includes removing and reinstallation, or repair, of waterproofing and accessories including replacement of protection board and drainage panels,

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Basis of Design (Specified Manufacturer): To establish a standard of quality, design and function desired, Drawings and specifications have been based on Tremco, Inc., product: TREMproof Amphibia.

B. Acceptable Manufacturers: Subject to compliance with the requirements specified herein, manufacturers offering products which may be incorporated in the work include the following, or approved equal:

1. Tremco, Inc., Beachwood OH, product “TREMproof Amphibia”
2. Mineral Technologies, New York NY, (Cetco Brand), product “Ultraseal XP”
3. Carllisle Coatings and Waterproofing (CCW brand), Wylie TX., product “MiraPLY-V”.
4. AVM Industries, Canoga Park CA., product “Assuie Skin 550G”.

2.2 PERFORMANCE REQUIREMENTS

A. General: Waterproofing system shall be capable of performing as a continuous watertight installation and as a moisture drainage plane transitioned to adjacent flashings and discharging water to the building exterior. Waterproofing shall accommodate normal substrate movement, construction material transitions, opening transitions, penetrations, and perimeter conditions without resultant moisture deterioration.

B. Compatibility: Provide waterproofing system materials that are compatible with adjacent materials under conditions of service and substrates on which product is applied, as recommended by waterproofing manufacturer based on testing and field experience.

2.3 MATERIALS, GENERAL

A. Source Limitations: Provide waterproofing system materials and accessory products from a single-source system manufacturer.

2.4 SHEET WATERPROOFING

A. Multi-Layer Sheet Waterproofing: Composite membrane of 63 mils thickness consisting of an EPDM watertight barrier layer, a hydro-reactive polymer core layer, an EPDM derivative/polymer hydro-reactive layer, and a non-woven polyethylene geotextile facing.
   1. Products: Subject to compliance with requirements, provide the following:
      a. Basis of Design Product: Tremco, Inc., TREMproof Amphibia
   2. Physical Properties:
      a. Elongation, ASTM D412: 709%
      b. Tensile Strength, ASTM D 412: 927 psi
      c. Nail Sealability, ASTM D1970, sect. 7.9: Passed
      d. Low Temp Flexibility @ -20° F, ASTM D1970, sect. 7.6: Unaffected, passed
      e. Peel Adhesion to Concrete, ASTM D903: 7.7 lbs./in.
      f. Strength at Break, ASTM D624: 161.51 psi
      g. Permeance, ASTM E96 B:0.069 US Perms, 0.016 US Perms (BW - Inverted Wet Cup)
      h. Resistance to Hydrostatic Head, ASTM D5385: Pass at 231 ft.²
      i. Thickness, ASTM D3767: 63 mils, 1.6mm
      j. Crack Cycling @ -9.4° F, 100 cycles, ASTM C836: Unaffected, Pass

k. Puncture Resistance of Geomembranes, ASTM D4833: 52.4 kg/M
l. Hydrostatic Pressure Resistance, ASTM D4068: Pass at 40 hrs.
m. Water Absorption, ASTM D570: 0.13%
n. Installation Temperatures: 32 to 95°F (0 to 35° C)
o. Freeze/Thaw Cycles: no effect before or after installation
p. Life Expectency: Indefinite
q. Color: Black

2.5 ACCESSORY MATERIALS

A. General: Furnish accessory materials recommended by waterproofing manufacturer for intended use and compatible with sheet waterproofing.

B. Termination Bar: Extruded-aluminum or formed-stainless-steel bars with upper flange to receive sealant.
   a. Basis of Design Product – Tremco, Inc., Paraterm Bar

C. Tapes: Waterproofing manufacturer's recommended tape for joints between sheets, membranes, or panels.
   1. Safety Overlap Tape: double-sided, synthetic rubber composite membrane tape, with a butyl adhesive on one side and a fleece material facing.
      a. Basis of Design Product: Tremco, Inc. TREMproof Amphibia Grip Tape

D. Waterstops: hydro-reactive, water swelling, single component elastic sealant.
   a. Basis of Design Product – Adeka ULTRASEAL P-201

E. Joint Sealants: Termination Seals:
   1. Single component, high performance, medium-modulus, low-VOC, UV-stable, non-sag polyurethane sealant.
      a. Basis of Design Product: Tremco Inc.; Dymonic 100.
   2. Single component, thermoplastic elastomer sealant.
      a. Basis of Design Product: Tremco Inc.; Tremco 830.

2.6 WATERPROOFING PROTECTION AND DRAINAGE PANELS

A. Protection Course: Not required.

B. Nonwoven-Geotextile-Faced, Molded-Sheet Drainage Panel: Manufactured composite subsurface drainage panels consisting of a nonwoven, spun-bonded polypropylene facing laminated to one side of a studded, non-biodegradable, polystyrene drainage core.
   1. Basis of Design: Tremco, TREMDrain.
   2. Flow Capacity, per unit width, ASTM D 4716: 12.5 gpm/ft. (155 lpm/m).
   3. Flow Rate, ASTM D 4491: 165 gpm/ft2 (6,724 lpm/m2).
   4. Apparent Opening Size: No. 70 sieve (210 micron).
   5. CBR Puncture, ASTM D 6241: 275 lb. (1,220 N).

6. Core Compressive Strength, ASTM D 1621: 11,000 lb/ft2 (527 kN/m2).
7. Thickness: 0.25 inch (6.35 mm).

C. Nonwoven-Geotextile-Faced, Molded-Sheet Drainage Panel: Manufactured composite subsurface drainage panels consisting of a nonwoven, spun-bonded polypropylene facing laminated to one side of a studded, non-biodegradable, polystyrene drainage core[, with polymeric film attached to back of drainage core].
1. Basis of Design: Tremco, TREMDrain [1000] [1000 PF].
2. Flow Capacity, per unit width, ASTM D 4716: 18 gpm/ft. (224 lpm/m).
3. Flow Rate, ASTM D 4491: 165 gpm/ft2 (6,724 lpm/m2).
4. Apparent Opening Size: No. 70 sieve (210 micron).
5. CBR Puncture, ASTM D 6241: 275 lb (1,220 N).
6. Core Compressive Strength, ASTM D 1621: 15,000 lb/ft2 (718 kN/m2).
7. Thickness: 0.437 inch (11 mm).

D. Drainage Panel: Manufactured composite subsurface drainage panels consisting of a nonwoven, spun-bonded polypropylene facing laminated to one side of a studded, non-biodegradable, polystyrene drainage core, with polymeric film attached to back of drainage core.
1. Basis of Design: Tremco, TREMDrain 6000/6000PF.
2. Flow Capacity, per unit width, ASTM D 4716: 18 gpm/ft. (223 lpm/m).
3. Flow Rate, ASTM D 4491: 150 gpm/ft2 (6,113 lpm/m2).
4. Apparent Opening Size: 70 sieve (210 micron).
5. CBR Puncture, ASTM D 6241: 320 lb (1,410 N).
6. Core Compressive Strength, ASTM D 1621: 15,000 lb/ft2 (718 kN/m2).
7. Thickness: 0.40 inch (10 mm).

E. Nonwoven-Geotextile-Faced, Molded-Sheet Drainage Panel: Manufactured composite subsurface drainage panels consisting of a nonwoven, needle-punched polypropylene facing laminated to one side of a studded, non-biodegradable, polystyrene drainage core.
1. Basis of Design: Tremco, TREMDrain TotalDrain.
2. Flow Capacity, per unit width, ASTM D 4716: 21 @ HG= 0.1, 261@HG=0.1
3. Flow Rate, ASTM D 4491: 150 gpm/ft2 (6,113 lpm/m2).
4. Apparent Opening Size: 70 sieve (210 micron).
5. CBR Puncture, ASTM D 6241: 320 lb (1,410 N).
6. Core Compressive Strength, ASTM D 1621: 9,500 lb/ft2 (455 kN/m2).
7. Thickness: 0.437 inch (11 mm), 1 inch (25mm).

PART 3 - EXECUTION

3.1 EXAMINATION

A. Surface Condition: Before applying waterproofing materials, examine substrate conditions.

B. Proceed with installation once unsatisfactory conditions have been corrected.

3.2 INTERFACE WITH OTHER WORK

A. Sequencing of Work: Coordinate sequencing of waterproofing installation with work of other sections that form portions of building envelope moisture control to ensure that flashings and transition materials can be properly installed and inspected.

B. Subsequent Work: Coordinate waterproofing installation with work of other sections installed subsequent to waterproofing to ensure complete inspection of installed waterproofing and sealing of waterproofing penetrations necessitated by subsequent work.

3.3 PREPARATION

A. Clean, prepare, and treat substrates. Fill voids with cement grout as recommended by manufacturer.

B. Formed Concrete Surfaces: Remove fins and projections. Fill voids, form-tie holes, and other defects greater than 1/4 inch (6 mm) in depth.

C. Horizontal Concrete Surfaces: Remove standing water, debris, and substances that may impair bonding of patching materials or effectiveness of waterproofing. Fill voids and other defects greater than 1/4 inch (6 mm) in depth.

D. Excavation Support and Protection System: Fill minor gaps and spaces 1 (25 mm) wide or wider with appropriate filling material. Cover or fill large voids and crevices.

3.4 INSTALLATION, GENERAL

A. Install waterproofing and accessories according to manufacturer's written instructions.

1. Install a continuous layer of waterproofing membrane with ends and edges lapped a minimum of 2-4 inches (102 mm). Stagger end joints, seal laps and treat fastener penetrations in accordance with manufacturer’s written instructions.
2. Apply hydro-reactive expandable sealant around penetrations in horizontal and vertical surfaces, construction joints in substrate, and penetrations.
3. Apply Tremco 830 sealant between all overlaps and compress with a 2” x 2” steel seam roller using pressure sufficient to adequately flatten/spread the sealant bead.
4. Seal all overlaps with TREMproof Amphibia Grip Tape centered on the adjacent sheet edge, adhering to the white, non-woven fleece fabric layer facing the installer and pressing or rolling down to ensure full adhesion.

B. Protect waterproofing from damage during construction. Repair punctures, tears, and cuts.

3.5 VERTICAL BLINDSIDE WALL WATERPROOFING

A. Install Amphibia membrane with the white, fleece fabric side to be in direct contact with concrete and over a continuous layer of a TREMDrain drainage board. TREMDrain drainage board is applied 4 feet (1.2 m) above submerged conditions.

B. On shoring walls, install membrane with a minimum 2 – 4 inches (101.6 mm) sheet edge overlaps. Tack membrane to highest point of shoring. All overlaps of Amphibia must be treated in accordance with manufacturer's details.

C. Verify which penetrations must be accessed after concrete placement for completion of waterproofing detail treatment and ensure that sufficient access to membrane is provided within a wood formed box out; verify which penetrations will not be accessed after concrete placement for completion of waterproofing detail treatment and ensure that final detailing procedures are completed prior to concrete pour; waterproof penetrations in accord with manufacturer's current procedures; contact manufacturer for procedures at project conditions not provided in installation manuals.

D. After any precipitation, pump standing water off waterproofing as soon as possible and repair any damage to membrane.

E. Excavation Support and Protection: Cut, clean, and treat tiebacks and similar projections. Encase tieback rods, nuts, and plates. If water is present, cover shoring and lagging with plastic protection sheets. If water is present, set up a dewatering system to remove water.

3.6 HORIZONTAL WATERPROOFING

A. Horizontal Roofs, Plazas, and between Slabs: Install waterproofing membrane starting at lowest point, with ends and edges overlapped a minimum of 2 - 4 inches (102 mm) and tape sealed.

1. Install fleece fabric side of membrane against the material to be waterproofed.
2. Terminations at Vertical Surfaces: Provide a fillet or cant at intersection of horizontal and vertical substrates.

3.7 BELOW-SLAB WATERPROOFING

A. Below Structural Slabs-on-Grade: Apply waterproofing membrane with black EPDM side down, and white, fleece fabric side up.

1. Install membrane sheets with the fleece fabric side up. Tape all seams where subject to displacement during concrete placement.
2. Install under footings, grade beams, and pile caps; or continue waterproofing through key joints between footings and foundation walls, and extend a minimum of 8 inches (200 mm) up or beyond perimeter slab forms. Stagger seams minimum 12 inches (305 mm).

3. Install under slabs starting at lowest point, install a continuous layer of waterproofing membrane, with ends and edges lapped a minimum of 4 inches (102 mm).
4. Protect waterproofing from damage caused by reinforcing bar supports with sharp edges.

3.8 DRAINAGE PANEL INSTALLATION

A. Place and secure drainage panels in accordance with manufacturer’s written instructions. Use adhesives that do not penetrate waterproofing. Lap edges and ends of geotextile to maintain continuity. Protect installed molded-sheet drainage panels during subsequent construction.

B. Insulation: Refer to Section 07 21 00 "Thermal Insulation."

3.9 FIELD QUALITY CONTROL

A. Testing Agency: Owner will engage a qualified testing agency to inspect substrate conditions, surface preparation, waterproofing application, protection, and drainage components, and to furnish reports to Architect.

B. Reporting: Forward written inspection reports to the Architect of the inspection and test being performed.

C. Correction: Correct deficient applications not passing tests and inspections, make necessary repairs, and retest as required to demonstrate compliance with requirements.

3.10 CLEANING AND PROTECTING

A. Protect Amphibia membrane from damage prior to concrete placement.

End of Section

Section 07 16 13

POLYMER MODIFIED CEMENT WATERPROOFING

PART 1 - GENERAL

1.1 SUMMARY

A. Prepare surfaces and repair cracks in substrate scheduled to receive waterproofing.

B. Furnish and install cementitious waterproofing at walls and floor of elevator pits.

C. Recesses in concrete for floor mats.

1.2 RELATED REQUIREMENTS

A. Section 01 74 19 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL: Procedural and administrative requirements relating to recycling goals, waste management program and reporting.

B. Section 01 81 13 - SUSTAINABLE DESIGN REQUIREMENTS: Procedural and administrative requirements relating to required *Northeast CHPS Verified Program,* (NE-CHPS) Certification.

C. Section 03 30 00 - CAST-IN-PLACE CONCRETE: Concrete work including imbedding pre-molded water stops and saw-cutting of control joints in concrete.

D. Section 07 92 00 - JOINT SEALANTS: Sealant materials, for control joints in concrete.

E. Section 14 22 00 – COMPACT TRACTION ELEVATORS: Plunger casing, piston and related water stops.

1.3 REFERENCES

A. Comply with applicable requirements of the following standards and those others referenced in this Section, under the provisions of Section 01 42 00 - REFERENCES. Where these standards conflict with other specified requirements, the most restrictive requirements shall govern.

1. ASTM B 117 - Salt spray resistance.
2. ASTM C 67 - Methods of Sampling, and Testing Brick and Structural Clay Tile.
3. ASTM C 109 - Compressive Strength.
4. ASTM C 190 - Tensile Strength.
5. ASTM C 348 - Flexural Strength.
6. ASTM C 469 - Modulus of Elasticity.
7. ASTM C 531 - Coefficient of Thermal Expansion.
8. ASTM E 84 - Test Method for Surface Burning Characteristics of Building Materials.
9. ASTM E 96 - Water Vapor Transmission of Materials.

10. ASTM G 26 - Accelerated Weathering.
11. FS TT-P-29B - Fungus Growth Resistance.
12. FS TT-P-141b - Abrasion Strength.

B. Sustainability Requirement Reference: The following sustainability requirements are hereby made a part of this Section by reference thereto:
   1. High Performance Schools Exchange, Northeast Energy Efficiency Partnerships NE-CHPS, (referred to herein as “NE-CHPS”).

1.4 SUBMITTALS

A. Submit the following under provisions of Section 01 33 00 - SUBMITTAL PROCEDURES:
   1. Literature: Manufacturer's product data sheets, specifications, performance data and physical properties.
   2. Manufacturer’s instructions: Manufacturer’s installation instructions indicating special procedures, and perimeter conditions requiring special attention.
   3. Sustainable Design Submittals: As required by NE CHPS.

1.5 QUALITY ASSURANCE

A. Waterproofing applicator, with a minimum of 5 years documented experience demonstrating previously successful work of the type specified herein, and approved by product manufacturer.

B. Make all necessary arrangements with the respective waterproofing systems manufacturer to provide qualified supervision at the site, commencing immediately prior to the first application of materials, and continuing until completion of the application all waterproofing materials. Perform all preparation, mixing, and application procedures as recommended by each manufacturer's representative. Bear all costs in conjunction with such supervision.

1.6 DELIVERY, STORAGE AND HANDLING

A. Deliver and store waterproofing materials in new, sealed, containers showing manufacturer's identification, year of production, net weight, date of packaging, and location of packaging.

B. Store all materials in an elevated, dry location, protected by waterproof coverings. Following manufacturer's recommended storage procedures for humidity and temperature conditions, protect materials from freezing.

1.7 PROJECT CONDITIONS

A. Maintain ambient temperatures above 40 degrees Fahrenheit for 24 hours before and during application and 72 hours after until cementitious waterproofing has cured.

B. Water saturated substrates scheduled to receive waterproofing must be fully dried and areas of active water leakage must be repaired prior to application of waterproofing.

1.8 WARRANTY

A. General: Submit warranties under provisions of Section 01 78 00 - CLOSEOUT SUBMITTALS, and in compliance with Section 01 78 36 – WARRANTIES.

PART 2 - PRODUCTS

2.1 CEMENTITIOUS WATERPROOFING

A. Manufacturer: Products which may be considered by the Architect, include the following:

1. Five Star Products, Inc., Fairfield CT., product “Five Star Cementitious Waterproofing”.
2. Silpro Masonry Systems, Inc., MA., product “Sealcoat”, with C21 “All Acrylic” admix.
3. Master Builders Solutions Construction Systems US, LLC., Shakopee, MN (Master Builders). “Masterseal 581” (*formerly “Thoroseal*”).

B. Cementitious waterproofing system meet the following minimum requirements:

Properties	Test	Results
Bond Strength:	ASTM C 882	2,000 psi
Tensile Strength:	ASTM C 190	7 day: 250 psi (2 MPa) 28 day, 440 psi (3 MPa)
Flexural Strength	ASTM C 348	7 day: 360 psi (2.5 MPa) 28 day, 1027 psi (72.4 kg/cm^2)
Modulus of Elasticity	ASTM C 469	2.72 x 10^6 psi 1.87 x 10^4 MPa
Adhesion strength	Tensile bond	418 psi. (2.9 MPa)
Compressive Strength	ASTM C 109	1 day: 4000 psi (280.8 kg/cm^2) 7 days, 6300 psi (442.4 kg/cm^2)
Coefficient of Thermal Expansion	ASTM C 531	6.99 x 10 $^{-6}$ in/in˚F
Accelerated Weathering	ASTM G 26	5000 hours, pass with no change
Fungus Growth Resistance	FS TT-P-29B	meets all requirements
Abrasion Strength	FS TT-P-141b	passed
Permeability	ASTM E 96	12 perms
Water Absorption	ASTM C 67	3.6 percent (24 hours boiling test)
Salt spray resistance	ASTM B 117	no deterioration or loss of adhesion

C. Joint filler, and other installation accessories: As recommended by the waterproofing manufacturer.

D. Portland cement plaster to be mixed with waterproofing: As recommended by the waterproofing manufacturer.

E. Water: Clean and fresh without contaminates.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Inspect all surfaces and verify that they are in proper condition to receive the work of this Section.

1. Verify substrate surfaces are durable; free of frozen matter, dampness, loose particles, cracks, pits, projections, or foreign matter detrimental to adhesion or application of waterproofing system.
2. Verify that substrate surfaces are smooth, free of pitting, and not detrimental to full contact bond of waterproofing materials.
3. Verify that items which penetrate surfaces to receive waterproofing are securely installed.

B. Beginning of installation means acceptance of existing substrate and site conditions.

3.2 PREPARATION

A. Protect adjacent surfaces not designated to receive waterproofing.

B. Thoroughly remove all previously applied coatings. Clean walls by high pressure - wash or sand blast, and prepare surfaces to receive waterproofing in accordance with manufacturer's instructions.

C. New concrete surfaces to receive waterproofing must cure a minimum of 14 days prior to application of waterproofing materials.

D. Do not apply waterproofing to surfaces unacceptable to applicator or manufacturer. Perform a bond test as recommended by manufacturer if applicator has any doubt about the suitability of substrate.

E. Cut out and place a cove of hydraulic cement at wall and floor junction.

F. Repair cracks, breaks, voids, honeycombing larger than 1/32 inch width with hydraulic cement.

G. Seal dynamic joints with backer rod and sealant materials using depth to width ratio as recommended by sealant manufacturer.

3.3 APPLICATION

A. Dampen substrate to prevent surface drag of application.

B. Apply waterproofing material in accordance with manufacturer's instructions by brush or broom to substrate surfaces. Ensure first coat is well brushed into substrate.

1. Apply a minimum of two thick coats to a total thickness of 1/16 inch.
2. Allow first coat to set a minimum of 4 hours prior to application of second coat. Moisten first coat with fine spray of water before applying second coat.

C. Ensure there are no pinholes, voids or uncovered areas.

D. Apply extra thickness of waterproofing material at corners, intersections, and angles.

E. Seal watertight, items projecting through waterproofing.

3.4 PROTECTION

A. During the operation of waterproofing work, protect the work of other trades against undue soilage and damage by the exercise of reasonable care and precautions. Repair and/or replace any work so damaged and soiled.

3.5 CLEANING

A. After completion of the work of this Section, remove equipment, and clean all interfacing wall areas, free from excess deposits of waterproofing, and other materials installed under this Section.

End of Section

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Section 07 21 00

THERMAL INSULATION

PART 1 – GENERAL

1.1 SUMMARY

A. Furnish and Install:

1. Rigid insulation beneath interior concrete slabs.
2. Rigid insulation at perimeter foundation walls.
3. Rigid insulation at exterior wall cavities.
4. Thermal batt insulation between framing.
5. Perimeter fire containment insulation at curtainwall systems.
6. Low pressure, low expansion polyurethane foamed-in-place insulation / air barrier sealant: applied to seal gaps, cracks, cavities and joints in the building envelope, at door frames, perimeter of window frames, and other similar penetrations in exterior walls.

1.2 RELATED REQUIREMENTS

A. Section 01 74 19 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL: Procedural and administrative requirements relating to recycling goals, waste management program and reporting.

B. Section 01 81 13 - SUSTAINABLE DESIGN REQUIREMENTS: Procedural and administrative requirements relating to required *Northeast CHPS Verified Program,* (NE-CHPS) Certification.

C. Section 06 10 00 - ROUGH CARPENTRY: Wood blocking, nailers.

D. Section 07 27 13 – MODIFIED BITUMINOUS SHEET AIR BARRIERS.

E. Section 07 54 19 - POLYVINYL CHLORIDE (PVC) ROOFING: roof insulation.

F. Section 09 81 00 - ACOUSTICAL INSULATION: Acoustical batt insulation between framing members.

G. Section 09 29 00 - GYPSUM BOARD: Installation of wall board over insulation in Z-channel furring system.

H. Division 23 - HEATING, VENTILATING AND AIR CONDITIONING: Ductwork and piping insulation.

1.3 REFERENCES

A. Referenced Standards: Comply with applicable requirements of the following standards and those others referenced in this Section, under the provisions of Section 01 42 00 - REFERENCES. The standards referenced herein are included to establish recognized minimum quality only. Where these standards conflict with other specified requirements, the most restrictive requirements shall govern.

Equivalent quality and testing standards will be acceptable, subject to their timely submission, review and acceptance by the Architect.

1. ASTM C177 - Standard Test Method for Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of the Guarded-Hot-Plate Apparatus.
2. ASTM C203 – Standard Test Methods for Breaking Load and Flexural Properties of Block Type-Thermal Insulation.
3. ASTM C423 - Standard Test Method for Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method.
4. ASTM C518 – Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus.
5. ASTM C553 – Standard Specification for Mineral Fiber Blanket Thermal Insulation for Commercial and Industrial Applications.
6. ASTM C578 – Standard Specification for Rigid, Cellular Polystyrene Thermal Insulation.
7. ASTM C612 – Standard Specification for Mineral Fiber Block and Board Thermal Insulation.
8. ASTM C665 - Standard Specification for Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing.
9. ASTM C1136 - Standard Specification for Flexible, Low Permeance Vapor Retarders for Thermal Insulation.
10. ASTM D1621 – Standard Test Method for Compressive Properties of Rigid Cellular Plastics.
11. ASTM D1622 - Standard Test Method for Apparent Density of Rigid Cellular Plastics.
12. ASTM E136 - Standard Test Method for Assessing Combustibility of Materials Using a Vertical Tube Furnace at 750°C.
13. ASTM E84 – Standard Test Method for Surface Burning Characteristics of Building Materials.
14. ASTM E96/E96M – Standard Test Methods for Gravimetric Determination of Water Vapor Transmission Rate of Materials.
15. All applicable federal, state and municipal codes, laws and regulations for thermal insulation.

B. Sustainability Requirement Reference: The following sustainability requirements are hereby made a part of this Section by reference thereto:

1. High Performance Schools Exchange, Northeast Energy Efficiency Partnerships NE-CHPS, (referred to herein as “NE-CHPS”).

C. Definitions:

1. "R-Value": as referred to herein refers to the thermal resistance of the insulation alone and does not allow consideration of air spaces or other factors.
2. “HFC”: refers to regulated (prohibited) Hydrofluorocarbon organic compounds which are designated as having high Global Warming Potential (GWP).

1.4 ADMINISTRATIVE REQUIREMENTS

A. Coordination:

1. General: Coordinate the work of this Section with the respective trades responsible for installing interfacing and adjoining work for proper sequence of installation, and ensure that the work performed hereunder is acceptable to such trades for the installation of their work.

B. Pre-installation Meetings: Installer of the Work of this Section is required to attend pre-installation conference(s) specified under the following sections

1. Section 07 16 13 – POLYMER MODIFIED CEMENT WATERPROOFING.
2. Section 07 27 13 - MODIFIED BITUMINOUS SHEET AIR BARRIERS.

1.5 SUBMITTALS

A. Information and Review Submittals: Submit the following under provisions of Section 01 33 00 - SUBMITTAL PROCEDURES:

1. Product Data: Manufacturer's product data sheets, specifications, performance data, physical properties for each item furnished hereunder.
2. Sustainable Design Submittals: As required by NE CHPS.

1.6 DELIVERY, STORAGE AND HANDLING

A. Delivery and Acceptance Requirements:

1. Do not deliver items to the site, until all specified submittals have been submitted to, and approved by, the Architect.
2. Deliver materials in original packages, containers or bundles bearing brand name and identification of manufacturer or supplier.

B. Storage and Handling Requirements:

1. Store and handle materials following manufacturer's recommended procedures, and in accordance with material safety data sheets.
    a. Rigid board insulation materials are combustible and may constitute a fire hazard, do not expose insulation materials to open flames or other ignition sources, comply fully with manufacturer’s recommendations and the requirements of local authorities having jurisdiction, for delivery, handling, storage and installation.
2. Protect materials from damage due to moisture, direct sunlight, excessive temperatures, surface contamination, corrosion and damage from construction operations and other causes.

C. Damaged material: Remove any damaged or contaminated materials from job site immediately, including materials in packages containing water marks, or show evidence of mold.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Acceptable Manufacturers: Subject to compliance with the requirements specified herein, manufacturers offering products which may be incorporated in the work include the following, or approved equal:

1. Rigid insulation board (XPS - extruded polystyrene):
    a. Dow Chemical Corp., Midland MI.
    b. Owens Corning Commercial Insulation, Toledo OH.
    c. Kingspan Insulation LLC; Atlanta, GA.
2. Glass fiber batt/blanket insulation:
    a. CertainTeed Corporation, Valley Forge PA.
    b. Johns Manville Building Insulation, Denver CO
    c. Knauf Insulation, Shelbyville, IN.
    d. Owens Corning Fiberglas Corp., Toledo OH.
    e. USG Corp./ USG Interiors Inc., Chicago IL.
3. Mineral fiber insulation:
    a. Johns Manville, Inc., Denver CO.
    b. Rockwool, North America, Milton, Ontario. (Rockwool).
    c. Owens Corning (Thermafiber Division), Wabash IN. (Thermafiber)
4. Low pressure polyurethane foamed-in-place insulation / air barrier sealant:
    a. Fomo Products, Inc., Norton OH.
    b. DAP Products Inc., Baltimore, MD.
    c. Dupont, Inc., Wilmington, DE.

2.2 THERMAL INSULATION

A. Wall Insulation for Between Framing: Thermal batt/blanket glass fiber insulation conforming to ASTM C665 Type I, un-faced, comprised of inorganic fibers bonded with formaldehyde-free thermosetting resin.

1. Surface burning characteristics when tested per ASTM E84:
    a. Flame Spread: 25 or less.
    b. Smoke Developed: 50 or less.
2. Thicknesses and R-values:
    a. Walls: Thickness matching wall framing depth.
        1) Nominal 5-1/2 inch thick [139 mm] with R-21 thermal rating.
        2) Nominal 3-1/2 inch thick [89 mm] with R-15 thermal rating.
3. Recycled content of glass in glass-fiber insulation: Use maximum available percentage of recycled glass. Fiber glass insulation products incorporated into the work shall contain not less than 20 percent of recycled glass cullet.

B. Foamed-in-place insulation for air barrier sealant: Single component / two-component low pressure polyurethane foam sealant:

1. Regulatory Requirement: Pursuant to State of Rhode Island's "*Prohibition of Hydrofluorocarbons (HFCs) in Specific End-Uses*" regulation, 250-RICR-120-05-53; foam polyurethanes used for this project are prohibited from having HFC blowing agents used in manufacture of rigid PU low-pressure two component spray foam insulation and one component foam sealants, including HFC-134a and HFC-245fa (and blends thereof), blends of HFC-365mfc, commercial blends of HFC-365mfc with 7 to 13 percent HFC 227ea and the remainder HFC-365mfc, and Formacel TI.
    a. Acceptable products include but are not limited to:
        1) DAP Products Inc., product: "Touch 'n Foam Professional One-Component Low GWP".
        2) Dupont, product "HFC-Free Froth-Pak" (two component).
        3) Fomo Products, Inc., product: "HandiFoam E84 LowGWP"

C. Curtainwall insulation: Semi-rigid mineral wool insulation for perimeter fire containment systems at curtain walls: mineral wool fiber insulation board, conforming to ASTM C612, Types IA, IB and IVA, having a nominal density of 8 pounds per cubic foot, equal to Thermafiber product "FireSpan 90", having FRK (Foil-reinforced kraft vapor retarder) facing.

1. Non-Combustible as tested per ASTM E136.
2. Flame Spread Classification: Class A (less than 25, per testing by NFPA 255, ASTM E84 or UL 723), with flame spread rating of 0 and smoke developed rating of 0.
3. Thermal Resistance: ASTM C518 (C177), R-value of 4.2 per inch.
4. Thickness: 3 inches, and as otherwise indicated on Drawings.

D. Exterior Wall Cavity Insulation type 1, (typical): Semi-rigid mineral wool insulation for exterior wall cavities: mineral wool fiber insulation board, conforming to ASTM C612, Type IVB having a nominal density of 4.4 pounds per cubic foot.

1. Non-Combustible as tested per ASTM E136.
2. Flame Spread Classification: Class A (less than 25, per testing by NFPA 255, ASTM E84 or UL 723), with flame spread rating of 0 and smoke developed rating of 0.
3. Thermal Resistance: ASTM C518 (C177), R-value of 4.2 per inch.
4. Thickness: As indicated on Drawings.
5. Size: 16 inches x 48 inches (406 mm x 1219 mm).
6. Acceptable products include the following or approved equal:
    a. Rockwool, Inc., Milton, Ontario, product "CavityRock MD".
    b. Owens Corning (Thermafiber Division), Wabash IN, product "Thermafiber, RainBarrier 45."
    c. Johns Manville, Inc., Denver CO. product: "MinWool Curtainwall CW4".

E. Exterior Wall Cavity Insulation type 2, at rain screen walls: Rigid mineral wool insulation for exterior wall cavities: dual density mineral wool fiber insulation board,

conforming to ASTM C612, Type IVB compliant, having a nominal density of 11 pounds per cubic foot.

1. Non-Combustible as tested per ASTM E136.
2. Flame Spread Classification: Class A (less than 25, per testing by NFPA 255, ASTM E84 or UL 723), with flame spread rating of 0 and smoke developed rating of 0.
3. Thermal Resistance: ASTM C518 (C177), R-value of 4 per inch.
4. Thickness: As indicated on Drawings.
5. Acceptable products include the following or approved equal:
   a. Rockwool, Inc., Milton, Ontario, product “Rockwool ComfortBoard 110”.
   b. Owens Corning (Thermafiber Division), Wabash IN, product “Thermafiber, RainBarrier ci High Compressive plus (110)”.
   c. Or equal.
6. Basis of Design: Rockwool, Inc., Milton, Ontario, product

F. Exterior Wall Cavity Insulation type 3, at indicated locations: Foil-faced rigid polyisocyanurate foam insulation manufactured with HCFC-free blowing agent and laminated to 1.0 mil smooth reflective aluminum faces, on both sides, with square and shiplap edge, self-extinguishing. Insulation shall conform to property requirements of ASTM C1289, Type I, Class 1 or 2.

1. Long Term Thermal Resistance (LTTR) R-value per inch (as determined by ASTM C1289-11a, or later): R = 5.6 per inch.
2. Thickness as indicated on Drawings.
3. Flexural Strength per ASTM C203: 40 psi min.
4. Water Absorption per ASTM C209, (% by volume, max.): 0.1.
5. Water Vapor Permeance, ASTM E96/E96M, (perm, max.): <0.03.
6. Maximum Use Temperature: 250 °F.

2.3 ACCESSORIES

A. Staples, tape, adhesives and fasteners required for the proper and complete installation for work of this Section shall be as recommended by each respective manufacturers of each insulation type.

B. Staples, tape, adhesives and fasteners required for the proper and complete installation for work of this Section shall be as recommended by each respective manufacturers of each insulation type.

C. Foil-facing repair tape: Insulation recommended flashing for repairs of damaged facer:

1. 3M product “Venture FSK Facing Tape 1525CW.” (Basis of Design).
2. Dow Chemical Company, product “LiquidArmor CM spray flashing” or product “LiquidArmor LT flexible single component silicone flashing”
3. Johns Manville, Inc, product: “JM UltraFast Flashing Tape”.
4. Rmax, product: ”R-Seal 3000” tape.

D. Adhesive for rigid insulation: Conforming with ASTM C-557-65T, equal to W.W. Henry Company, Huntington Park CA., product “118 - Foam Insulation Adhesive”

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verification of Conditions: Inspect all surfaces and verify that they are in proper condition to receive the work of this Section.

1. Beginning of installation means acceptance of existing substrate and project conditions.

3.2 INSTALLATION

A. Install insulation baffles between roofing framing members (at sloped roofing) scheduled to receive batt/blanket insulation. Install as recommended by baffle manufacturer in manner to provide continuous free flow of air underside of roof sheathing, from bottom of roof to top of roof

B. Mineral Fiber insulation (cavity insulation types 1 and 2) in exterior wall cavities: Type 2 at rain screen wall cladding.

1. Install boards, friction fit, horizontally between wall reinforcement.
2. Install full thickness of insulation over the entire surface to be installed as indicated. Ensure tight fit around penetrating elements and abutting construction. All voids and gaps shall be filled. Minimize potential for thermal bridging.
3. Install insulation hold-down clips as per the manufacturer’s recommendations, and in conformance with the Building Code.
4. At completion of each days’ work, protect all exposed edges. Seal edges or lap over with a moisture retardant barrier.

C. Polyisocyanurate Rigid insulation (cavity insulation type 3) in exterior wall cavities, at indicated conditions.

1. Apply adhesive to substrate, in three continuous beads per board length to a full bed of 1/8 inch thick.
2. Place boards in a method to maximize contact bedding. Stagger vertical joints. Butt edges and ends tight to adjacent board and to protrusions or interruptions to the insulation plane. Place impale fastener locking discs. Tape seal board joints.
3. Install boards horizontally between wall reinforcement.

D. Batt and blanket insulation:

1. Install in accordance with manufacturer's instructions. Do not compress or “stuff” insulation into voids, compressed insulation has less thermal resistant value.
2. Trim insulation neatly to fit spaces. Fit insulation tight in spaces and tight to exterior side of mechanical and electrical services within the plane of insulation, do not cut around electrical boxes. Leave no gaps or voids.

3. Where faced insulation is specified, apply membrane facing on warm side of building spaces. Lap ends and staple side flanges of membrane between framing members.
4. Where insulation is located between joists/rafters and is not to be covered, install wire insulation supports to keep insulation in place.

E. Acoustical insulation:
1. Install insulation in accordance with insulation manufacturer's instructions.
2. Install in interior walls, and ceiling spaces where indicated. Trim insulation neatly to fit spaces. Fit insulation tight in spaces. Leave no gaps or voids.

F. Foamed-in-place insulation / air barrier sealant: Apply insulation in froth method to a uniform monolithic density without voids, in accordance with manufacturer's instructions.
1. Apply application of foam for air barrier seal includes, but is not limited to:
a. Door frames, window frames, and similar penetrations in exterior walls.
b. Gaps, cracks, cavities and joints in the building envelope, not sealed with other forms of air boots, including electrical boxes and conduit, ducts, fans, and piping.
c. Where additionally indicated on Drawings.

G. Low Pressure foamed-in-place insulation / air barrier sealant: Apply insulation in method to a uniform monolithic density without voids, in accordance with manufacturer's instructions.
1. Apply application of foam for air barrier seal includes, but is not limited to:
a. Door frames, window frames, and similar penetrations in exterior walls.
b. Gaps, cracks, cavities and joints in the building envelope, not sealed with other forms of air boots, including electrical boxes and conduit, ducts, fans, and piping.
c. Where additionally indicated on Drawings.

3.3 CLEANING

A. Clean work under provisions of Section 01 73 00 – EXECUTION.

B. Daily clean work areas by sweeping and disposing of debris, and scraps.

C. Upon completion of the work of this Section in any given area, remove tools, equipment and all rubbish and debris from the work area; leave area in broom-clean condition.

End of Section

Section 07 21 29

SPRAY-ON SOUND ABSORPTION

PART 1 - GENERAL

1.1 SUMMARY

A. General: The work of this Section consists of sprayed applied cellulose fiber insulation where shown on the Drawings, as specified herein, and as required for a complete and proper installation.

1.2 RELATED REQUIREMENTS

A. Section 01 74 19 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL: Procedural and administrative requirements relating to recycling goals, waste management program and reporting.

B. Section 01 81 13 - SUSTAINABLE DESIGN REQUIREMENTS: Procedural and administrative requirements relating to required *Northeast CHPS Verified Program,* (NE-CHPS) Certification.

C. Section 03 30 00 - CAST-IN-PLACE CONCRETE.

D. Section 05 31 00 - STEEL DECKING

1.3 REFERENCES

A. Comply with applicable requirements of the following standards and those others referenced in this Section, under the provisions of Section 01 42 00 - REFERENCES. Where these standards conflict with other specified requirements, the most restrictive requirements shall govern.

1. ASTM C518 – Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus.
2. ASTM E736/E736M – Standard Test Method for Cohesion/Adhesion of Spray Fire-Resistive Materials Applied to Structural Members.
3. ASTM C739 – Standard Specification for Cellulosic Fiber Loose-Fill Thermal Insulation.
4. ASTM E759/E759M – Standard Test Method for Effect of Deflection on Sprayed Fire-Resistive Material Applied to Structural Members.
5. ASTM E84 – Standard Test Method for Surface Burning Characteristics of Building Materials.
6. ASTM E136 – Standard Test Method for Assessing Combustibility of Materials Using a Vertical Tube Furnace at 750°C.
7. ASTM E736 - Standard Test Method for Cohesion/Adhesion of Sprayed Fire-Resistive Materials Applied to Structural Members.
8. ASTM E759 - Standard Test Method for Effect of Deflection on Sprayed Fire-Resistive Material Applied to Structural Members.
9. UL - Building Products Directory.

10. UL 2818 GREENGUARD Standard for Building Materials, Finishes And Furnishings.
11. UL 2821 GREENGUARD Test Method for Building Materials, Finishes and Furnishings.
12. All applicable federal, state and municipal codes, laws and regulations regarding flammability and smoke generation of interior finishes.

B. Sustainability Requirement Reference: The following sustainability requirements are hereby made a part of this Section by reference thereto:

1. High Performance Schools Exchange, Northeast Energy Efficiency Partnerships NE-CHPS, (referred to herein as “NE-CHPS”).

1.4 SUBMITTALS

A. Information and Review Submittals: Submit the following under provisions of Section 01 33 00 - SUBMITTAL PROCEDURES:

1. Literature: Manufacturer's product data sheets, specifications, performance data, and physical properties for each item furnished hereunder.
2. Manufacturer’s instructions: Manufacturer’s installation instructions indicating special procedures, and perimeter conditions requiring special attention.
3. Selection samples: Sample card indicating Manufacturer's full range of colors available for selection by Architect
4. Verification samples (submit one): 24 x 24 inch by 1-1/4 inch thick sample of acoustical finish on 1/2 inch plywood, illustrating material, finish and selected color.
5. Sustainable Design Submittals: As required by NE CHPS.

1.5 QUALITY ASSURANCE

A. Obtain system components including fiber, adhesive and encompassing equipment from a single manufacturer, or from manufacturers recommended by the prime manufacturer of system.

B. Notify the Architect where conflicts apply between referenced standards and existing materials, and existing methods of construction.

1.6 QUALIFICATIONS

A. Applicator, with a minimum of 3 years documented experience demonstrating previously successful work of the type specified herein , and licensed by product manufacturer.

1.7 MOCK-UPS

A. Provide mock-up under provisions of Section 01 43 39 – MOCK-UPS.

B. Provide mock-up panels, using accepted colors, minimum 100 square feet, illustrating color, texture and finish, and demonstrating the minimum standard for the Work.

C. Locate mock-up where directed and include all surfaces and materials scheduled to receive a field applied finish.

D. Accepted mock-up may remain as part of the work; the number of mock-ups shall not be restricted.

1.8 DELIVERY, STORAGE AND HANDLING

A. Do not deliver items to the site, until all specified submittals have been submitted to, and approved by, the Architect.

B. Do not deliver materials to the project until all concrete, masonry, plaster and other wet work has been completed and dry.

C. Deliver and store materials in original, sealed, bag showing manufacturer's identification, year of production, new weight, date of packaging, location of packaging.

D. Protect liquid adhesives from freezing.

E. Damaged material: Remove any damaged or contaminated materials from job site immediately, including materials in broken packages, packages containing water marks, or show other evidence of damage, unless Architect specifically authorizes correction thereof and usage on project.

1.9 SEQUENCING AND SCHEDULING

A. Coordinate the work of this Section with the respective trades responsible for installing interfacing work, and ensure that the work performed hereunder is acceptable to such trades for the installation of their work.

1. Coordinate work with Divisions 23 and 26 to ensure completion of electrical and mechanical work prior to start of application of acoustical finish.

PART 2 - PRODUCTS

2.1 SPRAY-ON ACOUSTICAL TREATMENT

A. Basis of Design: To establish a standard of quality, design and function desired, Drawings and specifications have been based on International Cellulose Corporation, Houston TX, product "K-13" Similar products manufactured by others, will be considered as an equal by the Architect complying with the following minimum requirements.

1. Thermal resistance: R value of 3.8 per inch or better, as tested by ASTM C518.
2. Bond strength shall be greater than 100 psf per ASTM E736.
3. Non-corrosive per ASTM C739.
4. Bond Deflection per ASTM E759: 6 inch Deflection in 10 foot Span – No Spalling or Delamination.
5. Comply with IBC 803.3/2009 IBC 803.10 stability requirements for interior finishes.

6. The insulation must have been tested in sprayed form by UL or similar recognized testing agency according to ASTM E84 or UL 723 with the following results:
   a. Tested at minimum 4 inch thickness, Class A (Class I), having a maximum flame spread of 5 and a smoke development of 5.
7. Sound resistance: NRC rating of 0.75 for 1 inch thickness (on solid backing).
8. Combustion toxicity: Less than 50 grams as tested in accordance with University of Pittsburgh Protocol.
9. Minimum recycled content: 75 percent.
10. Color of spray insulation as selected from manufacturers full range of standard colors.

B. Accessories: Stick pins, lath and fasteners as furnished by manufacturer.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Inspect all surfaces and verify that they are in proper condition to receive the work of this Section.

B. Beginning of installation means acceptance of existing substrate and project conditions.

3.2 PREPARATION

A. During the operation of work of this Section, protect existing finishes against undue soilage and damage by the exercise of reasonable care and precautions. Clean, or repair all existing materials which are soiled or otherwise damaged by Work of this Section, to match original profiles and finishes. Existing materials and finishes which cannot be cleaned, or repaired shall be removed and replaced with new work to match existing.

B. Provide masking, drop cloths and other coverings for all materials and surfaces which are not scheduled to receive sprayed insulation.

C. Verify surfaces are bondable by sprayed insulation, apply primer or otherwise prepare as recommended by insulation manufacturer.

3.3 APPLICATION

A. Apply insulation in accordance with manufacturer’s written instructions.
   1. Spray-applied total thickness: As indicated on Drawings.
   2. Spray-applied total thickness: Nominal 0000 inches, having minimum R-Value of R-00.

B. Provide ventilation continuously after insulation to properly cure installation.

End of Section

Section 07 21 31

CLOSED CELL SPRAYED FOAM INSULATION

PART 1 – GENERAL

1.1 SUMMARY

A. The work of this Section consists of Resin-isocyanate (polyurethane) sprayed-in-place closed cell foam insulation system insulation where shown on the Drawings, as specified herein, and as required for a complete and proper installation.

B. Furnish and install the following:

1. Foamed-in-place insulation in masonry cavities.
2. Foamed-in-place insulation framed walls.
3. Foamed-in-place insulation at junctions of dissimilar wall and roof materials to achieve a thermal and air seal.

1.2 RELATED REQUIREMENTS

A. Section 01 74 19 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL: Procedural and administrative requirements relating to recycling goals, waste management program and reporting.

B. Section 01 81 13 - SUSTAINABLE DESIGN REQUIREMENTS: Procedural and administrative requirements relating to required *Northeast CHPS Verified Program,* (NE-CHPS) Certification.

C. Section 03 30 00 - CAST-IN-PLACE CONCRETE: Concrete walls.

D. Section 04 20 00 - UNIT MASONRY: Masonry cavity walls.

E. Section 05 40 00 - COLD-FORMED METAL FRAMING.

F. Section 06 16 00 - SHEATHING: Wall sheathing.

G. Section 07 21 00 - THERMAL INSULATION.

H. Section 07 92 00 - JOINT SEALANTS: Requirements for joint sealant and backing materials.

I. Division 23 - HEATING, VENTILATING AND AIR CONDITIONING: Ductwork and piping insulation.

1.3 REFERENCES

A. Referenced Standards: Comply with applicable requirements of the following standards and those others referenced in this Section, under the provisions of Section 01 42 00 - REFERENCES. The standards referenced herein are included to establish recognized minimum quality only. Where these standards conflict with other specified requirements, the most restrictive requirements shall govern.

Equivalent quality and testing standards will be acceptable, subject to their timely submission, review and acceptance by the Architect.

1. ASTM C177 - Standard Test Method for Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of the Guarded-Hot-Plate Apparatus.
2. ASTM C518 - Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus.
3. ASTM C1029 - Standard Specification for Spray-Applied Rigid Cellular Polyurethane Thermal Insulation.
4. ASTM D412 - Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers—Tension.
5. ASTM D570 - Standard Test Method for Water Absorption of Plastics.
6. ASTM D1004 - Standard Test Method for Tear Resistance (Graves Tear) of Plastic Film and Sheeting.
7. ASTM D1621 – Standard Test Method for Compressive Properties of Rigid Cellular Plastics.
8. ASTM D1622 – Standard Test Method for Apparent Density of Rigid Cellular Plastics.
9. ASTM D1623 – Standard Test Method for Tensile and Tensile Adhesion Properties of Rigid Cellular Plastics.
10. ASTM D1876 - Standard Test Method for Peel Resistance of Adhesives (T-Peel Test).
11. ASTM D1938 - Standard Test Method for Tear-Propagation Resistance (Trouser Tear) of Plastic Film and Thin Sheeting by a Single-Tear Method.
12. ASTM 1970/D1970M - Standard Specification for Self-Adhering Polymer Modified Bituminous Sheet Materials Used as Steep Roofing Underlayment for Ice Dam Protection.
13. ASTM D2126 – Standard Test Method for Response of Rigid Cellular Plastics to Thermal and Humid Aging.
14. ASTM D2842 – Standard Test Method for Water Absorption of Rigid Cellular Plastics.
15. ASTM D5116 - Standard Guide for Small-Scale Environmental Chamber Determinations of Organic Emissions from Indoor Materials/Products.
16. ASTM D6226 - Standard Test Method for Open Cell Content of Rigid Cellular Plastics.
17. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.
18. ASTM E96/E96M - Standard Test Methods for Gravimetric Determination of Water Vapor Transmission Rate of Materials.
19. ASTM E136 - Standard Test Method for Assessing Combustibility of Materials Using a Vertical Tube Furnace at 750°C.
20. ASTM E154//E154M - Standard Test Methods for Water Vapor Retarders Used in Contact with Earth Under Concrete Slabs, on Walls, or as Ground Cover.

21. ASTM E283/E283M - Standard Test Method for Determining Rate of Air Leakage Through Exterior Windows, Skylights, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen.
22. ASTM E1186 - Standard Practices for Air Leakage Site Detection in Building Envelopes and Air Barrier Systems.
23. ASTM E2832 – Standard Test Method for Measuring the Coefficient of Retroreflected Luminance of Pavement Markings in a Standard Condition of Continuous Wetting (RL-2).
24. ASTM E2179 - Standard Test Method for Laboratory Measurement of the Effectiveness of Floor Coverings in Reducing Impact Sound Transmission Through Concrete Floors.
25. ASTM G21 - Standard Practice for Determining Resistance of Synthetic Polymeric Materials to Fungi.
26. UL - Building Products Directory.
27. CAN/ULC-S705.1-01 Standard for Thermal Insulation - Medium Density Closed Cell Spray Applied Rigid Polyurethane Foam – Material Specification.
28. CAN/ULC-S705.2-05 Standard for Thermal Insulation - Medium Density Closed Cell Spray Applied Rigid Polyurethane Foam – Application.
29. All applicable federal, state and municipal codes, laws and regulations for thermal insulation and vapor barriers.

B. Definitions:

1. The term “AVB” referenced herein refers to “Air and Vapor Barrier” system.
2. The term “ccSPF” referenced herein refers to “Closed Cell Spray Polyurethane Foam” insulation.
3. The "R-Value" referred to herein refers to the thermal resistance of the insulation alone and does not allow consideration of air spaces or other factors.
4. “HFC”: refers to regulated (prohibited) Hydrofluorocarbon organic compounds which are designated as having high Global Warming Potential (GWP).
5. Prescriptive Thermal Barrier: Pursuant to IBC and IRC, minimum ½ inch thick gypsum wallboard (specified under Section 09 29 00).
6. Equivalent Thermal Barrier: Pursuant to IBC and IRC, independently tested assembly to limit temperature rise to 15 minutes. Equivalent thermal barriers may include:
    a. Spray-applied cementitious materials.
    b. Spray-applied cellulose materials.
    c. Portland cement plaster.
    d. Other approved various proprietary materials.
7. Applied Intumescent non-prescriptive thermal barrier (Alternative Assembly): Pursuant to IBC and IRC, independently tested Alternative Assembly, which has been specifically approved on the basis of large-scale fire testing representing the actual end-use configuration as identified in ECC-ES Evaluation Report, and approved by local authorities having jurisdiction.

a. Alternative assemblies tested under AC 377; Appendix X is not an acceptable Alternative Assembly.

C. Sustainability Requirement Reference: The following sustainability requirements are hereby made a part of this Section by reference thereto:

1. High Performance Schools Exchange, Northeast Energy Efficiency Partnerships NE-CHPS, (referred to herein as “NE-CHPS”).

1.4 ADMINISTRATIVE REQUIREMENTS

A. Coordination:

1. General: Coordinate the work of this Section with the respective trades responsible for installing interfacing and adjoining work for proper sequence of installation, and ensure that the work performed hereunder is acceptable to such trades for the installation of their work.

B. Pre-installation meetings specified under related specifications:

1. Installer of the Work of this Section is required to attend pre-installation conference specified under Section 04 20 00 – UNIT MASONRY.
2. Installer of the Work of this Section is required to attend pre-installation conference specified under Section 07 27 13 - MODIFIED BITUMINOUS SHEET AIR BARRIERS.

C. Sequencing: Do not install sprayed insulation until all pipes, ducts, conduits, and other such items which are to be concealed by insulation installation, have been permanently installed, inspected and approved.

1.5 SUBMITTALS

A. Information and Review Submittals: Submit the following under provisions of Section 01 33 00 - SUBMITTAL PROCEDURES:

1. Product Data: Provide data on material characteristics, performance criteria, and limitations.
   a. Submit letter from primary materials manufacturer indicating approval of products not manufactured by primary manufacturer.
   b. Include statement that materials are compatible with adjacent materials proposed for use.
   c. Submit reports indicating that field peel-adhesion test on all materials to which spray foam is adhered have been performed and the changes made, if required, to other approved materials, in order to achieve successful adhesion.
2. Manufacturer’s certifications:
   a. Provide an Evaluation Report as the manufacturer’s documentation confirming material has been evaluated and conforms to the requirements of the ASTM E2832 Standard for Air Barrier Materials.
   b. Certification from an independent testing laboratory that insulation meets fire hazard classification requirements.

3. Shop Drawings: Developed for specific project conditions including mock-up, submittal of manufacturer's standard details are prohibited.
    a. Show the locations and extent of air and vapor barrier system including details of typical conditions including:
        1) Intersections with other envelope systems and materials.
        2) Membrane counter-flashings.
        3) Bridging of gaps.
        4) Penetrations through barrier including conduits, pipes and similar items.
    b. Shop Drawings of Mock-Up: Submit shop drawings of proposed mock-ups showing plans, elevations, large-scale details, and connections to the test apparatus.
4. Test and Evaluation Reports:
    a. Provide an Evaluation Report as the manufacturer's documentation confirming material has been evaluated and conforms to the requirements of the ASTM E2832 Standard for Air Barrier Materials.
    b. Provide dew point analysis of exterior wall assembly and field testing of mockup for static air, pressure air, static water, and bond/adhesion in compliance with applicable ASTM standards.
5. Samples: Submit clearly labeled samples, 3 by 4 inch (75 mm by 100 mm) minimum size of each material specified.
6. Manufacturers installation instructions: indicate preparation, installation requirements and techniques, product storage and handling criteria, and limitations of the material.
7. Special Procedure Submittals:
    a. Written statement, signed by the air barrier applicator, stating that the Contract Drawings have been completely reviewed with an agent of the air barrier and vapor barrier system manufacturer; accompanied by a written statement from the manufacturer that the selected air barrier and vapor barrier system is proper, compatible, and adequate for the application shown.
        1) Manufacturer's review shall include recommendations for detailed conditions and specific application requirements for project. Copies shall be sent to Architect, Owner, General Contractor and application sub-contractor.
    b. The applicator will notify the Architect and Owner in writing that the existing conditions when exposed are in conflict with the Contract Documents for the proper application of the selected air barrier and vapor barrier system or the warranty requirements.
8. Qualification Submittals.
    a. Submit proof of License of the Contractor by ABAA (Air Barrier Association of America, Inc.) at the time of bidding and prior to commencing the work
9. Sustainable Design Submittals: As required by NE CHPS.

B. Closeout Submittals: Submit the following under provisions of Section 01 78 00 - CLOSEOUT SUBMITTALS.

1. Bonds and Warranty Documentation:

a. Manufacturer's Warranties and Guarantees as specified elsewhere herein this Section.

1.6 QUALITY ASSURANCE

A. General: Notify the Architect where conflicts apply between referenced standards and existing materials, and existing methods of construction.

B. Sole Source: Obtain products required for the Work of this Section from a single manufacturer, or from manufacturers recommended by the prime manufacturer of sprayed foam insulation.

C. Qualifications:

1. Installer/Applicator: Minimum of 3 years documented experience demonstrating previously successful work of the type specified herein, and a licensed applicator by product manufacturer.

a. Provide proof of manufacturer's certification upon request.

D. Certifications:

1. Fire Hazard Classification: Maximum flame spread/smoke developed rating of 25/450, tested to ASTM E84.

E. Manufacturer's Installation Review: Make arrangements to have Manufacturer's representative (employed by manufacturer) on-site during work of this Section to periodically review installation procedures. A minimum of 2 site visits are required.

1.7 MOCK-UPS

A. Provide mock-up under provisions of Section 01 43 39 – MOCK-UPS.

B. Provide mock-up areas, minimum 200 square feet, illustrating application thickness, and demonstrating the minimum standard for the Work.

C. Locate mock-ups where directed and include all materials which are part of the air and vapor membrane system. Incorporate as part of the mock-up area, substrate, window frame, attachment of insulation, and showing air and vapor barrier membrane application details.

D. Mock-up Testing:

1. Mock-Up Tests for Air and Water Infiltration: Test mock-up for air and water infiltration in accordance with ASTM E 1186 (air leakage location) or ASTM E 783 (air leakage quantification), and ASTM E 1105 (water penetration). Use smoke tracer to locate sources of air leakage. If deficiencies are found, reconstruct mock-up and retest until satisfactory results are obtained. Deficiencies include air leakage beyond values specified, uncontrolled water leakage, unsatisfactory workmanship.

a. Perform the air leakage tests and water penetration test of mock-up prior to installation of cladding and trim but after installation of all fasteners for cladding and trim and after installation of other penetrating elements.

2. Mock-Up Tests for Adhesion: Test mock-up of materials for adhesion in accordance with manufacturer's recommendations. Perform test after curing period recommended by the manufacturer. Record mode of failure and area which failed in accordance with ASTM D 4541. When the air barrier material manufacturer has established a minimum adhesion level for the product on the particular substrate, the inspection report shall indicate whether this requirement has been met. Where the manufacturer has not declared a minimum adhesion value for their product/substrate combination, then the inspector shall simply record the value.

E. Maintain mock-up during construction for workmanship comparison; remove and legally dispose of mock-up when no longer required. Allow 24 hours for inspection of mock-up by Architect. before proceeding with sprayed foam installation.

F. Accepted mock-ups may remain as part of the work; the number of mock-ups shall not be restricted.

1. Protect mock-up from soiling and damage until Project Substantial Completion.

1.8 DELIVERY, STORAGE AND HANDLING

A. Delivery and Acceptance Requirements:

1. Do not deliver items to the site, until all specified submittals have been submitted to, and approved by, the Architect.
2. Deliver materials in original unopened packages, containers or bundles bearing brand name, and identification of manufacturer, with labels and package seals intact and legible.

B. Storage and Handling Requirements:

1. Store and handle materials following manufacturer's recommended procedures, and in accordance with material safety data sheets.
2. Protect materials from damage due to moisture, direct sunlight, excessive temperatures, surface contamination, corrosion and damage from construction operations and other causes.

C. Packaging Waste Management: Comply with packaging requirements specified under Section 01 60 00 - PRODUCT REQUIREMENTS.

1. Shipping materials: Manufacturer shall utilize to the greatest extent possible packaging materials which are biodegradable and recyclable.
2. Jobsite packaging waste management: Recycle packaging materials coordinated with general construction waste management specified under Section 01 74 19 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL

D. Damaged material: Remove any damaged or contaminated materials from job site immediately, including materials in broken packages, packages containing water

marks, or show other evidence of damage, unless Architect specifically authorizes correction thereof and usage on project.

1.9 SITE CONDITIONS

A. Maintain temperature and humidity recommended by the materials manufacturer for 24 hours before, during, and 48 hours after installation of sprayed foam insulation.

B. Field Conditions: Do not install spray foam insulation in snow, rain, fog, or mist. Do not install air barrier when the temperature of substrate surfaces and surrounding air temperatures are below those recommended by the manufacturer.

1. To avoid overspray, product should not be applied when conditions are windy.

1.10 WARRANTY

A. General: Submit the following warranties under provisions of Section 01 78 00 - CLOSEOUT SUBMITTALS, and in compliance with Section 01 78 36 – WARRANTIES.

B. Special Warranty:

1. Warrant work of this section against defects or deficiencies for a period of two years from the date work is certified as substantially performed in accordance with general condition of the contract.
2. Promptly correct, at own expense, defects or deficiencies which become apparent within the warranty period.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Acceptable Manufacturers and Products: Subject to compliance with the requirements specified herein, manufacturers offering products which may be incorporated in the work include the following, or approved equal:

1. BASF Polyurethane Foam Enterprises, LLC, Minneapolis, MN, product “WALLTITE LWP”.
2. Carlisle Spray Foam Insulation (formerly Bayer Material Science LLC), Cartersville, GA, product “SealTite Pro One Zero (HFO)”.
3. Henry Company, Inc., Huntington Park, CA, product “Permax Spray System 2.0 HFO Series”.
4. Huntsman Building Solutions, The Woodlands TX., product “Heatlok HFO Pro”.
5. Johns Manville Insulation Systems, Denver CO., product “Corbond IV”.
6. NCFI Polyurethanes, Inc., Mount Airy, NC., product “11-033 InsulStar 1.7” spray foam insulation.
7. Victory Polymers, Houston, TX., product: “VPC-HFO.”

2.2 DESCRIPTION

A. General Description: Plastic resin and catalyst, cold setting low-density, closed-cell foam, two component system.

B. Regulatory Requirements

1. Regulatory Requirements: Comply with *International Energy Conservation Code 2018* Edition, as published by the International Code Council, Inc. (I.C.C.), as revised by *RHODE ISLAND CONSERVATION CODE*, Regulation RISBC-8.

a. Regulatory Requirement: Pursuant to State of Rhode Island's "Prohibition of Hydrofluorocarbons (HFCs) in Specific End-Uses" regulation, 250-RICR-120-05-53; foam polyurethanes used for this project are prohibited from having HFC blowing agents used in manufacture of rigid extruded insulation, including HFC-134a, HFC-245fa, and blends thereof; blends of HFC365mfc with at least 4 percent HFC-245fa, and commercial blends of HFC-365mfc with 7 to 13 percent HFC-227ea and the remainder HFC-365mfc; Formacel TI.

2.3 PERFORMANCE/DESIGN CRITERIA

A. General: The air barrier shall have the following characteristics:

1. Air permeability: Not to exceed 0.004 cubic feet per minute per square foot under a pressure differential of 0.3 in. water (1.57 psf) (0.02 L/sm @ 75 Pa.) when tested according to ASTM E2178.
2. It must be continuous, with all joints made airtight.
3. It shall be capable of withstanding positive and negative combined design wind, fan and stack pressures on the envelope without damage or displacement, and shall transfer the load to the structure. It shall not displace adjacent materials under full load.
4. The air barrier shall be joined in an airtight and flexible manner to the air barrier material of adjacent systems, allowing for the relative movement of systems due to thermal and moisture variations and creep. Transition connections shall be made between the following:
   a. Foundation and walls, including penetrations, ties and anchors.
   b. Walls, windows, curtain walls, storefronts, louvers or doors.
   c. Different wall assemblies, and fixed openings within those assemblies.
   d. Wall and roof connections.
   e. Floors over unconditioned space.
   f. Walls, floor and roof across construction, control and expansion joints.
   g. Walls, floors and roof to utility, pipe and duct penetrations.
   h. Seismic and expansion joints.
   i. All other leakage pathways in the building envelope.
5. All penetrations of the sprayed foam insulation, and paths of air infiltration/exfiltration shall be made airtight.

B. VOC Regulations: Provide products which comply with applicable regulations controlling the use of volatile organic compounds.

C. Outgassing/Reactivity or Toxicity/Hazardous Materials:

1. Formaldehyde: Products containing urea-formaldehyde will not be permitted.
2. Chlorofluorocarbons (CFCs)/HCFCs: Products and equipment requiring or using CFCs or HCFCs during the manufacturing process will not be permitted.
3. Long Term Thermal Resistance (LTTR): 6.4 per inch, when tested in accordance with ASTM C518.
4. Closed cell content: 90 percent minimum when tested in accordance with ASTM D6226
5. Density: Minimum 1.9 pounds per cubic foot minimum when tested in accordance with ASTM D1622.
6. Compressive Strength: 15 pounds per square inch minimum when tested in accordance with ASTM D1621.
7. Tensile Strength: 28 pounds per square inch minimum when tested in accordance with ASTM D1623.
8. Dimensional Stability: 11 percent change in volume maximum at 158 degrees F and 95 percent relative humidity when tested in accordance with ASTM D2126.
9. Water Absorption: 0.025 (grams per cubic centimeter) when tested in accordance with ASTM D2842.
10. Air Leakage (for 4 inches of material): ASTM E283; 0.01 L/s/m^2 @ Pa maximum.
11. Sound Transmission Class (STC): ASTM E90; STC 43 minimum.
12. Noise Reduction Coefficient (NRC): ASTM E90; NRC 0.2 minimum.
13. Bacterial or Fungal Growth: Zero rating when tested in accordance with ASTM G21.
14. Flame Spread and Smoke Developed Rating: Flame Spread <25, Smoke Developed <450 when tested in accordance with ASTM E84.
15. Fuel Contribution: 0 when tested in accordance with ASTM E84.

2.4 EQUIPMENT

A. Equipment for spraying foam shall be manufactured specifically for the application of polyurethane foam. The equipment shall be airless, capable of maintaining a 1:1 volume ratio and have primary and hose heaters (300 feet of material hose maximum allowable to meet mix pressure requirements.) Acceptable application guns shall include but are not limited to Gusmer GX-7, D Gun, GAP Pro, Fusion, Probler and other direct impingement type mixing guns with low output tips in the 15 pound per minute range or as recommended by the manufacturer.

B. Equipment settings are to be recorded on the Daily Work Record

2.5 ACCESSORIES

A. Prime substrate when required by spray polyurethane manufacturer or the membrane manufacturer. The type of primer and the installation of the primer shall follow the requirements of the manufacturer for the surface conditions.

B. Membrane at transitions in substrate and connections to adjacent elements, and counterflashing for through-wall flashing: One of the following non-asphaltic transitions, acceptable to the spray polyurethane foam air barrier manufacturer:

1. Carlisle Coatings and Waterproofing, Inc., Wylie, TX., product: “BRT-801 Black HDPE Faced Butyl Flashing Tape.
2. GCP Applied Technologies Inc., Cambridge MA., product: “Vycor Pro”
3. Henry Company, El Segundo CA., product: “Blueskin Butyl Flash”.
4. Kingspan LLC, Columbus OH., product: “GreenGuard Butyl Flashing”

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verification of Conditions: Inspect all surfaces and verify that they are in proper condition to receive the work of this Section.

1. All application surfaces must be free of oil, grease, dust and debris. Surface must be dried prior to application of spray foam. Excess humidity may cause poor adhesion and result in product failure.
2. Report in writing defects in substrates which may adversely affect the performance of the foam insulation.
3. Beginning of installation means acceptance of existing substrate and project conditions.

B. Evaluation and Assessment: Examine joints before sealing to ensure configurations, surfaces and widths are suitable for foam sealant.

3.2 PREPARATION

A. Protection of In-situ Conditions: During the operation of work of this Section, protect surrounding materials and finishes against undue soilage and damage by the exercise of reasonable care and precautions. Clean, or repair all existing surfaces which are soiled or otherwise damaged by Work of this Section, to match indicated profiles and specified finishes. Materials and finishes which cannot be cleaned, or repaired shall be removed and replaced with new work in conformance with the Contract Documents.

B. Surface Preparation: Surfaces to receive foam insulation shall be free of frost and loose or foreign matter which might impair adhesion of materials.

1. Prepare surface by brushing, scrubbing, scraping, or grinding to remove loose mortar, dust, oil, grease, oxidation, mill scale and other contaminants which will affect adhesion and integrity of the foam insulation system. Wipe down metal surfaces to remove release agents or other no compatible coatings,

using clean sponges or rags soaked in a solvent compatible with the foam insulation. Ensure surfaces are dry before proceeding.

3.3 APPLICATION – SPRAY FOAM

A. Apply foam insulation in strict accordance with ULC S705.2, manufacturer's written instructions, and the following.

1. Apply foam insulation only when surfaces and ambient temperature are within limits prescribed by the material manufacturer.

B. Fill joints with foam sealant making allowances for post expansion of foam.

C. Finish joints shall be free from air pockets and imbedded foreign materials. Cut back excess foam sealant after cutting flush with surrounding surfaces unless otherwise directed and/or detailed.

D. Apply foam insulation to within the following tolerances: minus 1/4 inch thickness or plus 1/2 inch thickness indicated on the Drawings.

1. Trim, as required, any excess thickness that would interfere with the application of cladding/covering system by other trades.

E. Finished sprayed foam insulation shall be free of voids and imbedded foreign materials.

F. Do not install spray polyurethane foam within 3 inches of heat emitting devices such as light fixtures and chimneys.

G. Complete connections to other components and repair any gaps, holes or other damage using material which conforms to ULC S710.1 or ULC S711.1 and installed in accordance with ULC S710.2 or ULC S711.2 as applicable.

H. Do not allow foam insulation to cover or mark adjacent surfaces. Use masking materials if necessary.

I. Do not permit adjacent work to damage work of this section. Damage to work of this section caused by other sections shall be made good by this section at the expense of the section which caused the damage.

3.4 INTERFACE WITH OTHER WORK

A. Coordinate the work of this Section installation of windows and door frames. Ensure air and vapor barrier transitions from windows and door frames is completed.

3.5 FIELD QUALITY CONTROL

A. Field inspection will be performed under the provisions of Section 01 45 29 - TESTING LABORATORY SERVICES.

1. Manufacturer's Technical Representative Site Inspections: Arrange for site inspections by insulation manufacturer to observe field conditions, substrates, and to instruct installer in project-specific installation procedures. Technical Representative to verify conformance with the manufacturer's instructions.

a. If the inspections reveal any defects, promptly remove and replace defective work at no additional expense to the Owner.

2. Fully inspect air and vapor barrier installation, including transitions, prior to enclosing. Repair punctures, damaged areas and inadequately lapped seams with a patch of the membrane sized to extend 6 inches [150 mm] in all directions from the perimeter of the affected area.

3. Owner's Inspection and Testing: Cooperate with Owner's testing agency. Allow access to work areas and staging. Notify Owner's testing agency in writing of schedule for Work of this Section to allow sufficient time for testing and inspection. Daily inspection and testing may be required. Do not cover Work of this Section until testing and inspection is accepted.

B. Non-Conforming Work: Remove and replace all non-conforming work.

3.6 CLEANING

A. After completion of the work of this Section, remove equipment, and clean all wall, partition, and floor areas free from deposits of sprayed-foam and other materials installed under this Section.

B. Clean work under provisions of Section 01 70 00 – EXECUTION.

1. Remove over-spray and masking materials immediately after foam has cured to hard surface film.

2. Clean and make good surfaces soiled or damaged by work of this section. Consult with section of work soiled before cleaning to ensure methods used will not damage the work.

C. Waste Management:

1. Recycle or dispose of off-site waste materials and trash at intervals approved by the Owner and in compliance with waste management procedures specified in Section 01 74 19 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL.

2. Dispose of liquid waste in accordance with all applicable regulations. Consult all regulations (federal, provincial, state, local) or a qualified waste disposal firm when characterizing waste for disposal. Contact manufacturer for MSDS sheets for product information, and recommendations for proposal disposal. Utilize licensed waste disposal companies as may be required, the following phone numbers for national companies are provided for the Contractor's convenience only.

a. Safety Kleen, Plano TX., (telephone 800-669-5740).

b. Clean Harbors, Norwell MA., (telephone 800-422-8998).

c. Phillip Services Corporation (PSC), Houston TX., (telephone 800-726-1300).

3.7 PROTECTION

A. Protect finished work under provisions of Section 01 50 00 - TEMPORARY FACILITIES AND CONTROLS.

B. Protect spray foam insulation from ultraviolet light following installation on exterior surfaces, do not leave exposed to weather elements for a period greater than 30 calendar days.

End of Section

Section 07 27 13

SELF-ADHERING SHEET AIR BARRIERS

PART 1 – GENERAL

1.1 SUMMARY

A. The work of this Section consists of air and vapor membrane system where shown on the Drawings, as specified herein, and as required for a complete and proper installation.

B. Furnish and install the following:

1. Self-adhesive elastomeric sheet membrane vapor-permeable air barrier system, including specified sheet membrane, required primers and adhesives.
2. Compatible with air barrier, self-adhesive membrane flashing.
3. Prefinished aluminum flashing and stainless steel sheet metal flashing.
4. Sheet air barrier membrane for transitions to work of metal doors, windows, vents, storefront, curtainwall, and similar openings in walls.

1.2 RELATED REQUIREMENTS

A. Section 01 74 19 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL: Procedural and administrative requirements relating to recycling goals, waste management program and reporting.

B. Section 01 81 13 - SUSTAINABLE DESIGN REQUIREMENTS: Procedural and administrative requirements relating to required *Northeast CHPS Verified Program,* (NE-CHPS) Certification.

C. Section 04 20 00 - UNIT MASONRY: Masonry cavity walls.

D. Section 06 16 00 - SHEATHING: Wall sheathing.

E. Section 07 21 00 - THERMAL INSULATION.

F. Section 07 21 31 - CLOSED CELL SPRAYED FOAM INSULATION.

G. Section 07 92 00 - JOINT SEALANTS: Requirements for joint sealant and backing materials.

1.3 REFERENCES

A. Referenced Standards: Comply with applicable requirements of the following standards and those others referenced in this Section, under the provisions of Section 01 42 00 - REFERENCES. The standards referenced herein are included to establish recognized minimum quality only. Where these standards conflict with other specified requirements, the most restrictive requirements shall govern. Equivalent quality and testing standards will be acceptable, subject to their timely submission, review and acceptance by the Architect.

1. AABA 0002-2019 – Standard Test Method for Pull-Off Strength of Adhered Air and Water Resistive Barriers Using an Adhesion Tester.
2. ASTM D412 – Standard Test Methods for Vulcanized Rubber & Thermoplastic Rubbers and Thermoplastic Elastomers – Tension.
3. ASTM D570 - Standard Test Method for Water Absorption of Plastics.
4. ASTM D903 – Standard Test Method for Peel or Stripping Strength of Adhesive Bonds.
5. ASTM D1004 - Standard Test Method for Initial Tear Resistance of Plastic Film and Sheeting.
6. ASTM D1876 - Standard Test Method for Peel Resistance of Adhesives.
7. ASTM D1938 - Standard Test Method for Tear Propagation Resistance of Plastic Film and Thin Sheeting by a Single-Tear Method.
8. ASTM D1970 - Standard Specifications for Self-Adhering Polymer Modified Bituminous Sheet Materials Used as Steep Roofing Underlayment for Ice Dam Protection.
9. ASTM E96 - Standard Test Methods for Water Vapor Transmission of Materials.
10. ASTM E154 - Standard Test Method for Water Vapor Retarders used in contact with Earth Under Concrete Slabs, on Walls or as Ground Cover.
11. ASTM E2178: Standard Test Method for Air Permeance of Building Materials.
12. ASTM E2357: Standard Test method for Determining Air Leakage of Air Barrier Assemblies.
13. ICC ES (ICC Evaluation Service) AC48 – Acceptance Criteria for Roof Underlayment for Use in Severe Climate Areas.

B. Inclusionary References: The following reference materials are hereby made a part of this Section by reference thereto:

1. U.S. Army Corps of Engineers Air Leakage Test Protocol for Measure Air Leakage In Buildings.

C. Sustainability Requirement Reference: The following sustainability requirements are hereby made a part of this Section by reference thereto:

1. High Performance Schools Exchange, Northeast Energy Efficiency Partnerships NE-CHPS, (referred to herein as “NE-CHPS”).

D. Definitions:

1. “Dry weather”: Less than 20 percent change of rain per local weather forecasts.

1.4 ADMINISTRATIVE REQUIREMENTS

A. Coordination:

1. General: Coordinate the work of this Section with the respective trades responsible for installing interfacing and adjoining work for proper sequence of installation, and ensure that the work performed hereunder is acceptable to such trades for the installation of their work.

2. Sequence activities to accommodate required inspection and testing services with a minimum of delay. Coordinate activities to avoid the necessity of removing and replacing construction to accommodate inspections and tests.
    a. The Contractor is responsible for scheduling times for inspections, tests, taking samples, and similar activities.
    b. Provide for continuity of the air barrier materials and products within each assembly in the air barrier system.
    c. Provide for continuity of all the enclosure assemblies with joints and transition materials to provide a whole building air barrier system.
    d. Cooperate with agencies performing required inspections, tests, and similar services. Notify the agency sufficiently in advance of operations to permit assignment of personnel. Provide supplemental assistance to testing agencies
        1) Provide access to the Work.
        2) Furnish incidental labor and facilities necessary to facilitate inspections and tests.
        3) Take adequate quantities of representative samples of materials that require testing or assist the agency in taking samples.
        4) Deliver samples to testing laboratories.
        5) Provide security and protection of samples and test equipment at the Project Site.

B. Pre-installation meetings specified under related specifications:
    1. Installer of the Work of this Section is required to attend pre-installation conference specified under Section 04 20 00 – UNIT MASONRY.

1.5 SUBMITTALS

A. Information and Review Submittals: Submit the following under provisions of Section 01 33 00 - SUBMITTAL PROCEDURES:
    1. Product Data: Manufacturer's product data sheets, specifications, performance data, physical properties.
        a. Include certification of data indicating Volatile Organic Compound (VOC) content of all components of waterproofing system.
    2. Shop Drawings: Developed for specific project conditions including mock-up, submittal of manufacturer’s standard details are prohibited.
        a. Mock-up Shop Drawings: Indicate size of mock-up, details of construction including, expansion/control joints, sealing penetrations, transitions with adjacent materials, and connections to the test apparatus. Include recommended sequence for air and vapor barrier installation.
            1) Obtain approval of mock-up shop drawings prior to installation of mock-up.
        b. Installation Shop Drawings: Provide 3-D drawings. Show the locations and extent of air and vapor barrier system including details of typical conditions including:
            1) Intersections with other envelope systems and materials.

2) Membrane counter-flashings.
3) Bridging of gaps.
4) Penetrations through barrier including conduits, pipes and similar items.

c. Provide 3-D axon drawings demonstrating step by step installation procedures.
1) Include matrix showing length of UV exposure.

3. Verification Samples:
a. Self-adhered air and vapor barrier membrane, 12 by 12 inch size.
b. Through-wall flashing membrane, 6 inch length.
c. Transition membrane, 6 inch length.

4. Test and Evaluation Reports:
a. Provide an Evaluation Report as the manufacturer's documentation confirming material has been evaluated and conforms to the requirements of the ASTM E2176 Standard for Air Barrier Materials.
b. Provide dew point analysis of exterior wall assembly and field testing of mockup for static air, pressure air, static water, and bond/adhesion in compliance with applicable ASTM standards.

5. Source Quality Control Submittals:
a. Quality Assurance Program: Submit evidence of current accreditation and certification under the Air Barrier Association of America's (ABAA) Quality Assurance Program. Submit accreditation number of manufacturer and certification number of installers.

6. Field Quality Control Submittals:
a. Field Test Results of Mock-Up: Submit test results of air leakage test and water leakage test of mock-up in accordance with specified standards, including retesting if initial results are not satisfactory.

7. Manufacturer Reports:
a. Compatibility: Submit letter from manufacturer stating that materials proposed for use are permanently chemically compatible and adhesively compatible with adjacent materials proposed for use. Submit letter from manufacturer stating that cleaning materials used during installation are chemically compatible with each of the adjacent materials proposed for use.

8. Manufacturer's Instructions:
a. Installation Instructions: indicate preparation, installation requirements and techniques, joint and crack treatment and application temperature range, product storage and handling criteria, and limitations of the material.

9. Sustainable Design Submittals: As required by NE CHPS.

10. Special Procedure Submittals:
a. Written statement, signed by the air barrier applicator, stating that the Contract Drawings have been completely reviewed with an agent of the air barrier and vapor barrier system manufacturer; accompanied by a

written statement from the manufacturer that the selected air barrier and vapor barrier system is proper, compatible, and adequate for the application shown.

1) Manufacturer's review shall include recommendations for detailed conditions and specific application requirements for project. Copies shall be sent to Architect, Owner, General Contractor and application sub-contractor.

b. The applicator will notify the Architect and Owner in writing that the existing conditions when exposed are in conflict with the Contract Documents for the proper application of the selected air barrier and vapor barrier system or the warranty requirements.

B. Closeout Submittals: Submit the following under provisions of Section 01 78 00 - CLOSEOUT SUBMITTALS.

1. Bonds and Warranty Documentation:

a. Manufacturer's Warranties and Guarantees as specified elsewhere herein this Section.

1.6 QUALITY ASSURANCE

A. General: Notify the Architect where conflicts apply between referenced standards and existing materials, and existing methods of construction.

B. Sole Source: Obtain products required for the Work of this Section from a single manufacturer, or from manufacturers recommended by the prime manufacturer of air barrier system.

C. Qualifications:

1. Installer/Applicator: Minimum of 3 years documented experience demonstrating previously successful work of the type specified herein, and approved by product manufacturer.

a. Submit proof of License of the Contractor by ABAA (Air Barrier Association of America, Inc.) at the time of bidding and prior to commencing the work.

2. Testing Agencies: Laboratory accredited by International Accreditation Service Inc. (IAS), American Association for Laboratory Accreditation (A2LA), or the Standards Council of Canada (SCC).

D. Manufacturer's Installation Review: Make arrangements to have Manufacturer's representative (employed by manufacturer) on-site during work of this Section to periodically review installation procedures. A minimum of 3 site visits are required.

1.7 MOCK-UPS

A. Provide mock-up under provisions of Section 01 43 39 – MOCK-UPS. Mock-up to be fabricated, reviewed and accepted, prior to installation on building.

B. Provide mock-up areas using air and vapor membrane system, minimum 400 square feet (total), demonstrating the minimum standard for the Work. Mock-ups to include the following conditions.

1. Mock-up air barrier connection at wall and roof transition.
2. Mock-up air barrier connection at wall and foundation transition/termination
3. Mock-up air barrier connection at wall and a curtainwall framing.
4. Mock-up air barrier connection at wall and a window frame.
5. Mock-up air barrier connection at 90 degree corner.

C. Locate mock-ups where directed and include all materials which are part of the air and vapor membrane system. Incorporate as part of the mock-up area, substrate, window frame, attachment of insulation, and showing air and vapor barrier membrane application details.

D. Allow 24 hours for inspection of mock-up by Architect. before proceeding with air/vapor barrier work. Accepted mock-ups may remain as part of the work; the number of mock-ups shall not be restricted.

E. Independent Third Party Testing of Mock-up:

1. Air and Water Infiltration Testing: Test mock-up for air and water infiltration in accordance with ASTM E 1186 (air leakage location) or ASTM E 783 (air leakage quantification), and ASTM E 1105 (water penetration). Use smoke tracer to locate sources of air leakage. If deficiencies are found, repair or modify mock-up and retest until satisfactory results are obtained. Deficiencies include air leakage beyond values specified, uncontrolled water leakage, unsatisfactory workmanship.
    a. Perform the air leakage tests and water penetration test of mock-up prior to installation of cladding and trim but after installation of all fasteners for cladding and trim and after installation of other penetrating elements. For fasteners which would normally only be installed with cladding, install representative fasteners without cladding; intent is to perform testing with all types of penetrations in place.
2. Adhesion Testing: Test mock-up of fluid-applied and sheet applied materials for adhesion in accordance with AABA 0002-2019, or in accordance with ASTM D903. Perform test after curing period recommended by the manufacturer. Record mode of failure and area which failed in accordance with specified testing method. When the air barrier material manufacturer has established a minimum adhesion level for the product on the particular substrate, the inspection report shall indicate whether this requirement has been met. Where the manufacturer has not declared a minimum adhesion value for their product/substrate combination, then the inspector shall simply record the value.

F. Accepted mock-ups may remain as part of the work; the number of mock-ups shall not be restricted.

1. Protect mock-up from dust, soiling and damage until Project Substantial Completion.

1.8 DELIVERY, STORAGE AND HANDLING

A. Delivery and Acceptance Requirements:

1. Do not deliver items to the site, until all specified submittals have been submitted to, and approved by, the Architect.
2. Deliver and store air barrier materials in new, sealed, containers showing manufacturer's identification, year of production, net weight, date of packaging, and location of packaging.

B. Storage and Handling Requirements:

1. Store and handle materials following manufacturer's recommended procedures, and in accordance with material safety data sheets.
   a. Protect primers, mastic and adhesives from high heat, flames or sparks.
2. Store all materials in an elevated, dry location, protected by waterproof coverings. Following manufacturer's recommended storage procedures for humidity and temperature conditions, protect materials from freezing.

1.9 SITE CONDITIONS

A. Maintain ambient temperature above 30 degrees Fahrenheit for 24 hours before, during, and after installation until liquid or mastic accessories have cured.

1.10 WARRANTY

A. General: Submit the following warranties under provisions of Section 01 78 00 - CLOSEOUT SUBMITTALS, and in compliance with Section 01 78 36 – WARRANTIES.

1. Warranties shall be effective starting from Date of Project Substantial Completion and are effective for specified term lengths.

B. Manufacturer Warranty:

1. Provide 5 year Manufacturer’s product warranty which shall include replacement of defective materials.
   a. Warranty shall include provisions for coverage of the following: Membrane will bridge ruptures caused by cracking of the immediate substrate up to 1/16 inch width.

C. Special Warranty:

1. Provide 2 year Applicator’s warranty or bond which shall include removal and replacement of defective materials, and repairs or replacement of Owner’s materials and products damaged due to failure of air and vapor barrier installation to resist water or moisture penetration.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Basis of Design: For assembly compliance with NFPA 285 and to establish a standard of quality, design and function desired, Drawings and specifications have been based on the following”

1. Self-adhesive elastomeric sheet membrane permeable air barrier (vapor permeable) system: Carlisle Coatings & Waterproofing Inc., (“CCW”) product: “Fire Resist 705 VP”

B. Acceptable Manufacturers: Subject to compliance with the requirements specified herein, manufacturers offering products which may be incorporated in the work include the following, or approved equal:

1. GCP Applied Technologies Inc., Cambridge MA. (“GCPAT”)
2. Carlisle Coatings & Waterproofing Inc., Wylie, TX. (“CCW”)
3. W.R. Meadows, Hampshire, IL., (“Meadows”).

2.2 DESCRIPTION

A. Regulatory Requirements: *International Building Code*, 2018 edition, as published by the International Code Council, Inc. (I.C.C.), as revised by *RHODE ISLAND BUILDING CODE*, Regulation RISBC-1, effective February 1, 2022.

2.3 PERFORMANCE/DESIGN CRITERIA

A. General: The air barrier shall have the following characteristics:

1. It must be continuous, with all joints made airtight.
2. It shall have an air permeability not to exceed 0.004 cfm/ft^2 under a pressure differential of 0.3 in. water. (1.57 psf.) (equal to 0.02 L/s/m^2 @ 75 Pa.) when tested in accordance with ASTM E2178.
3. It shall be capable of withstanding positive and negative combined design wind, fan and stack pressures on the envelope without damage or displacement, and shall transfer the load to the structure. It shall not displace adjacent materials under full load.
4. The air barrier shall be joined in an airtight and flexible manner to the air barrier material of adjacent systems, allowing for the relative movement of systems due to thermal and moisture variations and creep. Transition connections shall be made between the following:
    a. Foundation and walls.
    b. Walls and windows or doors.
    c. Different wall systems.
    d. Wall and roof.
    e. Wall and roof over unconditioned space.
    f. Walls, floor and roof across construction, control and expansion joints.
    g. Walls, floors and roof to utility, pipe and duct penetrations.
5. All penetrations of the air barrier and paths of air infiltration/exfiltration shall be made airtight.

2.4 MATERIALS - PERMEABLE AIR BARRIER (VAPOR PERMEABLE) SYSTEM

A. Sheet membrane: Prefabricated composite sheet 0.9 mm (36 mils) of self-adhesive rubberized asphalt integrally bonded to 0.1 mm (4 mils) of cross-laminated, high-density polyethylene film to provide a minimum 1 mm (40 mil) thick membrane. Membrane shall be interleaved with disposable silicone-coated release paper until installed.

1. Physical Properties

a. Water Vapor Transmission (ASTM E 96, Method B): 202 g/m^2/ 24 hours, (29 perms).
b. Water Vapor Permeability: 1658 ng/Pa.m^2 s.
c. Peel adhesion to unprimed plywood (tested per ICC ES AC48):
   1) Control baseline: 62 lbf/ft (905N/m).
   2) After 7 day water immersion: 54 lbf/ft (786N/m).
   3) After accelerated aging: 72 lbf/ft (1049N/m).
   4) After UV exposure: 77 lbf/ft (1125N/m).
d. Accelerated Aging (tested per ICC ES AC48): 25 cycle test, passed.
e. Cycling and elongation: (tested per ICC ES AC48): 100 cycle test at minus 20 degrees F., passed.
f. Criteria for water resistive barriers (tested per ICC ES AC48): passed.
g. Flame Spread Index (ASTM E 84): 0, Class A.
h. Smoke Developed (ASTM E 84): 105, Class A.

2. Acceptable products:
   a. CCW Product: “Fire Resist 705 VP”.
   b. GCPAT Product: “Perm-A-Barrier VPS 30”.
   c. Meadows Product “Air-Shield SMP”

B. Surface conditioner, liquid membrane tape, crack filler, mastics, and accessories as recommended by the sheet membrane manufacturer and when applied will not affect water vapor transmission of membrane.
   1. Primer: As recommended by sheet vapor barrier manufacturer for substrate conditions.
      a. VOC Content: less than 680 g/l.

C. Termination mastic/sealant: Manufacturers standard medium modulus mastic or sealant which is fully compatible with sheet air barrier, roofing and waterproofing membranes and substrate.
   1. VOC Content: less than 200 g/l.

D. Primer: As recommended by sheet vapor barrier manufacturer for substrate conditions.
   1. VOC Content: less than 680 g/l.

2.5 AIR BARRIER ACCESSORIES

A. Flexible membrane: Minimum 1 mm (.040 inch) thick membrane comprised of 0.8 mm (0.032 inch) of self-adhesive rubberized asphalt integrally bonded to 0.2 mm (.008 in) of cross-laminated, high-density polyethylene film. Membrane shall be interleaved with disposable silicone-coated release paper until installed, and comply with the following:
   1. Water Vapor Transmission, ASTM E 96, Method B: 2.9 ng/m2sPa (0.05 perms) max.
   2. Water Absorption, ASTM D 570: max. 0.1% by weight

3. Puncture Resistance, ASTM E 154: 356 N (80 lbs.) min.
4. Tear Resistance
   a. Initiation ASTM D 1004: min. 58 N (13.0 lbs.) M.D.
   b. Propagation ASTM D 1938: min. 40 N (9.0 lbs.) M.D.
5. Lap Adhesion at -4ºC (25ºF), ASTM D 1876: 880 N/m (5.0 lbs./in.) of width
6. Low Temperature Flexibility, ASTM D 1970: Unaffected to -43ºC (-45ºF)
7. Tensile Strength, ASTM D 412, Die C Modified: min. 5.5 MPa (800 psi)
8. Elongation, Ultimate Failure of Rubberized Asphalt, ASTM D412, Die C: min. 200%

B. Preformed Silicone-Sealant Extrusion / Transition Strip System: Manufacturer's standard preformed extruded pre-engineered pre-cured, low-modulus silicone-rubber extrusion, sized to fit opening widths, with a single-component, neutral-curing, 40 durometer. Class 100/50 (low-modulus) translucent silicone sealant for bonding extrusions to substrates, with a lock-in dart designed to fit pressure bar conditions

1. Basis of Design: Tremco Commercial Sealants & Waterproofing, Beachwood, OH. Product: “Proglaze ETA, System 3”.
   a. Width: Required by field conditions.
   b. Acceptable Products: Subject to compliance with the requirements specified herein, manufacturers offering products which may be incorporated in the work include the following, or approved equal:
      1) Dow Corning Corporation, Midland MI, product: “123 Silicone Seal”.
      2) Momentive Performance Materials, Inc., (GE Silicones), Waterford NY, product: “US11000 UltraSpan”.
      3) Pecora Corporation, Harleysville PA, product: “Sil-Span”.
      4) Tremco Commercial Sealants & Waterproofing, Beachwood, OH, Product: “Proglaze ETA, System 3”.

C. Lap Sealant: Manufacturer’s Two-part, elastomeric, trowel grade material designed for use with self-adhered membranes and tapes 10 g/l max. VOC Content.

1. Lap Sealant for terminations within 12 inches of fenestration assemblies to receive silicone sheet transition membrane:
2. Silicone sealant compatible with rubberized asphalt, and approved by both the sealant manufacturer and air barrier manufacturer for use as a lap sealant. Basis of design Dow 758 Silicone Weather Barrier Sealant.

2.6 WATERPROOF MEMBRANE FLASHING

A. Acceptable Manufacturers: Subject to compliance with the requirements specified herein, manufacturers offering similar products are limited to the following:

1. W.R. Grace & Co., Cambridge MA., product “Bituthene 3000”.
2. Carlisle Coatings and Waterproofing, Inc., Wylie, TX., product “CCW 701”.
3. Henry Company, El Segundo CA., product “Blueskin WP 2000”.

B. Sheet membrane: Prefabricated composite sheet, minimum of 60 mils thick, consisting of 56 mils thickness of rubberized asphalt and 4 mils thick cross-laminated polyethylene film, self-adhering after removal of release paper, and furnished in 36 or 48 inch wide rolls, formulated for anticipated ambient temperature, and meeting or exceeding the following physical properties:

1. Flexibility: Unaffected when tested by ASTM D 1970 at -25 degrees F.
2. Tensile strength for membrane, as per ASTM D 412, modified: 300 pounds per square inch, minimum.
3. Tensile strength for film, as per ASTM D 412, modified: 5,000 pounds per square inch, minimum.
4. Elongation, as per ASTM D 412, modified: 300 percent, minimum.
5. Cycling over crack at minus 25 degrees Fahrenheit: No effect at 100 cycles.
6. Peel adhesion, when tested per ASTM D 903 (modified) for 7 days dry at 70 degrees Fahrenheit and 120 degrees Fahrenheit and for 7 days wet at 70 degrees Fahrenheit: 7.5 pounds per inch width, minimum.
7. Puncture resistance for membrane, (ASTM E 154): 40 pounds, minimum.
8. Resistance to hydrostatic head of water when tested per ASTM D 5385: 200 feet of water, minimum.
9. Exposure to fungi in soil for 16 weeks, as per GSA-PBS 07111: Unaffected.
10. Permeance as per ASTM E 96, Method B: 0.05 perms (grains/sq. ft./hr./in. Hg), maximum.
11. Water absorption, as per ASTM D 570: 0.2 percent by weight, maximum.

C. Primer: Rubber based low VOC content primer formulated with high solids content which shall comply with regulatory VOC requirements.

2.7 ALUMINUM FLASHING

A. Aluminum flashing: FS QQ-A-250d sheet aluminum having a minimum thickness as specified herein below, for applications where indicated:

1. Aluminum finish for exposed flashing and trim: 0.050 inch thick.
    a. Polyvinylidene Fluoride (PVDF), Kynar 500 shop applied three coat resin based, high performance thermoplastic organic coating in custom non-standard color to match Architect’s sample, conforming to AAMA 605.2, NAAMM - Metal Finishes Manual, and the following.
        1) Resin base of 70 percent PVDF by weight, Atochem North America, Inc., product “Kynar 500” or Ausimont USA. product “Hylar 5000 “.
        2) Finish Coating shall be manufactured as one of the following products:
            a) Glidden Company; product “Visulure.”
            b) Morton International; product “Fluoroceram CL.”
            c) PG Industries, Inc.; product “Duranar XL.”
            d) Valspar Corp., product “Flurothane.”

b. Surface Preparation: Properly clean aluminum with inhibited chemical cleaner and pretreat with acid chromate-fluoride-phosphate conversion coating, in accordance with Aluminum Association method AA-C12C42

c. Primer: Corrosion resistant, epoxy or urethane based primer compatible with finish coating, averaging 0.2 to 0.3 mils dry film thickness.

d. Finish Coat (Color Coat): Polyvinylidene fluoride enamel averaging 0.70 to 0.80 mil dry film thickness.

e. Top Coat: Polyvinylidene fluoride enamel clear top coat averaging 0.45 to 0.55 mils dry film thickness.

f. Color and Appearance: Provide custom color to match Architect's sample. Architect's color sample will be a shade of white however, it will NOT be considered "exotic", "polychromatic", "pearlescent" or "metallic".

2.8 STAINLESS STEEL SHEET METAL FLASHING

A. Stainless-Steel Sheet: ASTM A 240/A 240M, Type 302/304, dead soft, fully annealed; with smooth, flat surface and having 2D Finish (dull, cold rolled) having a minimum thickness as specified herein below, for the applications indicated:

1. Exposed to weather, concealed flashings and trim: 26 gauge (0.0478 inch) thick.

2.9 PREFORMED SILICONE TRANSITION STRIPS

A. Preformed Silicone-Sealant Extrusion / Transition Strip System: Manufacturer's standard preformed extruded pre-engineered pre-cured, low-modulus silicone-rubber extrusion, sized to fit opening widths, with a single-component, neutral-curing, 40 durometer. Class 100/50 (low-modulus) translucent silicone sealant for bonding extrusions to substrates, with a lock-in dart designed to fit pressure bar conditions

1. Basis of Design: Tremco Commercial Sealants & Waterproofing, Beachwood, OH. Product: "Proglaze ETA, System 3".
   a. Width: As required by field conditions.
2. Performance criteria:
   a. Tensile Strength (ASTM D412): ,≥1000 psi
   b. Tear Strength (ASTM D624): ,≥ 200 ppi
   c. Elongation (ASTM D412): ,≥ 400%
3. Acceptable Products: Subject to compliance with the requirements specified herein, manufacturers offering products which may be incorporated in the work include the following, or approved equal:
   a. Dow Corning Corporation, Midland MI., product: "123 Silicone Seal".
   b. Elbex Corporation, Kent OH., product "Elbex HS-222".
   c. Momentive Performance Materials, Inc., (GE Silicones), Waterford NY., product: "US11000 UltraSpan".
   d. Pecora Corporation, Harleysville PA., product: "Sil-Span".
   e. Tremco Commercial Sealants & Waterproofing, Beachwood, OH. Product: "Proglaze ETA, System 3".

B. Lap Sealant: Manufacturer's Two-part, elastomeric, trowel grade material designed for use with self-adhered membranes and tapes 10 g/l max. VOC Content.

1. Lap Sealant for terminations within 12 inches of fenestration assemblies to receive silicone sheet transition membrane:
2. Silicone sealant compatible with rubberized asphalt, and approved by both the sealant manufacturer and air barrier manufacturer for use as a lap sealant. Basis of design Dow 758 Silicone Weather Barrier Sealant.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verification of Conditions: Inspect all surfaces and verify that they are in proper condition to receive the work of this Section.

1. Verify items which penetrate surfaces to receive air barrier and vapor barrier are rigidly installed.
2. Verify surfaces are free of cracks, depressions, waves, or projections which may be detrimental to successful installation.
3. Concrete Masonry Substrates: Notify the General Contractor in writing if concrete unit masonry substrate requires filling of voids and holes greater than ½ inch, gaps and joints exceeding ¼ inch, or surface irregularities greater than ¼ inch, or other corrections required by Section 04 20 00 – UNIT MASONRY, for application of air barrier over concrete unit masonry.
4. Do not apply air barrier and vapor barrier system to damp, frozen, dirty, dusty or surfaces unacceptable to membrane manufacturer.
5. Examine joints and transitions to other building materials. Verify surfaces and size of transitions are suitable for products specified herein.
6. Report in writing defects in substrates which may adversely affect the performance of the air and vapor barrier.
7. Beginning of installation means acceptance of existing substrate and project conditions.

3.2 PREPARATION

A. Perform all preparation work on receiving surfaces as required, including removal of fins, scaling, and projecting rough spots. Remove all dirt, oil, and other foreign matter from the concrete surfaces. Clean substrate surfaces (broom, vacuum or compressed air) to remove dust, loose stones and debris.

B. All masonry joints shall be filled and struck flush with the face of masonry and limestone, using a 3:1 mix of sharp sand and Portland cement mixed with a one part bonding agent to five parts water, and allowed to cure.

C. Apply primer as recommended by manufacturer at a rate of 250 to 350 square feet per gallon; Prime only the area which will be covered with membrane in a working day, areas not covered with membrane in 24 hours must be reconditioned.

D. Prepare inside corners by installing a fillet of liquid membrane, latex modified cement mortar or epoxy mortar, extend 6 inches in all directions beyond the corner.

E. Cracks and joints in substrate surface must be properly sealed with waterstop, joint filler and sealant as recommended by the sheet membrane waterproofing manufacturer.

3.3 APPLICATION

A. Perform the application of the sheet membrane air barrier and vapor barrier system in strict accordance with the manufacturer's installation specifications, details, and recommendations, and as specified herein.

B. Condition and prime substrate surfaces:

1. When required by dirty or dusty site conditions; by surfaces having irregular or rough texture, or if it becomes difficult to adhere the air and vapor barrier to the substrate, apply surface conditioner by spray, brush, or roller at the rate recommended by manufacturer, prior to membrane installation. Allow surface conditioner to dry completely before membrane application.
2. Apply a bead or trowel coat of mastic along membrane edges, seams, cuts, and penetrations.
3. Apply primer by brush or heavy nap, natural-material roller at rate recommended by manufacturer prior to membrane installation. Allow primer to dry completely before membrane application.

C. Application of Membrane:

1. Precut pieces of air & vapor barrier into easily-handled lengths.
2. Remove silicone-coated release paper and position membrane carefully before placing length horizontally against the surface.
3. Begin installation at the base of the wall placing top edge of membrane immediately below any masonry reinforcement or ties protruding from substrate.
4. When properly positioned, place against surface by pressing firmly into place. Roll membrane with extension-handled countertop roller immediately after placement.
5. Overlap horizontally-adjacent pieces 2 inches [50 mm] and roll seams.
6. Subsequent sheets of membrane applied above shall be positioned immediately below masonry reinforcement or ties. Bottom edge shall be slit to fit around reinforcing wires or ties, and membrane shall overlap the membrane sheet below by 2 inches [50 mm]. Roll firmly into place.
7. Seal around masonry reinforcing or ties and all penetrations with termination mastic.
8. Continue the membrane into all openings in the wall, such as doors, windows, and terminate at points that will prevent visibility from interior.
9. Coordinate the installation of air & vapor barrier with roof installer to ensure continuity of membrane with rooftop air & vapor membrane.
10. At end of each working day seal top edge of air & vapor barrier to substrate with termination mastic.

11. Do not allow the rubberized asphalt surface of the air & vapor barrier membrane to come in contact with polysulfide sealants, creosote, uncured coal tar products or EPDM.

3.4 INTERFACE WITH OTHER WORK

A. Connect and seal exterior wall air-barrier membrane continuously to roofing-membrane air barrier, concrete below-grade structures, floor-to-floor construction, exterior glazing and window systems, glazed curtain-wall systems, storefront systems, exterior louvers, exterior door framing, and other construction used in exterior wall openings, using accessory materials.

B. Coordinate the work of this Section with installation of curtainwall, storefront and door frames. Ensure air and vapor barrier transitions from curtain wall, storefront and door frames is completed with specified silicone sheet tie-ins.

C. Provide compatible lap sealant over all membrane laps and terminations within 12 inches of window, curtainwall, storefront, door frames, louvers, and similar envelope openings, to silicone sheet tie-ins.

D. Silicone sheet transition tie-ins: Install silicone transition sheet following manufacturer's instructions and recommendations, and as additionally specified herein:

1. Preparation: Solvent wipe clean with isopropyl alcohol (IPA) using a clean, white, lint-free rag of all surfaces to receive silicone sheet transition strip from all dirt, debris, and contaminants that may affect the bond of performance of the sealant and silicone sheet. Dry wipe using a clean, white, lint-free rag.
2. Use manufacturer's pre-made corners where applicable.
3. Lap sheets to shed water, and seal all laps and transitions.
4. Bed silicone transition sheet in a minimum 1 inch bed of approved sealant. Sealant shall extend to the outboard edge of the silicone sheet, and the counterflash from the wall AVWB onto the face of the silicone sheet.
5. Bed silicone sheet into sealant in the glazing pocket of curtain wall framing. If the silicone sheet has a dart, fully engage dart into receiver in curtain wall system. Counterflash edge of silicone sheet with sealant such that the sealant extents from the curtain wall framing onto the face of the silicone sheet. Provide continuous pressure against silicone sheet with curtain wall framing components.
6. Transitions shall be subjected to all testing conducted for air, vapor and water barriers, as well as all fenestration testing for fenestrations to which the silicone sheet is applied.

3.5 FIELD QUALITY CONTROL

A. General: Field inspection will be performed under the provisions of Section 01 45 29 - TESTING LABORATORY SERVICES.

1. Owner’s testing: At the Owner's discretion, Owner intends to engage an independent third-party inspector and testing agency to perform inspections

and testing of the air barrier assembly, including but not limited to the following:

a. Daily reports of installation observation.

b. Confirmation of length of exposure of air barrier system to ultra-violet light.

c. Measurement and confirmation of Dry Film Thickness, based on manufacturer's published installation instructions and data for optimum performance of system.

d. Visual inspection of air/vapor barrier membranes.

e. Air barrier adhesion testing (using Quantitative Testing Practice):
   1) Test Method: ASTM D 4541 – "Standard Test Method for Pull-Off Strength of Coating Using Portable Adhesion Testing".
   2) Results: Pass/Fail. Membrane shall be capable to withstand a minimum tensile load of 16 pounds per square inch, applied perpendicular to the test area. Locations of testing shall be as recommended by testing agency and approved by Architect. Perform one test for every 600 square feet of surface.

f. Air barrier air leakage testing (using Qualitative and Quantitative Testing Practices):
   1) Locations: Areas determined by Owner.
   2) Testing: Comply with ASTM E 1186 – "Standard Practices for Air Leakage Site Detection in Building Envelopes and Air Barrier Systems. Testing to include the following:
      a) Infrared scanning with pressurization/depressurization.
      b) Smoke pencil with pressurization/depressurization.
      c) Pressurization/depressurization with use of anemometer.
      d) Generated sound with sound detection.
      e) Tracer gas measurement of decay rate.
      f) Chamber pressurization/depressurization in conjunction with smoke tracers
      g) Chamber depressurization using detection liquids.
   3) Additional test methods employed:
      a) Air leakage: ASTM E 783 – "Standard Test Method for Field Measure of Air Leakage Through Installed Exterior Windows and Doors". Test Method B for windows and connections to adjacent building assemblies with the air chamber having been tested per ASTM E 1186.
      b) Tracer Gas Testing: ASTM E 741 – Standard Test Method for Determining Air Change in a Single Zone by Means of a Trace Gas Dilution.

2. Manufacturer's Inspections: As specified herein above in Article 1.6 – QUALITY ASSURANCE, and as additionally required by Roofing Manufacturer for specified warranties, and as necessary for confirmation of roofing design for specified and regulatory wind speeds.

B. Non-Conforming Work: Repair punctures, damaged areas and inadequately lapped seams with a patch of air barrier membrane sized to extend 6 inches (150 mm) in all directions from the perimeter of the affected area.

C. Installer to perform daily inspection air and vapor barrier installation, including transitions, prior to enclosing. Maintain log of thickness checks by date and location.

1. Repair all punctures, damaged areas and inadequately lapped seams with a patch of the membrane sized to extend 6 inches (150 mm) in all directions from the perimeter of the affected area.

D. Manufacturer Services:

1. Make arrangements to have Manufacturer’s representative (employed by manufacturer) on-site full-time during mock-up work of this Section to observe and review installation procedures, and provide procedural recommendations.
2. Make arrangements to have Manufacturer’s representative (employed by manufacturer) on-site during work of this Section to periodically observe and review installation procedures. A minimum of 3 site visits are required.

3.6 CLEANING

A. Daily clean work areas by sweeping and disposing of debris, and scraps.

3.7 PROTECTION

A. Protect finished work under provisions of Section 01 50 00 - TEMPORARY FACILITIES AND CONTROLS.

B. Do not expose air and vapor barrier membrane to sunlight for more than thirty days prior to enclosure.

C. Protect installed membrane from all deleterious environmental conditions, and damage from construction. Maintain warrantable product with respect to Manufacturer's requirements; maintain “as new condition” until covered.

End of Section

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Section 07 42 13
METAL WALL PANELS

PART 1 - GENERAL

1.1 SUMMARY

A. Furnish and install preformed metal soffit panel system which includes, but is not limited to:
   1. Non-insulated aluminum panel system including fascias and horizontal soffits.
   2. Related flashing adapters, copings, trim and filler components indicated as integral parts of the panel system or as designed.
   3. Sub-assemblies, anchorages, shims, furring, fasteners, gaskets, and sealant associated with the work of this Section.

1.2 RELATED REQUIREMENTS

A. Section 01 74 19 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL: Procedural and administrative requirements relating to recycling goals, waste management program and reporting.

B. Section 01 81 13 - SUSTAINABLE DESIGN REQUIREMENTS: Procedural and administrative requirements relating to required *Northeast CHPS Verified Program,* (NE-CHPS) Certification.

C. Section 06 10 00 – ROUGH CARPENTRY.

D. Section 06 16 00 – SHEATHING.

E. Section 07 21 00 – THERMAL INSULATION

F. Section 07 54 19 – POLYVINYL CHLORIDE (PVC) ROOFING: Membrane roofing and related insulation.

G. Section 07 92 00 - JOINT SEALANTS: Requirements for sealants and backing materials.

1.3 REFERENCES

A. Comply with applicable requirements of the following standards and those others referenced in this Section, under the provisions of Section 01 42 00 - REFERENCES. Where these standards conflict with other specified requirements, the most restrictive requirements shall govern.
   1. AAMA 501 - Methods of Test for Metal Curtain Walls.
   2. ASCE, Minimum Loads for Buildings and Other Structures (ASCE) American Society of Civil Engineers (ASCE).
   3. ASTM A 653 Structural Quality Grade 37 (A 653M), Steel Sheet, Zinc-Coated, (galvanized) by the hot-dip process, structural (physical) quality with coating applied in accordance with A 924 (A 924M) general requirements for Steel Sheet, Zinc-Coated (galvanized) by the hot-dip process.
   4. ASTM A 792 (ASTM A 792M) - Grade 50 (230), Structural Quality Steel Sheet, Aluminum-Zinc Alloy-Coated by the hot-dip process, general requirements for Galvalume.

5. ASTM A 924 - Standard Specification for General Requirements for Steel Sheet, Metallic-Coated by the Hot-Dip Process.
6. ASTM E 283 - Rate of Air Leakage through Exterior Entrance and storefront, Curtains Walls and Doors.
7. ASTM E 330 - Structural Performance of Exterior Entrance and storefront, Curtain Walls, and Doors by Uniform Static Air Pressure Difference.
8. ASTM E 331 - Test method for Water Penetration of Exterior Windows, Curtain Walls, and Doors by Uniform Static Air Pressure Difference.
9. NFPA 285 - Standard Fire Test Method For Evaluation Of Fire Propagation Characteristics Of Exterior Non-Load-Bearing Wall Assemblies Containing Combustible Components.

B. Sustainability Requirement Reference: The following sustainability requirements are hereby made a part of this Section by reference thereto:
1. High Performance Schools Exchange, Northeast Energy Efficiency Partnerships NE-CHPS, (referred to herein as “NE-CHPS”).

1.4 SUBMITTALS

A. Submit the following under provisions of Section 01 33 00 - SUBMITTAL PROCEDURES:
1. Literature: Manufacturer's product data sheets, specifications, performance data, physical properties and installation instructions for each item furnished hereunder.
2. Manufacturer’s instructions: Manufacturer’s installation instructions indicating special procedures, and perimeter conditions requiring special attention.
3. Warranty: Provide sample copies of manufacturers' actual warranties for all materials to be furnished under this Section, clearly defining all terms, conditions, and time periods for the coverage thereof.
4. Shop drawings:
   a. 1/4 inch scale elevations indicating panel jointing.
   b. Large scale design details of soffit system; indicating sizes, types, and gauges of all metal components; expansion provisions, sealant details, indicating types and thickness of bracing and stabilizing members; attachment clips and brackets; and complete installation details.
   c. Design engineering shall be the responsibility of the soffit systems manufacturer; details may vary from those indicated on the Contract Drawings.
5. Selection Samples:
   a. Sample card indicating Manufacturer's full range of coating colors available for selection by Architect.
   b. Provide physical samples as requested by Architect for initial selection of colors and finishes
   c. Manufacturer's sample boards for sealant colors, for selections by the Architect.
6. Verification Samples:
   a. After receipt of selected standard colors from the Architect, submit at least two 12-inch long pieces of major metal extruded components of the

systems, and 12 by 12 inch samples of finished sheet metal used for trim components, prefinished in the specified finish system in selected colors.

7. Performance: Indicate how design requirements for loading and other performance criteria have been satisfied.
8. Sustainable Design Submittals: As required by NE CHPS.

1.5 QUALITY ASSURANCE

A. Notify the Architect where conflicts apply between referenced standards and existing materials, and existing methods of construction.

1.6 QUALIFICATIONS

A. Manufacturer Qualifications: Minimum of 10 years experience in manufacturing of architectural metal soffit panels.

B. Applicator, with a minimum of 7 years documented experience demonstrating previously successful work of the type specified herein , and approved by product manufacturer.

1.7 DELIVERY, STORAGE AND HANDLING

A. Do not deliver items to the site, until all specified submittals have been submitted to, and approved by, the Architect.

B. Deliver all materials packaged, boxed, wrapped or otherwise protected to assure complete protection from damage during shipment.

C. Handle, store and protect materials from damage due to moisture, direct sunlight, excessive temperatures, surface contamination, corrosion and damage from construction operations and other causes.

1. Storage method shall provide air circulation and protection from surface staining.

D. Damaged material: Inspect delivered materials for damage and stains upon their arrival at the site. Remove any damaged or contaminated materials from job site immediately, including materials in broken packages, packages containing water marks, or show other evidence of damage, unless Architect specifically authorizes correction thereof and usage on project.

1.8 FIELD MEASUREMENTS

A. Take field measurements before preparation of shop drawings and fabrication, where possible, to ensure proper fitting of Work.

B. Allow for adjustments within specified tolerances wherever taking of field measurements before fabrication might delay Work.

1.9 ENVIRONMENTAL REQUIREMENTS

A. Maintain substrate surface temperature above 50 degrees Fahrenheit for 24 hours before, during, and 48 hours after installation of joint sealant.

1.10 SEQUENCING AND SCHEDULING

A. Coordinate the work of this Section with the respective trades responsible for interfacing work.

1.11 WARRANTY

A. Submit the following warranties under provisions of Section 01 78 00 - CLOSEOUT SUBMITTALS:

1. Manufacturer's written warranty for soffit panel systems, covering repair or replacement of any system which leaks, or exhibits defects in materials, finish, design, within 2 years from date of substantial completion of the General Contract. Failure due to defective materials or workmanship is deemed to include, but not to be limited to:
   a. Failures in operation of operating component or components.
   b. Leakage or air infiltration in excess of the specified standard.
   c. Deterioration of finish to an extent visible to the unaided eye.
   d. Defects which contribute to unsightly appearance, potential safety hazard, or potential untimely failure of the work of this Section or the Work as a whole.
2. Provide 10 year warranty on polyvinylidene flouride enamel finish which shall include covering the applied finish against defects, including color fading, chipping, crazing, pitting, and delamination.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Specified Manufacturer: To establish a standard of quality, design and function desired, Drawings and specifications have been based on Peterson Aluminum, Elk Grove Village IL, product “Flush and Reveal Soffit”.

B. Acceptable Manufacturers: Subject to compliance with the requirements specified herein, manufacturers offering products which may be incorporated in the work include the following, or approved equal:

1. Peterson Aluminum, Elk Grove Village IL.
2. Centria Architectural Systems, Moon Township, PA.
3. IMSA Building Products, Inc., Los Angeles CA.
4. Metal Sales Manufacturing Corporation, Rancho Cucamonga CA.

2.2 PERFORMANCE REQUIREMENTS

A. General Performance: The metal panel system including required supports, trim and sealant shall meet all regulatory requirements for wind loading, water penetration, and air leakage and in addition the following criteria.

B. Components: Design and size components to withstand dead and live loads wind loads, and combinations loads, positive and negative acting normal to plane of wall as calculated in accordance with the 2018 International Building Code with Rhode Island Building Code Regulation RISBC-1.

C. Engineering criteria: The manufacturer for wall system shall employ the services of a qualified structural engineer, registered to practice in the State of Rhode Island, to prepare all calculations and other performance criteria for the respective systems, and bear all costs therefor. All shop drawings for the metal components of the respective systems shall bear the registration stamp of the engineer.

1. Wind loading: Aluminum panel system shall conform to the 2018 International Building Code with Rhode Island Building Code Regulation RISBC-1:
   a. Basic Wind Speed: 128 miles per hour. (three-second-gust).
   b. Occupancy Risk Factor: II.
   c. Structural design calculations shall be certified by a registered professional engineer and be submitted to verify load carrying capacities of the panel system, including fastener calculations.
2. Design wall system, to withstand thermal expansion and contraction movements of component materials, without buckling, failure of joint seals, undue stress on members or fasteners, or other detrimental effects.
3. Limits of Deflection: Metal wall panel assembly shall withstand scheduled wind pressure with the following allowable deflection:
   a. Maximum allowable deflection limited to L/175 deflection of panel perimeter normal to plane of wall with no evidence of failure.
4. Secondary Metal Framing: Design secondary metal framing for metal wall panel assembly according to AISI's "Standard for Cold-Formed Steel Framing - General Provisions."

D. Thermal Movements: Allow for thermal movements from variations in both ambient and internal temperatures. Accommodate movement of support structure caused by thermal expansion and contraction.

2.3 MATERIALS

A. Substrate: Roll formed 0.040 inch thick aluminum complying with ASTM B209 and Herr-Voss corrective leveled for flat appearance.

B. Exterior Panels

1. Soffit panels: Pac-Clad “Flush and Reveal Soffit” or approved equal.

C. The flashing and trim shall be of the same material, thickness, finish and color(s) as the panels, unless otherwise indicated.

D. Accessories

1. Fasteners: Type 300 Series stainless steel, with 5/8 diameter combination neoprene bonded metal washers.
   a. Exposed fasteners color-coated to match panels.
2. Closures
   a. Where called for on approved shop drawings, provide pre-molded flexible, crosslinked, closed-cell, gray polyethylene foam to fit the contour of the panel specified.
   b. Provide metal closures manufactured from material that is the same finish and color of the adjacent metal panels and furnished where shown on drawings.

3. Tape sealant: Tremco MBT35 or equal shall be installed in all side and end laps of all metal panels and for all flashing, to assure weathertightness.
4. Subgirts: hat-shaped.
    a. Subgirts shall be roll-formed from 16 gage, G-90 galvanized steel.
    b. Subgirts shall be located at each structural building support and not more than 4'-0" on center between supports.

E. Negative Pressure Clips (specifically designed for use with panel system) shall be used to assist in resisting high pressure conditions. The clips shall be 22 gage spring steel. No additional fasteners are required. Clips shall be located at each subgirt.

2.4 FABRICATION

A. Components shall be fabricated to the greatest extent possible in the factory, ready for field assembly.

2.5 FACTORY FINISH

A. Exterior Panels:
1. Shop-applied, fully oven cured Polyvinylidene Flouride (PVDF) resin based, high performance thermoplastic organic coating applied to all exposed surfaces, including all exposed screws, fastenings, etc., having a minimum total film thickness of 2 mils and conforming to AAMA 2605, NAAMM - Metal Finishes Manual, and the following:
    a. Resin base of 70 percent PVDF by weight, Atochem North America, Inc., product “Kynar 500” or Ausimont USA. product “Hylar 5000 “.
    b. Surface Preparation: Properly clean metal substrate with inhibited chemical cleaner and pretreat with acid chromate-fluoride-phosphate conversion coating.
    c. Primer: Corrosion resistant, epoxy or urethane based primer compatible with finish coating, averaging 0.2 to 0.3 mils dry film thickness on exterior and interior surface of panels
    d. Barrier Coat: Epoxy-based primer compatible with finish coating, averaging 2.7 mils dry film thickness on exterior and interior surface of panels.
    e. Finish Coat (Color Coat): Polyvinylidene flouride enamel averaging 0.70 to 0.80 mil dry film thickness on exterior side of panels.
2. Color: PPG “Duranar”, color “Bistro Bronze” or approved equal.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Inspect all surfaces and verify that they are in proper condition to receive the work of this Section.
1. All structural supports shall be in place and all sag rods, diagonal bracing and connections shall be tightened before work proceeds.
2. Field-check dimensions and check support alignment with a taut string or wire; support misalignment will cause panel "oil-canning".

B. Beginning of installation means acceptance of substrate and project conditions.

3.2 INSTALLATION

A. Install metal panels, fasteners, trim and related items in conformance with approved drawings and performance requirements as set by system manufacturer.

B. Protect installed panels from abuse by other trades. The general contractor shall be responsible for protecting the panels from wet cement, plaster, painting operations, etc.

3.3 TOLERANCES

A. Maximum variation from plumb or level: 1/8 inch.

B. Maximum offset from true dimensional alignment: 1/4 inch.

3.4 DAMAGED MATERIAL AND CLEANING

A. Replace damaged panels and other components of work which cannot be repaired by finish touch-up or similar minor repair.

B. To prevent rust staining, remove immediately from finished surfaces any filings caused by drilling or cutting.

C. Wipe down each area after erection is complete for final acceptance.

3.5 PROTECTION

A. Protect finished work under provisions of Section 01 50 00 - TEMPORARY FACILITIES AND CONTROLS.

End of Section

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Section 07 46 46

MINERAL FIBER CEMENT SIDING

PART 1 - GENERAL

1.1 SUMMARY

A. Furnish and install:

1. Factory primed and finished mineral fiber cement panelized siding.
2. Factory primed and finished mineral fiber cement unvented soffit board and trim (smooth).
3. Prefinished aluminum formed brake-metal work, closures, flashings, and similar items, in conjunction with siding system.
4. Sealant and backer materials used as part of the system.

B. Touch-up paint of mineral fiber cement siding and trim where field cut.

1.2 RELATED REQUIREMENTS

A. Section 01 74 19 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL: Procedural and administrative requirements relating to recycling goals, waste management program and reporting.

B. Section 01 81 13 - SUSTAINABLE DESIGN REQUIREMENTS: Procedural and administrative requirements relating to required *Northeast CHPS Verified Program,* (NE-CHPS) Certification.

C. Section 06 10 00 - ROUGH CARPENTRY: Pressure preservative treated wood blocking.

D. Section 07 21 00 - THERMAL INSULATION: Cavity wall insulation.

E. Section 07 92 00 - JOINT SEALANTS: Sealant, other than those specified herein.

1.3 REFERENCES

A. Referenced Standards: Comply with applicable requirements of the following standards and those others referenced in this Section, under the provisions of Section 01 42 00 - REFERENCES. The standards referenced herein are included to establish recognized minimum quality only. Where these standards conflict with other specified requirements, the most restrictive requirements shall govern. Equivalent quality and testing standards will be acceptable, subject to their timely submission, review and acceptance by the Architect.

1. ASTM B136 - Standard Method for Measurement of Stain Resistance of Anodic Coatings on Aluminum.
2. ASTM B244 - Standard Test Method for Measurement of Thickness of Anodic Coatings on Aluminum and of Other Nonconductive Coatings on Nonmagnetic Basis Metals with Eddy-Current Instruments.

3. ASTM C834 - Standard Specification for Latex Sealants.
4. ASTM C920 - Standard Specification for Elastomeric Joint Sealants.
5. ASTM C1186 - Standard Specification for Flat Non-Asbestos Fiber-Cement Sheets.
6. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.
7. ASTM D1730 - Standard Practices for Preparation of Aluminum and Aluminum-Alloy Surfaces for Painting.
8. ASTM E96 - Test Methods for Water Vapor Transmission of Materials.
9. ASTM D1117 - Standard Guide for Evaluating Nonwoven Fabrics.
10. ASTM E119 - Standard Test Methods for Fire Tests of Building Construction and Materials.
11. ASTM E136 - Standard Test Method for Behavior of Materials in a Vertical Tube Furnace at 750 degrees C.
12. ASTM E330 - Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure.
13. AATCC127 - Water Resistance: Hydrostatic Pressure Test.

B. Sustainability Requirement Reference: The following sustainability requirements are hereby made a part of this Section by reference thereto:
   1. High Performance Schools Exchange, Northeast Energy Efficiency Partnerships NE-CHPS, (referred to herein as “NE-CHPS”).

1.4 SUBMITTALS

A. Information and Review Submittals: Submit the following under provisions of Section 01 33 00 - SUBMITTAL PROCEDURES:
   1. Product Data: Manufacturer's data sheets on each product to be used, including:
      a. Preparation instructions and recommendations.
      b. Storage and handling requirements and recommendations.
      c. Installation methods, including fastening patterns.
   2. Shop Drawings: Provide shop drawings and erection plans for review including the following:
      a. All Shop Drawings shall bear the registration stamp of a Professional Structural Engineer registered in State of Rhode Island indicating compliance with wind loading associated with the 2018 International Building Code with Rhode Island Building Code Regulation RISBC-1 for basic wind speed of 140 miles per hour (3 second gust).
      b. Layout of furring, finished sheets and fastener pattern.
      c. Details at base and top of walls, corners, at window trim and at other openings and connections.
   3. Product certificates including Research//Evaluation report or Code Authority approval of the system use for intended application.

4. Selection Samples: For each finish product specified, two complete sets of color chips representing manufacturer's full range of available colors and patterns.
5. Verification Samples: For each finish product specified, two samples, minimum size 3 inches by 6 inches (76 mm by 150 mm) square, representing actual product, color, and patterns.
6. Sustainable Design Submittals: As required by NE CHPS.

1.5 QUALIFICATIONS

A. Licensed Professionals: Provide the services of a Professional Structural Engineer, registered in the State of Rhode Island to design and certify that the work of this section meets or exceeds the performance requirements specified in this section and required by the Rhode Island State Building Code.
   1. Prepare Shop Drawings for under direct supervision of a same Engineer experienced in design of this work.

1.6 QUALITY ASSURANCE

A. Discard lengths of material which are unsound, warped, bowed, twisted, improperly treated, not adequately seasoned or too small to fabricate work with minimum of joints or optimum jointing arrangements, or which are of defective manufacture with respect to surfaces, sizes or patterns.

1.7 DELIVERY, STORAGE AND HANDLING

A. Do not deliver cement panels to site until job is ready for their installation.

B. Ship and handle all materials in a manner which will prevent damage; protect edges and corners from chipping.

C. Stack mineral fiber cement panels and trim on edge or lay flat on a smooth, level dry surface. Store sheets under cover and keep dry prior to installing.
   1. Store materials off the ground, flat and under cover in a dry place until erection.
   2. Keep materials dry and protect from freezing.
   3. Store materials in such a way to accommodate easy inspection of the materials prior to installation.

1.8 PROJECT CONDITIONS

A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.

1.9 WARRANTY

A. Furnish the following warranties under provisions of Section 01 78 00 - CLOSEOUT SUBMITTALS, and in compliance with Section 01 78 36 – WARRANTIES:

1. Provide manufacturer's 30 year transferable limited materials warranty, covering mineral fiber board panel siding and soffit panels, providing coverage for:
   a. Damage in siding resulting from defects in material and fabrication.
   b. Cracking, rotting, or delamination.
   c. Damage from hail.
2. Provide manufacturer's 10 year transferable limited materials warranty, covering mineral fiber board trim, providing coverage for:
   a. Damage in siding resulting from defects in material and fabrication.
   b. Cracking, rotting, or delamination.
   c. Damage from hail.

PART 2 - PRODUCTS

2.1 SYSTEM DESCRIPTION

A. Performance Requirements:
1. Design system to accommodate, without damage to system, components or deterioration of seals; movement within system; movement between system and perimeter framing components; dynamic loading and release of loads; and deflection of structural support framing.
2. Design to accommodate vertical inter-story movement and provide an allowance for the following tolerances:
   a. Building floor slab live load differential deflection.
   b. Structural creep.
   c. Thermally induced expansion and contraction of framing members.
   d. Fabrication and erection tolerances.

2.2 COMPONENTS

A. Basis of Design: To establish a standard of quality, design and function desired, Drawings and specifications have been based on James Hardie Building Products, Inc., Orlando, FL.
1. Acceptable Manufacturers: Subject to compliance with the requirements specified herein, manufacturers offering products which may be incorporated in the work include the following, or approved equal:
   a. James Hardie Building Products, Inc., Orlando FL.
   b. Rieder Group, Weyerhaeuser WI., ("FibreC." Brand).
   c. TakTL LLC, Turtle Creek, PA.

B. Construction: Cellulose fiber-reinforced cement siding with textured surface, factory primed and finished with acrylic paint. Panels shall conform to the following:
1. ASTM Standard Specification C1186 Grade II, Type A.
2. Weight: 2.3 pounds per square foot.
3. Flexural strength:

a. Along direction of plank: 2,300 psi (tested in accordance with ASTM C473).

b. Across plank: 2,900 psi (tested in accordance with ASTM C473).

4. Tensile strength:

a. Along direction of plank: 1,600 psi.

b. Across plank: 1,000 psi.

C. Wall panels: Cellulose fiber-reinforced cement panel siding with smooth surface texture, factory primed and finished. Equal to James Hardie Building Products, Inc., Orlando FL, product “Hardie Panel Smooth Panel Siding”.

D. Soffits: Cellulose fiber-reinforced cement boards with smooth finish, 4 by 8 feet, factory primed and finished, equal to James Hardie Building Products, Inc., Orlando FL, product “HardieSoffit Unvented Smooth”.

1. Color 1: Standard collection, “Light Mist”.

2. Color 2: Dream Collection, “Nocturne Blue 0579”

2.3 ACCESSORIES

A. Starter strips: Manufacturer’s standard strip fabricated from same material as siding.

B. Support system framing: Provided under Section 07 48 00 - CLADDING SUPPORT SYSTEMS.

C. Fasteners: Stainless steel fastener, equal to SFS Intec LTD, product No. TW-S-D12. Color as selected by the Architect.

D. Reveal trim: Extruded aluminum 6063 aluminum alloy in T-5 temper with a minimum thickness of 0.050 inch, furnished in 12 foot lengths.

1. Reveal Trim Finish: Clear anodized conforming to ASTM B244 and ASTM B136.

2. Manufacturers: Subject to compliance with the requirements specified herein manufacturers offering similar products include the following, or approved equal

a. Fry Reglet Architectural Metals, Santa Fe, CA.

b. Tamlyn, Stafford, TX.

c. Pittcon Industries, Riverdale, MD.

E. Permeable insect barrier: Crush resistant extruded polypropylene fluted core with integral enhanced insect screen, equal to Cor-A-Vent, Inc., Mishawaka, IN., product No. SV-5.

F. Joint Sealer Type PUM50 (Polyurethane, Multi-component, 50 percent movement): Low modulus type, Multi-component non-sagging gun-grade polyurethane sealant, conforming to ASTM C920, Type M, Class 50, Grade NS, use NT,M, A and O with a minimum movement capability of ±50 percent, equal to the following:

1. Tremco, product “Dymeric 240FC”. [50% movement]

2. Pecora, product “Dynatrol II”. [50% movement]

2.4 ALUMINUM “BRAKE-METAL” AND “PANNING WORK”

A. Fabricate and install factory prefinished extruded aluminum and formed sheet aluminum “brake-metal” work in conjunction with siding system as detailed and as reasonably required to complete the work including trim pieces, closures, coverings, flashings and other miscellaneous extruded and formed “brake-metal” work in conjunction with system.

1. Provide extruded shapes wherever possible, reserving formed work for conditions where extrusions are not applicable.
2. Provide sheet metal panning not less than 0.060 inch thick.
3. Fasten trim clips, at no more than 16 inches on center.

B. Protect surfaces from marring when forming work. Provide sufficient material thickness with all necessary concealed reinforcement and anchorage to prevent “oil canning” or deformation of the finished work. Material deemed defective by the architect will be replaced at no cost to the Owner.

2.5 FINISH

A. Factory Finish: Provide manufacturer's factory applied universal primer and baked-on color finish matching colors specified herein below.

1. Factory applied finish shall be applied in a climate controlled environment within the fiber cement manufacturer's own facility utilizing a multi-coat, heat cured finish in one manufacturing process.
2. Each finish color must have documented color match to delta E of 0.5 or better between product lines, manufacturing lots or production runs as measured by photo spectrometer and verified by a third party.
3. Colors:
   a. Color 1: Standard Collection, Color: Light mist.
   b. Color 2: Standard, Color: Gray Slate.
   c. Color 3: Dream Collection, Color: Titanium 0663.
   d. Color 4: Dream Collection, Color: Nocturne Blue 0579.

B. Field Painting: Installer of mineral fiber cement siding and trim is responsible to touch-up all cut surfaces, and damaged factory applied paint.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify adequacy of sheathing, backing and support framing for all siding work.

3.2 PREPARATION

A. Clean surfaces thoroughly prior to installation.

B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

3.3 INSTALLATION, GENERAL

A. Install siding in strict accordance with Manufacturer’s written instructions and as additionally specified herein. Install claddings to dry surfaces.

B. Do not fasten mineral fiber cement boards to each other under any circumstance.

C. Panel Cutting:

1. Cut panels using a high speed circular saw with a segmented diamond blade.
2. Cut panels from the front side and protect the face from being damaged during cutting.
3. For incidental cuts, cut panels from the front side using a jigsaw with a carbide tip blade.
4. Provide adequate ventilation during cutting. Use of a dust extractor is recommended.
5. Touch up all cut edges with manufacturer's recommended sealer or paint system.

D. Drilling:

1. Drilling of holes must be done from the front of the panel using a carbide tip drill bit.
2. Holes are recommended to be done using a universal drill.
3. Larger holes, or cut-outs on the panel, can be made by a jig saw with a carbide blade or a hole saw with a diamond blade.

3.4 INSTALLATION, PANEL SIDING

A. Block framing between furring where panel siding horizontal joints occur.

B. Place fasteners no closer than 3/8 inch from panel edges and 2 inch from panel corners.

C. Install panel using spacers at all joints to allow for reveal dimensions indicated on the Drawings. Leave bottom edge of panel above all horizontal trims exposed, no caulking shall be placed at this overlap of horizontal reveal trim. Factory primed edge shall always be used.

D. Allow minimum 1 inch vertical clearance between roofing and bottom edge of siding.

E. Maintain clearance between siding and adjacent finished grade as indicated on the Drawings.

F. Specific framing and fastener requirements refer to Tables 2 and 3 in National Evaluation Service Report No. NER-405.

3.5 INSTALLATION - TRIM

A. Fasten through trim into furring or blocking. Fasteners must penetrate minimum 3/4 inch or full thickness of sheathing. Additional fasteners may be required to ensure adequate security.

B. Place fasteners no closer than 3/4 inch and no further than 2 inch from side edge of trim board and no closer than 1 inch from end. Fasten maximum 16 inch on center.

C. Allow 1/8 inch gap between trim and siding. Seal gap with high quality, paintable caulk.

3.6 INCINDENTAL SITE FINISHING

A. Carefully set exposed nails flush with siding coating.

B. Paint all cut ends of siding and trim to match siding color. Touch up using primer and manufacturer’s recommended paint.

C. Touch-up blemished siding materials to match siding color using paint recommended by manufacturer.

3.7 TOLERANCES

A. Maximum variation for siding from true position of 1/8 inch in 8 feet for plumb.

3.8 CLEANING

A. Daily clean work areas by sweeping and disposing of scraps and sawdust.

End of Section

Section 07 48 00

CLADDING SUPPORT SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

A. Cladding support system integrated with exterior siding and metal panel cladding systems.

1. Substrate: Exterior sheathing over metal stud framing.

1.2 RELATED REQUIREMENTS

A. Section 01 74 19 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL: Procedural and administrative requirements relating to recycling goals, waste management program and reporting.

B. Section 01 81 13 - SUSTAINABLE DESIGN REQUIREMENTS: Procedural and administrative requirements relating to required *Northeast CHPS Verified Program,* (NE-CHPS) Certification.

C. Section 05 40 00 – COLD-FORMED METAL FRAMING: Metal stud substrate support framing.

D. Section 06 10 00 – ROUGH CARPENTRY: Wood blocking.

E. Section 06 16 00 - SHEATHING: Exterior wall sheathing.

F. Section 07 21 00 - THERMAL INSULATION: Cavity wall insulation.

G. Section 07 27 13 – MODIFIED BITUMINOUS SHEET AIR BARRIERS: Air, water, vapor barrier at exterior walls.

H. Section 07 46 46 - MINERAL FIBER CEMENT SIDING.

I. Section 07 42 13 – ALUMINUM COMPOSITE PANELS: Composite panel system.

J. Section 07 92 00 - JOINT SEALANTS.

1.3 REFERENCE STANDARDS

A. Referenced Standards: Comply with applicable requirements of the following standards and those others referenced in this Section, under the provisions of Section 01 42 00 - REFERENCES. The standards referenced herein are included to establish recognized minimum quality only. Where these standards conflict with other specified requirements, the most restrictive requirements shall govern. Equivalent quality and testing standards will be acceptable, subject to their timely submission, review and acceptance by the Architect.

1. ASCE 7 – Minimum Design Loads for Buildings and Other Structures; 2010 with Supplements and Errata.
2. ASCE – Structural Plastics Design Manual.

3. ASHRAE 90.1 – Energy Standard for Buildings Except Low-Rise Residential Buildings; 2013.
4. ASHRAE 189.1 – Standard for the Design of High-Performance Green Buildings Except Low-Rise Residential Buildings; 2014.
5. ASTM A653/A653M – Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2015.
6. ASTM C518 – Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus; 2015.
7. ASTM C553 - Standard Specification for Mineral Fiber Blanket Thermal Insulation for Commercial and Industrial Applications; 2013.
8. ASTM C612 - Standard Specification for Mineral Fiber Block and Board Thermal Insulation; 2014.
9. ASTM C754 - Standard Specification for Installation of Steel Framing Members to Receive Screw-Attached Gypsum Panel Products; 2015.
10. ASTM C1177/C1177M – Standard Specification for Glass Mat Gypsum Substrate for Use as Sheathing; 2013.
11. ASTM C1363 - Standard Test Method for Thermal Performance of Building Materials and Envelope Assemblies by Means of a Hot Box Apparatus; 2011.
12. ASTM C1396/C1396M – Standard Specification for Gypsum Board; 2014a.
13. ASTM D256 - Standard Test Methods for Determining the Izod Pendulum Impact Resistance of Plastics; 2010e1.
14. ASTM D570 – Standard Test Method for Water Absorption of Plastics; 2010e1.
15. ASTM D635 – Standard Test Method for Rate of Burning and/or Extent and Time of Burning of Plastics in a Horizontal Position; 2014.
16. ASTM D638 – Standard Test Method for Tensile Properties of Plastics; 2014.
17. ASTM D695 – Standard Test Method for Compressive Properties of Rigid Plastics; 2015.
18. ASTM D696 - Standard Test Method for Coefficient of Linear Thermal Expansion of Plastics Between minus 30 degrees C and 30 degrees C with a Vitreous Silica Dilatometer; 2008e1.
19. ASTM D790 – Standard Test Methods for Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials; 2010.
20. ASTM D792 – Standard Test Methods for Density and Specific Gravity (Relative Density) of Plastics by Displacement; 2013.
21. ASTM D2583 - Standard Test Method for Indentation Hardness of Rigid Plastics by Means of a Barcol Impressor; 2013a.
22. ASTM D2842 - Standard Test Method for Water Absorption of Rigid Cellular Plastics; 2012.
23. ASTM D4385 - Standard Practice for Classifying Visual Defects in Thermosetting Reinforced Plastic Pultruded Products; 2013.
24. ASTM E84 – Standard Test Method for Surface Burning Characteristics of Building Materials; 2015a.

25. ASTM E96/E96M - Standard Test Methods for Water Vapor Transmission of Materials; 2015.
26. ASTM E283 - Standard Test Method for Determining Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen; 04 (2012).
27. ASTM E2178 - Standard Test Method for Air Permeance of Building Materials; 2013.
28. NFPA 285 – Standard Fire Test Method for Evaluation of Fire Propagation Characteristics of Exterior Non-Load-Bearing Wall Assemblies Containing Combustible Components; 2012.

B. Sustainability Requirement Reference: The following sustainability requirements are hereby made a part of this Section by reference thereto:
   1. High Performance Schools Exchange, Northeast Energy Efficiency Partnerships NE-CHPS, (referred to herein as “NE-CHPS”).

1.4 ADMINISTRATIVE REQUIREMENTS

A. Coordination:
   1. General: Coordinate the work of this Section with the respective trades responsible for installing interfacing and adjoining work for proper sequence of installation, and ensure that the work performed hereunder is acceptable to such trades for the installation of their work.
   2. Coordinate construction of support system over substrate indicated for proper drainage, flashing, trim, back-up support, soffits, and other related Work.
      a. Review and finalize construction schedule.
      b. Verify availability of materials, installer's personnel, equipment, and facilities needed to maintain schedule.
      c. Review means and methods related to installation, including manufacturer's written instructions.
      d. Examine support conditions for compliance with requirements, including alignment and attachment to structural support system.
      e. Review flashings, wall cladding details, wall penetrations, openings, and condition of other construction that affects this Work.
      f. Review temporary protection requirements for during and after installation of this Work.

B. Pre-Installation Meetings: At least two weeks prior to commencing the work of this Section, conduct a pre-installation conference at the Project site. Comply with requirements of Section 01 31 00 - PROJECT MANAGEMENT AND COORDINATION. Coordinate time of meeting to occur prior to installation of work under the related sections named below.
   1. Required attendees: Architect, General Contractor, Installer’s Project Superintendent, manufacturer’s technical representative and representatives of other related trades.
   2. Agenda:

a. Review of staging and material storage locations.
b. Coordination of work by other trades.
c. Installation procedures for ancillary equipment.
d. Protection of completed Work.
e. Establish weather and working temperature conditions to which Architect and Contractor must agree.
f. Emergency rain protection procedure.
g. Discuss process for manufacturer's inspection and acceptance of completed Work of this Section.

C. Sequencing:
1. Field Measurements
a. Take field measurements before preparation of shop drawings and fabrication, where possible, to ensure proper fitting of Work.
b. Allow for adjustments within specified tolerances wherever taking of field measurements before fabrication might delay Work.

1.5 SUBMITTALS

A. Information and Review Submittals: Submit the following under provisions of Section 01 33 00 - SUBMITTAL PROCEDURES:
1. Product Data: Manufacturer's complete product data and specifications for all prefabricated items, shop primer paints, liquid zinc coating, and hydraulic cements, to be furnished hereunder.
a. For epoxy anchoring systems: Furnish ICC-ES Code approvals and performance data that includes recommended loading for each application.
2. Shop Drawings, bearing registration stamp of a Professional Structural Engineer registered in State of Rhode Island.
a. General requirements:
1) Include large scale details of items of all cladding support components to be furnished hereunder, showing proposed methods of anchorage to surrounding structure and conditions.
2) Indicate on the shop drawings all erection marks and ensure that the actual field pieces bear corresponding marks.
3) Indicate shop-built components, and field-built components.
4) Indicate and detail all field installation connections.
5) Indicate blocking locations.
b. Coordination Drawings: Submit scaled exterior elevations that provide the following items in coordination with each other and with input from installers of these items:
1) Cladding support system attachment methods and required fasteners
2) Sub-framing.

3) Continuous insulation support system attachment methods and required fasteners
4) Wall-mounted items including doors, windows, louvers, and lighting fixtures
5) Wall penetrations including pipes, electrical fixtures, and any other utilities

3. Certificates:
   a. Certificate of Compliance from Galvanizer: Submit notarized Certificate of Compliance with application for payment for galvanizing, signed by galvanizer, indicating compliance with requirements of specifications. Include scope of services provided, and quantity and itemized description of items processed.
4. Delegated Design Submittals: Provide calculations for loading and stresses for the work of this section, bearing the Professional Structural Engineer's seal. Show how design load requirements and other performance requirements as required by the *RHODE ISLAND BUILDING CODE*, Regulation RISBC-1, have been satisfied.
5. Test and Inspection Reports: Submit test and inspection reports on each type of wall cladding/veneer system based on evaluation of comprehensive tests performed by nationally recognized testing agency.
6. Sustainable Design Submittals: As required by NE CHPS.

B. Closeout Submittals: Submit the following under provisions of Section 01 78 00 - CLOSEOUT SUBMITTALS.
   1. Special Inspections: Submit prior to request for Certificate of Occupancy, to both Architect and local Building Official having jurisdiction, the following:
      a. All certifications, reports and programs required by the *RHODE ISLAND BUILDING CODE*, Regulation RISBC-1, for work engineered by Contractor's Professional Engineer under the requirements of this Section.

1.6 QUALITY ASSURANCE

A. General: Notify the Architect where conflicts apply between referenced standards, specified materials, and methods of construction.

B. Sole Source: Obtain products required for the Work of this Section from a single manufacturer.

C. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section with at least three years of documented experience.

D. Installer: Company specializing in performing work of this section and the following:
   1. Install system in strict compliance with manufacturer's installation instructions.
   2. Have not less than three years of documented experience.
   3. Factory trained and approved by CLADDING SUPPORT system manufacturer.

E. Professional Engineer Qualifications: Design structural elements under direct supervision of Professional Engineer experienced in design of this Work and licensed in the State of Rhode Island

1.7 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials to site in manufacturer's original unopened containers and packaging with labels clearly identifying product name and manufacturer.

B. Deliver components and other manufactured items or accessories without damage or deformation.

C. Storage: Store materials in clean, dry, and level interior areas or outdoor areas for limited duration in accordance with manufacturer's written instructions.

D. Protect components and auxiliary accessories during transportation, handling, and installation from moisture, excessive temperatures and other construction operations in accordance with manufacturer's written instructions.

E. Handle components in strict compliance with manufacturer's written instructions and recommendations, and in a manner to prevent bending, warping, twisting, and surface, edge or corner damage.

1.8 SITE CONDITIONS

A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit assembly of this Work in accordance with manufacturer's written installation instructions and warranty requirements.

1.9 WARRANTY

A. General: Submit warranties under provisions of Section 01 78 00 - CLOSEOUT SUBMITTALS, and in compliance with Section 01 78 36 – WARRANTIES.

B. System Warranty: Provide written warranty by manufacturer agreeing to correct defects in manufacturing within five-year period after date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Basis of Design (Specified Manufacturer): To establish a standard of quality, design and function desired, Drawings and specifications have been based on Knightwall Systems, Product: "HCI" or approved equal.

B. Acceptable Manufacturers: Subject to compliance with the requirements specified herein, manufacturers offering products which may be incorporated in the work include the following, or approved equal:

1. Knight Wall Systems, Deer Park WA, product "Knight CI/HCI System".
2. Armatherm Solutions, Deer Park, WA, product "Armatherm Horizontal "Z" Girts".

3. Cascadia Windows LTD., product “Cascadia Clips”.

2.2 PERFORMANCE/DESIGN CRITERIA

A. Design Requirements:

1. Manufacturer is responsible for designing system, including anchorage to structural system and necessary modifications to meet specified requirements and maintain visual design concepts.
2. Employ registered professional engineer, licensed to practice engineering in jurisdiction where Project is located, to engineer each component of rainscreen attachment system.
3. Structural Design: Exterior rainscreen wall assembly capable of withstanding effects of load and stresses from dead loads, wind loads, ice loads (if applicable) as indicated on Structural General Notes on Structural Drawings, and normal thermal movement without evidence of permanent defects of assemblies or components.
    a. Thermal Movements: Provide assemblies that allow for thermal movements resulting from the following maximum ambient temperatures by preventing overstressing of components and other detrimental effects:
        1) Temperature Change (range): 120 degrees Fahrenheit (67 degrees C), ambient:
4. Support Framing/Attachment System:
    a. No framing component may penetrate the layer of continuous exterior insulation other than thermally isolated fasteners.
    b. Frequency and spacing of stiffened horizontal girts as indicated by manufacture in project specific engineering package.

B. Performance Requirements:

1. No thermal bridges other than fasteners and service openings.
2. Thermal Performance:
    a. Continuous framing profiles including C- or Z-shaped sections or furring penetrating insulation not allowed.
3. Structural Performance:
    a. Wind Load Performance – Attachment system must show the following results when tested in accordance with ASTM E330.
        1) 90 pound per square foot negative and positive pressure held for 60 seconds, system components shall not experience failure or gross permanent distortion.
        2) 135 pound per square foot negative and positive pressure held for 10 seconds, system components shall not experience failure or gross permanent distortion.
        3) Verify compliance with the 2018 International Building Code with Rhode Island Building Code Regulation RISBC-1.
            a) Basic Wind Speed (V.ult.): 143 miles per hour (three second gust).
            b) Risk Category: III

c) Exposure: “B.”

b. Wind cycling (air pressure cycling) performance – Attachment system must show conformance to the following results when tested in accordance with ASTM E1886.

1) A total of 4,500 air pressure cycles. Cycles must include 50 cycles at a maximum pressure of 90 pounds both positive and negative. Average cycle time must not be less than 3.25 seconds for both negative and positive cycles. Cladding weight supported during test must be a minimum of 11.5 pounds per square foot. No damage or deformation must be seen at end of test.

c. Gravity load (dead load) performance – Attachment system must demonstrate resistance to deflection under shear loading, applied parallel to the wall assembly and directly to the attachment system. Testing must be conducted using calibrated equipment by an IAS accredited third party laboratory. Deflection not to exceed 0.050 inches at 150 pounds per square foot.

4. Framing Members:

a. Test framing components to AAMA TIR- A8 – Section 7.2 to determine structural performance and effective moment of inertia for each perforated component. Minimum Effective Moment of Inertia: 0.0066 in^4.

b. Localized bending stress for eccentrically loaded framing members must be evaluated with the maximum effective length of resisting element not more than 12 inches.

5. Fasteners:

a. Minimum Safety Factor of 3 for both tension and shear values

b. Combined tension and shear shall be evaluated according to an interaction formula. Sum of terms shall not exceed 1.0.

2.3 CLADDING SUPPORT FRAMING SYSTEM

A. Thermal isolation stand-offs: 100 percent pultruded glass fiber and thermoset polyester resin insulation clip in depths indicated on Drawings.

1. Thermal Spacer thickness for top, base and web: 3/16 inches nominal.
2. Thermal spacer depth: As indicated on Drawings.
3. Fasteners: Stainless steel.
4. Minimum Characteristics:

a. Compressive Strength: ASTM D638 40,000 psi.

b. Compressive Modulus: ASTM D695 673,400 psi.

c. Shear Strength: ASTM D732 16,000 psi.

d. Thermal Conductivity: ASTM C518 1.05 BTU in/ hr sf degree F.

e. Coefficient of Thermal Expansion: ASTM E831 2.2 x 10e-6 in/in/degree F.

f. Thermal Resistance (R value): ASTM C518 0.95 hr sf degree F/ BTU.

g. Surface Burning Characteristics: ASTM E84.

1) Flame Spread: 25 (Class A).
2) Smoke Developed: 50 (Class A)

B. Fasteners:

1. Sufficient length to provide solid attachment through rigid insulation to structure as required by manufacturer.
2. Steel stud framing substrate: Self-drill hex-washer-head stainless steel with 1,000 hour salt-spray rated thermoset polyester coating.
   a. Embedment depth: 0.625 inches or three full threads minimum, whichever is greater.
   b. Minimum ultimate pull-out capacity from 18 gauge steel: 450 pounds.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verification of Conditions: Inspect all surfaces and verify that they are in proper condition to receive the work of this Section.

1. Beginning of installation means acceptance of existing substrate and project conditions.
2. Examine substrates, areas of this work, and project conditions with installer present for compliance with requirements for installation tolerances, substrates, cladding support system conditions, and other conditions affecting performance of this Work.
3. Examine structural wall framing to ensure that angles, channels, studs, and other structural support members have been installed within alignment tolerances required by cladding support system manufacturer.
4. Examine rough-in for components and systems penetrating cladding support system to coordinate actual locations of penetrations relative to cladding support systems joint locations prior to installation.
5. Verify that mechanical and electrical services for exterior walls have been installed and tested and, if appropriate, verify that adjacent materials and finishes are dry and ready to receive insulation.

B. Proceed with installation only after wall substrate surfaces have been properly prepared and unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Protection of In-situ Conditions: During the operation of work of this Section, protect surrounding materials and finishes against undue soilage and damage by the exercise of reasonable care and precautions. Clean, or repair all in situ surfaces which are soiled or otherwise damaged by Work of this Section, to match indicated profiles and specified finishes. Materials and finishes which cannot be cleaned, or repaired shall be removed and replaced with new work in conformance with the Contract Documents.

B. Prepare surfaces using methods recommended by cladding support manufacturer for achieving best result for substrate under project conditions.

C. Prepare sub-framing, base angles, sills, furring, and other cladding support system members and provide anchorage in accordance with ASTM C754 for substrate type and wall cladding type in accordance with manufacturer's installation instructions.

3.3 INSTALLATION

A. Install cladding support system in accordance with manufacturer's installation instructions.

1. Do not use powder, air, or gas actuated fasteners or actuated fastener tools. Do not use impact wrenches when fastening to or from the cladding support.

B. Install system to fill-in exterior spaces without gaps or voids, and do not compress insulation panels.

C. Trim insulation neatly to fit spaces, and insulate miscellaneous gaps and voids.

D. Fit insulation tight in spaces and tight to exterior side of Mechanical/Electrical services within plane of insulation.

E. Exposed insulation must be protected from open flame.

F. Exterior wall insulation is not intended to be left exposed for extended periods of time without adequate protection.

G. Install cladding support system in compliance with system orientation, sizes, and locations as indicated on drawings.

3.4 TOLERANCES

A. Shim and align cladding support system within installed tolerances of 1/4 inch in 20 feet, non-cumulative, level, plumb, and on location lines as indicated.

3.5 PROTECTION

A. Protect installed products from damage until Date of Substantial Completion.

B. Ensure that insulation panels are not exposed to moisture.

1. Remove wet insulation panels or allow them to completely dry prior to installation of cladding support system.

C. Replace damaged insulation prior to Date of Substantial Completion.

End of Section

Section 07 54 19

POLYVINYL-CHLORIDE (PVC) ROOFING

PART 1 - GENERAL

1.1 SUMMARY

A. Furnish and install the following:

1. Pressure preservative treated solid wood and plywood blocking required for all work of this Trade.
2. Fully adhered polyvinyl chloride (PVC) sheet roofing system.
3. Overlayment (recovery) board beneath membrane.
4. Tapered and flat insulation included as part of roofing system of this Section.
5. Sprayed foam insulation at thermal gaps within roofing system
6. Provide fully reinforced, two-component, polymethyl methacrylate (PMMA) liquid flashing at all non-circular roof penetrations.
7. Acoustical insulation at flutes in acoustical metal decking as indicated on the Structural Drawings.
8. Vapor barrier beneath roofing insulation, over roof decking.
9. Flashing at all penetrations through the roofing system and at all materials which abut roofing system.
10. Building expansion joints occurring in roofing system.
11. Roof edge coping and parapet covers.
12. Crickets between drains.
13. Splash blocks where a higher roof drains to lower roof.
14. Three-sided metal pan thresholds.
15. Concrete walkway pads at each access door and roof hatch.
16. Walkways in places of traffic leading from roof access points (ladders, stairs, doorways) to, and around rooftop mechanical equipment. Provide a mockup of the new roofing and flashing system on the building in an area selected by the Owner and Engineer.

B. Provide Electronic Field Vector Mapping (EVFM) network, and quality assurance testing.

C. Provide testing of heat-welded seams.

D. Provide flood testing of roof drains.

E. Provide manufacturer’s pre-construction and final inspection as specified herein. These inspections are to be included in the base bid; additional inspections, or work incurred as a result of the final inspection shall be without additional cost to the Owner.

1. Work of this Section additional includes providing Owner assistance in the preparation and submittal of roof installation acceptance certification as may

be necessary in connection with fire and extended insurance coverage of roofing and associated work.

1.2 RELATED REQUIREMENTS

A. Section 01 45 29 – TESTING LABORATORY SERVICES: General construction test requirements.

B. Section 01 74 19 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL: Procedural and administrative requirements relating to recycling goals, waste management program and reporting.

C. Section 01 81 13 - SUSTAINABLE DESIGN REQUIREMENTS: Procedural and administrative requirements relating to required *Northeast CHPS Verified Program,* (NE-CHPS) Certification.

D. Section 04 20 00 - UNIT MASONRY: Concrete unit masonry curbs.

E. Section 05 31 00 - STEEL DECKING.

F. Section 06 10 00 - ROUGH CARPENTRY: Wood blocking not related to roofing systems.

G. Section 07 21 00 - THERMAL INSULATION: Interior building insulation, below roof deck.

H. Section 07 62 00 - SHEET METAL FLASHING AND TRIM: Metal flashing, trim, gravel stops, scuppers, and downspouts.

I. Section 07 72 00 - ROOF ACCESSORIES: Roof hatches, vents, roof pavers and pedestals.

J. Section 07 92 00 - JOINT SEALANTS: Sealant other than those specified in this Section 07 54 19.

K. Section 11 40 00 - FOODSERVICE EQUIPMENT: Prefabricated curbs for cooler compressors and related roof mounted equipment.

L. Division 23 - HEATING, VENTILATING AND AIR CONDITIONING: Prefabricated curbs for roof mounted mechanical equipment.

1.3 REFERENCES

A. Referenced Standards: Comply with applicable requirements of the following standards and those others referenced in this Section, under the provisions of Section 01 42 00 - REFERENCES. The standards referenced herein are included to establish recognized minimum quality only. Where these standards conflict with other specified requirements, the most restrictive requirements shall govern. Equivalent quality and testing standards will be acceptable, subject to their timely submission, review and acceptance by the Architect.

1. ANSI/SPRI ES-1 – Wind Design Standard for Edge Systems Used with Low-Sloped Roofing Systems.

2. ASTM A525 – Standard Specification for General Requirements for Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process.
3. ASTM A526 – Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process, Commercial Quality.
4. ASTM A90 – Standard Test Method for Weight [Mass] of Coating on Iron and Steel Articles with Zinc or Zinc-Alloy Coatings.
5. ASTM C33 – Standard Specification for Concrete Aggregates.
6. ASTM C209 – Standard Test Methods for Cellulosic Fiber Insulating Board.
7. ASTM C578 – Standard Specification for Rigid, Cellular Polystyrene Thermal Insulation.
8. ASTM C920 - Standard Specification for Elastomeric Joint Sealants.
9. ASTM C1177/C1177M - Standard Specification for Glass Mat Gypsum Substrate for Use as Sheathing.
10. ASTM C1289 - Standard Specification for Faced Rigid Cellular Polyisocyanurate Thermal Insulation Board.
11. ASTM D570 – Standard Test Method for Water Absorption of Plastics.
12. ASTM D638 – Standard Test Method for Tensile Properties of Plastics.
13. ASTM D751 – Standard Test Methods for Coated Fabrics.
14. ASTM D1004 – Standard Test Method for Tear Resistance (Graves Tear) of Plastic Film and Sheeting.
15. ASTM D1079 - Standard Terminology Relating to Roofing and Waterproofing.
16. ASTM D1204 – Standard Test Method for Linear Dimensional Changes of Nonrigid Thermoplastic Sheeting or Film at Elevated Temperature.
17. ASTM D1621 – Standard Test Method for Compressive Properties of Rigid Cellular Plastics.
18. ASTM D2126 – Standard Test Method for Response of Rigid Cellular Plastics to Thermal and Humid Aging.
19. ASTM D3045 – Standard Practice for Heat Aging of Plastics Without Load.
20. ASTM D3273 – Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber.
21. ASTM D4434/D4434M – Standard Specification for Poly(Vinyl Chloride) Sheet Roofing.
22. ASTM D5635/D5635M - Standard Test Method for Dynamic Puncture Resistance of Roofing Membrane Specimens.
23. ASTM D5957 – Standard Guide for Flood Testing Horizontal Waterproofing Installations.
24. ASTM D7877 - Standard Guide for Electronic Methods for Detecting and Locating Leaks in Waterproof Membranes.
25. ASTM E96 – Standard Test Methods for Water Vapor Transmission of Materials.
26. ASTM E1745 – Standard Specification for Plastic Water Vapor Retarders Used in Contact with Soil or Granular Fill under Concrete Slabs.

27. ASTM G90 – Standard Practice for Performing Accelerated Outdoor Weathering of Materials Using Concentrated Natural Sunlight.
28. ASTM G154 - Standard Practice for Operating Fluorescent Ultraviolet (UV) Lamp Apparatus for Exposure of Nonmetallic Materials.
29. FM Roof Assembly classifications and loss prevention requirements contained in FM Global Property Loss Prevention Data Sheets 1-28, 1-29, 1-31, and 1-49.
30. FM 4470 - Corrosion Resistance Testing.
31. Underwriters Laboratories, Inc. (UL): Fire Resistance Directory.
32. All applicable federal, state and municipal codes, laws and regulations for fire-resistance roof ratings.

B. Inclusionary References: The following reference materials are hereby made a part of this Section by reference thereto:

1. American Society of Civil Engineers, ASCE-7 - Minimum Design Loads for Buildings and Other Structures.
2. Sheet Metal and Air Conditioning Contractors' National Association (SMACNA): Architectural Sheet Metal Manual.
3. NRCA - Roofing and Waterproofing Manual, Latest edition.
4. Roof System Manufacturer's published Technical Specifications, Bulletins and Advisories.

C. Sustainability Requirement Reference: The following sustainability requirements are hereby made a part of this Section by reference thereto:

1. High Performance Schools Exchange, Northeast Energy Efficiency Partnerships NE-CHPS, (referred to herein as "NE-CHPS").

D. Definitions:

1. Roofing Terminology: Refer to ASTM D1079 and the glossary of NRCA's "The NRCA Roofing and Waterproofing Manual" for definition of terms related to roofing work in this Section.
2. PVC: Polyvinyl Chloride.

1.4 ADMINISTRATIVE REQUIREMENTS

A. Coordination:

1. General: Coordinate the work of this Section with the respective trades responsible for installing interfacing and adjoining work for proper sequence of installation, and ensure that the work performed hereunder is acceptable to such trades for the installation of their work.

B. Roofing and Flashing Pre-Installation Conference: Installer of the Work of this Section is required to attend pre-installation conference specified under Section 07 00 02 – ROOFING AND FLASHING TRADE CONTRACT REQUIREMENTS.

C. Pre-installation conferences specified elsewhere: Installer of the Work of this Section is required to attend pre-installation conference specified under the following:

1. Section 04 20 00 - UNIT MASONRY.
2. Section 07 27 13 – SELF-ADHERING SHEET AIR BARRIERS.

D. Sequencing:

1. Flood Testing:
2. EFVM Testing.

E. Scheduling:

1. Notify manufacturer's representative 48 hours in advance for deck acceptance. Plan the lay-up of roofing membrane with respect to deck slope; avoid situations where excessive drainage could pass into completed roofing.
2. The Roofing applicator shall maintain communication with roofing manufacturer’s representative to inform of progress and to schedule period sample testing.

1.5 SUBMITTALS

A. Information and Review Submittals: Submit the following under provisions of Section 01 33 00 - SUBMITTAL PROCEDURES:

1. Literature: Manufacturer's product data sheets, specifications, performance data, physical properties and installation instructions for each item furnished hereunder.
   a. Manufacturer’s written and notarized certification that roofing membrane furnished for project has been treated with specified “dirt-repellent” acrylic coating.
   b. Include certification of data indicating Volatile Organic Compound (VOC) content of all components of roofing system.
   c. Safety Data Sheets (SDS) for products submitted.
2. Manufacturer's specimen warranties: Provide sample copies of manufacturers' actual warranties for all materials to be furnished under this Section, clearly defining all terms, conditions, and time periods for the coverage thereof.
3. Certification:
   a. Manufacturer's certification stating that roofing materials comply with specified ASTM and referenced trade standards.
   b. Manufacturer's written certification stating that roofing and insulation products and all related items to be furnished hereunder, meet or exceed the requirements specified under this Section and that all FM and Underwriters Laboratories (UL) fire-resistive requirements for the indicated Labels have been met.
   c. Submit roof manufacturer's certification that insulation fasteners and insulation furnished is acceptable to roofing manufacturer as a component of roofing system and is eligible for roof manufacturer's system warranty.

d. Roof manufacturer's certification that roof system is approved by Factory Mutual (FM), Underwriters Laboratories (UL), Warnock Hersey (WH) or approved third party testing facility in accordance with ASTM E108, Class 1A for external fire and meets local or nationally recognized building codes.

4. Review statement: Written statement, signed by the roofing applicator, stating that the Contract Drawings have been reviewed by an agent of the roofing system manufacturer; accompanied by a pre-installation written statement from the manufacturer that the selected roof system is proper, compatible, and adequate for the application shown.
   a. Provide certification from roofing manufacturer that system meets all identified code requirements.
   b. The roofing applicator will notify the Architect and Owner in writing if the existing conditions when exposed are in conflict with the Contract Documents for the proper application of the selected roofing system or the warranty requirements.
5. Construction schedule and work area plan indicating work sequence and duration of the roofing work in each area; indicate methods and duration of temporary waterproofing, thermoplastic membrane, and flashing work. Provide adequate detail showing all staging and storage areas and any effect of the work at each building access. Coordinate schedule and site access with the other trades.
6. Project roofing superintendent’s resume and project experience list for similar installations.
7. Shop drawings:
   a. Fully dimensioned 1/4-inch scale plans of roof. Indicate on plans, major areas of patching existing roofing and all areas of new roofing. Plans shall show changes in level, key locations of details, all roof penetrations, roof slopes and direction of slope. Indicate on plans any areas of proposed staging and material storage on roof.
   b. Large scale design details, minimum of 1-1/2 inch per foot scale, showing perimeter flashing conditions and penetrations. Details shall show dimensions of actual measurements taken at the project and reflect actual conditions; manufacturer’s standard preprinted details will not be accepted as substitute for shop drawings.
   c. Tapered Insulation Shop Drawings: Submit scaled plans showing all proposed tapered insulation layouts in accordance with the Basis of Design (BOD) shown on the Roof Drainage Plans. Show the following on the tapered insulation plans:
      1) Cross-section of each tapered insulation system identifying tapered slope and thickness of each insulation layer.
      2) Arrows indicating directions of slope (new slope at new areas and existing slope at existing adjacent areas of roofing assembly to remain) at all locations.
      3) Height of the final roofing assembly (i.e., top of finished PVC membrane elevation), relative to the top of the structural deck, at all

roofing assembly high and low points, perimeter wall/roof curb, and penetrations.

4) Available flashing height at all roofing assembly high and low points, perimeter wall/roof curb, and penetrations.

d. Walkway Pad Plan: Contractor shall submit a walkway pad layout plan for review and approval by Architect.

8. Verification samples:
   a. Provide 8-1/2 by 11 inch samples of roofing membrane and membrane flashing materials.
   b. Provide 12 inch long samples of membrane batten.
   c. Provide 12 inch long samples of each metal flashing type, include PVC coated metals.
   d. Furnish additional samples are requested by the Architect.
9. Sustainable Design Submittals: As required by NE CHPS.

B. Submit the following under provisions of Section 01 78 00 - CLOSEOUT SUBMITTALS:
   1. Manufacturer’s field quality control reports of field inspections, including, revised “as-built” shop drawings and manufacturer’s final punch list.
   2. Manufacturer’s warranties: Include coverage of materials and installation.

1.6 QUALITY ASSURANCE

A. General:
   1. The manufacturer’s authorized technical representative shall provide a final inspection at the completion of the project to insure, that the project has been completed in accordance with the manufacturer’s requirements. Upon approval and acceptance of the project, furnish to Owner, implemented manufacturer's warranty certification.
   2. Submit Manufacturer’s field quality control reports of field inspections, including, revised “as-built” shop drawings and manufacturer’s final punch list.
   3. All roofing shall be as described in this Section and shall be provided and approved by the roof system manufacturer. Any materials not manufactured or provided by manufacturer shall have written approval from the manufacturer stating the materials are acceptable and are compatible with the other materials and systems required.
   4. Notify the Architect where conflicts apply between referenced standards and existing materials, and existing methods of construction.

B. The roof system manufacturer’s technical specifications, bulletins and advisories shall be considered a part of this specification and should be used as a reference for specific application procedures and recommendations. Where a conflict does exist between the manufacturer’s written specifications and those procedures specified in this Section, the more stringent requirements meeting the Manufacturer’s minimum requirements for the provided warranty shall apply.
   1. Roofing Trade subcontractor shall provide at no additional cost to this contract, all additional labor and materials to conform to manufacturer’s

required installation procedures which are necessary to provide a total roofing system which is in full compliance with manufacturer's warranty requirements, including additional materials, installation procedures, manufacturer's inspections, sample testing and other requirements.

C. Sole Source: Obtain products required for the Work of this Section from a single manufacturer, or from manufacturers recommended by the prime manufacturer of roofing system.

D. Roofing Inspector: The Owner may engage a roofing inspector to be on site during the roof reconstruction including during demolition, installation of the vapor retarder, insulation assembly, membrane, flashing, and other appurtenances, and when a survey of the roof and roof drains is conducted. Cooperate with Owner's roofing inspector and allow unlimited access to roofing during construction. The roof inspector may be on site full time or part time at the Owner's option. The roofing inspector is only on site to observe the roof installation for the benefit of the Owner. The roofing inspector is not a substitute for the Contractor's own quality control procedures.

E. Manufacturer's Inspections:

1. Manufacturer's On-site Inspections: Make arrangements to have manufacturer's representative (employed by manufacturer) be present on-site during the Work of this Section at key points, which include, but are not limited to:
    a. Roofing pre-installation meeting.
    b. Inspection of mock-up assemblies.
    c. Manufacturer shall visit and inspect roofing work not less than 4 times (in addition to a final inspection of each roof area) during the progress of work.
        1) Each separate roofing area inspected by manufacturer's representative.
    d. Inspection of installation prior to flood testing at drains.
    e. Final inspection of each separate roofing area (including patched areas of existing roofing).
2. When roofing work is in progress, the Manufacturer's representative shall perform the following, at no additional cost to the Owner:
    a. Keep the Architect informed as to the progress and quality of the work as observed.
    b. Provide job site inspections as specified herein, during the performance of roofing work. Submit reports for each site visit to Owner and Architect within 48 hours of site visit. Reports to include:
        1) Date of on-site visit.
        2) Arrival and departure times.
        3) Weather conditions and temperature.
        4) Itemized (and numbered) list of all installation activities performed during visit.

5) List of each direction and recommendation made by the manufacturer's representative.
6) Copies of documents furnished by the manufacturer's representative to the roofing subcontractor and Contractor.
7) Clear statement that work is compliant, or list of items with recommended corrections of non-compliant work.

c. Report to the Architect in writing any failure or refusal of the Contractor to correct unacceptable practices called to the Contractor's attention.

d. Confirm after completion, that the manufacturer's representative has observed no application procedures which were in conflict with the Contract Document Specifications and manufacturer's own technical specifications, other than those that may have been previously reported and corrected.

3. The manufacturer's authorized representative shall provide a final inspection at the completion of the project to insure, that the project has been completed in accordance with the manufacturer's requirements and those of this specification. Upon approval and acceptance of the project, then a manufacturer's warranty certification written, executed and furnished to the Owner.

a. Submit Manufacturer's field quality control reports of field inspections, including, revised "as-built" shop drawings and manufacturer's final punch list.

F. Third-Party Inspections: Make arrangements to have Owner's Roofing Inspector to be present on-site during the Work of this Section.

1. Roofing manufacturer is required to review qualifications of Owner's Third-Party Inspector and if deemed acceptable, manufacturer will certify acceptable in writing.

2. Owner's Roofing Inspector will be on site during installation of the vapor retarder, insulation assembly, membrane, flashing, and other appurtenances, and when a survey of the roof and roof drains is conducted. Cooperate with Owner's roofing inspector and allow unlimited access to roofing during construction. The roof inspector may be on site full time or part time at the Owner's option. The roofing inspector is only on site to observe the roof installation for the benefit of the Owner. The roofing inspector is not a substitute for the Contractor's own quality control procedures.

G. Qualifications:

1. Manufacturer: A firm regularly engaged in producing the specified roofing systems for at least 5 years with successful results, conducts a contractor training and certification program, and provides factory-trained representatives who are available for consultation and project-site inspection and assistance at no additional cost

2. Installer/Applicator: trained and authorized by product manufacturer for installation of specified system.

a. Minimum of 5 years documented experience demonstrating previously successful work of the type specified herein.

3. Testing Agencies:

1.7 MOCKUPS

A. At least two weeks prior to the start of each type of roofing and flashing work, provide samples of flashing on the building where directed by the Engineer, as described below. Notify the Architect at least seven days before construction of the sample so that the Architect may have a representative present during the construction of the sample. Do not start work until the Architect has approved the mockup.

1. Construct mockups of the following:
   a. Typical roof system
   b. Drain
   c. Roof base flashing interface with through-wall flashing
   d. Roof base flashing interface with curtain wall
   e. Typical mechanical curb
   f. Typical coping condition
   g. Typical PMMA flashing condition

B. Coordinate with related work to construct a complete mockup of each condition.

C. In general, field mockups may become a permanent part of the work, after approval. The Contractor is responsible for reconstructing any mockups that are not approved along with any associated construction.

D. Mockups shall establish both the technical and the aesthetic qualities for this Section of the work and will be used to set a standard for acceptance for this work. Reconstruct the mockups as many times as necessary to meet the EOR's approval, without additional cost to the Owner.

1.8 DELIVERY, STORAGE AND HANDLING

A. Deliver materials in manufacturer's original, unopened containers or packages with labels and package seals intact and legible.

B. Store all materials in accordance with the manufacturer's recommendations. Store rolled goods on clean, raised platforms. Store other materials in dry areas, protected from water and direct sunlight.

1. Do not expose stored curable roofing materials and accessories, including uncured flashing, adhesives, sealants and pourable sealer, to a constant temperature in excess of 80 degrees Fahrenheit.
2. Provide continuous protection of stored materials against deterioration for duration of project.
3. Store insulation on dunnage and completely cover with a water-resistant breathable material (not polyethylene). Provide weights to prevent wind damage to insulation.

4. Handle all materials to avoid damage. Store rolled goods (except roofing membrane) on ends only. Discard rolls that become flattened, creased, or otherwise damaged.

C. Distribute any materials stored on roof levels for immediate use to prevent concentrated loads that would impose excessive strain on deck or structural members. Protect roof stored materials to prevent displacement by the wind and protect from exposure to inclement weather and sun.

D. Damaged material: Remove Coordinate with the Owner's representative regarding roof access and hoist or crane locations. any damaged or contaminated materials from job site immediately, including materials in broken packages, or show other evidence of damage, unless Architect specifically authorizes correction thereof and usage on project.

1.9 ENVIRONMENTAL REQUIREMENTS

A. Apply roofing in dry weather; do not install roofing in inclement weather or when precipitation is predicted with greater than 20 percent possibility.

B. Do not apply roofing membrane to damp or frozen deck surface.

C. Apply roofing in ambient temperature approved by roof system manufacturer.

1.10 WARRANTY

A. General: Submit the following warranties under provisions of Section 01 78 00 - CLOSEOUT SUBMITTALS, and in compliance with Section 01 78 36 – WARRANTIES.

1. Warranties shall be effective starting from Date of Project Substantial Completion and are effective for specified term lengths.

B. Manufacturer's Warranty: Deliver to the Owner upon completion of the work of this Section, a conditional warranty for the roofing system, on the work of this Section agreeing to promptly repair the roofing as necessary to prevent penetration of water through it.

1. Warranty: "Total System Roof Warranty" which shall cover product quality, performance, and workmanship for a period of Thirty years from date of Project Substantial Completion.
    a. The Total Roofing System is defined as the following materials: Membrane, Flashings, Counter flashings, , Adhesives and Sealants, Insulation, Recovery Board, Fasteners, Fastener Plates, Fastener Strips, Metal Edging, Metal Termination Bars, and any other products utilized in this installation.
2. The roofing manufacturer will, at his own expense, repair and replace all defective materials and workmanship covered by their warranty and will repair any leak for the Thirty (30) year warranty period.
3. Pro-rated System Warranties shall not be accepted.
4. Warranty shall provide coverage for maximum peak gust wind speed of 100 miles per hour.

5. Evidence of the manufacturer's warranty reserve included as part of the project submittals for the Architect’s approval.

C. Installer’s special warranty: Roof system installer shall supply Owner with a separate three-year workmanship warranty or bond. In the event any work related to roofing, flashing, or metal is found to be within the Applicator warranty term, defective or otherwise not in accordance with Contract Documents, the Applicator shall repair that defect at no cost to Owner. Applicator's warranty obligation shall run directly to Owner.

1. Warranty includes: All costs and expenses to be make repairs or replacements to installed work as necessary to correct faulty and defective work, and as are necessary to maintain said work in a watertight condition. Warranty shall include provision to repair or replacement metal roofing work which demonstrates defects in structure, watertight integrity, or appearance, including, but not limited to the following:
    a. Failure to meet specified performance requirements.
    b. Loose parts.
    c. Leaking (including integrity of seals).
    d. Wrinkling.
    e. Buckling.
    f. Degradation of metal finish.
    g. Galvanic action between roofing and dissimilar materials.
2. Warranty shall be active and unaffected by subsequent application of Owner’s ballasted photo-voltaic (PV) system, Roofing Manufacturer shall provide inspection of roofing both prior to, and following installation of PV array. Perform repairs as required to installed roof following installation of PV system to insure no leakage. Roofing contractor will be reimbursed for repair work resulting from PV system installation.
3. Warranty excludes: damages to work and other parts of the building, and to building contents, caused by:
    a. Lightning.
    b. Warranty shall provide coverage for uplift created by specified design wind speed.
    c. Fire.
    d. Failure of roofing system substrate, including cracking, settlement, excessive deflection, deterioration, and decomposition.
    e. Faulty construction of parapet walls, copings, chimneys, skylights, vents, equipment supports, and other edge conditions and penetrations of the work.
    f. Activity on roofing by others, including construction contractors, maintenance personnel, other persons, and animals, whether authorized or unauthorized by Owner.
4. Roofing Installer is responsible for damage to work covered by this Warranty but is not liable for consequential damages to building or building contents resulting from leaks or faults or defects of work.

5. During Warranty Period, if Owner allows alteration of work by anyone other than Roofing Installer, including cutting, patching, and maintenance in connection with penetrations, attachment of other work, and positioning of anything on roof, this Warranty shall become null and void on date of said alterations, but only to the extent said alterations affect work covered by this Warranty. If Owner engages Roofing Installer to perform said alterations, Warranty shall not become null and void unless Roofing Installer, before starting said work, shall have notified Owner in writing, showing reasonable cause for claim, that said alterations would likely damage or deteriorate work, thereby reasonably justifying a limitation or termination of this Warranty.
6. Owner shall promptly notify Roofing Installer of observed, known, or suspected leaks, defects, or deterioration and shall afford reasonable opportunity for Roofing Installer to inspect work and to examine evidence of such leaks, defects, or deterioration.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Basis of Design: To establish a standard of quality, design and function desired, Drawings and specifications have been based on Sika Sarnafil Inc., Canton, MA.

B. Acceptable Manufacturers: Subject to compliance with the requirements specified herein, manufacturers offering products which may be incorporated in the work include the following, or approved equal:
1. Sika Sarnafil Inc., Canton, MA. (Basis of Design).
2. Duro-Last Roofing, Inc., Saginaw, MI.
3. Carlisle Syntech, Carlisle, PA.
4. Johns Manville, Denver, CO.

2.2 SYSTEM DESCRIPTION

A. Fully Adhered polyvinyl chloride (PVC) roofing system, including insulation and substrate, shall meet Underwriters Laboratories, Inc. Fire Hazard Classification “Class A” roof.

B. Regulatory Requirements: Refer to applicable building codes for roofing system installation requirements and limitations. When a conflict exists, the more restrictive document will govern.

C. Performance Requirements
1. Wind Loading:
a. Comply with specified requirements on Structural Drawings.
b. Conform to the 2018 International Building Code with Rhode Island Building Code Regulation RISBC-1.
1) Basic Wind Speed (V.ult.): 143 miles per hour (three second gust).
2) Risk Category: III.
3) Exposure: “B”.

2. Above-deck roof components shall be designed and installed in accordance with requirements of FM 1-29 for performance requirements specified.

2.3 ROOFING MATERIALS

A. Recycled content of roof membrane: Use maximum available percentage of recycled material. Roofing membrane products incorporated into the work shall contain not less than 13 percent recycled content.

B. Membrane: 0.080 inch thick glass-fiber-fabric-reinforced plasticized polyvinyl chloride (PVC) conforming to ASTM D4434 (latest edition), Type II, Grade 1, equal to Sika Sarnafil type “G410” membrane.

1. Sheet width: Nominally 6 feet wide sheets (full-width sheets), typical. Provide nominally 3 feet wide sheets (half-width sheets) at locations where recommended by Manufacturer, and as indicated on approved shop drawings.

2. Roofing membrane shall conform to the following minimal properties:

Property	ASTM Test Method	Resultant Value
Tensile Strength:	D638	1500 lbf.
Tear Strength:	D1004	10 lbf./in.
Breaking Strength:	D751	240 lbf./in.
Elongation:	D638	220 percent, MDxCD
Seam Strength:	D638	75 percent of breaking strength.
Heat Aging, Tensil Strength	D638	Retaining 90 percent of tensil strength for heat aged at 176 degrees F. for 7 days.

3. Roof Membrane Color: Manufacturer’s “light gray” surface color, compliant with LEED:

C. Secondary Roofing Membrane (Oil-Resistant Type): 0.060 inch thick glass-fiber-fabric-reinforced plasticized polyvinyl chloride (PVC) conforming to ASTM D4434 (latest edition), Type II, Grade 1, equal to Sika Sarnafil type “G410” membrane, conforming to ASTM D4434, Type II, Grade 1.

1. Sheet width: Nominally 3.5 feet wide sheets (half-width sheets).

2. Roofing membrane shall conform to the following minimal properties:

Property	ASTM Test Method	Resultant Value
Tensile Strength:	D638	1600 lbf.
Tear Resistance:	D1004	14 lbf./in.
Breaking Strength:	D751	270 lbf./in.
Elongation at break:	D638	250 percent, MDxCD
Seam Strength:	D638	80 percent of breaking strength.
Heat Aging, Tensil Strength	D638	Retaining 95 percent of tensil strength for heat aged at 176 degrees F. for 7 days.

Heat Aging, Minimum Elongation	D638	Retaining 90 percent of original strength for heat aged at 176 degrees F. for 7 days.

3. Roof Membrane Color (exposed): Manufacturer's standard white/Tan membrane with "Tan" color (oil resistant surface) exposed when installed, having the following characteristics:
   a. Initial reflectivity: 0.73
   b. Initial emissivity: 0.85.
   c. Initial Solar reflective index (SRI): 89.

D. Flashing membrane: 0.080 inches thick, plasticized PVC, fiberglass reinforced, ASTM D4434, Type II, Grade 1. having a minimal tensil strength of 1600 psi when testing in compliance with ASTM D638.
   1. Color to match roofing membrane.

E. Coated metal flashing: PVC laminated to 25 gage steel, with a zinc coating supplied by the hot-dip process conforming to ASTM A525 or A526, A90 or G90 coating weight standard equal to Sanaclad.
   1. Prefabricated edge metal.

F. Securement discs:
   1. Discs: 26 gage 3 inch square SAE 1010 steel with a AZ 55 galvalume coating, punched on center for securement of membrane.
   2. Fasteners: #12 corrosion-resistant fastener to attach insulation boards to metal decking with a modified buttress thread, and shank diameter of approximately 0.168 inch (4 mm) and a thread diameter of approximately 0.214 inch (5 mm). The driving head has a diameter of approximately 0.435 inch (11 mm) with a #3 Phillips recess for positive engagement.

G. Cant Strips, tapered edge strips and flashing accessories: Types recommended by manufacturer of polyvinyl chloride material, provided at locations indicated and at locations recommended by manufacturer, including adhesive tapes, flashing cements, and sealants.

2.4 ELECTRONIC FIELD VECTOR MAPPING (EVFM) COMPONENTS

A. Electronic Field Vector Mapping, General: Provide permanent network of testing loops, as required to test entire waterproofing assembly. Network shall remain the property of the Owner, for future maintenance use.
   1. Grounding Screen: Sika Sarnafil, product "Grounding Screen", bright aluminum 18 by 16 mesh, or approved equal.
   2. Conductor Network Materials:
   3. Conductor Wire: Braided polyethylene interwoven with a minimum of six strands of stainless steel wire. Tensile strength of wire shall be no less than 180 lbs.
   4. Accessory Materials: Connectors and other materials as needed for complete loop or network.

B. Equal testing method consistent with warranty requirements of the waterproofing system manufacturer

2.5 OVERLAYMENT (RECOVERY) BOARD

A. Overlayment (recovery) Board: 4 foot by 4 foot, or 4 foot by 8 foot, high density, coated glass-fiber faced, closed cell polyisocyanurate foam core panel conforming to ASTM C1289, Type II, Class 4, Grade 1, FM Global approved, 1/2 inch thick with a minimum R-value of 2.5.

1. Physical Characteristics:
   a. R-Value: 2.5 per ASTM C518.
   b. Dimensional stability when tested in accordance with ASTM D2126: <0.6 percent maximum.
   c. Water absorption when tested in accordance with ASTM C209: 3 percent maximum.
   d. Compressive Strength when tested in accordance with ASTM D1621: 100 psi minimum.
   e. Mold resistance when tested in accordance with ASTM D3273: Pass.
   f. Service Temperature: 260 degrees F.
2. Acceptable Manufacturers: Subject to compliance with the requirements specified herein and approval with specified liquid air barrier (for compatibility), manufacturers offering similar products include the following, or approved equal:
   a. Sika, product: “Sarnatherm Roof Board H”.
   b. Carlisle, product “SecurShield HD Composite”.
   c. Firestone Building Products, product “ISOGARD HD Cover Board”.

2.6 ROOF EDGE COPING AND PARAPET COVERS

A. Fascia trim/ roof edge: Refer to Section 07 71 00 - ROOF SPECIALTIES.

2.7 ROOFING INSULATION

A. General: Insulation shall be approved by the roof manufacturer, and shall be UL listed and FM approved.

1. Roof insulation is included as a system component under the specified “Total System” warranty and therefore shall either be furnished by the roofing manufacturer or be otherwise in compliance with the requirements of the roof system warranty

B. Acceptable manufacturers: Subject to acceptance of roofing manufacturer and the following specification requirements:

1. Atlas Roofing Corporation, Atlanta, GA.
2. The Dow Chemical Co., Midland, MI.
3. Hunter Panels, Portland ME.
4. Johns Manville Roofing System, Denver, CO.

5. Carlisle Syntec, Carlisle PA.
6. Firestone Building Products Co., LLC, Indianapolis, IN.

C. Polyisocyanurate foam insulation manufactured with HCFC-free blowing agent and bonded to glass fiber reinforced facers on top and bottom surfaces during the manufacturing process. Insulation shall conform to property requirements of ASTM C1289, Type II.

1. Long Term Thermal Resistance (LTTR) R-value per inch (as determined by ASTM C1289-11a, or later): R = 5.6 per inch.
2. Minimum Thickness 6 inches at low points.
3. Density: 2.0 pounds per cubic foot (ASTM D1622).
4. Compressive strength: 20 psi (ASTM D1621).
5. Moisture vapor transmission: Less than 1 perm (ASTM E96).
6. Water absorption: Less than 1 percent per volume (ASTM C209).
7. Provide factory-tapered insulation system as required to meet elevations and slopes shown on drawings or as required by membrane manufacturer, whichever is more stringent. Provide cants and crickets at drains as necessary.

2.8 VAPOR BARRIER

A. Vapor barrier: Equal to Sarnafil product: “Vapor Retarder SA31”. A 31 mil thick composite sheet consisting of a high-density polyethylene grid laminated between two layers of polyethylene film bonded to SBS modified bitumen, and self-adhesive on the underside designed for direct application over metal deck.

1. Primer: Sarnafil product “Sarnavap-Self-Adhered Primer” is required for non-metal decks.
2. At metal decks provide manufacturer’s recommended galvanized metal plate attached to deck, spanning flutes at conditions where vapor barrier membrane has an end lap between flutes.

2.9 WOOD BLOCKING AND NAILER MATERIALS

A. Pressure preservative treated solid lumber for blocking, nailers and curbs as indicated or required: Hem Fir, Douglas Fir, Eastern Spruce, Eastern Hemlock, or Southern Pine, surfaced dried stud or utility grade. Wood members shall be of sizes indicated on the Drawings or of the same size as the members being braced.

1. For blocking and nailers used for attachment of other construction, select and cut lumber to eliminate knots and other defects that will interfere with attachment of other work.
2. For furring strips for installing plywood or hardboard paneling, select boards with no knots capable of producing bent-over nails and damage to paneling.

B. Pressure preservative treated plywood for unspecified exterior applications (including plywood blocking, nailers, and backing for roofing and flashing work) : APA graded B-C, Exposure 1, EXT, Group 1 species, 5 ply/5 layer plywood, touch-sanded, thickness as indicated on approved shop drawings.

C. Pressure Preservative Treatment (PT):

1. General: Treated wood products shall be produced by a single treatment plant, fully licensed by the chemical manufacturers, and conforming to the requirements specified herein.
   a. Toxicity and Environmental Quality:
      1) Products containing chromium will not be permitted.
      2) Products containing arsenic will not be permitted.
   b. Kiln dry all treated lumber and plywood to the following maximum moisture content after treatment.
      1) Lumber: 19 percent.
      2) Plywood 15 percent.
      3) Discard pieces with defects which might impair quality of work.
   c. Quality marks: Each piece of lumber and plywood shall be permanently affixed with a quality mark, containing the following information:
      1) Identification of the inspection agency.
      2) Standard to which material was treated.
      3) Identification of the treating plant.
      4) Preservative treated wood shall include: Retention and end use for which product is suitable.
2. Pressure preservative treatment products include the following:
   a. Ammoniacal Copper Quaternary Compound (ACQ) Treatment: arsenic-free and chromium-free chemical “ACQ Preservative” in compliance with AWPA Standards. Apply the preservative in a closed cylinder by pressure process in accordance with AWPA Standard C15.
      1) Chemical Manufacturer: Subject to compliance with the requirements specified herein, Products which may be incorporated in the work include:
         a) Osmose, Inc., Griffin GA., product “NatureWood”.
         b) Flameproof Companies., Montgomery, IL, product: “ACQ Preserve”.
         c) Universal Forest Products, Inc., Grand Rapids MI., product “ProWood ACQ”.
         d) Viance, LLC., Charlotte, NC., product “Preserve”
   b. Micronized Copper Wood Preservative (MCA, MCA-C) Treatment: arsenic-free and chromium-free chemical, waterborne micronized copper azole or preservative in compliance with AWPA Standards,
      1) Chemical Manufacturer: Subject to compliance with the requirements specified herein, Products which may be incorporated in the work include:
         a) Culpepper, Lancaster, MA., product “Micropro”.
         b) Koppers Performance Chemicals, Griffin, GA., product MicroPro.”
         c) UFP Industries, Auburn, MA., product: ”Prowood.”
         d) Great Souther Wood Preserving, Abbevie AL., product: “Yellawood.”

e) Arxada, Alpharetta, GA, “Wolmanized” Brand, Product: “Wolman E”.

3. Fixation of Chemical: Treated wood shall not be shipped from treatment plant until fixation of the preservative has occurred in the wood.

2.10 ACCESSORIES

A. Fasteners:

1. For roofing system components: Steel fastener with fluorocarbon coating, complying with FM 4470 corrosion resistance test.. Minimum thread diameter 0.22 inches and minimum shank diameter of 0.172 inches, as recommended by roofing manufacturer. Nail type fasteners are not permitted.
2. For pressure preservative treated (PT) wood: Flat head type 304 or 316 stainless steel only, wood screws and carriage bolts, of the appropriate sizes for specified wind loading. Aluminum, galvanized steel, and coated metal fasteners are prohibited with PT wood.

B. Flat securement bars: 1 inch wide, aluminum or galvanized steel bar or extruded aluminum, 1/8 inch thickness, pre-punches at 12 inches on center; bar shall have a G90 coating (steel).

1. Install with approved type 304 stainless steel screw fasteners at framing and blocking.
2. Install with approved corrosion resistant “Tapcon” type fasteners at masonry construction.
   a. Drill pilot holes 1/4 inch deeper than fastener length.

C. Insulation fastening plates, minimum 3 inches square.

D. Wind uplift securement bars: 14 gage hot-galvanized dipped U shaped bar, 1 inch wide by 1/8 inch wall thickness, prepunched at 12 inches on center.

E. Adhesive: Roofing manufacturers water based contact adhesive, formulated to withstand specified uplift forces.

F. Roof metal: As required by manufacturer’s shop drawings.

1. Three-sided metal pan thresholds at roof terrace: fabricate from 0.25 inch thick aluminum, with reinforcement.

G. Walkway surfacing: Rolled polyester reinforced polyvinyl chloride embossed membrane minimum 0.096 inches (2.4mm) thick.

H. Precast concrete pavers at roof entry points: Solid concrete masonry units, fabricated from normal weight aggregates conforming to ASTM C33, Portland cement, air-entraining agents, integral water repellants, finely-ground silica, integral colorant, and other filler materials; having a compressive strength of not less than 5,000 psi.

1. Nominal 24 by 36 inch by 2 inch thick.
2. Provide 2 pavers at each roof entry point, separated by 2 inches.

I. Foamed-in-place insulation for air barrier sealant: Low pressure polyurethane foam sealant. Acceptable products include the following or approved equal:

1. Fomo Products, Inc., product: "Handi Foam" or "Handi-Seal".
2. Dow Chemical Company, product: "Great Stuff Pro".
3. Premier industrial Supply, product: "XtraFoam".
4. Convenience Products, Division of Clayton Corp., product: "Touch 'n Foam No Warp".
5. Henry Company, product: "NailTite NT-100".

J. Sealant: (Polyurethane 1-component): Low modulus single component gun-grade polyurethane sealant, non-sagging, conforming to ASTM C920, Type S, Class 35, Grade NS, use NT,M, A and O with a minimum movement capability of ±35 percent, equal to the following:

1. Master Builders Solutions Construction Systems US, LLC., Shakopee, MN., product “MasterSeal NP1”.
2. Sika Corp, Lyndhurst NJ.,, product “Sikaflex 1a”.
3. Tremco, Inc., Beachwood OH., product “Vulkem 116 FC”, or “Dymonic 100”.

K. Insulation for Acoustical Deck Fluting:

1. Thermal / acoustical glass fiber insulation, minimum 3/4 pound per cubic foot density, complying with ASTM E84/UL 723 flame spread 25 or less and smoke developed 50 or less, unfaced, comprised of rotary process glass fibers bonded with formaldehyde-free thermosetting resin.
    a. Expanded Polystyrene (EPS) flute fillers are not acceptable.
2. Custom fabricate insulation batts to suit metal deck flute depth and width and supply in rolls ready for installation
3. Acceptable manufacturers:
    a. ModulRTS, Paris ON, Canada, product: “Protec Metal Deck Flute Filler”.
    b. Johns Manville, Denver CO.: product: “SG” Series “Spin-Glas SG 30”.
    c. Owen’s Corning, Toledo OH., “Thermafiber” brand, product: “Top Stop”.

L. Splash Blocks:

1. Precast concrete splash blocks: Solid concrete, fan-shaped units, 8-1/2 inches wide at narrow end, 14 inches wide at opposite end, 23-3/4 inches long, and 2-1/4 inches thick.
2. Adhesives for splash blocks: As approved by the roofing manufacturer.

M. Miscellaneous materials: Best grade or quality as furnished or approved by the roofing manufacturer for the specific application.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Inspect all surfaces and verify that they are in proper condition to receive the work of this Section.

B. Verify edge nailers, curbs and penetrations are in place prior to roofing, so that the roof system can be installed as continuously as possible.

C. Verify the roof deck, and related surfaces are clean, smooth, flat, free of depressions, waves, or projections, properly sloped to drains, and suitable for installation of roof system.

D. Verify deck surfaces are dry and free of snow or ice.

E. Verify deck surfaces are dry and free of snow or ice.

F. Any condition requiring correction or completion shall be corrected or completed prior to the installation of the roofing system. Notify Contractor of unacceptable conditions.

G. Do not proceed until defects are corrected.

H. Beginning of installation means acceptance of substrate and site conditions.

3.2 PREPARATION

A. Carefully broom clean substrate immediately prior to roofing application.

B. Where surface joints at roof and wall substrates exceed 1/4-inch width, fill flush with surface with pourable sealer or insulating foam before proceeding with the installation.

3.3 EMERGENCY MATERIALS AND PROCEDURES

A. Maintain continuous temporary protection prior to and during installation of new roofing system. Do not leave unfinished roof areas uncovered over-night or during inclement weather.

1. Provide temporary protective sheeting over uncovered deck surfaces.
2. Turn sheeting up and over parapets and curbing. Retain sheeting in position with weights or temporary fasteners.
3. Do not permit traffic over unprotected or repaired deck surface.

B. Maintain on site equipment and materials necessary to apply emergency temporary coverage in the event of sudden storms or inclement weather.

C. Do not install more insulation than can be covered by roofing system in the same workday. Do not apply more roofing than can be properly fastened and sealed in the same workday. Ensure that water does not flow beneath any completed sections of the roofing system, provide temporary closures.

D. Roofing Subcontractor is fully responsible for all damage due to water penetration occurring during the Work of this Section.

3.4 INSTALLATION - GENERAL

A. The entire work of this Section shall be performed in accordance with the best standards of practice relating to trades involved.

B. Follow local, state and federal regulations, safety standards and codes. When a conflict exists, the more restrictive document shall govern.

C. Follow insurance underwriter's requirements acceptable for use with specified products or systems.

D. Review all special conditions, such as at projections, at connections to sheet metal gravel stops, flashings, and similar materials with the Roofing Manufacturer, submit the Roofing Manufacturer's recommendations and details to the Designer for approval.

E. Special Cautions:

1. Do not use oil-based or plastic roof cement.
2. Do not subject polymeric materials to contact with petroleum, grease, oil, solvents, vegetable or mineral oil, nor animal fat. Prevent contact with hot pipes, and ducts.
3. Cements and bonding adhesive contain petroleum distillates and are extremely volatile and flammable. Avoid breathing vapors and do not use near fire or flame.
4. Ensure that welding and bonding surfaces are dry during installation.

F. Pre-drill deck 18 gage or heavier to receive fasteners.

G. Install acoustical insulation at acoustical metal deck flutes prior to roofing work covering the same.

3.5 INSTALLATION - ROOF NAILERS AND BLOCKING

A. General: Provide anchorage for nailers as required for roof and edging to obtain specified wind loading requirements.

1. Secure nailers and blocking to metal deck with electro-galvanized screws at not greater than 12 inch on center spacing, extending a minimum of 3/4-inch below deck.
2. Secure nailers and blocking to wood substrates with electro-galvanized screws at not greater than 12 inch on center spacing, extending a minimum of 1-1/2 inch into board substrates and 3/4 inches into sheet materials.

B. When building up layers of nailers and blocking, fully secure each layer to at least the one below, alternating location of fasteners, spacing at 12 inches on center. Provide fasteners in lengths to penetrate through more than one substrate layer of blocking. Stagger locations of butt ends of boards, such that no two joints are "lined up".

C. Ensure finished height of nailers is same as top surface of roof insulation within 1/4-inch, plus or minus.

D. Install perpendicular to the steel roof deck with joints staggered and occurring over the crests of the roof deck. Loose lay, or spot secure to deck with adhesive for wind conditions during installation.

1. Provide thermal barrier only at steel deck roof substrate surfaces. Do not provide at concrete deck.

3.6 INSTALLATION – VAPOR BARRIER

A. Where applicable over concrete deck, ensure that concrete substrates have cured for at least 28 days, and have a relative humidity moisture content acceptable to roof manufacturer.
   1. Do not install when it is raining or snowing, or over wet/humid surfaces
   2. Substrate surfaces shall be clean and dry.

B. Install vapor barrier primer prior to installation of self-adhered vapor barrier over metal decking or concrete substrate for 100 percent of roofing surface. Comply with manufacturer's minimum ambient and surface application temperature requirements. Apply primer by brush, roller or spray at coverage rates recommended by manufacturer for substrate surface to receive primer. Permit primer to fully dry prior to application of self-adhered vapor barrier.

C. Apply self-adhered vapor barrier over cured primer (as directed by manufacturer), starting at the bottom of the slope. Unroll vapor barrier onto the substrate without adhering for alignment. Overlap each preceding sheet by 3 inches (75 mm) lengthwise following the reference line and by 6 inches (150 mm) at each end. Stagger end laps by at least 12 inches (300 mm). Do not immediately remove the silicone release sheet.
   1. On metal decks use a galvanized steel plate (6 inch width minimum) secured to roof deck to support the membrane end lap (which occurs between metal flutes ensuring a complete end lap seal).

D. Once sheets are aligned, peel back a portion of the silicone release sheet and press the membrane onto the substrate for initial adherence. Hold vapor barrier, tight and peel back the release sheet by pulling diagonally.

E. Use a 75 pound (34 kg) roller to press vapor barrier down into the substrate including the laps. Finish by aligning the edge of the roller with the lower end of the side laps and rolling up the membrane. Do not cut the membrane to remove air bubbles trapped under the laps. Squeeze out air bubbles by pushing the roller to the edge of the laps.

F. Apply manufacturer's recommended mastic to seal around roof penetrations and T-joints.

3.7 INSTALLATION - INSULATION

A. Install only as much insulation as can be covered with roofing membrane and completed before the end of the day's work, or before the onset of inclement weather.

B. Place the constant thickness insulation of first layer and the subsequent tapered insulation to the required slope pattern and cants for drainage, in accordance with manufacturer's instructions.

C. Neatly fit insulation to all penetrations, projections, and nailers. Loosely butt edges and ends of insulation with gaps not greater than 1/4 inch.

3.8 INSTALLATION OF COVER BOARDS

A. Install cover boards over insulation with long joints in continuous straight lines with end joints staggered between rows. Offset joints of insulation below a minimum of 6 inches in each direction.

B. Trim cover board neatly to fit around penetrations and projections, and to fit tight to intersecting sloping roof decks.

C. At internal roof drains, conform to slope of drain sump.

1. Trim cover board so that water flow is unrestricted.

D. Cut and fit cover board tight to nailers, projections, and penetrations.

E. Install cover board over insulation using manufacturer’s recommended fasteners and cover plates or adhesives, according to SPRI's Directory of Roof Assemblies listed roof assembly requirements for specified Wind Uplift Load Capacity and FM Global Property Loss Prevention Data Sheet 1-29.

3.9 INSTALLATION GROUNDING SCREEN

A. Install grounding Screen beneath cover board. Overlap adjacent grounding screen a minimum of 3 in (76 mm). Provide positive contact between adjacent sheets at both side and end laps. Tape together Adjacent sheets using manufacturers approved aluminum tape spaced approximately 5 feet (1.52 m) on center to prevent shifting.

B. Connect the grounding screen to a conductive part of the structure at several separate locations in accordance with approved shop drawings. Use a 2 inch (51 mm) wide strip of the grounding screen extended from the grounding screen to the structure, and tape it into place with duct tape or aluminum tape.

3.10 INSTALLATION - MEMBRANE

A. General: Begin application at the highest point of the highest roof level and work to the lowest point. Proceed in a work sequence to minimize construction traffic on completed areas of roofing.

B. Apply membrane and adhesives in accordance with manufacturer’s instructions, and as specified herein.

1. Apply a 100 percent continuous coat of adhesive to the substrate
   a. The amount of substrate that can be coated with a workable amount of adhesive will be determined by application method, ambient temperature, humidity, and available manpower.
2. Ensure proper application and curing of the adhesive, the outside air temperature shall be above 40°F and rising.
3. Adhesive shall be applied by spraying and back rolling or rolling alone. Do not dump adhesive or pour from the cans.

a. Roller applied adhesive shall utilize a solvent resistant ⅜ inch nap roller.

4. Adhesive must be rolled out to ensure a smooth, even 100% coverage of the substrate with no voids, skips, globs, puddles, or similar irregularities.
5. Allow the adhesive to set up only to the point that the adhesive is slightly cured but still wet. Do not allow adhesive to skin or dry out.
6. Adhesives shall not to be installed over/on substrates that are moist or wet or on systems or substrates that have residual moisture.
7. Broom the adhered portion of the membrane to ensure full contact and complete the bonding process by firmly pressing the bonded membrane into place with a weighted, foam-covered, lawn roller.

C. Roll out membrane, free from wrinkles or tears. Inspect sheet for defects as it is being rolled out. Place sheet sections into place. Align sheet with previous sheet to obtain a lap width of not less 4-1/2 inches.

D. Make cutouts in membrane for protrusions such that when the skirts on the factory fabricated accessories, when welded to the deck membrane, will cover the cutouts. Fasten around cutouts with approved fasteners.

E. Clean and dry welding joint areas of both membrane sheets. Weld membrane as recommended by manufacturer without wrinkles and voids and as additionally specified herein. Apply pressure to the lap to ensure contact.

F. Heat weld membrane accessories and membrane flashings as specified herein and in accordance with manufacturer’s written instructions.

G. Provide additional membrane securement at expansion joints, curbs, skylights, and similar roof top penetrations, at interior wall and penthouse perimeters, and at any angle change which exceeds 2 inches in on horizontal foot.

1. Weld polyvinyl chloride flashing over installed fastening plates as recommended by roofing manufacturer, and in no case provide flashing of less than 6 inches in width and at ends of flashing, provide a minimum 2 inch space from edge of plate.

H. Extend membrane up cant strips and a minimum of 8 inches onto vertical surfaces.

I. Provide oil resistant PVC membrane (secondary membrane) surrounding all food service exhaust vents. Membrane to cover curbing at vents, and extending a minimum of 3 feet from curb over primary roof membrane. Fully adhere secondary membrane to primary roofing membrane, and heat weld all seams along perimeter.

J. Install termination bars with screw fasteners located 6 or 12 inches on center. Install roofing manufacturer’s recommended sealant along top and bottom edges of termination bar.

K. Walkway Protection: Install walkway membrane at locations shown and where required from roof access points to all roof-mounted equipment.

1. Clean roofing membrane and attach heat weld walkway pads, to roof, on center with each other in manner as recommended by manufacturer.

3.11 WELDING OF SEAMS

A. General:

1. Heat weld the PVC membrane using an Automatic Heat Welding Machine or Hot Air Hand Welder in accordance with the manufacturer's specifications and as additionally specified herein. At all splice intersections, roll the seam with a silicone roller immediately after the welder causes the membrane step off to ensure a continuous hot air welded seam.
    a. Overlay all splice intersections with manufacturer’s “T-Joint” covers.
2. Probe all seams once the hot air welds have thoroughly cooled (approximately 30 minutes).
3. Repair all seam deficiencies the same day they are discovered.
4. Apply Cut Edge Sealant on all cut edges of reinforced membrane (where the scrim reinforcement is exposed) after seam probing is complete. Cut Edge Sealant is not required on vertical splices except where noted.

B. Welding of seams: Clean and dry splice joint areas of both membrane sheets. Heat-weld all joints and lap seams permanently waterproof, without wrinkles and voids using manufacturer’s recommended heat seaming methods, and as follows.

1. Clean the seam prior to welding using water, scouring powder and cotton cloths. Rinse al soap and wipe dry.
2. Minimum seam width is 3 inches for machine welding equipment with at least 1-1/2 inches being welded, and 4 inches with hand welding equipment with at least 2 inches being welded.
3. To greatest extent possible, utilize an automatic heat welding machine for all field splices on the horizontal plane, including flashing.
4. Utilize hand-heal welders on vertical welds, repair patches, and where an automatic heat welder is not practical.
5. To ensure proper seam strength, perform practice welds to adjust machine (air intake, temperature and speed) on spare membrane sheets. Do not perform practice welding on installed roof membrane.
6. After the sheet has cooled probe all seams and use a hand held welder and silicone covered roller to repair any voids in seams. Apply constant pressure against the seam edge to feel for voids, loose areas or poor welds. Probing and repair of voids is to be done on a daily basis.
7. At any point where the automatic heat welding machine is stopped and restarted, even on the same seam, the location of the stop and start shall be marked and a “T” patch shall be installed centered on the area.

C. Hand Welding Procedure: Comply with manufacturer’s recommended requirements and the following.

1. Hand welded seams completed in three stages. Equipment allowed to warm up for at least one minute prior to start of welding.
    a. The lap tack welded every 3 feet to hold the material in place.
    b. The back edge of the lap welded with a thin, continuous weld to prevent loss of hot air during the final welding.

c. The hot-air nozzle inserted into the lap, keeping the welding equipment at a 45 degree angle to the side lap. Once the proper welding temperature has been reached and the material starts to flow, the hand roller applied at a right angle to the welding gun and pressed lightly. For straight laps, the 1-1/2 inch wide nozzle used. For corners and compound connections, the 3/4 inch wide nozzle used.

D. Machine Welding: Comply with manufacturer's recommended requirements and the following.

1. Machine welded seams may be achieved by the use of manufacturer's recommended automatic welding equipment. when using this equipment, the manufacturer's instructions followed and local codes for electric supply, grounding, and overcurrent protection observed. The automatic welding machines require 218 to 230 volts at 30 amps. The use of a portable generator is recommended.
2. When welding sheets adhered with adhesive, 15-inch wide metal tracks must be used over the deck sheet and under the machine welder to prevent wrinkles.

E. Test seams periodically and when ambient temperatures change to ensure proper welds are being achieved.

1. Perform destructive tests of seams at the beginning of each work day.
2. Perform destructive tests of seams every time there is an interruption in the welding process which includes, but is not limited to:
   a. Power failure.
   b. Welder shut down.
   c. Job site conditions change.
   d. After personnel breaks, lunch and similar interruptions.

3.12 INSTALLATION - SPLASH BLOCKS

A. Refer to the Drawings for locations of splash blocks on roofs.

B. Carefully cut a piece of sheet membrane flashing material, and adhesive-apply to underside of splash blocks before placing, to prevent abrasion with the sheet membrane roofing, and set the blocks in a full bed of adhesive on sheet membrane roofing.

3.13 WALKWAYS

A. Install 2 concrete pavers at each roof entry points (ladders, doors and hatches). Spaced not greater than 2 inches apart. Provide at traffic concentration points (including but not limited to roof hatches, access doors, rooftop ladders, and similar conditions), leading to and surrounding roof-top equipment, and at all additional locations identified on Drawings.

3.14 FIELD QUALITY CONTROL

A. General: Field inspections will be performed under the provisions of Section 01 45 00 - QUALITY CONTROL.

B. Owner's testing: At the owner's discretion, he/she may engage a testing agency to perform testing of the roofing assembly, including but not limited to the following:

1. Flood testing of drain assemblies.
2. Flood testing of roof paving areas
3. Infrared imaging of the roofing assembly
4. Moisture content testing of roofing materials

C. Fastener Pull-out testing. Prior to installation of roofing membrane, obtain a independent testing agency approved by the Architect for each separate roofing area pull out resistance. Report findings to Architect and the roofing manufacturer. Perform testing per ANSI/SPRI FX-1-2001 - Standard Field Test Procedure for Determining the Withdrawal Resistance of Roofing Fasteners, without additional cost to the Contract.

1. Testing frequency: Ten tests per initial 50,000 square feet (or less) and five additional pullouts for each additionally 50,000 square feet, or portion thereof for each section of roof.

D. Heat Welded Seam Testing:

1. Test cuts: Provide test cuts through seams and joints as representative sample of workmanship. For each welding machine used, provide not less than three test cuts per day of roofing work. Identify on roof plan locations of all test cuts. Label each test cut by a unique identifier, including date of cut.
2. Verification procedure: Cutting a 1 inch wide strip of the membrane through a heat-welded seam. Each end of the sample is then pulled in opposite directions until failure. Acceptable samples result in failure of the membrane prior to separation of the weld. The contractor shall date and retain each sample on site throughout the duration of the project to allow for inspection by roofing manufacturer, Architect, and Owner.
3. Frequency: As required by the roofing manufacturer but no less than three per day, or every time the machine is reset or restarted. Additionally test hand-welded seams a minimum of three times per day.

E. Roof Drain Testing: Perform testing in compliance with While ASTM D5957 - *Standard Guide for Flood Testing Horizontal Waterproofing Installations*.

1. Procedure: Block roof drain to be tested and flood the drain sump to a minimum 1 inch of water and minimum 3 inch at drain for a period of 24 hours to simulate water backup from a clogged drain.
2. Frequency: Three randomly selected drains per individual roof areas.
3. Submit flow rates from tests.

F. Electronic Field Vector Mapping (EFVM): Confirm integrity of installed waterproofing membrane by testing membrane for holes, open seams and capillary defects that will allow water intrusion.

1. Electric Breach Detection Procedure:
    a. Comply with requirements of ASTM D7877.
    b. Conduct testing after installing membrane and before placing pavers, test to verify membrane is watertight.
    c. Schedule testing to best meet project demands and construction schedule with ample time to allow for repairs of defects and consequential retesting.
    d. If breaches are found, conduct retest after repairs to membrane have been completed.
    e. Conduct third and final test after paver placement to verify that no damage has been done to the membrane during installation of pavers.
2. Placement of Electric Breach Detection Wiring:
    a. Provide stationary impulse conductor wire around perimeters of designated areas. Individual test areas will typically range between 2,000 SF and 7,500 SF. The testing agency will determine size and shape of each designated area based on field conditions.
    b. More than one test area may be tested within any given testing period.
    c. Place the conductor wire approximately 6 inches from perimeter of each test area and secure against accidental movement or damage or conceal completely if necessary so as not to create a tripping hazard. Ideally, place conductor wire directly on the membrane or within layers of geo-textile that will contact the membrane. Run the conductor wires to predetermined locations and leave accessible for future testing.
    d. Isolate all conductive components that penetrate the membrane or contact both the membrane and the structure by outlining each item with several additional strands of conductor wire to isolate the field or by removing the metal items temporarily if possible.
    e. Where grounded soil or structure contacts the membrane, isolate test area by placing several additional parallel strands of conductor wire.
3. Testing Procedure:
    a. Attach EFVM impulse generator to conductor wire and ground or building structure creating a potential circuit. The circuit will complete if water finds a path to ground by way of a breech in membrane.
    b. Create a continuous conducting “plate” above the membrane by wetting some or all of the test area with water. Test only areas that are wetted.
    c. Deliver a one second long 40 volt potential electrical impulse to the conductor wire at an average rate of one impulse every two or three seconds.
    d. Detect the presence or absence of electrical flow across the surface of the membrane by systematically contacting the wet field with two noninvasive probes and reading the potentiometer linked between them.
4. Results of Testing
    a. If, after a systematic search, no concentration of electrical flow is found, the installed membrane in that area tested is determined to be free of

breaches, seam and capillary defects and will be considered waterproof at that time.

b. If concentrations of electrical flow are found, trace and identify all contact points and therefore any breaches in the membrane. Document on a drawing and provide a written report - immediately if possible showing the exact location of breaches found in the installed membrane in the area tested.

c. Retest repaired defects.

d. Record each day's test results with a written description and photographs of all breaches and any corrections made and a schematic CAD drawing and provide three copies of the report at the completion of the waterproofing or roofing work.

5. Engage an independent testing agency to observe testing and examine underside of decks and terminations for evidence of leaks during testing.

6. When all areas have been tested, submit Final Report stating that the waterproofing system is "totally waterproof" consistent with warranty requirements of the waterproofing system manufacturer.

G. As-built Infra-red Survey: Perform survey in compliance with ASTM C1153 - *Standard Practice for Location of Wet Insulation in Roofing Systems*.

1. Schedule test for "cool, clear night following a warm, sunny day."

H. Roofing Trade Contractor to correct all deficiencies in roof as determined by roof sample analysis, EFVM testing, and as prescribed by roof system manufacturer. Should additional samples be required, these cost will be borne by the roofing applicator.

3.15 CLEANING

A. In areas where finished surfaces are soiled by work of this section, consult manufacturer of surfaces for cleaning advice and conform to their instructions.

B. Repair or replace defaced, or disfigured finishes caused by the work of this Section.

3.16 PROTECTION

A. General: Provide special protection or avoid traffic on completed work. Contractor is responsible to restore to original condition, or replace, work and roofing materials damaged by work of other trades.

B. Avoid traffic over completed roofing surfaces. Do not use roof surfaces for storage or work areas. Protect new and existing roof surfaces with smooth 5/8 in. thick (minimum) plywood runways where access is required, and ensure full protection of new and existing roofing surfaces against mechanical damage. Notify the Architect immediately, and in writing, if anyone abuses or damages roofing or flashing components.

End of Section

Section 07 61 00

SHEET METAL ROOFING

PART 1 - GENERAL

1.1 SUMMARY

A. Furnish and install pre-coated aluminum architectural roofing system, including:

1. Associated integral flashings and underlayment.
2. Snow guards.
3. Integral aluminum fascia.
4. Related flashings and running sheet metal work, for all non-specified locations in conjunction with the roofs.
5. Sealants in conjunction with metal work furnished hereunder, and plastic wedges for cap flashings terminating in reglets.

1.2 RELATED REQUIREMENTS

A. Section 01 74 19 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL: Procedural and administrative requirements relating to recycling goals, waste management program and reporting.

B. Section 01 81 13 - SUSTAINABLE DESIGN REQUIREMENTS: Procedural and administrative requirements relating to required *Northeast CHPS Verified Program,* (NE-CHPS) Certification.

C. Section 06 10 00 - ROUGH CARPENTRY: Wood blocking and nailers.

D. Section 07 21 00 - THERMAL INSULATION: Rigid insulation under sheet metal roofing system.

E. Section 07 62 00 - SHEET METAL FLASHING AND TRIM: Aluminum gutters and downspouts, miscellaneous metal flashing.

F. Section 07 92 00 - JOINT SEALANTS: Sealants.

G. Division 22 - PLUMBING: Connection of downspouts to storm sewer.

1.3 REFERENCES

A. Comply with applicable requirements of the following standards and those others referenced in this Section, under the provisions of Section 01 42 00 - REFERENCES.

1. ASTM A 361 - Steel Sheet, Zinc Coated (Galvanized) by the Hot-Dip Process for Roofing and Siding.
2. ASTM A 446 -Steel Sheet, Zinc Coated (Galvanized) by the Hot-Dip Process, Structural (Physical) Quality.
3. ASTM A 525 - Specification for Sheet Steel, Zinc Coated (Galvanized).
4. NRCA - Roofing Manual.

5. SMACNA - Architectural Sheet Metal Manual, 6th Edition.
6. UL 2218 - Impact Resistance Test
7. UL 263 - Fire Tests of Building Construction and Materials
8. UL 580 - Test for Wind-Uplift Resistance of Roof Assemblies
9. UL 790 - Test for Fire Resistance of Roof Covering Materials

B. Sustainability Requirement Reference: The following sustainability requirements are hereby made a part of this Section by reference thereto:
   1. High Performance Schools Exchange, Northeast Energy Efficiency Partnerships NE-CHPS, (referred to herein as “NE-CHPS”).

1.4 SUBMITTALS

A. Submit the following under provisions of Section 01 33 00 - SUBMITTAL PROCEDURES:
   1. Literature: Manufacturer's data sheets for each metal type and accessories furnished hereunder, include material specifications, performance data, physical properties and finishes.
   2. Certification: Provide certifications that materials and systems comply with the specified requirements for the use indicated.
   3. Shop drawings:
      a. Fully dimensioned large scale design details showing material profiles, splices, flashing terminations and other jointing details, fastening methods and installation details. Indicate material type, sizes, and weights or gages. Indicate extent of adjacent work specified under other Sections of the Specifications.
      b. Fully detail methods of relieving stresses due to thermal movement, including sealing of expansion seams.
   4. Selection Samples:
      a. Finished metal sample chips, indicating Manufacturer's full range of finish colors available for selection by Architect.
      b. Provide additional samples as requested by Architect to facilitate initial selection of colors and finishes
   5. Verification Samples:
      a. 12 by 12 inch samples illustrating metal finish color.
   6. Sustainable Design Submittals: As required by NE CHPS.

B. Submit the following under provisions of Section 01 78 00 - CLOSEOUT SUBMITTALS:
   1. Manufacturer’s field quality control reports of field inspections, including, revised “as-built” shop drawings and manufacturer’s final punch list.
   2. Manufacturer’s warranties: Include coverage of materials and installation and resultant damage from failure of installation to resist penetration of moisture.

1.5 QUALITY ASSURANCE

A. Installer: Company with a minimum of 5 years documented experience demonstrating previously successful work of the type specified herein, and approved by product manufacturer.

B. Perform work in accordance with AA, AISI, CDA, SMACNA, and NRCA standard details and requirements.

1.6 DELIVERY, STORAGE AND HANDLING

A. General: Deliver, store, and protect and handle products to site under provisions of Section 01 60 00 - PRODUCT REQUIREMENTS.

B. Store preformed and prefinished material to prevent twisting, bending, or abrasion, and to provide ventilation. Slope metal sheets to ensure drainage.

C. Prevent contact with materials during storage which may cause discoloration, staining, or damage.

1.7 WARRANTY

A. Provide 2 year warranty under provisions of Section 01 78 00 - CLOSEOUT SUBMITTALS. Warranty shall include provisions for degradation of metal finish, water tightness, integrity of seals.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Basis of Design (Specified Manufacturer): To establish a standard of quality, design and function desired, Drawings and specifications have been based on Petersen Aluminum (PAC), Elk Grove Village, IL. Product: “Snap-Clad”.

B. Acceptable Manufacturers: Subject to compliance with the requirements specified herein, manufacturers offering similar products include the following:

1. Petersen Aluminum, Elk Grove Village, IL.
2. Berridge Manufacturing Company, Houston, Texas.
3. Englert, Inc., Perth Amboy, NJ.
4. MBCI, Architectural Metal Systems Inc., Houston TX.

2.2 SYSTEM DESCRIPTION

A. Performance Requirements: Provide sheet metal roofing that has been manufactured, fabricated and installed to withstand structural and thermal movement, wind loading and weather exposure to maintain manufacturer’s performance criteria without defects, damage, failure of infiltration of water.

1. Wind Loading and uplift: Comply with specified requirements on Structural Drawings and the greater pressure of the following:

a. Conform to the 2018 International Building Code with Rhode Island Building Code Regulation RISBC-1.

1) Basic Wind Speed (V.ult.): 143 miles per hour (three second gust).
2) Risk Category: III.
3) Exposure: “B”.

b. Wind-Uplift: Roof panel assembly shall comply with UL Classification 580 for UL Classified 90 rated assemblies

2. Static Air Infiltration: Completed roof system shall have a maximum of .06 cfm/sf with 6.24 kPa air pressure differential as per ASTM E283/1680.

3. Water Infiltration: No evidence of water penetration at an inward static air pressure differential of not less than 6.24 psf (43 kPa) and not more than 12.0 psf (83 kPa) as per ASTM E331/1646.

2.3 MATERIALS

A. Pre-coated aluminum: Preformed roofin panels fabricated from 0.040 inch thick aluminum complying with ASTM B 209, shop pre-coated with polyvinylidene fluoride enamel coating of color as selected.

2.4 TYPICAL PANEL SYSTEM FOR ROOFING

A. Roofing system: PAC-CLAD Snap-On Panels or approved equal.

B. Standing seam panels to be of an interlocking, "snap-lock" design having 1 inch high vertical legs, 16 inches on center seam spacing.

C. Provide manufacturer’s optional vinyl weather seal to be factory installed over continuous standing rib.

D. Panel assembly to bear Underwriter's Laboratories Label UL90, and applicable Fire Ratings.

E. Certification shall be submitted, based on independent testing laboratory, indicating no measurable water penetration or air leakage through the system when tested in accordance with ASTM E-331-86 and E-283-84.

2.5 PROTECTION MEMBRANE

A. Membrane for ice-dam and wind-blown rain protection (“Protection Membrane”): Sheet barrier of high density cross laminated polyethylene with butyl-based rubber adhesive, with strippable silicone-coated release sheet.

1. Performance characteristics:

a. Maximum service temperature: 260°F. (127°C.)

b. Thickness: Membrane 40 mil (1.02 mm) ASTM D3767 Method A.

c. Minimum tensile strength (tested in accordance with ASTM D412, die C) 250 pounds per square inch [1720 kN/m2].

d. Minimum elongation to ultimate failure of 250 percent, and unaffected pliability when tested per ASTM D412 Die C modified.

e. Low Temperature Flexibility Unaffected @ -20°F (-29°FC) ASTM D1970

f. Minimum adhesion of 3 pounds per inch width (528 N/m), tested per ASTM D903 to plywood.

g. Maximum permeance when tested in accordance with ASTM D96, 0.05 perms (2.9ng/m^2sPa).

h. Material Weight Installed (Max) 1.1 kg/m_2 (0.22 lb/ft_2) ASTM D461

2. Subject to conformance with the above requirements, Acceptable products include the following, or approved equal:

a. Carlisle Coatings & Waterproofing, Inc., Wylie, TX, product, Dri-Start "HR" High Performance Underlayment.

b. GCP Applied Technologies Inc., Cambridge MA., (“GCPAT”), product, “Ice and Water Shield HT”.

c. Firestone Building Products, Indianapolis, IN., product “Clad-Gard SA”

d. Henry Company, El Segundo, CA, product, Perma-Seal PE.

e. SDP Advanced Polymer Products Inc., Toronto Canada, product “Palisade SA-HT”.

2.6 SNOW RETENTION SYSTEM:

A. Basis of Design (Specified Manufacturer): To establish a standard of quality, design and function desired, Drawings and specifications have been based on Petersen Aluminum (PAC), Elk Grove Village, IL, Product “ColorGard Snow Retention System”.

1. Acceptable Manufacturers: Subject to compliance with the requirements specified herein, manufacturers offering products which may be incorporated in the work include the following, or approved equal:

a. Petersen Aluminum (PAC), Elk Grove Village, IL, Product “ColorGard Snow Retention System”.

b. Metal Roof Innovations LTD, Colorado Springs CO., Product: “ S-5! ColorGard”.

c. Alpine Snow Guards, Morrisville, VT, Product: “SnoMax”

B. Clamps: Manufactured from 6061-T6 aluminum extrusions conforming to ASTM B221 or aluminum castings conforming to ASTM B85, sized to fit roof seam, with supplemental clips to secure rails for roofing system seam spacing.

1. Set screws: Stainless steel, 18-8 alloy, 3/8 inch diameter, with round nose point.

2. Attachment bolts: Stainless steel, 18-8 alloy, 10 mm diameter, with flat washers.

C. Rails: Extruded aluminum conforming to ASTM B221, alloy 6061-T6.

1. Receptacle in face to receive color-matched metal strips.

2. Provide splice connectors ensuring alignment and structural continuity at end joints.

D. Finish: Match finish system specified for sheet metal roofing system.

2.7 ACCESSORIES

A. Fasteners: Same material and finish as roofing and flashing metal, of sizes most appropriate for the specific application, and equipped with soft neoprene washers.

B. Primer: Zinc chromate type as recommended for aluminum.

C. Joint Sealer Type SX (Silicone, Exterior construction): Medium modulus, neutral curing, low to no bleed silicone passing ASTM C1248, having a useful life expectancy of at least 20 years, conforming to ASTM C920, Type S, Grade NS, Class 50, with a minimum movement capability of +50 percent and -50 percent, equal to the following:

1. Dow Corning, product, “795”.
2. GE Silicones, product, “SCS9000 SilPruf NB”.
3. Sika, product “Sikasil-WS-295”.
4. Tremco, product “Spectrem 4-TS”.

D. Plastic cement as recommended by roofing manufacturer.

E. Clips for flashing and counter flashing: As recommended by the manufacturer.

F. Bedding Compound: Rubber asphalt type.

G. Reglets: Surface mounted galvanized steel; face and ends covered with plastic tape.

2.8 FLASHING FABRICATION

A. Form sections square and accurate to profile, in maximum possible lengths, free from distortion or defects detrimental to appearance or performance. To the greatest extent applicable, fabricate sheet metal components in shop, and thoroughly clean all joints on both sides of the sheet metal work.

B. Fabricate cleats and starter strips of same material as sheet, minimum 6 inches wide, interlockable with sheet.

C. Form material with standing seams.

D. Hem exposed edges on underside 1/2 inch, miter and seam corners.

E. Form flashings as required, or to profiles indicated on the Drawings, to protect materials from physical damage and shed water.

F. Fabricate corners from one piece with minimum 18 inch long legs, seam for rigidity, seal with sealant.

G. Fabricate vertical faces with bottom edge formed outward 1/4 inch and hemmed to form drip.

H. Fabricate flashings to allow toe and extend 2 inches over roofing. Return and brake edges.

2.9 FINISHES

A. Aluminum roofing, gutters rain leaders, fascia, edging, exposed trim and any other aluminum indicated for enamel or color finish: Shop-applied polyvinylidene fluoride enamel finish system equal to PPG Industries, Product: PPG “Duranar”, color “Bistro Bronze” or approved equal.

1. Prime all surfaces with a corrosion resistant, epoxy-based primer compatible with finish coating, minimum 2.0 mils dry film thickness, fully oven-cured.
2. Provide a finish coating of polyvinylidene fluoride enamel on all exposed surfaces, including all exposed screws, fastenings, etc., with a minimum coating of 1.0 to 1.3 mills. dry film thickness.
3. Provide a clear top coating of polyvinylidene fluoride enamel on all exposed surfaces, including all exposed screws, fastenings, etc., with a minimum coating of 1.0 to 1.3 mills. dry film thickness.
4. Ensure that all coatings, proposed to be applied hereunder, are compatible with the receiving substrate material for each condition, thoroughly clean, and treat aluminum by chromate process.
5. Color and Appearance: Color shall be from paint manufacturer's available library of non-exotic colors and shall match color sample furnished by Architect.
    a. Gloss: Medium, measured by ASTM D523, 35±5 at 60 degrees Fahrenheit.

B. The manufacturer of the products specified herein, under this Section, shall furnish to the Architect, color control samples of the color and finish selected on aluminum for issuance to other trades and manufacturers required to match these colors and finishes.

C. Back paint concealed metal surfaces with protective backing paint to a minimum dry film thickness of 15 mil.

2.10 EXTRA MATERIALS

A. Provide sufficient quantity of each color finish coat material, for field touch-up work after erection, and pack the additional coating materials with the components to be furnished hereunder.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Inspect roof deck to verify deck is clean and smooth, free of depressions, waves, or projections, properly sloped to valley or eaves.

B. Verify deck is dry and free of snow or ice.

C. Verify roof openings, curbs, pipes, sleeves, ducts, or vents through roof are solidly set, cant strips and reglets in place.

D. Verify roofing termination and base flashings are in place, sealed, and secure.

E. Beginning of work shall constitute acceptance of the conditions of the surfaces to which this work is to be applied.

3.2 PREPARATION

A. Field measure site conditions prior to fabrication.

B. Install starter and edge strips, and cleats before starting installation.

C. Install surface mounted reglets true to lines and levels. Seal top of reglets with sealant.

D. Insert flashings into reglets to form tight fit. Secure in place with lead wedges at a maximum of 8 inches on center. Pack remaining spaces with lead wool. Seal flashings into reglets with sealant.

E. Seam and seal all joints. Apply plastic cement compound between metal flashings and felt flashings, asphalt shingle roofing or asphalt roll roofing.

F. Fit flashings tight in place. Make corners square, surfaces true and straight in planes, and lines accurate to profiles.

G. During the installation of work of this Section, protect the work of other trades against undue soilage and damage by the exercise of reasonable care and precautions. Repair or replace any work so damaged and soiled.

3.3 INSTALLATION - ROOFING

A. Comply with manufacturers standard instructions and conform to standards set forth in the Architectural Sheet Metal Manual published by SMACNA, in order to achieve a watertight installation.

1. Install panels in such a manner that horizontal lines are true and level and vertical lines are plumb.
2. Install starter and edge trim before installing roof panels.
3. Remove protective strippable film prior to installation of roof panels.
4. Attach panels using manufacturer's standard clips and fasteners, spaced in accordance with approved shop drawings.

B. Install accessory components required for a complete roof panel system including, trim, copings, fascia, mullions, sills, corner units, ridge closures, clips, seam covers, battens, flashings, gutters, sealant, gaskets, fillers, closure strips, and similar items.

C. Installation tolerances: Shim and align panel units within tolerance of 3/8 inch in 40 feet on level/plumb/slope and location line as indicated and within 1/8 inch offset to adjoining faces and of alignment of matching.

D. Install sealant for preformed roofing panels as approved on shop drawings.

E. Do not allow panels or trim to come into contact with dissimilar materials.

F. Do not allow traffic on completed roof. If required, provide cushioned walk boards.

G. Protect installed roof panels and trim from damage caused by adjacent construction until completion of installation.

H. Remove and replace any panels or components which are damaged beyond successful repair.

3.4 INSTALLATION - FLASHINGS

A. Clean and seam all joints. Apply plastic cement compound between metal flashings and felt flashings, asphalt shingle roofing or asphalt roll roofing.

B. Fit flashings tight in place. Make corners square, surfaces true and straight in planes, and lines accurate to profiles.

C. Seal joints watertight.

3.5 CLEANING

A. Daily clean work areas by sweeping and disposing of debris.

B. Upon completion of the work of this Section in any given area, remove tools, equipment and all rubbish and debris from the work area; leave area in broom-clean condition.

3.6 PROTECTION

A. Protect finished work; do not permit traffic over unprotected roof surfaces.

End of Section

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Section 07 62 00

SHEET METAL FLASHING AND TRIM

PART 1 - GENERAL

1.1 SUMMARY

A. Furnish and install the following:

1. Aluminum flashings and running sheet metal work, for all non-specified locations in conjunction with the roofs.
2. Cap flashings, in conjunction with roofing system sheet membrane base flashings.
3. Aluminum flashing.
4. Formed brake-metal work.
5. Sealant in conjunction with sheet metal work specified herein.
6. Custom fabricated, prefinished aluminum gutters, downspouts and accessories.

1.2 RELATED REQUIREMENTS

A. Section 01 43 39 - MOCKUPS: Requirements for exterior wall mock-up assembly requiring work of this Section.

B. Section 01 60 00 - PRODUCT REQUIREMENTS: Listing of VOC requirements for adhesives, cleaning/maintenance materials, paints, coatings, and sealants.

C. Section 01 74 19 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL: Procedural and administrative requirements relating to recycling goals, waste management program and reporting.

D. Section 01 81 13 - SUSTAINABLE DESIGN REQUIREMENTS: Procedural and administrative requirements relating to required *Northeast CHPS Verified Program,* (NE-CHPS) Certification.

E. Section 04 20 00 - UNIT MASONRY: Flashing at masonry, installation of reglets furnished by this Section.

F. Section 06 10 00 - ROUGH CARPENTRY: Wood blocking, nailers.

G. Section 07 27 13 – SELF-ADHERING SHEET AIR BARRIER.

H. Section. 07 71 00 - ROOF SPECIALTIES: Factory fabricated and finished roof edging.

I. Section 07 92 00 - JOINT SEALANTS: Sealant and backing material not specified herein

J. Flashing sleeves and collars for mechanical and electrical items protruding through roofing: By respective trade sections furnishing same.

1.3 REFERENCES

A. Referenced Standards: Comply with applicable requirements of the following standards and those others referenced in this Section, under the provisions of Section 01 42 00 - REFERENCES. The standards referenced herein are included to

establish recognized minimum quality only. Where these standards conflict with other specified requirements, the most restrictive requirements shall govern. Equivalent quality and testing standards will be acceptable, subject to their timely submission, review and acceptance by the Architect.

1. ASTM A167 - Specification for Stainless and Heat Resisting Chromium-Nickel Steel Plate, Sheet and Strip.
2. ASTM A308 - Specification for Steel Sheet, Cold Rolled, Long Terne Coated.
3. ASTM A653 / A653M - Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
4. ASTM A924 / A924M - General Requirements for Steel Sheet, Metallic-Coated by the Hot-Dip Process.
5. ASTM B32 - Solder Metal.
6. ASTM B101 - Specification for Lead-Coated Copper Sheets.
7. ASTM B152 - Specification for Copper, Sheet, Strip, Plate and Rolled, Bar.
8. ASTM B209 - Specification for Aluminum Alloy, Sheet and Plate.
9. ASTM B221 - Specification for Aluminum Extrusions.
10. ASTM B370 - Copper Sheet and Strip for Building Construction.
11. ASTM B486 - Paste Solder.
12. ASTM D226 - Asphalt-Saturated Organic Felt Used in Roofing and Waterproofing.
13. ASTM D1784 - Polyvinyl chloride material for outdoor exposure.
14. ASTM D2178 - Asphalt Impregnated Glass Mat for Roofing and Waterproofing.
15. ASTM D4586 - Asphalt Roof Cement, Asbestos-Free.
16. FS QQ-A-250d - Aluminum and Aluminum Alloy, Plate and Sheet.

B. The following reference materials are hereby made a part of this Section by reference thereto:

1. SMACNA - Architectural Sheet Metal Manual 6th Edition, referred to herein as “Sheet Metal Manual”.
2. NRCA - Roofing and Waterproofing Manual.

C. Sustainability Requirement Reference: The following sustainability requirements are hereby made a part of this Section by reference thereto:

1. High Performance Schools Exchange, Northeast Energy Efficiency Partnerships NE-CHPS, (referred to herein as “NE-CHPS”).

1.4 SUBMITTALS

A. Information and Review Submittals: Submit the following under provisions of Section 01 33 00 - SUBMITTAL PROCEDURES:

1. Literature: Manufacturer's data sheets for each metal type and accessories furnished hereunder, include material specifications, performance data, physical properties and finishes.
2. Certification: Provide certifications that materials and systems comply with the specified requirements for the use indicated.
3. Shop drawings:

a. Fully dimensioned large scale design details showing material profiles, splices, flashing terminations and other jointing details, fastening methods and installation details. Indicate material type, sizes, and weights or gages. Indicate extent of adjacent work specified under other Sections of the Specifications.

b. Fully detail methods of relieving stresses due to thermal movement, including sealing of expansion seams.

c. All details bearing dimensions of actual measurements taken at the project.

4. Selection Samples:

a. Metal sample chips, indicating Manufacturer's full range of finish colors for factory finishes available for selection by Architect.

b. Manufacturer's sample boards for sealant colors.

5. Sustainable Design Submittals: As required by NE CHPS.

B. Closeout Submittals: Submit the following under provisions of Section 01 78 00 - CLOSEOUT SUBMITTALS:

1. Manufacturer’s warranties: Include coverage of materials and installation and resultant damage from failure of installation to resist penetration of moisture.

1.5 QUALITY ASSURANCE

A. Company specializing in fabrication and installation of sheet metal flashing work with minimum 5 years documented experience.

B. Flashing and sheet metal applicator, with a minimum of 5 years documented experience demonstrating previously successful work of the type specified herein, and approved by product manufacturer.

1.6 MOCK-UP

A. Provide mock-up elements for field panel in accordance with Section 01 43 39 – MOCKUPS at exterior location where directed by Architect. Mock-up will demonstrate quality of work, construction methods, relationship to other work.

1.7 PRE-INSTALLATION CONFERENCE

A. Installer of the Work of this Section is required to attend pre-installation conference specified under Section 07 54 19 – POLYVINYL CHLORIDE (PVC) ROOFING.

1.8 DELIVERY, STORAGE AND HANDLING

A. Store preformed and prefinished material to prevent twisting, bending, or abrasion, and to provide ventilation. Slope metal sheets to ensure drainage.

B. Prevent contact with materials during storage which may cause discoloration, staining, or damage.

1.9 SEQUENCING AND SCHEDULING

A. Coordinate the installation of flashings and sheet metal work with the various trades responsible for installing interfacing materials, and install the work at appropriate times so as not to delay the progress of related work.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Aluminum flashing: FS QQ-A-250d sheet aluminum, mill finish, having a minimum thickness as specified herein below, for applications where indicated:

1. Exposed to weather flashings and trim: 0.050 inch thick
2. Aluminum Finish:
    a. Polyvinylidene Fluoride (PVDF), Kynar 500 shop applied three coat resin based, high performance thermoplastic organic coating in custom non-standard color to match Architect's sample, conforming to AAMA 605.2, NAAMM - Metal Finishes Manual, and the following.
        1) Resin base of 70 percent PVDF by weight, Atochem North America, Inc., product "Kynar 500" or Ausimont USA. product "Hylar 5000 ".
        2) Finish Coating shall be manufactured as one of the following products:
            a) Glidden Company; product "Visulure".
            b) Morton International; product "Fluoroceram CL".
            c) PPG Industries Inc.; product "Duranar XL".
            d) Valspar Corp., product: "Flurothane".
    b. Surface Preparation: Properly clean aluminum with inhibited chemical cleaner and pretreat with acid chromate-fluoride-phosphate conversion coating, in accordance with Aluminum Association method AA-C12C42.
    c. Primer: Corrosion resistant, epoxy or urethane based primer compatible with finish coating, averaging 0.2 to 0.3 mils dry film thickness.
    d. Finish Coat (Color Coat): Polyvinylidene fluoride enamel averaging 0.70 to 0.80 mil dry film thickness.
    e. Top Coat: Polyvinylidene fluoride enamel clear top coat averaging 0.45 to 0.55 mils dry film thickness.
    f. Color and Appearance: Provide custom color to match Architect's sample. Architect's color sample will be a shade of grey however, it will NOT be considered "exotic", "polychromatic", "pearlescent" or "metallic".
3. Custom fabricated gutters and outlets, 0.063 inch thick.
4. Custom fabricated rain leaders, leader heads, leader straps, 0.050 inch thick".

2.2 ACCESSORIES

A. Flashing cement: Trowel grade, composed of selected asphalt, solvents, and non-asbestos fillers, conforming to FS SS-C-153 Type 1, ASTM D 2822, Type 1 and ASTM D 4586, Type 1 (Non-asbestos) as manufactured by Karnak Chemical Corporation, product Nº. 19 "Flashing Cement" , or equal as manufactured by Koch Materials Company, J & P Petroleum Products Company or other approved manufacturer.

B. Dampproofing mastic: Trowel grade, self-priming type composed of selected asphalt, solvents, fibers and non-asbestos fillers, conforming to ASTM D 2822, Type 1 and ASTM D 4586, Type 1 (Non-asbestos) as manufactured by Karnak Chemical Corporation, product Nº. 86 "Fibrated Trowel Mastic" , or equal as manufactured by Koch Materials Company, J & P Petroleum Products Company or other approved manufacturer.

C. Nails shall not be smaller than Nº.2 of 12 stub gauge (1.109 inches), with large flat heads, and of sufficient length to penetrate the wood nailers a minimum of 7/8-inch. Nails shall be stainless steel.

D. Screws: Stainless steel wood screws, of sizes most appropriate for the specific application, and equipped with soft neoprene washers.

E. Joint Sealer: Low modulus single component gun-grade polyurethane sealant, non-sagging, conforming to FS TT-S-000227E, Type II, Class A, and ASTM C 920, Type S, Class 12-1/2, Grade NS, use NT,M, A and O with a minimum movement capability of ±25 percent, equal to the following:

1. Mameco International, Inc. (Division of Tremco), Cleveland, OH, product “Vulkem 116”.
2. Sika Corp., Lyndhurst NJ: product, “Sikaflex”.
3. Sonneborn Building Products Inc. (BASF), Minneapolis MN: product, “Sonolastic NP1”.
4. Tremco, Beachwood OH: product, “Dymonic”.
5. Pecora Corporation, Harleysville PA: product “Dynatrol I”.

F. Plastic cement as recommended by roofing manufacturer and eave protection manufacturer.

2.3 FLASHING FABRICATION - GENERAL

A. Form flashings, or to profiles indicated on the Drawings, to protect materials from physical damage and shed water.

B. Form sections square and accurate to profile, in maximum possible lengths, free from distortion or defects detrimental to appearance or performance. To the greatest extent applicable, fabricate sheet metal components in shop, and thoroughly clean all joints on both sides of the sheet metal work.

C. Fabricate cleats and starter strips of same material as sheet.

D. Form pieces in longest practical lengths, with flat lock seams. Hem exposed edges on underside 1/4 inch, miter and seam corners.

E. Fabricate corners from one piece with minimum 18 inch long legs, solder for rigidity, seal with sealant.

2.4 FABRICATION - GUTTERS AND DOWNSPOUTS

A. General: Fabricate gutters and downspouts in accordance with SMACNA Architectural Sheet Metal Manual 7th Edition, Chapter 1, referred to below as the “Sheet Metal Manual”.

1. Manufactured products equal to specified custom fabricated materials may be considered by the Architect.

B. Gutters: having a girth support not to exceed 30 inches, fabricate in accordance with the following Sheet Metal Manual Figures:

1. Gutter design and shape: Rectangular Figure 1-2 as applicable and as indicated on Drawings

C. Hangers: Fabricate in accordance with Sheet Metal Manual Figures 1-12 through 1-20, appropriate to conditions indicated on Drawings.

D. Downspouts: Size and shape as indicated on Drawings, fabricated in accordance with Sheet Metal Manual Figures 1-32, 1-33 and 1-35 as applicable.

1. Locate downspouts in place where indicated. Review exact locations in field with Architect prior to gutter and downspout fabrication.
2. Concealed hangers, fabricated in accordance with Sheet Metal Manual Figure 1-34A and 1-34B as applicable.
3. Downspout cleanouts: Provide one at the base of each downspout.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify roof openings, curbs, pipes, sleeves, ducts, or vents through roof are solidly set, cant strips and reglets in place and nailing strips located.

B. Beginning of work shall constitute acceptance of the conditions of the surfaces to which this work is to be applied.

3.2 PREPARATION

A. Field measure site conditions prior to fabrication.

B. Install starter and edge strips, and cleats before starting installation.

C. Install surface mounted reglets true to lines and levels. Seal top of reglets with sealant.

D. Insert flashings into reglets to form tight fit. Secure in place with plastic wedges at maximum of 8 inches on center. Seal flashings into reglets with sealant.

E. Secure flashings in place using concealed fasteners. Use exposed fasteners only where permitted.

F. Cleat and seam all joints. Apply plastic cement compound between metal flashings and felt flashings, asphalt shingle roofing or asphalt roll roofing.

G. Fit flashings tight in place. Make corners square, surfaces true and straight in planes, and lines accurate to profiles.

H. Seal all aluminum joints watertight.

I. During the installation of work of this Section, protect the work of other trades against undue soilage and damage by the exercise of reasonable care and precautions. Repair or replace any work so damaged and soiled.

3.3 FLASHING INSTALLATION - GENERAL

A. Except as otherwise shown on the reviewed shop drawings or specified herein, the workmanship of sheet metal work, method for forming joints anchoring, cleating, provisions for thermal movement shall conform to the standard details and recommendations of the sheet metal producer and those of producer organizations and research institutions and associations concerning the sheet metal used, in

addition to the standards and details set forth in the referenced materials specified this Section.

B. Face nailing will not be permitted, concealed cleating or other concealed method must be used to attach sheet metal work to structure.

C. Ensure that fastenings do not exceed 8 inches on centers. Use flat head fasteners throughout, and seal all fastener heads after installation thereof.

D. Fill all slip joints and overlapping surfaces in the assembly with specified sealant material, removing all excess sealant material from the prefinished surfaces immediately, to prevent staining the finish.

E. Install continuous vents full length of soffits, unless otherwise indicated.

3.4 CLEANING

A. Daily clean work areas by sweeping and disposing of debris.

B. Upon completion of the work of this Section in any given area, remove tools, equipment and all rubbish and debris from the work area; leave area in broom-clean condition.

3.5 INSTALLATION – HANGING GUTTERS

A. Hangers: Fabricate in accordance with SMACNA Architectural Sheet Metal Manual 7th Edition details, Figures 1-1 through 1-20, and 1-24 appropriate to conditions indicated on Drawings.

B. Secure gutter to substrate with a continuous flat cleat along edges of gutters.

C. Seam and seal gutters watertight. Seal gutter to drain joint.

D. Mount downspouts in place in locations where approved by Architect.

End of Section

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Section 07 71 00
ROOF SPECIALTIES

PART 1 - GENERAL

1.1 SUMMARY

A. Furnish and install the following:
   1. Factory fabricated and finished roof edging, scuppers and trim.
   2. Sealant in conjunction with sheet metal work specified herein.

1.2 RELATED REQUIREMENTS

A. Section 01 60 00 - PRODUCT REQUIREMENTS: Listing of VOC requirements for adhesives, cleaning/maintenance materials, paints, coatings, and sealants.

B. Section 01 74 19 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL: Procedural and administrative requirements relating to recycling goals, waste management program and reporting.

C. Section 01 81 13 - SUSTAINABLE DESIGN REQUIREMENTS: Procedural and administrative requirements relating to required *Northeast CHPS Verified Program,* (NE-CHPS) Certification.

D. Section 06 10 00 - ROUGH CARPENTRY: Wood blocking, nailers.

E. Section 07 62 00 - SHEET METAL FLASHING AND TRIM: Metal flashing.

F. Section 07 72 00 - ROOF ACCESSORIES: Roof hatches.

G. Section 07 92 00 - JOINT SEALANTS: Sealant and backing material not specified herein

H. Flashing sleeves and collars for mechanical and electrical items protruding through roofing: By respective trade sections furnishing same.

1.3 REFERENCES

A. Referenced Standards: Comply with applicable requirements of the following standards and those others referenced in this Section, under the provisions of Section 01 42 00 - REFERENCES. The standards referenced herein are included to establish recognized minimum quality only. Where these standards conflict with other specified requirements, the most restrictive requirements shall govern. Equivalent quality and testing standards will be acceptable, subject to their timely submission, review and acceptance by the Architect.
   1. ASTM A361 - Steel Sheet, Zinc Coated (Galvanized) by the Hot-Dip Process for Roofing and Siding.
   2. ASTM A446 -Steel Sheet, Zinc Coated (Galvanized) by the Hot-Dip Process, Structural (Physical) Quality.
   3. ASTM A525 - Specification for Sheet Steel, Zinc Coated (Galvanized).
   4. ASTM B209 - Specification for Aluminum Alloy, Sheet and Plate.
   5. ASTM B221 - Specification for Aluminum Extrusions.

6. ASTM D226 - Asphalt-Saturated Organic Felt Used in Roofing and Waterproofing.
7. ASTM D1784 - Polyvinyl chloride material for outdoor exposure.
8. ASTM D2178 - Asphalt Impregnated Glass Mat for Roofing and Waterproofing.
9. ASTM D4586 - Asphalt Roof Cement, Asbestos-Free.
10. FS QQ-A-250d - Aluminum and Aluminum Alloy, Plate and Sheet.

B. The following reference materials are hereby made a part of this Section by reference thereto:
1. SMACNA - Architectural Sheet Metal Manual, referred to herein as “Sheet Metal Manual”.
2. NRCA - Roofing and Waterproofing Manual.

C. Sustainability Requirement Reference: The following sustainability requirements are hereby made a part of this Section by reference thereto:
1. High Performance Schools Exchange, Northeast Energy Efficiency Partnerships NE-CHPS, (referred to herein as “NE-CHPS”).

1.4 SUBMITTALS

A. Information and Review Submittals: Submit the following under provisions of Section 01 33 00 - SUBMITTAL PROCEDURES:
1. Literature: Manufacturer's data sheets for each metal type and accessories furnished hereunder, include material specifications, performance data, physical properties and finishes.
2. Certification: Provide certifications that materials and systems comply with the specified requirements for the use indicated.
3. Shop drawings:
a. Fully dimensioned large scale design details showing material profiles, splices, flashing terminations and other jointing details, fastening methods and installation details. Indicate material type, sizes, and weights or gages. Indicate extent of adjacent work specified under other Sections of the Specifications.
b. Fully detail methods of relieving stresses due to thermal movement, including sealing of expansion seams.
c. All details bearing dimensions of actual measurements taken at the project.
4. Selection Samples:
a. Metal sample chips, indicating Manufacturer's full range of finish colors for factory finishes available for selection by Architect.
b. Manufacturer's sample boards for sealant colors.
5. Verification Samples:
a. 12 inch long samples of formed fascia, gutters and downspouts.
6. Sustainable Design Submittals: As required by NE CHPS.

B. Closeout Submittals: Submit the following under provisions of Section 01 78 00 - CLOSEOUT SUBMITTALS:

1. Manufacturer's warranties: Include coverage of materials and installation and resultant damage from failure of installation to resist penetration of moisture.

1.5 QUALITY ASSURANCE

A. Company specializing in fabrication and installation of sheet metal flashing work with minimum 5 years documented experience.

B. Flashing and sheet metal applicator, with a minimum of 5 years documented experience demonstrating previously successful work of the type specified herein, and approved by product manufacturer.

C. Factory fabricated roof edge shall be certified by roof edge manufacturer to meet the following design criteria:

1. SPRI Test Method RE-1 Test for Roof Edge Termination of Single-ply Roofing Membranes: The fascia system shall be tested to secure the membrane to minimum 100 lbs/ft in accord with SPRI Test Method RE-1. Use current edition of 'Wind Resistance Guide for Edge Systems Used with Low Slope Roofing Systems'.
2. SPRI Test Method RE-2 Pull-Off Test for Fascia: The fascia system shall be tested in accord with SPRI Test Method RE-2. Use current edition of 'Wind Resistance Guide for Edge Systems Used with Low Slope Roofing Systems'.
3. FMRC Loss Prevention Data Sheet 1-49 "Perimeter Flashing". The fascia product shall be listed in current Factory Mutual Research Corporation "Approval Guide for Zone 2 - 90 PSF uplift.

1.6 PRE-INSTALLATION CONFERENCE

A. Installer of the Work of this Section is required to attend roofing pre-installation conference specified under Section 07 54 19 - POLYVINYL CHLORIDE (PVC) ROOFING.

1.7 DELIVERY, STORAGE AND HANDLING

A. Store preformed and prefinished material to prevent twisting, bending or abrasion and to provide ventilation. Slope metal sheets to ensure drainage.

B. Prevent contact with materials during storage which may cause discoloration, staining or damage.

1.8 SEQUENCING AND SCHEDULING.

A. Coordinate the installation of flashings and sheet metal work with the various trades responsible for installing interfacing materials, and install the work at appropriate times so as not to delay the progress of related work.

1.9 WARRANTY

A. Provide the following warranties under provisions of Section 01 78 00 – CLOSEOUT SUBMITTALS , and in compliance with Section 01 78 36 – WARRANTIES.

1. Furnish manufacturer's 20 year coating warranty for custom colors, covering film integrity, chalk resistance and color change, assigned to project. Warranty shall be pro-rated after 10 years.

1.10 EXTRA MATERIALS

A. Provide sufficient quantity of each color finish coat material, for field touch-up work after erection, and pack the additional coating materials with the components to be furnished hereunder.

B. Clearly label and package extra materials securely to prevent damage.

PART 2 - PRODUCTS

2.1 FACTORY FABRICATED FASCIA TRIM / ROOF EDGE AND PARAPET COVERS / EXPOSED FINISH METAL

A. Manufacturers and products: Subject to compliance with the requirements specified herein, products which may be incorporated in the work, or approved equal:
   1. Sika Sanarfil Corporation, Canton MA, product “Edge Grip Fascia”.
   2. W.P. Hickman Company, Asheville NC, Product: “Econosnap 3”.
   3. Metal ERA, Waukesha WI, Product: “Anchor-Tite AF”.

B. Fascia trim / roof edge / exposed finish metal, scuppers: Multi-component aluminum cant dam system, Factory Mutual Inc. certified Class I-90, and shall conform to the following additional requirements:
   1. Performance characteristics:
      a. Edging shall lock membrane, preventing wind pullback.
      b. Fascia shall freely thermal cycle on spring cant substrate.
      c. Fascia may be factory modified for true radius application.
      d. Fabricate assembly such that the fascia may be field installed without fastener penetration of either the roofing membrane or the cant waterdam.
      e. Factory fabricate all pier miters, fascia sumps and spillouts.
   2. Fascia trim / exposed finish metal, nominal height 5-1/4 inches, formed aluminum alloy 6063, temper T5, minimum 0.050 inch thick.
   3. Fascia corners: Factory fabricated, welded fascia, shop finished to exactly match running fascia. Minimum leg length 12 inches.
   4. Cant waterdam: G90 galvanized steel, minimum 24 gage, 10’-0” lengths.
      a. Provide galvanized fasteners securing cant dam in place, spaced not greater than 24 inches on center on back edge, and 12 inches on center on roofing side.
   5. Provide aluminum fascia trim/roof edge shall have PVC membrane laminated to one side (equal to Sika-Sarnafil product “Sarnaclad”).

C. Parapet Covers: Roofing manufacturer’s multi-component aluminum parapet cover system; conform to ANSI/SPRI ES-1, and the following additional requirements:
   1. Performance characteristics:
      a. Edging shall lock membrane, preventing wind pullback.
      b. Fascia shall freely thermal cycle on spring cant substrate.
      c. Fascia may be factory modified for true radius application.

d. Fabricate assembly such that the fascia may be field installed without fastener penetration of roofing membrane.

2. Coping cap, nominal 4 inch height, formed aluminum alloy 6063, temper T5 0.050 inch thick.

3. Corners: Factory fabricated mitered and welded, shop finished to exactly match running cap trim. Minimum leg length 24 inches.

4. Cant waterdam: G90 galvanized steel, minimum 24 gage, 10'-0" lengths.

a. Provide galvanized fasteners securing cant dam in place, spaced not greater than 24 inches on center on back edge, and 12 inches on center on roofing side.

D. Fasteners: As recommended by fascia manufacturer for particular substrate encountered. No exposed fasteners permitted.

E. Aluminum Finish:

1. Polyvinylidene Fluoride (PVDF), Kynar 500 shop applied three coat resin based, high performance thermoplastic organic coating in custom non-standard color to match Architect's sample, conforming to AAMA 605.2, NAAMM - Metal Finishes Manual, and the following

a. Resin base of 70 percent PVDF by weight, Atochem North America, Inc., product "Kynar 500" or Ausimont USA. product "Hylar 5000 ".

b. Finish Coating shall be manufactured as one of the following products:

1) Glidden Company; product "Visulure".

2) Morton International; product "Fluoroceram CL"..

3) P.P.G. Industries Inc.; product "Duranar XL".

4) Valspar Corp., product: "Flurothane".

c. Surface Preparation: Properly clean aluminum with inhibited chemical cleaner and pretreat with acid chromate-fluoride-phosphate conversion coating, in accordance with Aluminum Association method AA-C12C42.

d. Primer: Corrosion resistant, epoxy or urethane based primer compatible with finish coating, averaging 0.2 to 0.3 mils dry film thickness.

e. Finish Coat (Color Coat): Polyvinylidene fluoride enamel averaging 0.70 to 0.80 mil dry film thickness.

f. Top Coat: Polyvinylidene fluoride enamel clear top coat averaging 0.45 to 0.55 mils dry film thickness.

2. Color and Appearance: At all exposed to view surface provide custom color to match Architect's sample. Architect's color sample will be a shade of white or gray, however, it will NOT be considered "exotic," "polychromatic," "pearlescent," or "metallic".

2.2 ACCESSORIES

A. Underlayment: Asphalt saturated building felt, non-perforated, 15 pounds per square as recommended for use in waterproofing and in construction of built-up roofs.

B. Flashing cement: Trowel grade, composed of selected asphalt, solvents, and non-asbestos fillers, conforming to FS SS-C-153 Type 1, ASTM D 2822, Type 1 and ASTM D 4586, Type 1 (Non-asbestos) as manufactured by Karnak Chemical Corporation, product Nº. 19 "Flashing Cement", or equal as manufactured by Koch

Materials Company, J & P Petroleum Products Company or other approved manufacturer.

C. Sealant: Sealant in conjunction with metal work: One-part acrylic terpolymer sealant, Tremco “Mono”, Pecora “Unicrylic”, Sonneborn “Sonac”, or equal, in color to match the color of the metal.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify roof openings, curbs, pipes, sleeves, ducts, or vents through roof are solidly set, cant strips and reglets in place and nailing strips located.

B. Beginning of work shall constitute acceptance of the conditions of the surfaces to which this work is to be applied.

3.2 PREPARATION

A. Field measure site conditions prior to fabrication.

B. Install starter and edge strips, and cleats before starting installation.

C. Install surface mounted reglets true to lines and levels. Seal top of reglets with sealant.

D. During the installation of work of this Section, protect the work of other trades against undue soilage and damage by the exercise of reasonable care and precautions. Repair or replace any work so damaged and soiled.

3.3 FLASHING INSTALLATION - GENERAL

A. Except as otherwise shown on the reviewed shop drawings or specified herein, the workmanship of sheet metal work, method for forming joints anchoring, cleating, provisions for thermal movement shall conform to the standard details and recommendations of the sheet metal producer and those of producer organizations and research institutions and associations concerning the sheet metal used, in addition to the standards and details set forth in the referenced materials specified this Section.

B. Face nailing will not be permitted, concealed cleating or other concealed method must be used to attach sheet metal work to structure.

C. Ensure that fastenings do not exceed 8 inches on centers. Use flat head fasteners throughout, and seal all fastener heads after installation thereof.

D. Fill all slip joints and overlapping surfaces in the assembly with specified sealant material, removing all excess sealant material from the prefinished surfaces immediately, to prevent staining the finish.

3.4 INSTALLATION – ROOF EDGE COPING

A. Coordinate with roofing installer prior to installation. Verify site conditions and manufacturer’s roof edging details. Comply with roof edging manufacturer’s installation instructions and recommendations.

B. Nail galvanized spring clip in continuous manner to vertical face of wood nailers. Locate fasteners 3/4 inch below roof edge and 4 inches on center using a minimum 1-1/2 inch galvanized roofing nail. Allow 1/4 inch gap between sections of spring clip.

C. Lay roofing membrane over the spring clip allowing it to extend down the face to the drip edge. Locate and hang joint covers at all joints between corners and straight sections.

D. Hook each fascia section over the top of the spring clip and membrane. Press down on the fascia until the drip edge is engage. Allowed 1/8 to 1/4 inch gap for expansion (as recommended by manufacturer).

3.5 INSTALLATION – PARAPET COPING

A. Coordinate with roofing installer prior to installation. Verify site conditions and manufacturer’s roof edging details. Comply with roof edging manufacturer’s installation instructions and recommendations.

B. Install coping system in accord with manufacturer's product data and approved shop drawings, except where more stringent requirements are specified, to achieve a FM wind uplift classification.

C. Install anchor plates with concealed fasteners at 6'-O" on center maximum. Install concealed splice plates at coping intersections.

D. Snap copings into place over anchor plates and splice plates, with minimum 1/4 inch wide joints over splice plate intersections. Set copings over splice plates in with extruded butyl tape, 1/2 inch from intersection edges.

E. Make weathertight fit, allowing for expansion and contraction.

End of Section

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Section 07 72 00

ROOF ACCESSORIES

PART 1 - GENERAL

1.1 SUMMARY

A. Furnish and install the following:

1. UL listed prefabricated heat and smoke vents.
    a. Monitoring sensor/contact tied into fire alarm system at Atrium and Auditorium.
2. Prefabricated equipment curbing.
3. Prefabricated elevator penthouse and louvers.
4. Precast concrete pavers and pedestal System
5. Prefabricated roof scuttles with insulated hatch cover and prefabricated insulated curb.
6. Safety railing system.

1.2 RELATED REQUIREMENTS

A. Section 01 60 00 - PRODUCT REQUIREMENTS: Listing of VOC requirements for adhesives, cleaning/maintenance materials, paints, coatings, and sealants.

B. Section 01 74 19 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL: Procedural and administrative requirements relating to recycling goals, waste management program and reporting.

C. Section 01 81 13 - SUSTAINABLE DESIGN REQUIREMENTS: Procedural and administrative requirements relating to required *Northeast CHPS Verified Program,* (NE-CHPS) Certification.

D. Division 26 - ELECTRICAL: Connection of vent release mechanism to building fire alarm system

1.3 REFERENCES

A. Referenced Standards: Comply with applicable requirements of the following standards and those others referenced in this Section, under the provisions of Section 01 42 00 - REFERENCES. The standards referenced herein are included to establish recognized minimum quality only. Where these standards conflict with other specified requirements, the most restrictive requirements shall govern. Equivalent quality and testing standards will be acceptable, subject to their timely submission, review and acceptance by the Architect.

1. ASTM A525 - General Requirements for Steel Sheet, Zinc-Coated by the Hot Dip Process
2. ASTM B209 - Aluminum and Aluminum-Alloy Sheet and Plate.
3. ASTM D2822 - Asphalt Roof Cement.

4. ASTM E85 - Test Method for Surface Burning Characteristics of Building Materials.
5. UL - Fire Hazard Classifications
6. FM - Roof Assembly Classifications.
7. All applicable federal, state and municipal codes, laws and regulations for ratings of roof assemblies

B. The following reference materials are hereby made a part of this Section by reference thereto:
1. NRCA - Roofing and Waterproofing Manual.
2. SMACNA - Architectural Sheet Metal Manual.

C. Sustainability Requirement Reference: The following sustainability requirements are hereby made a part of this Section by reference thereto:
1. High Performance Schools Exchange, Northeast Energy Efficiency Partnerships NE-CHPS, (referred to herein as “NE-CHPS”).

1.4 SUBMITTALS

A. Information and Review Submittals: Submit the following under provisions of Section 01 33 00 - SUBMITTAL PROCEDURES:
1. Literature: Manufacturer's product data sheets, specifications, performance data, physical properties for each roof specialty item and related accessories furnished hereunder, include data on shape of components, materials and finishes, anchor types and locations.
2. Manufacturer’s installation instructions: Indicate interface with adjacent components, and perimeter conditions.
3. Shop drawings: Indicate configuration and dimension of components, adjacent construction, required clearances and tolerances, and other affected work. Provide details bearing dimensions of actual measurements taken at the project.
a. Indicate layout of safety railings.
4. Sustainable Design Submittals: As required by NE CHPS.

1.5 QUALITY ASSURANCE

A. Perform work in accordance with NRCA details.

1.6 PRE-INSTALLATION CONFERENCES

A. Installer of the Work of this Section is required to attend pre-installation conference specified under Section 07 54 19 – POLYVINYL CHLORIDE (PVC) ROOFING.

1.7 DELIVERY, STORAGE AND HANDLING

A. Deliver products in unopened, factory labeled packages. Store and handle in strict compliance with manufacturer’s instructions and recommendations. Store under cover and protect from weather damage.

B. Sequence deliveries to avoid delays, but minimize on-site storage time.

C. Store all materials in an elevated dry location, protected by waterproof coverings.

1.8 PROJECT CONDITIONS

A. Perform work of this Section when existing or forecasted weather conditions are within the limits established by manufacturers of the materials and products used.

B. Field Measurements: Do not delay job progress, allow for field tolerances.

1.9 WARRANTY

A. Provide 5 year warranty under provisions of Section 01 78 00 - CLOSEOUT SUBMITTALS, and in compliance with Section 01 78 36 – WARRANTIES. Warranty shall include repair or replacement of roof accessories which exhibit defects in materials or workmanship. Defects is defined as uncontrolled leakage or water and abnormal aging or deterioration.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Acceptable Manufacturers: Subject to compliance with the requirements specified herein, manufacturers offering products which may be incorporated in the work include the following, or approved equal:

1. Smoke hatches:
    a. Babcock-Davis Hatchways, Inc., Arlington MA.
    b. The Bilco Company, New Haven CT.
    c. Naturalite/EPI Inc., Garland TX.
    d. ThyBar Corporation, Addison IL.
2. Prefabricated Curbs:
    a. Custom Curb, Inc., Chattanooga, CA.
    b. The Pate Company, Lombard, IL.
    c. S&L Manufacturing, Leslie, MO.
    d. ThyBar Corporation, Addison IL.
3. Elevator penthouse and louvers:
    a. Airolite Company, Marietta OH.
    b. Construction Specialties, Inc., Cranford NJ.
    c. Industrial Louvers, Inc., Delano MN.
4. Roof hatches:
    a. Babcock-Davis Hatchways, Inc., Arlington, MA.
    b. The Bilco Company, New Haven, CT.
    c. Dur-Red Products, Cudahy, CA.
    d. Nystrom, Inc., Minneapolis, MN.

5. Safety Railing Systems:
    a. BlueWater Manufacturing, Inc., Chanhassen, MN.
    b. Kee Industrial Products, Inc., Buffalo, NY.
    c. Garland Equipment Company, Plymouth, MN.
    d. McMasters-Carr, Elmhurst IL.

2.2 HEAT AND SMOKE VENTS

A. UL-labeled low profile, automatic heat and smoke relief venting units, 5’-0” by 16’-0” factory-assembled for installation on roof deck. Vents shall open automatically when a 212 degree F fusible link is broken.
    1. Lids shall be capable of opening against a 10 pounds per square foot simulated snow or wind load and positively lock in wide open position.

B. Curb construction: 11 gauge (0.0907 inch) thick aluminum curb, 12 inches high, containing one-inch thick rigid insulation, and provided with integral cap flashing and 4 inch metal mounting flange.

C. Lid: Located a minimum of 12 inches above the roof deck, 11 gauge (0.0907 inch) thick extruded aluminum frame and aluminum cover containing one inch thick glass fiber insulation, connected directly to curb wall with heavy pintle type hinges.

D. Lid latch shall allow manual opening from the inside [and outside] without disturbing latch-fusible link assembly. Latch shall automatically lock the lid when manually closed.

E. Operating and latching mechanisms shall be completely enclosed within the unit and not exposed to outside weather.

F. Furnish units with individual approval labels attached.

G. Electrical key switch override system: Electrically operated thermolatch 115VAC, 60 cycles, 0.25 amp latch release mechanism controlled by a remote station where indicated on the Drawings equal to Bilco “Thermolatch II”

2.3 PREFABRICATED CURBS

A. Prefabricated support curbs: Provide custom units, fabricated from minimum 14 gage galvanized steel, minimum 3 feet high, sized as necessary To coordinate with elevator vent being supported. Provide units with welded corners and as follows:
    1. Curb type: Insulated, double wall, minimum 36 inches high with treated wood nailer at top of entire curb perimeter.
    2. Counter-flashing: Provide counter-flashing coordinated with roofing system.

2.4 ROOF SCUTTLES / HATCH

A. Type 1 description: Factory prefabricated roof scuttle/hatch unit having a clear opening dimension of 3’-0” wide by 5’-0” complying with requirements specified below.

1. Products which may be incorporated in the work include, but are not limited to, the following:
   a. Babcock-Davis Hatchways, Inc., model Nº. BRHPA36x60S1T.
   b. Bilco Company, model “E-50”
   c. Dur-Red Products, model “LH_A”.
   d. Nystrom Inc., model “RHA36x601T”.

B. Curb construction: 040 inch thick aluminum liner; 0.090 inch thick aluminum curb, 12 inches high, containing one-inch thick rigid, high-density fiberboard insulation, and provided with integral cap flashing and 3 inch metal mounting flange.
   1. Integral flashing shall be of same gage and material as the curb.

C. Cover construction: 0.090 inch aluminum cover containing one inch thick glass-fiber insulation.
   1. Performance requirements:
   2. Cover shall be reinforced to support a minimum live load of 40 psf (195kg/m2) with a maximum deflection of 1/150th of the span or 20 psf wind uplift.
      a. Operation of the cover shall be smooth and easy with controlled operation throughout the entire arc of opening and closing.
      b. Operation of the cover shall not be affected by temperature.
   3. Gasketing: Provide mechanically retained, thermoplastic rubber or neoprene gasketing around perimeter of cover.

D. Hardware: Type 316 stainless steel.
   1. Padlock hasps: Provide interior and exterior of curb.
   2. Hinges: Heavy pintle hinges.
   3. Operator: Compression spring operators enclosed in telescopic tubes to provide controlled door operation throughout the entire arc of opening and closing.
   4. Hold open and handles: Automatic hold-open and operating arm with vinyl grip handle on interior of cover.

E. Fabricate components free of visual distortion or defects. Scuttle operation shall be unaffected by temperature. Weld corners and joints. Provide for removal of condensation occurring within components of assembly. Fit components for weathertight assembly.

F. Factory finish: Mill finish aluminum.

2.5 SAFETY RAILING SYSTEM

A. Description:
   1. Roof edge protection: Provide non-penetrating, self-supporting leading edge roof top safety and fall protection system that allows full access to leading edge of flat roof or parapet.

2. Roof hatch protection: Provide non-penetrating railing system with top rail, mid rail, and OSHA approved swinging gate, with the hatch curb acting as toe plate. System shall be capable of being dismantled for roof repair.

B. Specified Manufacturer: To establish a standard of quality, design and function desired, Drawings and specifications have been based on BlueWater Manufacturing, Inc., Chanhassen, MN. Product “Safety Rail 2000”.

C. Acceptable Manufacturers: Subject to compliance with the requirements specified herein, manufacturers offering products which may be incorporated in the work include the following, or approved equal:

1. BlueWater Manufacturing, Inc., Chanhassen, MN.
2. Kee Industrial Products, Inc., Buffalo, NY.
3. Garland Equipment Company, Plymouth, MN.

D. Safety Railing System:

1. Standards: System shall have top and mid rail in accordance with OSHA Standards – 29 CFR 1910.23 (a)(2).
   a. Mid-rail chain in lieu of solid railing is not acceptable under OSHA Standard 29 CFR 1910.23**.**
2. Structural Load: 200 lb (90.7 kg), minimum, in any direction to all components (Top rail, mid rail, and swinging gate, as applicable) in accordance with OSHA Regulation 29 CFR 1926.502.
3. Height: 42 inches (1067 mm), minimum.
4. Railings: 1-1/4 inch ID, A53 Grade B seamed pipe or galvanized, 1-5/8 inch OD A500 seamed tube, free of sharp edges and snag points.
   a. Flat Bar: 2 inch by 3/8 inch thickness, A36 mild steel.
   b. Pipe Ends and Tops: Covered or plugged with weather and light resistant material.
   c. Bolts and Washers: 3/8 inch by 2-1/2 inch, grade Z, zinc plated.
5. Mounting Bases: Class 30 gray iron material cast with four receiver posts. Provide rubber pads on bottom of bases.
6. Receiver Posts: Shall have a positive locking system into slots that allow rails to be mounted in any direction. Friction locking systems are not allowed. Receiver posts shall have drain holes.
7. Accessories: As required to provide continuous run of railing when roof steps up or down, for ducting and conduit interruptions and similar conditions.
   a. Gate Hardware: Bolts and washers shall be 3/8 inch by 3-1/2 inch (9.5 mm by 89 mm) and 3/8 inch by 3 inch (9.5 mm by 76 mm) grade 5, zinc plated.
   b. Gate Opener: Latch.
8. Installation: Locate within 6 inches of open roof hatch or roof opening.

E. Finish: Factory-applied hot dipped galvanized.

2.6 PAVERS AND PEDESTALS

A. Precast concrete pavers: Solid concrete masonry units, nominal 24 by 24 by 2 inches thick, fabricated from normal weight aggregates conforming to ASTM C 33, Portland cement, air-entraining agents, integral water repellants, finely-ground silica, integral colorant, and other filler materials; having a compressive strength of not less than 8,000 psi, a maximum water absorption of 5 percent after 24-hour submersion in cold water, and having no breakage when subject to 50 cycles of freezing and thawing, as per ASTM C67, Section 8 as manufactured by Hanover Architectural Products, Hanover PA, Product: “Prest Pavers” or approved equal.

1. Provide drainage pavers at ST7-3-01 door: Hanover Architectural Products, Hanover PA., product “Drainage Paver” (2 pavers required).

B. Pedestal system: Octagonal grid structure fabricated from high density polyethylene with integral spacer tabs, 7 inches wide by 5/8 inch thick, unaffected by freeze-thaw cycling, ozone, humidity or water absorption. Equal to Hanover Architectural Products, Hanover PA, Product: “High-Tab Pedestal”.

1. Pedestal shims: Manufacturer’s standard 1/16 inch and 1/8 inch synthetic pedestal shims, designed for fine leveling above pedestal top plate.
2. Pedestal leveling system: Plastic pedestal leveling sloped base units, 7-3/4 inches diameter by nominal ½ inch thick fabricated from thermoplastic resin, adjustable to accommodate roof slopes between 1/8 inch per foot to ½ inch per foot. Equal to Hanover Architectural Products, Hanover PA, Product: “Compensator”.
    a. Provide required number of leveling base units to suit roof slope indicated on the Drawings.

C. Pedestal system (for roof paver heights between 3 inches and 24 inches): Injection molded plastic pedestal system consisting of threaded base, coupling and top units designed to support a maximum load of 1,000 pounds per pedestal. Equal to

1. Manufacturers:
    a. Hanover Architectural Products, Hanover PA, Product: “Elevator”.
    b. Bison Deck Supports, Denver, CO, Product: “Level.it Pedestals”.
2. Pedestal shims: Manufacturer’s standard 1/16 inch and 1/8 inch synthetic pedestal shims, designed for fine leveling above pedestal top plate.
3. Pedestal leveling system: Plastic pedestal leveling sloped base units, 7-3/4 inches diameter by nominal ½ inch thick fabricated from thermoplastic resin, adjustable to accommodate roof slopes between 1/8 inch per foot to ½ inch per foot. Equal to Hanover Architectural Products, Hanover PA, Product: “Compensator”.
    a. Provide required number of leveling base units to suit roof slope indicated on the Drawings.

D. Adhesives for paver pedestals: As approved by the roofing manufacturer.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Inspect all surfaces and verify that they are in proper condition to receive the work of this Section.

B. Beginning of installation means acceptance of existing site conditions.

3.2 INSTALLATION – HEAT AND SMOPKE VENTS

A. Coordinate with installation of roofing system and related flashings for weathertight installation.

B. Apply bituminous paint on surfaces of units in contact with dissimilar metals to prevent electrolytic corrosion.

C. Perform the installation in strict accordance with the manufacturer's installation specifications. Install units plumb, level in alignment and plane without warp or rack.

D. Anchor units securely, fill voids between ribs in steel decking with mineral fiber fireproofing.

3.3 INSTALLATION – ROOF HATCHES

A. Examination: Ensure that all receiving nailers have been completely installed and are in proper condition to receive the unit.

B. Coordinate with installation of roofing system and related flashings for weathertight installation.

C. Apply bituminous paint on surfaces of units in contact with dissimilar metals to prevent electrolytic corrosion.

D. Perform the installation in strict accordance with the manufacturer's installation specifications. Install units plumb, level in alignment and plane without warp or rack.

E. Anchor units securely, fill voids between ribs in steel decking with mineral fiber fireproofing.

3.4 INSTALLATION – SAFETY RAILINGS

A. General: Assemble and install safety railing systems in strict accordance with manufacturer’s written instructions, and in compliance with OSHA regulations and standards.

B. Install hatch safety railing systems within 6 inches of open roof hatches and roof openings.

3.5 INSTALLATION OF PAVERS ON ADJUSTABLE PEDESTALS

A. Layout and stack Compensators as required to achieve a level terrace surface on sloping concrete deck. Maintain a stable base when stacking multiple Compensators.

B. Fit shims to Paver Support Pedestals as required for final elevation adjustment.

C. Use 1/2 Compensators and Paver Support Pedestals at edges, and 1/4 units at corners. Run subsequent rows of pavers parallel to the first row.

D. Place the pavers by lowering them vertically, rather than nosing into position. Align and make leveling adjustments as the Work progresses.

1. Provide space between paver units of 1/32 in. (1 mm) wide to achieve straight bond lines.
2. Do not exceed joint (bond) lines more than ¬±1/2 in. (¬±15 mm) over 50 ft. (15 m) from string lines.
3. Cut unit pavers with motor-driven masonry saw equipment to provide clean, sharp, unchipped edges. Cut units to provide pattern indicated and to fit adjoining work neatly. Use full units without cutting where possible. Hammer cutting is not acceptable.
4. Remove any cracked or structurally damaged pavers and replace with new units.
5. Tolerances: Do not exceed 1/32-inch (0.8-mm) unit-to-unit offset from flush (lippage). Do not exceed 1/8 inch in 10 feet (3 mm in 3 m) from level, or indicated slope, for finished surface of paving.

3.6 ADJUSTING

A. Test operation of vents and hatches upon completion of the installation. Make any and all adjustments necessary to ensure proper operation.

B. Touch up damaged coatings and finishes.

End of Section

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Section 07 72 73
VEGETATED ROOF SYSTEMS - TRAY

PART 1 - GENERAL

1.1 SUMMARY

A. Drawings and General Provisions of Contract, including General and Supplementary Conditions and Division 01 Specification section, apply to work of this section.

B. Related Sections: The following sections contain requirements that relate to this section.
1. Section 05 21 10 – Steel Framed Roof Deck
2. Section 07 71 00 – Roof Specialties
3. Section 07 72 00 – Roof Accessories
4. See Item 1.6 for Sustainable Requirements

1.2 DESCRIPTION OF WORK

A. The scope of work includes providing all materials, equipment and labor necessary to complete the work as indicated on the drawings and as specified herein.

B. This Section includes the following:
1. Vegetated Roof Systems

1.3 SUBMITTALS

A. To fully disclose merits of system and specifications, provide three (3) product design guides and supporting literature showing specifications and project photographs of completed jobs.

B. To provide evidence of wind and fire safety, demonstrate video evidence of fire spread testing and high-speed wind resistance testing (minimum of 110 mph), and report of full-scale dynamic wind uplift testing results. Provide green roof system wind uplift rating according to "Standard test method for wind resistance of modular vegetated roof assembly (CAN/CSA-A123.24-15)."

C. Provide reference sheet listing 6 references of owners and caretakers of green roof system.

D. Provide two (2) sample vegetated modules, showing same or similar product grown to maturity, with homogeneous mix of cutting grown plants, with 95% or greater coverage and fully rooted into entire soil profile, as it will be delivered to job site. Sample to be provided to facility manager and owner of property.

E. Provide two (2) plastic bags, each containing a 1 cup (8 oz.) sample of growing medium.

F. To demonstrate safe connection, provide two (2) sample module connectors intended to prevent displacement of modules against wind uplift.

G. To conform to project requirements, provide additional agreements of warranty and maintenance contract.

H. Provide written maintenance protocol.

I. Provide written documentation of installation procedures. provide documentation showing installer as being certified to install system.

J. To ensure Installer has been trained to efficiently and correctly install green roof system, provide certificate of completion of training issued by green roof system manufacturer.

K. To facilitate planning and create installation efficiency, indicate length of time required to install the green roof.

L. To provide evidence of wind and fire safety, demonstrate video evidence of fire-spread testing and high-speed wind resistance testing (minimum of 110 mph), and report of full-scale dynamic wind uplift testing results. Provide green roof system wind uplift rating according to "Standard test method for wind resistance of modular vegetated roof assembly (CAN/CSA-A123.24-15)."

M. To ensure that green roof system manufacturer produces consistently uniform and reliable product that meets or exceeds industry standards for fire and foot traffic resistance, provide copy of FM Approval report issued for evaluation according to FM Standard 4477.

N. To ensure that green roof meets or exceeds FM Approval Standard 4477 for Spread of Flame testing in accord with ASTM E108-10 Spread of Flame, provide Approval Examination Report with Class A Results.

O. Provide an engineering study that green roof system will meet or exceed 1.2 inches of Maximum Water Capacity in accord with FLL or ASTM E-2397 standards.

P. Provide a particle size distribution report by a certified soil testing facility which demonstrates the green roof growing media will meet minimum ASTM E-2397 and FLL Guidelines for multi-course extensive sites.

Q. To ensure proper plant selection and efficient delivery, provide address and contact information of professional horticulturist who will oversee planting and cultivation of modules, within 300 miles of project location.

R. Upon completion, arrange for owner staff to attend an onsite maintenance training with manufacturer representative.

S. Upon completion, submit green roof manufacturer warranty issued in owner's name

1.4 QUALITY ASSURANCE

A. No deviation should be made from this specification. Installer assumes liability for any deviations from specification.

B. Only manufacturer-approved Installers may perform the green roof installation. Special designation may be required for single source or overburden removal warranties. Please contact your local green roof system supplier for a list of approved installers to provide estimates for you.

C. Prior to installing green roof modules, the following procedures are to be conducted:
1. The building Owner, Architect, or Engineer shall verify that the roof is properly designed and constructed to adequately support the load of the green roof system.
2. The roof is to be flood tested for water tightness for 24 hours. Water testing shall be witnessed and confirmed in writing by Owner’s Representative and/or Design

Professional, Waterproofing Contractor, Membrane Manufacturer, and Installation Contractor.

3. Slip sheet/root barrier to be properly installed, seams overlapped and bonded, in accord with architect's and manufacturer's specifications.
4. The roof is to be inspected and determined ready to accept the green roof modules by a Technical Representative of the Installer.

D. Once the green roof installation is completed, an inspection is to be conducted by a Technical Representative of the Installer to verify that the green roof modules have been installed tight against each other, in straight rows, corners aligned, properly oriented, and tight against the edging.

1.5 PRE-INSTALLATION MEETING

A. Installer to convene one week before starting work of this section. Review green roof installation standardized procedures with supervisory staff and installation team.

B. Schedule certified installation personnel to supervise entire green roof installation.

C. Ensure that the slip sheet material meets membrane and green roof manufacturer specifications.

D. Ensure that edging is perforated at the bottom to allow water to drain freely and is installed between modules and stone ballast or wherever parapet or paver is of insufficient height/thickness to contain the soil from the subterranean green roof modules.

E. Ensure that soil and debris will be swept clean before placing each module.

F. Configure installation to minimize or eliminate walking on the plants during installation.

1.6 NE-CHPS GENERAL REQUIREMENTS

A. The work of this Section is required to comply with general requirements and procedures for compliance with certain prerequisites and credits needed for the Project to obtain CHPS Verified certification based on Northeast Collaborative for High Performance Schools Criteria Version 3.2 (NE-CHPS) and as outlined in Division 01 Section "Sustainable Design Requirements."

1. The General Contractor is responsible to coordinate with the work of other Sections and comply with all NE-CHPS requirements in accordance with the Contract Documents such that the work carried out by this Section does not compromise the achievement of any other NE-CHPS prerequisites and credits applicable to the entire Project.

B. Related Sections for Sustainable Design Requirements:

1. Division 01 Section "Substitution Procedures" for NE-CHPS substitution procedures.
2. Division 01 Section "Submittal Procedures" for NE-CHPS submittal requirements.
3. Division 01 Section "Construction Controls and Temporary Facilities" for requirements for temporary facilities.
4. Division 01 Section "Product Requirements" for additional NE-CHPS submittal requirements.
5. Division 01 Section "Construction Waste Management and Disposal" for waste management, recycling and disposal.

6. Division 01 Section “Sustainable Design Requirements” for general procedures for compliance with NE-CHPS prerequisites and credits.
7. Division 01 Section “Construction Indoor Air Quality (IAQ) Management Plan” for material and procedure requirements.

PART 2 - PRODUCTS

2.1 Any manufacturer’s names and/or model numbers identified herein are intended to assist in establishing a general level of quality, configuration, functionality, and appearance required. This is NOT a proprietary specification and it should be noted that “or equivalent” applies to all products denoted herein. It is understood that all manufacturers will have minor variations in configuration, appearance, and product specifications and such minor variations shall not eliminate such manufacturers as an equivalent. It is the intent of this specification to encourage open and competitive involvement from multiple manufacturers that are able to supply similar products.

2.2 VEGETATED GREEN ROOF MODULE

A. Provide vegetated roofing systems conforming to the following, acceptable manufactures of this system include the following:
   1. Prides Corner Farms Wholesale Nursery
      122 Waterman Road
      Lebanon, CT
      (860) 333-7726
   2. Or Approved Equivalent

B. The module system to comprising of 1' x 2' x 3¼" “Standard Tray System”, soil height raised to approximately 4¼" elevation for the Standard System with removable soil elevator modules to be 100 % post-industrial recycled polypropylene with 100 mil thick walls.

C. Module system to have a minimum of 187 ft³ of soil per 1000 ft² for the Lite System, 337 ft³ of soil per 1000 ft² for the Standard System of coverage.

D. Color shall be black.

E. Module to have positive drain holes placed at lowest point in the module. Module bottom to have water dispersal via its drain channels of approximately 7.0 gallons per minute per lineal foot.

F. To shield the module from photo-degradation and to promote plant health via sharing of water and nutrients between the modules, the soil continuum is to be monolithic, approximately 1" inch taller for the Standard System, ¾" inch taller for the Lite System than modules, and shall obscure modules during all 12 months of the year for optimal year-round aesthetic presentation.

G. For plant health by sharing of water and nutrients between modules, soil to be joined via subterranean moisture portals uniting soil from module to module.

H. Plant material to cover minimum of 95 % of surface area of soil within modules and be fully rooted into entire soil profile at time of delivery.

I. To ensure proper plant selection, efficient delivery and sustainable objectives, module planting and cultivation to occur under supervision of professional horticulturist located within 300 miles of project location.

J. To ensure adherence to proper installation procedures, green roof system manufacturer to provide the Installer with in-person training of Standardized Installation Procedures.

K. To optimize logistical efficiency, during the growing season, April to Sept. 30, growing time and method to be coordinated so as to mature on or before installation date. Time to mature depends upon plant selection, climate, and time or year. 2.2 GROWING MEDIUM

L. Soil to be enhanced German FLL 93 +% (by dry weight) inorganic content.

M. To ensure proper soil environment and allow for predictable maximum roof load during rain storm, module saturated weight (with soil and fully vegetated) to be approximately 27-29 lbs./ft² for the Standard System, 15-17 lbs./ft² for the Lite System.

2.3 PLANTS

A. Homogeneous mix of cutting grown highly drought resistant ground covers. Mix to Include accent plants for enhanced height, texture, or early/late season bloom times Mix shall be the “Prides School Mix” or approved equivalent.

B. Project must be bid with the specified plant varieties at the specified densities.

2.4 SLIP SHEET

A. Provided by Membrane Manufacturer. Confirm compatibility of slip sheet and waterproofing membrane with manufacturer.

B. Conventional Membrane Roof Assembly
1. Minimum 1-1.5 mm (40-60 mi) thickness with overlapped and effectively bonded seams to ward against root penetration and to keep waterproofing layer safe and clean from soil during installation. Slip sheet/root barrier typified as follows:
   a. Welded Seam Types - 1 mm (40 mil) or greater thickness
      -TPO, with seams heat welded
      -PVC, with seams heat welded
      -Polypropylene, with seams heat welded
      -HDPE, with seams heat welded
   b. Glued Seam Types - 1 mm (40 mil) or greater thickness
      -EPDM, with seams overlapped a minimum of 75 mm and glued with roll out adhesive or double sided tape adhesive of the type that is impervious to and not affected by moisture, and recommended by the manufacturer.
      -Low profile drain board of appx. 0.5 mm (17 mil) thickness, with edges overlapped 75 mm and glued with manufacturer approved adhesive.

C. Do not use duct tape or adhesive for seaming that is not approved by the membrane manufacturer.

D. Never use moisture holding fabric, such as needle-punched / non-woven polyethylene or felt, under the green roof system with "conventional" membrane roof assemblies. Such materials may trap aggregates and are impossible to sweep during installation and stay wet and encourage root growth and root penetration, which is especially detrimental if woody plants become established as such plants have woody root systems and may

potentially cause roof leaks. This could lead to impeded drainage and compromise plant health.

E. In cases where electronic leak detection may be desired, a fiber-backed drainboard may be used. Fiber-backed drainboards are only recommended when electronic leak detection is desired, and only when vegetated with Sedums or Sempervivums, or other succulents, as these plants are sparsely-rooted and not prone to rooting into the fiber of the drainboard.

2.5 ACCESSORIES

A. Edging
1. Edging required at perimeter of green roof when exposed, or adjacent to stone ballast or conventional pavers.
2. Aluminum, L-shaped Edge restraint to be 2.75” x 3.25” for 2.5” green roof system depth, 4.25” x 3.25” for 4.25” green roof system depth, 6.5” x 3.25” for 6” green roof system depth, and 8.5” x 3.25” for 8” system depth.
3. Edge restraint to be perforated to allow water to drain freely.
4. Edging shall be black anodized.
5. Edge pieces to be connected with aluminum sliding connectors. For the 6.5” x 3.5” and the 8.5” x 3.5” sizes, two sliding connectors must be used at each connection point.
6. Edging design must allow for sliding connector to be used to transition from 4.25" to 6" and/or to 8" green roof modules.
7. Edging must be certified as extruded and stamped in the USA.
8. Corners to be prefabricated by the manufacturer or may be bent or welded by the contractor.
9. Edging installations that are not surrounded by stone ballast or pavers should be secured to the green roof modules to ensure it is held in place. Edging should be fastened using 3/16" diameter wide-domed blind rivets into 0.192"-0.196" (drill size #11) holes on 12” centers.

PART 3- EXECUTION

3.1 GREEN ROOF INSTALLATION MUST BE CONDUCTED BY A MANUFACTURER. APPROVED INSTALLER. Special designation may be required for single source or overburden renewal warranties.

3.2 PREPARATION OF ROOF SURFACE

A. Slip sheet/root barrier, specified by architect and approved by waterproofing and green roof system manufacturer, of 1-1.5 mm (40-60 mi) thickness with overlapped and effectively bonded seams to ward against root penetration and to keep waterproofing layer safe and clean from soil during installation.
1. Do not use duct tape or adhesive for seaming that is not approved by the membrane manufacturer.
2. Never use moisture holding fabric, such as needle-punched polyethylene or felt, under the green roof system.

B. Experienced Contractor to install slip sheet/root barrier in accordance with manufacturer’s recommendations.

C. All surfaces to be smooth, free of debris, soil, and grit prior to placing modules. All materials to be tested water tight and free draining prior to module placement.

D. All surfaces to be maintained clean and free of debris, soil, and grit during installation process via use of broom. Never walk upon such materials as they may damage membranes.

3.3 INSTALLATION SEASON

Module Installation to be conducted:

A. When plants are properly adapted and acclimatized to local weather conditions.

B. When weather is above 33° F and there is no ice on the roof and engineered soil is unfrozen.

C. No later or earlier than the cutoff date required by the green roof system provider's warranty terms, if applicable. In areas of cold-winter temperatures, installation season is typically April 1 to November 15.

D. When the Owner and General Contractor can ensure that, during and after the green roof installation, no foot traffic will be allowed on the plantings. If the Owner or GC cannot guarantee that modules will not experience late fall, winter or early spring foot traffic, the green roof installation should not occur until the following spring when other trades have finished their work.

3.4 DELIVERY, STORAGE, HANDLING, PROTECTION

A. Green roof modules are to be delivered in good condition free from shipping damage.

B. If plastic wrapped, modules are to be kept out of the sun to prevent overheating.

C. Modules are to be installed on the roof top within 4 hours of delivery.

D. On the job site, modules are to be handled to prevent damage to the modules themselves and all roofing components.

E. To ensure optimum plant condition and safety, modules must be conveyed to the roof using a rack designed specifically for this use and constructed according to engineer approved and stamped plans. DO NOT stack modules during conveyance to rooftop or installation.

F. Modules are to be conveyed to roof surface with equipment designed to carry the collective load of the green roof modules and transport rack. Account for decreasing load limits when boom (of crane or fork lift) is extended. Use crane stabilizers and take all necessary precautions to protect building and personnel.

G. Never exceed the load capacity of the roof deck when placing green roof modules on the roof.

H. When suspending modules and conveyance rack above deck, take precautions to stabilize and prevent twisting of conveyance rack. Four tires or two four-inch-thick sheets of Styrofoam is recommended.

I. During installation, protect the roof deck and membranes with appropriate material such as plywood sheeting. Never scrape or puncture slip sheet or membranes. Keep roof surfaces free of soil, grit, or debris at all times with broom. Never set modules on top of soil, dirt or grit.

J. Transport conveyors to be run parallel to the line of installation.

K. Transport carts to have pneumatic tires, to be wheeled about only upon protective plywood sheeting, and to be loaded so as not to exceed weight capacity of roof deck.

3.5 SAFEGUARDING SYSTEM INTEGRITY

Before working on roof, all Installers and Laborers to be:

A. Properly instructed in safety procedures and provided with green roof manufacturer's Installation Standardized Procedures.

B. Instructed to keep all work surfaces clean and debris free.

C. To report immediately any damage to membranes, protective sheeting, or drain elements to supervisor, and to make appropriate repairs before proceeding.

D. Instructed in proper methods of green roof installation by manufacturer trained and approved representative of installation company.

3.6 LAYING (PLACING) MODULES

A. Module installation to follow behind installation of slip sheet/root barrier, irrigation system, pavers, ballast, and edging.

B. Module installation to be conducted in strict accordance with manufacturer installation guidelines. Surface to be clean and swept free of soil, dirt, stones or grit before placing each module. Rows to be straight, modules to be tight against each other with edges overlapping and arranged in proper directional orientation. As soon as one row of modules is surrounded completely by the parapet, edging, or other modules, pull all of the plastic soil elevator inserts out of the modules. Pull the soil elevators while standing on the slip sheet and avoid walking on the plants.

C. As each row of modules is installed tightly together, insert module connectors in module slots facing the installer. Line up the next row of modules and slide into place so that the module connectors each hold four module corners together.

D. Module installation to be conducted in accordance with green roof design.

E. It is recommended that any custom cutting/fitting be oriented on the high side (top), or sides of the roof. It is recommended that the cut side of the module be set tight against the edging or toward the side of an intact module so as to prevent soil spillage. If custom cutting must be done on the low, draining, side of the roof, it is imperative that no filter cloth be inserted as it could impede drainage. It is best to orient the cut side against another module, facing upstream.

F. After installing modules, they should be immediately watered so as to thoroughly moisten the media from top to bottom. Water shall be of suitable quality for plant growth and irrigation system or hoses and sprinklers may be used for such purpose. Note: it takes approximately 1 inch of water for the Standard System, ¾ inch of water for the Lite

System of water, or 1 ¼ gallons per module for the Standard System, ¾ gallons per module for the Lite System per module to moisten each module thoroughly.

G. First maintenance visit to be conducted two (2) weeks after first plant delivery date and continued according to Section 3.73.7 WARRANTY
1. 50 Year Module Limited Warranty: Green Roof system manufacturer shall provide limited fifty (50) year guarantee that product will be free of material defects and against photodegradation.
   a. Installer shall complete and submit warranty registration form and post-installation punch list to manufacturer within 60 days of delivery to complete warranty registration.
2. 15 Year Aluminum Edge Restraint Warranty Manufacturer shall provide limited fifteen (15) year guarantee against material defects.
3. Overburden Removal/Replacement Limited Warranty: Manufacturer shall provide a minimum fifteen-year warranty.

3.8 MAINTENANCE

A. Documentation
1. Green Roof Manufacturer shall provide twice monthly informational email maintenance protocol, that shares current best maintenance practices, seasonal topics related to plant care, and chronologically guides the maintenance contractor though the various steps of the maintenance protocol beginning March 15 and ending Nov. 1 of each year.
2. Contractor shall provide a bi-weekly report of all green roof maintenance events for the first year of installation. Report shall Include name of person, date and activity.
   a. If soil test, record lab, test, and results
   b. If fertilizer, record type and amount applied per 1000 SF
   c. Record time needed for bi-weekly weed walk and drain inspection
   d. If irrigation, record duration and quantity
3. Foot Traffic: Limit foot traffic to a random path a couple times per week by one person. Avoid walking in a single path, standing in one place, or trampling plants. If parapet or adjoining wall must be serviced, plants may be covered with plywood or foam sheeting for up to 4 hours intermittently, provided foliage is not wet or frozen and conditions are not too hot or sunny.

B. Maintenance
1. Soil Testing and Fertilization. Approximately 2-3 weeks before spring or in early April "growth flush," administer an annual soil test for PH and fertility levels. Growth flush varies by region, consult biweekly maintenance protocol email for specific recommended testing date in project's region.
2. Maintain pH in the range of 6.5 to 8.0. In the event that pH falls below 6.0, consult the testing lab for appropriate recommendations to increase alkalinity. If the soil is above 8.0, it can be made more acidic with elemental Sulphur or an application of acidifying fertilizer.
3. Maintain fertility in the normal range using a typical field soil fertility test as provided by A&L labs or equivalent testing lab. Evaluate the various nutrient levels such as Nitrogen (N or NO_3N), Potassium (K), Phosphorus (P). If the soil contains a low (L) amount of these nutrients, conduct a single application of a high-quality controlled release fertilizer at the lab recommended rate. Ensure that the chosen fertilizer contains NO Herbicides or Pesticides. Follow the fertilizer labeled directions for application rate and use a rotary spreader to ensure even fertilizer application. Runoff potential does exist and should be evaluated by the applicator in accord with the site specifics; the greater the runoff sensitivity, the lower the application rate. All applications of fertilizer are the sole responsibility of the applicator.

4. Conduct Bi Monthly Inspections.
   a. Weed Walk: Pull and dispose of all weeds before they flower and set seed. NEVER allow any woody plant to establish in a green roof system, as they have deep root systems which can damage roofing membranes.
   b. Displaced Soil: Nesting birds may displace soil. Replace lost soil using only green roof manufacturer approved engineered green roof soil.
   c. Drainage Inspection: Inspect roof drains for any debris, pebbles or leaves and remove to ensure proper drainage.
   d. Debris Removal: Remove any debris blown onto the roof immediately to ensure no damage to plants.
   e. Pest Control: Monitor pest presence, as most pest problems are the result of an imbalance in the relationship of pest organism and its natural biological controls and these problems may self-correct. If pest problems are persistent, use organic and natural biological control agents to restore balance. Pesticide use is discouraged and should always be considered secondary to cultural and biological control measures, as pesticides can contaminate runoff water and cause environmental damage. Pesticides shall only be applied by qualified and licensed applicators, and only as required. All applications of pesticides are the sole responsibility of the applicator.
   f. Rake, bag and remove fallen and matted leaves. These can smother the green roof plants.
5. Irrigation/Watering
   a. Contractor shall water plants immediately if wilting occurs and bi-weekly in times of prolonged hot dry weather to prevent plant thinning or death. Prolonged hot dry weather is defined as periods of 75° F weather with less than 1" of rainfall persisting for 2 weeks.
   b. Contractor shall water thoroughly to runoff to remoisten entire soil profile.

3.9 ACCEPTANCE

A. Contractor is responsible to complete requirements to obtain confirmation of warranty from the green roof systems manufacturer. Warranty information shall be provided by the contractor to the owner.

B. Contractor is responsible to ensure proper module/plant maintenance for One Year or until work has been accepted by representative of Owner or Owner and the Owner assumes responsibility for module/plant maintenance.

3.10 CLEAN UP

A. Throughout installation, keep all work surfaces clean and free of grit, dirt, or debris. Use broom not blower, do not sweep soil under modules or slip sheet. Do not place modules upon soil, dirt, stones or grit. Following installation, remove all excess materials and tools from job site. Ensure that any damage that occurs as a result of installation is appropriately and immediately repaired.

End of Section

Section 07 81 00

APPLIED FIREPROOFING

PART 1 – GENERAL

1.1 SUMMARY

A. The work of this Section consists of spray applied fireproofing where shown on the Drawings, as specified herein, and as required for a complete and proper installation.

B. Furnish and install factory blended, spray applied cementitious fireproofing, .

1.2 RELATED REQUIREMENTS

A. Section 01 45 29 – TESTING LABORATORY SERVICES: General construction test requirements.

B. Section 01 74 19 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL: Procedural and administrative requirements relating to recycling goals, waste management program and reporting.

C. Section 01 81 13 - SUSTAINABLE DESIGN REQUIREMENTS: Procedural and administrative requirements relating to required *Northeast CHPS Verified Program,* (NE-CHPS) Certification.

D. Section 05 12 00 - STRUCTURAL STEEL FRAMING.

E. Section 05 31 00 - STEEL DECKING.

1.3 REFERENCES

A. Referenced Standards: Comply with applicable requirements of the following standards and those others referenced in this Section, under the provisions of Section 01 42 00 - REFERENCES. The standards referenced herein are included to establish recognized minimum quality only. Where these standards conflict with other specified requirements, the most restrictive requirements shall govern. Equivalent quality and testing standards will be acceptable, subject to their timely submission, review and acceptance by the Architect.

1. ASTM E84 – Standard Test for Surface Burning Characteristics of Building Materials.
2. ASTM E119 -Standard Test Methods for Fire Tests of Building Construction and Materials.
3. ASTM E605 - Standard Test Methods for Thickness and Density of Sprayed Fire-Resistive Material (SFRM) Applied to Structural Members.
4. ASTM E736 - Standard Test Method for Cohesion/Adhesion of Sprayed Fire-Resistive Materials Applied to Structural Members.
5. ASTM E759/E759M - Standard Test Method for Effect of Deflection on Sprayed Fire-Resistive Material Applied to Structural Members

6. ASTM E760/E760M - Standard Test Method for Effect of Impact on Bonding of Sprayed Fire-Resistive Material Applied to Structural Members.
7. ASTM E761/E761M - Standard Test Method for Compressive Strength of Sprayed Fire-Resistive Material Applied to Structural Members.
8. ASTM E859 -Standard Test Method for Air Erosion of Sprayed Fire-Resistive Materials (SFRMs) Applied to Structural Members.
9. ASTM E937/E937M - Standard Test Method for Corrosion of Steel by Sprayed Fire-Resistive Material (SFRM) Applied to Structural Members.
10. ASTM G21 - Standard Practice for Determining Resistance of Synthetic Polymeric Materials to Fungi.
11. IAS AC291 – Accreditation Criteria for Special Inspection agencies.
12. UL - Fire Resistance Directory.
13. All applicable federal, state and municipal codes, laws and regulations for fire-resistant construction.

B. Definitions:

1. High Rise Construction: As defined by the 2018 International Building Code with Rhode Island Building Code Regulation RISBC-1
2. Structural Steel Elements: Structural building components scheduled to receive SFRM including: built-up trusses, steel decking, form decking, beams, columns, cross-braces, and related structural steel.
3. SFRM (Sprayed Fire-Resistant Materials) is spray-applied fireproofing as specified under this Section and defined under the International Building Code.

C. Sustainability Requirement Reference: The following sustainability requirements are hereby made a part of this Section by reference thereto:

1. High Performance Schools Exchange, Northeast Energy Efficiency Partnerships NE-CHPS, (referred to herein as “NE-CHPS”).

1.4 ADMINISTRATIVE REQUIREMENTS

A. Coordination:

1. General: Coordinate the work of this Section with the respective trades responsible for installing interfacing and adjoining work for proper sequence of installation, and ensure that the work performed hereunder is acceptable to such trades for the installation of their work.

B. Pre-Installation Meetings: At least two weeks prior to commencing the work of this Section, conduct a pre-installation conference at the Project site. Comply with requirements of Section 01 31 00 - PROJECT MANAGEMENT AND COORDINATION. Coordinate time of meeting to occur prior to installation of work under the related sections named below.

1. Required attendees: Owner, Architect, General Contractor, Fireproofing Applicator’s Project Superintendent, Fireproofing manufacturer’s technical representative and representatives of other related trades.
2. Agenda:

a. Scheduling of fireproofing operations.
b. Review of staging and material storage locations.
c. Coordination of work by other trades.
d. Installation procedures for ancillary equipment.
e. Protection of completed Work.
f. Establish weather and working temperature conditions to which Architect and Contractor must agree.
g. Emergency rain protection procedure.
h. Discuss process for manufacturer's inspection and acceptance of completed Work of this Section.

C. Sequencing:
1. Sequencing for application to steel decking:
a. Apply spray-applied fire resistive material to steel deck which has been fabricated and erected in accordance with the criteria set forth by the Steel Deck Institute. Refer to Structural Drawings and Specifications.
b. The application of spray-applied fire resistive material to the underside of roof deck shall not commence until the roof is completely installed and tight, all penthouses are complete, all mechanical units have been placed, and construction roof traffic has ceased.
1) Fire protection shall not be applied to steel floor decks prior to the completion of concrete work on that deck.
2) When occasional roof traffic is anticipated, as in the case of periodic maintenance, roofing pavers shall be installed as a walkway to distribute loads.

D. Scheduling:
1. The installation of ducts, piping, conduit or other suspended equipment shall not take place until the application of sprayed fire protection is complete in an area.

1.5 SUBMITTALS

A. Information and Review Submittals: Submit the following under provisions of Section 01 33 00 - SUBMITTAL PROCEDURES:
1. Product Data: Manufacturer's product data sheets, specifications, performance data, physical properties and limitations of fireproofing.
2. Test and Evaluation Reports:
a. Bond strength of fireproofing: ASTM E72, tested to provide minimum bond strength twenty times weight of fireproofing materials.
b. Fire test reports of fireproofing application to substrate materials similar to project conditions.
c. Reports from reputable independent testing agencies, of product proposed for use, which indicate conformance with ASTM E119 and ASTM E84

3. Manufacturer's Instructions and typical details: Indicate special application procedures or conditions.
4. Qualifications Data: For installer and testing agency.
5. Shop Drawings: Provide floor plans indicating fireproofing locations, ratings required, and types of fireproofing at each location.
6. Sustainable Design Submittals: As required by NE CHPS.

B. Closeout Submittals: Submit the following under provisions of Section 01 78 00 - CLOSEOUT SUBMITTALS.

1. Certificates: Installers certificate stating that sprayed fireproofing has been completed in full accordance with requirements to provide necessary fire resistance ratings.
2. Record Documentation: Installer's Field Reports stating environmental conditions during the installation of fireproofing materials, include temperature and humidity conditions.
3. Bonds and Warranty Documentation:
   a. Manufacturer's Warranties and Guarantees as specified elsewhere herein this Section.
4. Special Inspections: Submit prior to request for Certificate of Occupancy, to both Architect and local Building Official having jurisdiction, the following:
   a. All certifications, reports and programs required by the Rhode Island State Building code for applied fireproofing work performed under the requirements of this Section.

1.6 QUALITY ASSURANCE

A. General: Notify the Architect where conflicts apply between referenced standards and existing materials, and existing methods of construction.

B. Sole Source: Obtain products required for the Work of this Section from a single manufacturer, or from manufacturers recommended by the prime manufacturer of fireproofing.

C. Qualifications:

1. Installer/Applicator: Minimum of 3 years documented experience demonstrating previously successful work of the type specified herein, and approved by product manufacturer.
2. Special Inspector of Sprayed Fire-Resistant Materials and Mastic:
   a. Special Inspector Agency: Independent third party hired directly by the General Contractor.
   b. Special Inspector Agency (company and Individual) Qualifications: Comply with IAS AC291, and having the competence necessary to inspect the work of this Section 07 81 00.
   c. The Special Inspector (individual) shall have a valid and current ICC Spray-Applied Fireproofing Special Inspector Certificate, or ICC Fire Inspector 1 Certificate with not less than 1 year related experience.

1.7 MOCK-UPS

A. Provide mock-up under provisions of Section 01 43 39 – MOCK-UPS.

B. Construct mockup as follows, conform to project requirements for fire ratings, thickness and density of application.

1. Apply a mock-up area consisting of a typical overhead fireproofing installation, including not less than 15 feet (4.5 m) of beam and deck.
2. Apply second mock-up consisting of a typical column.

C. Locate where directed by Architect. Schedule mock-up installation with Owner's Project Representative for observation.

D. Examine installation within one hour of application to determine variance due to shrinkage, temperature and humidity.

1. Where shrinkage and cracking are evident, adjust mixture and method of application as necessary then remove materials and reconstruct mockup.

E. Accepted mockup may remain as part of the work.

1. Keep accepted mock-up installation open for observation as criteria for sprayed-on fireproofing work.
2. Protect mock-up from damage until Project Substantial Completion.

1.8 DELIVERY, STORAGE AND HANDLING

A. Delivery and Acceptance Requirements:

1. Do not deliver items to the site, until all specified submittals have been submitted to, and approved by, the Architect.
2. Deliver materials, factory proportioned and mixed, in original, unopened packages bearing the name of the product, manufacturer's name, plant identification, lot number and Underwriter's Laboratories, Inc. label.

B. Storage and Handling Requirements:

1. Store and handle materials following manufacturer's recommended procedures, and in accordance with material safety data sheets.
2. Store all materials in an elevated dry location, protected by waterproof coverings.
3. Protect materials from damage due to moisture, direct sunlight, excessive temperatures, surface contamination, corrosion and damage from construction operations and other causes.

C. Damaged material: Remove any damaged or contaminated materials from job site immediately, including materials in broken packages, packages containing water marks, or show other evidence of damage.

1.9 SITE CONDITIONS

A. Do not apply spray fireproofing when ambient temperature or surface temperature of substrate material is below 40 degrees Fahrenheit.

B. Provide ventilation in areas to receive fireproofing during and 24 hours after application, to cure fireproofing material.

1.10 WARRANTY

A. General: Submit warranties under provisions of Section 01 78 00 - CLOSEOUT SUBMITTALS.

B. Special Warranty: Provide 2 year warranty or bond which shall include failure of fireproofing, including: cracking, checking, dusting, flaking, spalling, separation and blistering. Failure to provide such performance will require re-installation to repair to satisfaction of Owner at no additional cost.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Acceptable Manufacturers: Subject to compliance with the requirements specified herein, manufacturers offering products which may be incorporated in the work include the following, or approved equal:

1. Carboline, Fireproofing Products, St. Louis MO. (“Carboline”)
2. GCP Applied Industries, Cambridge, MA. (“GCP”)
3. Isolatek International, Inc. “CAFCO”, Stanhope NJ.
4. Southwest Fireproofing Products Co. (*Division of Carboline*), Albuquerque, NM (“Southwest”).

2.2 DESCRIPTION

A. General: Spray applied fireproofing, factory proportioned and mixed meeting the following requirements:

1. Sprayed fireproofing materials (SFRM) shall be free of all forms of asbestos, including actinolite, amosite, anthophyllite, chrysotile, crocidolite and tremolite. Material manufacturer shall provide certification of such upon request.
2. Fireproofing materials shall not be subject to losses from finished application by sifting, flaking or dusting.
3. Fireproofing shall not deform more than 10 percent under 500 pound per square foot compressive forces in accordance with ASTM E761.
4. Bare, shop-coated, and galvanized steel sheets with the fireproofing applied shall be kept at 90 degrees Fahrenheit and 70 percent relative humidity for 240 hours without evidence of corrosion of steel, tested in accordance with ASTM E937.
5. Corrosion Resistance: When tested in accordance with ASTM E937, the material shall not promote corrosion of steel.
6. Combustibility: Fireproofing material shall have a maximum total heat release of 20 MJ/m^2 and a maximum 125 kw/m^{22} peak rate of heat release 600 seconds after insertion when tested in accordance with ASTM E1354 at a radiant heat flux of 75 kw/m^2 with the use of electric spark ignition. The sample shall be tested in the horizontal orientation.

7. Surface Burning Characteristics: When tested in accordance with ASTM E84, the material shall exhibit the following surface burning characteristics:
   a. Flame Spread 10
   b. Smoke Developed 0

B. Regulatory Requirements:
   1. Provide under Section 01 45 29 - TESTING LABORATORY SERVICES: Certification by an independent testing laboratory acceptable to the Owner, that materials, dry densities, thickness, and application procedures satisfy the requirements of the governing laws, building code, and UL requirements, with respect to the minimum protection requirements specified herein when tested in accordance with ASTM E119.

2.3 PERFORMANCE/DESIGN CRITERIA

A. Materials, procedures for application, dry densities, and thicknesses necessary to provide the required protection shall be tested and rated by UL in accordance with the procedures of UL 263 (ASTM E119) for the uses indicated

B. The UL listing for each fire rated assembly must state that the superimposed load used in the test was determined by Allowable Stress Design Method or Load and Resistance Factor Design Method. UL listings with a Load Restriction are not allowed.

C. Fire ratings interpolated or extrapolated from actual test data will not be acceptable. Provide evidence prior to application that proposed materials, installation methods and materials have been approved by all authorities having jurisdiction.

D. Thickness and density: Thickness and dry density of fire protection material shall be according to the manufacturer's data and UL requirements to provide the fire resistance ratings indicated on Drawings.

2.4 SPRAY APPLIED FIREPROOFING

A. Spray applied fireproofing Type A – "Light Density": For structural steel elements including: built-up trusses, steel deck, beams, and columns, and all other concealed applications except as otherwise indicated on the drawings, or as otherwise specified herein:
   1. Acceptable products:
      a. Carboline, product: "Pyrolite 15HY".
      b. GCP, product: "Monokote Type MK-6".
      c. Isolatek International, product: "Cafco 300".
      d. Southwest, product: "5GP".
   2. Performance Criteria:

Property	Test Method	Test value/results
Compressive Strength	ASTM E761	3.5 lb/in^2, minimum
Bond Strength	ASTM E736	200 lb/ft^2, minimum

Air Erosion	ASTM E859	3.5 grams/ft^2, maximum
Deflection	ASTM E759	No evidence of cracking or delamination
Bond Impact	ASTM E760	No evidence of cracking or delamination
Dry Density	ASTM E605	14 lb/ft, minimum

3. Deflection: When tested in accordance with ASTM E759, the material shall not crack or delaminate when the non-concrete topped galvanized deck to which it is applied is subjected to a one time vertical center load resulting in a downward deflection of 1/120th of the span.
4. Bond Impact: When tested in accordance with ASTM E760, the material shall not crack or delaminate from the concrete topped galvanized deck to which it is applied.
5. Cohesion/Adhesion (bond strength): When tested in accordance with ASTM E736, the material applied over uncoated or galvanized steel shall have a minimum bond strength of 150 psf (pounds per square foot) [667N].
6. Air Erosion: When tested in accordance with ASTM E859, the material shall not be subject to losses from the finished application greater than 0.025 grams per sq. ft.
7. Compressive Strength: When tested in accordance with ASTM E761, the material shall not deform more than 10 percent when subjected to a crushing force of 750 psf (pounds per square foot).
8. Density: When tested in accordance with ASTM E605, the material shall meet the minimum individual and average density values as listed in the appropriate UL design, or as required by the Authority having jurisdiction, or shall have a minimum average density of 15 pcf (pounds per cubic foot).
9. Resistance to Mold: Formulate the fireproofing material at the time of manufacturing with a mold inhibitor.
    a. Test fireproofing material per ASTM G21 and show resistance to mold growth for a period of 21 days for general use and 60 days for materials installed in plenums.
        1) Tested fireproofing material shall demonstrate resistance to mold growth when inoculated with aspergillus niger.
10. The material shall have been tested and reported by Underwriters Laboratories, Inc. (UL) in accordance with the procedures of UL 263 (ASTM E119).

B. Spray applied fireproofing Type B – “Medium Density”: Steel columns, steel framing and steel decking exposed within elevator shafts, and at all non-concealed (exposed to view) conditions:
    1. Acceptable products:
        a. Carboline, product: “Pyrolite 22”.
        b. GCP, product: “Monokote Type Z-106”.
        c. Isolatek International, product: “Cafco 400”.
        d. Southwest, product: “7GP”.

2. Density: When tested in accordance with ASTM E605, the material shall meet the minimum individual and average density values as listed in the appropriate UL/UC design or as required by the authority having jurisdiction, or shall have a minimum average of 22 pcf (pounds per cubic foot).
3. Cohesion/Adhesion (bond strength): When tested in accordance with ASTM E736, the material applied over uncoated or galvanized steel shall have a minimum bond strength of 430 psf (pounds per square foot) [1913N].
4. Compressive Strength: When tested in accordance with ASTM E761, the material shall not deform more than 10 percent when subjected to a crushing force of 7,344 psf (pounds per square foot).

C. Spray applied fireproofing Type C – “High Density”: For structural steel elements adjacent to louvers, exterior screens, and where exposed to weather.
1. Acceptable products:
a. Southwest, product: “7HD”.
b. Carboline, product: “Pyrocrete 40”.
c. GCP, product: “Monokote Type Z-146”.
d. Isolatek International, product: “Fendolite M-II”.
2. Density: When tested in accordance with ASTM E605, the material shall meet the minimum individual and average density values as listed in the appropriate UL/ULC design or as required by the Authority having jurisdiction, or shall have a minimum average of 39 pcf.
3. Cohesion/Adhesion (bond strength): When tested in accordance with ASTM E736, the material applied over uncoated or galvanized steel shall have an average bond strength of 1,000 psf (pounds per square foot) [4448N]
4. Compressive Strength: When tested in accordance with ASTM E761, the material shall not deform more than 10 percent when subjected to a crushing force of 43,200 psf (pounds per square foot).

2.5 ACCESSORIES

A. Potable water shall be used for the application of sprayed fireproofing materials.

B. Adhesive:
1. Bonding adhesive for fibrous materials as recommended and supplied by the fireproofing material manufacturer. Adhesive may be an integral part of the material or applied separately to surface receiving fireproofing material.

C. Sealer:
1. Carboline, product: “Carboguard 1390”.
2. GCP, product: “Firebond Concentrate”.
3. Isolatek International, product: “Bond-Seal”.
4. Southwest, product as recommended by manufacturer.

D. Mold Inhibitor: Mold inhibitor shall be added to fireproofing materials in accordance with manufacturer's instructions.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verification of Conditions: Inspect all surfaces and verify that they are in proper condition to receive the work of this Section.

1. Inspect all surfaces and verify that they are in proper acceptance of existing substrate and site conditions.
   a. Contact fireproofing manufacturer for procedures on handling primed / painted steel.
   b. Ensure clips, hangers, supports, sleeves and other attachments to the substrate are placed by others prior to the application of spray-applied fire resistive materials.
2. Beginning of installation means acceptance of existing substrate and project conditions.

3.2 PREPARATION

A. Close and seal ductwork in areas where fireproofing is being applied.

B. Provide temporary enclosures to prevent spray from contaminating air.

C. Protection of In-situ Conditions: Protect adjacent surfaces and equipment from damage by overspray and dusting. Mask adjacent work as required. Clean, or repair all existing materials which are soiled or otherwise damaged by Work of this Section, to match original profiles and finishes. Existing materials and finishes which cannot be cleaned, or repaired shall be removed and replaced with new work to match existing.

D. Surface Preparation:

1. Clean substrate of dirt, dust, grease, oil, loose material, or other matter which may effect bond of fireproofing.
2. Remove incompatible materials which affect bond by scraping, brushing, scrubbing, or sandblasting. Repair or replace any work so damaged and soiled.

3.3 MIXING AND APPLICATION

A. Mixing shall conform to manufacturer’s written instructions.

B. Materials and equipment shall be as approved by the materials manufacturer. Application shall be by licensed manufacturer’s applicators. Procedures shall be in strict accordance with said manufacturer’s directions and specifications. Only experienced, skilled mechanics approved by the materials manufacturer shall be allowed to place the materials. A qualified manufacturers representative shall be present for initial application to guide and assist applicator’s personnel.

C. Work shall comply with applicable UL standards in addition to the requirements imposed by the applicable laws and codes, for the indicated ratings, including local pollution control regulations.

D. Sprayed-on fireproofing shall be applied in the exact manner described in the certificates submitted to prove compliance with specified protection requirements. The fireproofing applicator shall be responsible for providing a controlled application of fireproofing material so that uniform quantity and thickness is maintained.

E. After completion of fireproofing work, equipment shall be removed and all surrounding wall and floor areas cleaned of deposits of sprayed-on fireproofing materials. Where hangers and other surfaces not requiring fireproofing have been sprayed unavoidably, the sprayed material shall be removed and the surfaces made clean.

3.4 REPAIR

A. Patch all areas of testing and any area where fireproofing has been damaged or removed during construction.

3.5 FIELD QUALITY CONTROL

A. Independent Testing Agency field inspection (Special Inspections will be performed under the provisions of Section 01 45 29 - TESTING LABORATORY SERVICES.

B. Perform the tests and inspections of completed Work in successive stages. Do not proceed with application of fireproofing for the next area until test results for previously completed applications of fireproofing show compliance with requirements. Tested values must equal or exceed values as specified and as indicated and required for approved fire-resistance design.

1. Prior to fireproofing application, verify surface preparation is in accordance with the written instructions of the approved manufacturer.
2. Verify substrate temperature before and after application is in accordance with the written instructions of the approved manufacturer.
3. Verify ventilation of area before and after application is in accordance with the written instructions of the approved manufacturer.
4. Measure average thickness per ASTM E605 and International Building Code, Chapter 17.
5. Determine density in accordance with ASTM E605 and International Building Code, Chapter 17.
6. Determine cohesive/adhesive bond strength in accordance with ASTM E736 and International Building Code, Chapter 1.
    a. Test bond strength to primed steel, painted steel and unpainted steel, as appropriate to project.
7. Test for bond impact strength: ASTM E760.

C. Ensure that applied fireproofing remains exposed to view until verification inspections and testing is made and approval of applied fireproofing is obtained. All costs for removal and replacement of prematurely installed materials to allow inspection of fireproofing shall be borne by the Contractor.

D. Fireproofing will be considered defective if it does not pass tests and inspections.

1. Remove and replace fireproofing that does not pass tests and inspections, and retest.
2. Apply additional fireproofing, per manufacturer's written instructions, where test results indicate insufficient thickness, and retest.

E. Inspection and testing shall verify that applied thickness and density meets manufacturer’s tested requirement standards for required fire-resistance ratings.

1. Where samples fail to meet thickness, quality, or dry density requirements, further sampling and testing will be required in the area of deficient sample. If such further testing indicates a deficient area, correction shall be made by the application of additional material or removal and replacement of faulty material.

3.6 CLEANING

A. Daily clean work areas by sweeping and disposing of debris. Place waste material in suitable bags or containers, and remove from site.

B. Upon completion of the work of this Section in any given area, clean walls, floors (including bare concrete slabs) and surrounding surfaces of overspray and drippings. Remove tools, equipment and all rubbish and debris from the work area; leave area in broom-clean condition.

C. Waste Management:

1. Recycle or dispose of off-site waste materials and trash at intervals approved by the Owner and in compliance with waste management procedures specified in Section 01 74 19 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL.

End of Section

Section 07 84 00

FIRESTOPPING

PART 1 - GENERAL

1.1 SUMMARY

A. Furnish and install fireproof firestopping, firesafing materials, smoke seals and related accessories required for this Project for all penetrations through fire resistance rated construction, including, but not limited to, penetrations for elevators, plumbing, fire suppression, heating, ventilating and air conditioning, electrical systems, and specialized equipment.

1. Fire resistance rated construction requiring firestopping includes, but is not limited to: floors, rated partitions, smoke barriers, smoke partitions, partitions in rated corridors, passageways and stairs, shaft partitions, shaft wall (vertical and horizontal), area separation fire walls, party wall systems, and temporary fire resistant rated partitions and barriers.
2. Provide removable temporary firestopping (pillows) as required to maintain fire integrity prior to Owner's final acceptance, to permit installation of electrical, telephone, data and sound system wiring. Replace temporary firestopping with permanent, after wiring systems are completed.

B. Furnish and install firestopping/smoke seals at construction joints occurring at tops of fire resistance rated partitions, smoke partitions, and temporary partitions between top of partition and underside of deck above.

C. Furnish and install all firestopping, firesafing, and smoke seals at perimeter of floor/roof construction and exterior wall systems, as indicated and where required by applicable codes.

D. Furnish and install all firestopping, firesafing, and smoke seals at expansion joints in chase walls where expansion joints are not exposed to view.

E. Furnish and install all firestopping, firesafing, and smoke seals where required by applicable codes and as additionally required by authorities having jurisdiction at no additional cost to the Owner.

1.2 RELATED REQUIREMENTS

A. Section 01 74 19 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL: Procedural and administrative requirements relating to recycling goals, waste management program and reporting.

B. Section 01 81 13 - SUSTAINABLE DESIGN REQUIREMENTS: Procedural and administrative requirements relating to required *Northeast CHPS Verified Program,* (NE-CHPS) Certification.

C. Section 04 20 00 - UNIT MASONRY: Masonry partitions.

D. Section 05 31 00 - STEEL DECKING: Metal floor and roof deck.

E. Section 07 81 00 - APPLIED FIREPROOFING: Spray applied fireproofing.

F. Section 09 29 00 - GYPSUM BOARD: Gypsum wallboard fireproofing.

G. Section 08 44 13 - GLAZED ALUMINUM CURTAIN WALLS: Multi-story glazed aluminum wall system.

H. Division 21 - FIRE SUPPRESSION: Fire protection system penetrations through fire resistance rated construction.

I. Division 22 - PLUMBING: Plumbing system penetrations through fire resistance rated construction.

J. Division 23 - HEATING, VENTILATING AND AIR CONDITIONING: Heating, ventilating and air conditioning system penetrations through fire resistance rated construction.

K. Division 26 - ELECTRICAL: Electrical penetrations through fire resistance rated construction.

1.3 REFERENCES

A. Referenced Standards: Comply with applicable requirements of the following standards and those others referenced in this Section, under the provisions of Section 01 42 00 - REFERENCES. The standards referenced herein are included to establish recognized minimum quality only. Where these standards conflict with other specified requirements, the most restrictive requirements shall govern. Equivalent quality and testing standards will be acceptable, subject to their timely submission, review and acceptance by the Architect.

1. ASTM C553 - Standard Specification for Mineral Fiber Blanket Thermal Insulation for Commercial and Industrial Applications.
2. ASTM C612 - Standard Specification for Mineral Fiber Block and Board Thermal Insulation.
3. ASTM C665 – Standard Specification for Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing.
4. ASTM E84 – Standard Test Method for Surface Burning Characteristics of Building Materials.
5. ASTM E119 – Standard Test Methods for Fire Tests of Building Construction and Materials.
6. ASTM E814 (ANSI UL 1479) – Standard Test Method for Fire Tests of Penetration Firestop Systems.
7. ASTM E2174 - Standard Practice for On-site Inspection of Installed Firestop Systems.
8. ASTM E2393 - Standard Practice for On-site Inspection of Installed Fire Resistive Joint Systems and Perimeter Fire Barriers.
9. NFPA 70 - National Electrical Code.
10. UL - Fire Resistance Directory.
11. UL 1479 - Fire Tests of Through Penetration Firestops.

B. Sustainability Requirement Reference: The following sustainability requirements are hereby made a part of this Section by reference thereto:

1. High Performance Schools Exchange, Northeast Energy Efficiency Partnerships NE-CHPS, (referred to herein as “NE-CHPS”).

1.4 SUBMITTALS

A. Information and Review Submittals: Submit the following under provisions of Section 01 33 00 - SUBMITTAL PROCEDURES:

1. Product Data: Manufacturer's product data sheets, specifications, performance data, and physical properties.
    a. Indicate requirements for manufacturer’s descriptive data for products and related materials with FM, UL or Warnock-Hersey illustrations showing systems and approval of materials in systems.
2. Certificates:
    a. Manufacturer's written certification stating that firestopping materials, meet or exceed the requirements specified under this Section and that all fire-resistive requirements for the indicated combustibility, Flame (F-rating) and Temperature (T-rating) Ratings have been met.
3. Manufacturer’s installation instructions.
4. Test reports: Submit fire test reports from recognized, independent testing agent(s) indicating the following:
    a. Fire test report of firestop material applied to substrate and penetration materials similar to project conditions. Tests to indicate both Flame (F-rating) and Temperature (T-rating) Ratings.
    b. Test reports of products to be used shall indicate conformance to ASTM E814.
5. On-site sample installation to be included in Work: Minimum thirty days prior to application in any area, provide samples of firestop and smokeseal materials and installation in accordance with the following requirements.
    a. Apply one sample of appropriate firestop and smokeseal material for each different penetration and fire rating required for the work.
    b. Sample areas will comply with thickness, fire resistance ratings, and finished appearance of the project and applicable fire code.
    c. Acceptance samples will constitute standard of acceptance for method of application, thickness, and finished appearance for firestop and smokeseal application. The sample(s) shall remain visible during completion of the work and shall remain as part of the completed work.
6. Shop drawings indicating requirements for penetrations in wall/deck intersections, change of planes, control joints, expansion joints and blank openings.
7. Sustainable Design Submittals: As required by NE CHPS.

1.5 QUALITY ASSURANCE

A. General: Notify the Architect where conflicts apply between referenced standards and existing materials, and existing methods of construction.

B. Sole Source: Obtain firestop and smokeseal products required for the Work of this Section from a single manufacturer, or from manufacturers recommended by the prime manufacturer of fireproofing, except as otherwise approved by Architect

C. Environmental Requirements for Volatile Chemicals: Use firestopping caulks that comply with the following limits for VOC content:

1. Firestopping caulks: VOC not more than 250 g/L.

D. Special Inspections: Allow for 3 percent of each type of firestopping system to be removed and inspected for conformance with approved submittals.

1. Firestopping shall be inspected prior to installation of suspended ceilings or concealed by other materials.

E. Qualifications:

1. Installer: a specialized subcontractor having not less than 3 years documented experience demonstrating previously successful work of the type specified herein.
   a. The manufacturer of the firestop material shall submit written certification that the firm to be used for the firestop products has been trained in the application of the products by the manufacturer.
2. Independent Third Party Firestopping Inspector: a specialized testing agency having not less than 5 years documented experience demonstrating previously successful work of the type specified herein.

1.6 MOCK-UPS

A. Provide mock-up under provisions of Section 01 43 39 – MOCK-UPS, or purpose of verifying quality of typical firestopping conditions.

B. Firestop at locations where accepted by Architect, or as directed. Schedule mock-up installation with Owner’s Project Representative for observation.

C. Accepted mockups may remain as part of the work.

1. Keep accepted mock-up installation open for observation as criteria for sprayed-on fireproofing work.
2. Protect mock-ups from damage until Project Substantial Completion.

1.7 DELIVERY, STORAGE AND HANDLING

A. Deliver and store firestopping materials in original, sealed, packages showing manufacturer’s identification and date of packaging.

B. Store and handle materials following manufacturer's recommended procedures, and in accordance with material safety data sheets.

C. Packaging Waste Management: Comply with packaging requirements specified under Section 01 60 00 - PRODUCT REQUIREMENTS.

1. Shipping materials: Manufacturer shall utilize to the greatest extent possible packaging materials which are biodegradable and recyclable.
2. Jobsite packaging waste management: Recycle packaging materials coordinated with general construction waste management specified under Section 01 74 19 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Acceptable Manufacturers: Subject to compliance with the requirements specified herein, manufacturers offering similar products include the following, or approved equal:

1. Bio Fireshield (A Division of Rectroseal), Houston TX.
2. Dow Corning Corporation, Midland MI.
3. Hilti, Inc. Tulsa OK.
4. 3M Company, Saint Paul MN.
5. Specified Technologies, Inc., Somerville NJ.
6. Metacaulk, (A Division of Rectroseal), Houston TX.
7. Tremco, Inc., Beachwood OH.

2.2 PERFORMANCE REQUIREMENTS

A. General: Provide materials and work to conform to Building Code Requirements in fire resistant wall and floor assemblies.

B. Regulatory Requirements:

1. Conform to applicable code for fire resistance ratings and surface burning characteristics.
2. Obtain certificate of compliance from authority having jurisdiction indicating approval of combustibility.

C. Manufacturer’s certified product test requirements:

1. All firestop/smokeseal material shall be tested by a recognized, independent testing agency and shall conform to both Flame (F-rating) and Temperature (T-rating) requirements of ASTM E814.
2. Conform to UL Fire Hazard Classification Requirements.
3. Tested and classified non-combustible per ASTM E84.

D. Firestops in place shall be of sufficient thickness, width, and density to provide a fire resistance rating at least equal to the floor, wall, or partition construction into which it is installed.

E. Non-combustible dams shall be constructed:

1. As necessary to achieve fire rating as tested and rated.

2. In conformance with installation requirements for type of floor, wall, and partition construction.
3. As recommended by firestop/smokeseal manufacturer.

F. Combustible damming materials, if used, must be removed after proper curing.

2.3 MATERIALS

A. Firestop mortar: asbestos free, cementitious mortar, U.L. classified as a "fill, void, or cavity material" for through penetration firestop system when tested in accordance with ASTM E814/UL1479.
1. Acceptable products, or approved equal:
a. Bio Fireshield, product “Novasit K-10”.
b. Hilti, Inc., product “CP 637 Firestop Mortar”.
c. Specified Technologies, Inc., product “SSM Firestop Mortar”.
d. Tremco Inc., product “Tremstop M”.

B. Firestop sealant: Single component, non-combustible firestop sealant, U.L. classified as a "fill, void, or cavity material" for through penetration firestop system when tested in accordance with ASTM E814/UL1479.
1. Acceptable products, or approved equal:
a. Bio Fireshield, product “Biotherm 100" (Gun Grade) or “Biotherm 200" (Self Leveling).
b. Hilti, Inc., product “CFS-S SIL GG” (Gun Grade).
c. Specified Technologies, Inc., product “SpecSeal SIL300 Sealant (gun grade)” or “SpecSeal SIL300SL" (Self Leveling).
d. 3M Company, product “Fire Barrier Silicone Sealants”.
e. Tremco Inc., product “Tremstop" (Gun Grade) or “Tremstop S/L" (Self Leveling).
2. Sealants will not dissolve in water.

C. Intumescent firestop sealant and caulks: Acrylic based, water resistant sealant, which will not re-emulsify after drying.
1. Acceptable products, or approved equal:
a. Bio Fireshield, product “Biostop 500".
b. Hilti, Inc., product “FS-ONE Intumescent Firestop Sealant” or “FS 657 Fireblock”.
c. Specified Technologies, Inc., product “SpecSeal SSS".
d. 3M Company, product “Fire Barrier Caulk CP25WB+".
e. Tremco Inc., product “Tremstop 1A".

D. Firestop putty: sticks or pads.
1. Acceptable products, or approved equal:
a. Bio Fireshield, product “Moldable Putty”.

b. Hilti, Inc., products “CP 617 Firestop Putty Pads”, “CP 618 Firestop Putty Stick,” and CFS-D 1 inch Firestop Putty Disk.”
c. Specified Technologies, Inc., product “SpecSeal Putty Bars and Pads”.
d. 3M Company, product “Fire Barrier Moldable Putty”.
e. Tremco Inc., product “Flowable Putty”.

E. Firestop collars: Pre-manufactured fire protective pipe sleeve, UL classified as "fill, void, or cavity material" for through penetration firestop system when tested in accordance with ASTM E814/UL1479.
1. Provide separated (two piece) firestop collar for application when plastic pipe system is already in place. Provide non-separated firestop collar for application prior to installation of plastic pipe system.
2. Acceptable products, or approved equal:
a. Bio Fireshield, product, product “Fireshield Pass-through Device”, or “Biostop Intumescent Sleeve.”
b. Hilti, Inc., product “CP 643 Firestop Collar”.
c. Specified Technologies, Inc., product “SpecSeal Collars”.
d. 3M Company, product “Fire Barrier PPD’s”.
e. Tremco Inc., product “Fyrecan sleeve”.

F. Firestop pillows: UL Classified as "fill, void, or cavity material" for through penetration firestop system when tested in accordance with ASTM E814/UL1479.
1. Acceptable products, or approved equal:
a. Bio Fireshield, product “Fireshield Firestop Pillows”.
b. Specified Technologies, Inc., product “SSB Firestop Pillows”.
c. Tremco Inc., product “Tremstop P.S”.

G. Wrap strips:
1. Acceptable products, or approved equal:
a. Bio Fireshield, product “FS-195”.
b. Hilti, Inc., product “CP 645-E Endless Wrap Strip, or CP 648-S Firestop Wrap Strip”.
c. Specified Technologies, Inc., product “Spec Seal Wrap Strip”.
d. 3M Company, product “Fire Barrier FS195 Wrap Strip”.
e. Tremco Inc., product “Tremco W.S”.

H. Mineral wool fiber / ceramic wool non-combustible insulation (fire safing): Conforming to ASTM C665, Type 1, ASTM C612, and ASTM C553 with a minimum density of 4 pounds per cubic foot.
1. Flame Spread Classification: Material shall be classified non-combustible per ASTM E814.
2. Recycled content of slag:: Use maximum available percentage of material (slag). Mineral wool insulation products incorporated into the work shall contain not less than 75 percent of recycled material (slag) by weight.

3. Acceptable products include:
    a. Fibrex Insulations Inc. Sarnia Ontario, Canada, product: “Fibrex FBX” Industrial board.
    b. Hilti, Inc., product, “CP 767 Speed Strips” or “CP 777 Speed Plugs”.
    c. Rock Wool Manufacturing Company, Leeds, AL, product: “Delta Safing Mineral Wool”.
    d. Roxul, Inc., product “Roxul Safe”.
    e. Thermafiber, Inc. product “Safing 4.0 pcf”.
4. Accessories: Provide galvanized steel safing clips as required for installation of insulation.

I. Elastomeric Firestopping: Non halogenated latex based elastomeric coating applied by airless spray.
1. Acceptable products, or approved equal:
    a. Bio Fireshield (A Division of Rectroseal), product “Biostop 750.”
    b. Hilti, Inc., product “CFS-SP-WB.”
    c. Specified Technologies, Inc., product “Spec Seal Elastomeric Firestop Spray”.

2.4 ACCESSORIES

A. Forming and damming materials: Mineral fiberboard or other type as recommended by firestopping manufacturer.

B. Primer, sealant and solvents: As recommended by manufacturer.

C. Woven wire mesh: Galvanized 20 gage woven wire mesh “chicken wire” or “poultry fencing”, 1 inch spacing.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verification of Conditions: Inspect areas and conditions where firestops are to be installed and notify the Architect of conditions detrimental to the proper and timely completion of the work. Do not proceed with the work until unsatisfactory conditions have been corrected.
1. Beginning of installation means acceptance of existing substrate and project conditions.

3.2 PREPARATION

A. Surface to receive firestops shall be free of dirt, dust, grease, oil, form release agents, or other matter that would impair the bond of the firestop material to the substrate or penetrating item(s).

B. Voids and cracks in substrate shall be filled and unnecessary projection removed prior to installation of firestops.

C. All penetrating items shall be permanently installed prior to firestop installation.

D. Substrate shall be frost, free and, when applicable, dry.

3.3 INSTALLATION

A. General

1. Installation of firestops shall be performed by applicators/installers qualified and trained by the manufacturer. Installation shall be performed in strict accordance with manufacturer's detailed installation procedures.
2. Apply firestops in accordance with fire test reports, fire resistance requirements, acceptable sample installations, and manufacturer's recommendations. Meet building code requirements.
3. Coordinate with plumbing, mechanical, electrical, and other trades to assure that all pipe, conduit, cable, and other items which penetrate fire rated construction have been permanently installed prior to installation of firestops. Schedule and sequence the work to assure that partitions and other construction which would conceal penetrations are not erected prior to the installation of firestops.
    a. Ensure that all firestopping is inspected prior to installation of suspended ceilings or concealed by other finished materials.

B. Dam construction

1. Install dams when required to properly contain firestopping materials within openings and as required to achieve required fire resistance rating. Combustible damming material must be removed after appropriate curing. Incombustible damming material may be left as a permanent component of the firestop system.
2. Placement of dams shall not interfere with function or adversely affect the appearance of adjacent construction.

C. Installation of single component silicone firestop

1. Apply with manual or powered caulking gun.
2. Apply minimum 1/2 inch thickness for 2 hour rating. Apply 1/2 inch to both sides of wall penetrations; one side only in floor penetrations.
3. Use incombustible insulation as required to achieve fire resistance rating.
4. Surface of gun grade silicone firestop may be tooled using clean, potable water.
5. Clean excess material off of adjacent surfaces and tools within 10 minutes using either water or Xylol where the use of such would not be hazardous.

D. Installation of cementitious firestop mortar.

1. Add dry powder to water and mix with mechanical mixer or hand mixing tools as recommended by firestop mortar manufacturer. Allow an average mixing time is 3 minutes and provide an average wet density of 70 pounds per cubic foot, plus or minus 5 PCF.

2. Do not apply if ambient or substrate temperature is less than 35 degrees Fahrenheit during 24 hours after application.
3. Wet all surfaces prior to application of firestop mortar.
4. Mortar may be hand applied or pumped into the opening.
5. Exposed surfaces shall be finished using conventional plastering tools prior to curing.
6. When installation around layered cables, it is recommended to increase the fluidity of the firestop mortar to provide a better fill around the cables. Vibrate or move the cables slightly to prevent voids from forming between the cables.
7. Allow 48 hours for initial cure prior to form removal. For full cure allow 27 days.
8. Wet material may be cleaned with water. Dry material may require scraping or chipping.

E. Installation of firestop collars (plastic pipe only)

1. Firestop collars may be surface mounted to a slab or wall or imbedded in Firestop Mortar to a maximum depth of 2 inches.
2. For wall penetrations with ABS pipe firestop collars must be installed on both sides of the penetration to provide a 2 hour F and T Rating. All other applications required installation on one side only to provide a 2 hour F and T Rating.

F. Firesafing insulation: Install firestopping safing insulation on safing clips spaced as needed between each stud and floor slab, leaving no voids. Secure safing clips to slab using fasteners recommended by insulation manufacturer. Install sealant over mineral wool in accordance with test requirements.

3.4 LABELING

A. Identify through-penetration firestop systems with pressure-sensitive, self-adhesive, preprinted vinyl labels. Attach labels permanently to surfaces of penetrated construction on both sides of each firestop system installation where labels will be visible to anyone seeking to remove penetrating items or firestop systems.

1. Include the following information on labels

WARNING: THROUGH-PENETRATION FIRESTOP SYSTEM-DO NOT DISTURB. NOTIFY FACILITY MANAGER OF ANY DAMAGE.

- *Contractor's name, address, and phone number.*
- *Through-penetration firestop systems designation of applicable testing and inspecting agency.*
- *Date of installation.*
- *Through-penetration firestop systems manufacturer's name.*
- *Installer's name.*

3.5 FIELD QUALITY CONTROL

A. Inspecting Agency: Owner will engage a qualified independent inspecting agency to inspect through-penetration firestop systems and to prepare test reports.

1. Inspecting agency will state in each report whether inspected through-penetration firestop systems comply with or deviate from requirements.

B. Proceed with enclosing through-penetration firestop systems with other construction only after inspection reports are issued.

C. Where deficiencies are found, repair or replace through-penetration firestop systems so they comply with requirements.

3.6 SCHEDULE

A. General: Typical penetrations are indicated below with list of standard firestopping/smokeseal approaches. Actual firestopping materials and combination of materials will vary with size of penetration and with individual firestopping manufacturer's approved UL Design System Requirements. Use only UL Design System materials for each penetration that best matches the wall and floor construction.

1. Where penetrations occur for which no listed UL or WH Design System test exists, obtain from the firestop system manufacturer an engineered system acceptable to the authorities having jurisdiction for firestopping such penetrations. Engineered system from manufacturer shall include a detail drawing showing the engineered system and shall contain no disclaimers.

B. Single metal pipe (non-insulated) and conduit penetrations through floors:

1. Firestop mortar.
2. Silicone Firestop sealant.
3. Intumescent firestop sealant.
4. Firestop putty, sticks or pads.
5. Mineral fiber / ceramic wool non-combustible insulation (fire safing) in conjunction with a firestop sealant.

C. Single metal pipe (non-insulated) and conduit penetrations through walls:

1. (masonry and concrete walls only) Firestop mortar and putty.
2. Intumescent firestop sealant over mineral fiber / ceramic wool non-combustible insulation (fire safing).
3. Intumescent firestop sealant with wrap strips.

D. Multiple metal pipe and conduit penetrations through floors:

1. Firestop mortar and wrap strips.
2. Intumescent firestop sealant over mineral fiber / ceramic wool non-combustible insulation (fire safing).

E. Multiple metal pipe and conduit penetrations through walls:

1. Firestop mortar and putty.
2. (through masonry walls only) Firestop pillows with woven wire mesh.
3. Silicone Firestop sealant over mineral fiber / ceramic wool non-combustible insulation (fire safing).

F. Insulated metal pipe penetrations through floors:

1. Firestop mortar and wrap strips.
2. Silicone Firestop sealant over mineral fiber / ceramic wool non-combustible insulation (fire safing).
3. Intumescent firestop sealant over mineral fiber / ceramic wool non-combustible insulation (fire safing).
4. Silicone Firestop sealant over wrap strip.
5. Mineral fiber / ceramic wool non-combustible insulation (fire safing) in conjunction with a firestop sealant.

G. Insulated metal pipe penetrations (single and multiple) through walls:

1. Firestop mortar with wrap strips.
2. Intumescent firestop sealant over mineral fiber / ceramic wool non-combustible insulation (fire safing).
3. Intumescent firestop sealant over mineral fiber / ceramic wool non-combustible insulation (fire safing) and Wrap strips.
4. (multiple penetrations through masonry walls only) Firestop pillows with woven wire mesh.

H. Duct penetrations through floors or walls:

1. Rectangular and square ducts: Intumescent firestop sealant over mineral fiber / ceramic wool non-combustible insulation (fire safing), and steel flanges provided under Division 23.
2. Round ducts: Intumescent firestop sealant over mineral fiber / ceramic wool non-combustible insulation (fire safing).

I. Combustible plastic pipe and conduit penetrations through floors:

1. Firestop mortar with wrap strips.
2. Firestop mortar with firestop putty and firestop collars.
3. Silicone firestop sealant over mineral fiber / ceramic wool non-combustible insulation (fire safing).
4. Silicone firestop sealant and firestop collars.
5. Intumescent firestop sealant and firestop collars.
6. Intumescent firestop sealant over mineral fiber / ceramic wool non-combustible insulation (fire safing) with firestop collars.
7. (maximum pipe size 2 inches) Intumescent firestop sealant over mineral fiber / ceramic wool non-combustible insulation (fire safing) with wrap strips.

J. Combustible plastic pipe and conduit penetrations through walls:

1. Intumescent firestop sealant over mineral fiber / ceramic wool non-combustible insulation (fire safing).
2. Intumescent firestop sealant with firestop collars.

K. Cable penetrations through floors:

1. Silicone Firestop sealant over mineral fiber / ceramic wool non-combustible insulation (fire safing).
2. Intumescent firestop sealant over mineral fiber / ceramic wool non-combustible insulation (fire safing).

L. Cable penetrations through walls:
1. Silicone Firestop sealant over mineral fiber / ceramic wool non-combustible insulation (fire safing).
2. Intumescent firestop sealant over mineral fiber / ceramic wool non-combustible insulation (fire safing).
3. (single penetrations only) Firestop putty.
4. (electrical boxes) Firestop pads.
5. Firestop putty over mineral fiber / ceramic wool non-combustible insulation (fire safing).

M. Cable tray penetrations:
1. (floors only) Firestop mortar.
2. Firestop pillows with woven wire mesh containment, and Firestop putty, sticks or pads for filling voids.
3. Firestop pillows with woven wire mesh containment, and Firestop mortar at perimeter and firestop putty, sticks or pads for filling voids.

N. Bus ducts through floors:
1. Firestop mortar and wrap strips.
2. Intumescent firestop sealant over mineral fiber / ceramic wool non-combustible insulation (fire safing) and 28 gage (minimum) steel cover plate.

O. Blank openings:
1. Firestop mortar.
2. Silicone Firestop sealant over mineral fiber / ceramic wool non-combustible insulation (fire safing).

P. Fire rated joints:
1. Silicone Firestop sealant over backer rod or bond breaker.

Q. Floor to curtain wall assemblies:
1. Silicone Firestop sealant/mastic over mineral fiber / ceramic wool non-combustible insulation (fire safing).

R. Construction joints at head of wall/floor assemblies:
1. Silicone Firestop sealant/mastic over mineral fiber / ceramic wool non-combustible insulation (fire safing).
2. Elastomeric spray over mineral fiber / ceramic wool non-combustible insulation (fire safing).

S. Smoke barrier sealant for dampers, fire door frames:

1. Silicone Firestop sealant.

T. Temporary sealing of openings and penetrations:

1. Firestop putty, sticks or pads.
2. Firestop pillows.

End of Section

Section 07 92 00

JOINT SEALANTS

PART 1 - GENERAL

1.1 SUMMARY

A. General: The work of this Section consists of sealants and backing materials where shown on the Drawings, as specified herein, and as required for a complete and proper installation.

1. This Section specifies general requirements, definition of joint sealer types, and application requirements for sealant work specified within other individual specification sections.

B. Prepare sealant substrate surfaces.

C. Furnish and install sealant and backing materials.

D. Furnish and install expanding foam sealant.

1.2 RELATED REQUIREMENTS

A. Section 01 74 19 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL: Procedural and administrative requirements relating to recycling goals, waste management program and reporting.

B. Section 01 81 13 - SUSTAINABLE DESIGN REQUIREMENTS: Procedural and administrative requirements relating to required *Northeast CHPS Verified Program,* (NE-CHPS) Certification.

C. Section 04 20 00 - UNIT MASONRY.

D. Section 06 10 00 - ROUGH CARPENTRY.

E. Section 07 54 19 – POLYVINYL CHLORIDE (PVC) ROOFING (ALTERNATE 2): Sealant used in conjunction with the application of single ply membrane roofing.

F. Section 07 62 00 - SHEET METAL FLASHING AND TRIM: Sealant integral with flashing.

G. Section 07 84 00 - FIRESTOPPING: Firestopping sealants and related backing materials.

H. Section 08 43 13 - ALUMINUM-FRAMED STOREFRONTS: Perimeter sealant at exterior of storefront framing.

I. Section 08 44 13 - GLAZED ALUMINUM CURTAIN WALLS: Perimeter sealant at exterior of curtain wall framing.

J. Section 08 80 00 - GLAZING: Sealant used in conjunction with setting glass.

K. Section 09 29 00 - GYPSUM BOARD: Application of concealed acoustical sealant used in conjunction with gypsum board work at abutting surfaces (perimeter of partitions and walls).

L. Section 09 91 00 - PAINTING: Caulks used in preparation of applied finish coatings.

1.3 REFERENCES

A. Referenced Standards: Comply with applicable requirements of the following standards and those others referenced in this Section, under the provisions of Section 01 42 00 - REFERENCES. The standards referenced herein are included to establish recognized minimum quality only. Where these standards conflict with other specified requirements, the most restrictive requirements shall govern. Equivalent quality and testing standards will be acceptable, subject to their timely submission, review and acceptance by the Architect.

1. ASTM C510 – Standard Test Method for Staining and Color Change of Single- or Multicomponent Joint Sealants.
2. ASTM C717 - Standard Terminology of Building Seals and Sealants.
3. ASTM C719 - Standard Test Method for Adhesion and Cohesion of Elastomeric Joint Sealants Under Cyclic Movement (Hockman Cycle).
4. ASTM C790 – Guide for Use of Latex Sealants
5. ASTM C804 – Practices for Use of Solvent-Release Type Sealants.
6. ASTM C834 - Standard Specification for Latex Sealants.
7. ASTM C919 - Standard Practice for Use of Sealants in Acoustical Applications.
8. ASTM C920 - Standard Specification for Elastomeric Joint Sealants.
9. ASTM C1193 – Standard Guide for Use of Joint Sealants.
10. ASTM C1247 - Standard Test Method for Durability of Sealants Exposed to Continuous Immersion in Liquids.
11. ASTM C1248 – Standard Test Method for Staining of Porous Substrate by Joint Sealants.
12. ASTM C1330 - Standard Specification for Cylindrical Sealant Backing for Use with Cold Liquid-Applied Sealants.
13. ASTM D1056 - Standard Specification for Flexible Cellular Materials - Sponge or Expanded Rubber.
14. ASTM C1521 - Standard Practice for Evaluating Adhesion of Installed Weatherproofing Sealant Joints
15. ASTM D3960 - Standard Practice for Determining Volatile Organic Compound (VOC) Content of Paints and Related Coatings.
16. ASTM G155 - Standard Practice for Operating Xenon Arc Light Apparatus for Exposure of Non-Metallic Materials.

B. Inclusionary References: The following reference materials are hereby made a part of this Section by reference thereto:

1. SWRI – Sealant and Caulking Guide Specification.

C. Sustainability Requirement Reference: The following sustainability requirements are hereby made a part of this Section by reference thereto:

1. High Performance Schools Exchange, Northeast Energy Efficiency Partnerships NE-CHPS, (referred to herein as “NE-CHPS”).

1.4 ADMINISTRATIVE REQUIREMENTS

A. Pre-Installation Meetings: At least two weeks prior to commencing the work of this Section, conduct a pre-installation conference at the Project site. Comply with requirements of Section 01 31 00 - PROJECT MANAGEMENT AND COORDINATION. Coordinate time of meeting to occur prior to installation of work under the related sections named below.

1. Required attendees: Owner or designated representative, Architect, General Contractor, Sealant Installer’s/Applicator’s Project Superintendent, silicone sealant manufacturer’s technical representative and representatives of other related trades as directed by the Architect or Contractor, and representatives for installers of related work specified under the following Sections:
   a. Section 04 20 00 - Concrete Unit Masonry
   b. Section 06 40 00 - Architectural Woodwork
   c. Section 07 24 20 - Exterior Finish System
   d. Section 07 27 13 – Self-Adhering Sheet Air Barriers
   e. Section 07 62 00 - Sheet Metal Flashing and Trim: Sealant integral with flashing.
   f. Section 07 62 00 - Sheet Metal Flashing and Trim
   g. Section 08 43 13 - Aluminum-Framed Storefronts: Perimeter sealant at exterior of storefront framing.
   h. Section 08 44 13 - Glazed Aluminum Curtain Walls: Perimeter sealant at exterior of curtain wall framing.
   i. Section 09 30 00 - Tiling.
2. Agenda:
   a. Coordination of sealant work performed by other trades.
   b. Coordination and scheduling of sealant applications.
   c. Review of primer requirements.
   d. Preconstruction product testing.
   e. Sealant field testing.
   f. Protection of completed Work.
   g. Establish weather and working temperature conditions to which Architect and Contractor must agree.
   h. Emergency rain protection procedure.
   i. Discuss process for manufacturer’s inspection and acceptance of completed Work of this Section.

1.5 SUBMITTALS

A. Information and Review Submittals: Submit the following under provisions of Section 01 33 00 - SUBMITTAL PROCEDURES:

1. Product Data: Manufacturer's product data sheets, specifications, performance data, chemical and physical properties and installation instructions for each item furnished hereunder.
2. Selection Samples: Sample card indicating Manufacturer's full range of colors available for selection by Architect.
3. Verification Samples: 12 inch long samples of sealant for verification of color, installed where directed by Architect.
4. Stain resistance testing results for each natural stone material with specified sealants. Include additional testing for hydrophobic action after stone/sealant wetting and provide photographic records of tests.
5. Certificates: Manufacturer's certification that the Products supplied meet or exceed specified requirements.
6. Test and Evaluation Reports:
    a. Compatibility and adhesion test reports: Test reports from sealant manufacturer indicating that sealant proposed for use have been tested for compatibility and adhesion with actual samples of substrates to be used on this project. Include sealant manufacturer’s interpretation of test results, and recommendations for primers and substrate preparation specific to this Project.
7. Sustainable Design Submittals: As required by NE CHPS.

B. Closeout Submittals: Submit the following under provisions of Section 01 78 00 - CLOSEOUT SUBMITTALS.

1. Bonds and Warranty Documentation: Manufacturer’s standard Warranties and Guarantees.

1.6 QUALITY ASSURANCE

A. General: Notify the Architect where conflicts apply between referenced standards and existing materials, and existing methods of construction.

B. Sole Source: Provide sealants from a single manufacturer for all work of this Section to the greatest extent possible. Each individual type of sealant installed in the Work shall be from a single manufacturer.

C. Qualifications:

1. Installer/Applicator: Minimum of 3 years documented experience demonstrating previously successful work of the type specified herein.
2. Testing Agencies: To qualify for acceptance, an independent testing laboratory must demonstrate to Architect's satisfaction that it has the experience and capability to conduct satisfactory testing indicated without delaying progress of the Work.

D. Sustainability Standards:

1. Environmental Requirements for Volatile Chemicals: Use only interior sealants and caulks that comply with the specified limits for VOC content.

E. Preconstruction Compatibility and Adhesion Testing: Submit samples of all materials that will contact or affect joint sealers to joint sealer manufacturers for compatibility and adhesion testing, as indicated below:

1. Use test methods standard with manufacturer to determine if priming and other specific joint preparation techniques are required to obtain rapid, optimum adhesion of joint sealers to joint substrates.
    a. Perform tests under normal environmental conditions that will exist during actual installation.
2. Contractor shall submit for testing, and sealant manufacturer shall test at least 9 pieces of each type of material, including joint substrates, shims, and joint backer rods.
3. Schedule testing so that it does not delay the work.
4. Investigate materials failing these tests and obtain joint sealer manufacturer’s written recommendations for corrective measures, including use of specially formulated primers.
5. The Architect may waive part or all of these specific testing requirements if the sealant manufacturer is able to provide written certification, demonstration to the Architect’s satisfaction, that sealant and substrates are compatible and that sealant performance and adhesion will not be compromised by project conditions.

F. Product Testing: Provide comprehensive test data for each type of joint sealer based on tests conducted by a qualified independent testing laboratory on current product formulations within 24-month period preceding date of Contractor's submittal of test results to Architect.

1. Test elastomeric sealant for compliance with requirements specified by reference to ASTM C920. Include test results for hardness, stain resistance, adhesion and cohesion under cyclic movement (per ASTM C719), low-temperature flexibility, modulus of elasticity at 100% strain, effects of heat aging, and effects of accelerated weathering.
2. Include test results performed on joint sealers after they have cured 1 year.

G. Preconstruction Field Testing: Prior to installation of joint sealants, field-test their adhesion to joint substrates as follows:

1. Locate test joints where indicated or, if not indicated, as directed by Architect.
2. Conduct field test for each type of elastomeric sealant and joint substrate indicated.
3. Arrange for tests to take place with both Architect and joint sealer manufacturer's technical representative present.
4. Test Method: Test joint sealers by hand pull method described below:
    a. Install joint sealant in 5-feet joint lengths using same materials and methods for joint preparation and joint sealant installation required for completed Work. Allow sealant to cure fully before testing.

b. Make knife cuts as follows: A horizontal cut from one side of joint to the other followed by 2 vertical cuts approximately 2 inches long at side of joint and meeting horizontal cut at top of 2 inch cuts. Place a mark 1 in. from top of 2 inch piece.

c. Use fingers to grasp 2 inch piece of sealant above 1 in. mark; pull firmly down at 90 degree angle or more while holding a straightedge along side of sealant. Pull sealant out of joint to the distance recommended by sealant manufacturer for testing adhesive capability, but not less than that equaling specified maximum movement capability in extension; hold this position for 10 seconds.

5. Evaluation of field test results:

a. For sealant evidencing adhesive failure, determine if primer is required. If so, re-test using primer.

b. Sealant not evidencing adhesive failure from testing, in absence of other indications of noncompliance with requirements, will be considered satisfactory.

c. Do not use sealant which fails to adhere to joint substrates during testing.

6. Submit report to Architect with description of test, results, and recommended installation procedures to obtain proper adhesion.

a. Report whether or not sealant in joint connected to pull-out portion failed to adhere to joint substrates or tore cohesively. Include data on pull distance used to test each type of product and joint substrate.

1.7 MOCK-UPS

A. Provide mock-up under provisions of Section 01 43 39 – MOCK-UPS.

B. Field Constructed Mock-Ups: Prior to installation of joint sealers, apply elastomeric sealant to building joints in mock-ups for further verification of colors selected from sample submittals and to represent completed Work for qualities of appearance, materials, and application:

1. Joints in field-constructed mock-ups of assemblies specified in other Sections which are indicated to receive elastomeric joint sealant specified in this Section.

2. Retain accepted mock-ups during construction as standard of quality for judging completed construction.

C. Accepted mock-ups may not remain as part of the work. Maintain mock-up during construction for workmanship comparison; remove and legally dispose of mock-up when no longer required.

1.8 DELIVERY, STORAGE AND HANDLING

A. Each container and package must bear an unbroken seal, test number and label of the manufacturer upon delivery to the site. Failure to comply with these requirements shall be sufficient cause for rejection of the material in question, by

the Architect and his requiring its removal from the site. New material conforming to said requirements, shall be promptly furnished at no additional cost to the Contract.

B. Store sealants within sealant manufacturer's recommended optimum temperature range for at least 16 hours before use. Store backer rod and bond breaker tape in clean dry areas at 70 deg. F so that will not become damp, wet, or frost covered

1.9 SITE CONDITIONS

A. Do not install single component solvent curing sealant in enclosed building spaces.

B. Environmental Requirements: Maintain temperature and humidity recommended by the sealant manufacturer during and 24 hours after installation. Do not proceed with installation of joint sealers under the following conditions:

1. When ambient and substrate temperature conditions are below 40 degrees F.
2. When joint substrates are wet due to rain, frost, condensation, or other causes.

C. Do not proceed with installation of joint sealers until contaminates capable of interfering with their adhesion are removed from substrates.

1.10 WARRANTY

A. Furnish the following warranties under provisions of Section 01 78 00 - CLOSEOUT SUBMITTALS, and in compliance with Section 01 78 36 – WARRANTIES:

1. Warranties shall be effective starting from Date of Project Substantial Completion and are effective for specified term lengths.

B. Manufacturer’s warranties shall guarantee sealants installed are free of manufacturing defects and conforms to the published physical properties and referenced standards effective at time of installation.

1. Sealant performance: Manufacturer’s warranties shall include coverage for the following listed failures, when sealants are applied in accordance with manufacturer’s written instructions. Warranty to include coverage for:
   a. Sealant will not become brittle, tear or crack due to normal exposure or normal expansion or contraction.
2. Warranty period:
   a. Silicone sealants on vertical surfaces: 20 years.
   b. Urethane sealants on vertical surfaces: 5 years.
   c. Urethane sealants on horizontal surfaces: 5 years.

C. Special Manufacturer's Warranty - Five years from date of Substantial Completion manufacturer agrees to furnish material only to repair or replace those joint sealants that do not comply with the performance or other specified requirements in the Section. Warranty: Include coverage of installed sealants that fail to achieve air tight and watertight seal, exhibit loss of cohesion or adhesion, or do not cure. Include coverage of sealants that revert to an uncured state. Warranty shall be transferable with no dollar limit and shall be non-pro-rated. Warranty shall not require Owner's signature to be effective.

D. Special Installer's Warranty: Provide 3 year warranty or bond which shall include coverage of installed sealant and accessories which fail to achieve air tight and watertight seal, exhibit loss of adhesion or cohesion, or do not cure.

1. Installer’s warrant shall include coverage for sealant that fails cohesively or adhesively. Installer agrees to provide material and labor to repair or replace joint sealants that do not comply with the performance or other specified requirements in the Section.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Specified Manufacturers and Products: To establish a standard of quality, design and function desired, Drawings and specifications have been based on the products specified under this section for each individual sealant type, for the applications scheduled at the end of Section, and as may be additionally identified on the Drawings.

B. Acceptable Manufacturers: Subject to compliance with the requirements specified herein, manufacturers offering products which may be incorporated in the work include the following, or approved equal:

1. Bostik, Inc., Wauwatusa, WI.
2. Chem Link Inc., Schoolcraft, MI.
3. Dow Corning Corporation, Auburn MI.
4. Emseal Joint Systems Ltd., Westborough MA.
5. GE Construction Sealants, Huntersville, NC. (GE)
6. Hilti, Inc. Tulsa OK.
7. Master Builders Solutions Construction Systems US, LLC., Shakopee, MN (Master Builders).
8. Momentive Performance Materials (GE Silicones), Waterford NY.
9. Owens Corning, Toledo, OH.
10. Pecora Corporation, Harleysville PA.
11. Phenomenal Brands, Baltimore, MD.
12. Schul International Company, Inc. (Sealtite), Pelham, NH.
13. Sika Corp, Lyndhurst NJ.
14. Specified Technologies, Inc. (STI), Somerville NJ.
15. STS Coatings, Inc., Comfort TX.
16. Tremco, Inc., Beachwood OH.
17. Williams Products Inc., Troy MI.
18. York Manufacturing, Inc., Sanford ME.

2.2 SEALANT MATERIALS

A. Sealant Materials, General Requirements:

1. Only use sealant and primers that comply with the following limits for VOC content:
   a. Architectural Sealants: 250 g/L.
   b. Roofing Sealants: 420 g/L.
   c. Roadway Sealants: 250 g/L.
   d. Sealant primer: 250 g/L.
2. Sealants containing aromatic solvents, fibrous talc, formaldehyde, halogenated solvents, mercury, lead, cadmium, chromium and their compounds, are not permitted.

B. Joint Sealer Type AA (Acrylic acoustical): One component acrylic latex, permanently elastic, non-staining, non-shrinking, non-migrating and paintable.
   1. Owens Corning, product: “QuietZone Acoustical Sealant.”
   2. Pecora, product “ AC-20 FTR”.
   3. Specified Technologies, Inc. (STI), product “Smoke ‘N” Sound Acoustical Sealant”. (spray applied).
   4. Tremco, product “Tremco Acoustical Sealant”.
   5. Hilti, product CP-506 Smoke and Acoustical Sealant.

C. Joint Sealer Type AP (Acrylic Painters caulk): One component acrylic latex caulking compound, conforming to ASTM C834 Type P, Grade NF, paintable within 24 hours after application, with a minimum movement capability of ±12.5 percent, equal to one of the following:
   1. Bostik, product, “Chem-Calk 600”.
   2. Master Builders, product, “MasterSeal NP 520”.
   3. Pecora, product “ AC-20+”.
   4. Tremco, product, “Tremflex 834”.

D. Joint Sealer Type BP (Bitumen modified polyurethane, 1-component): Pouring grade self-leveling bitumen modified single component urethane sealant, with a minimum movement capability of ±25 percent, equal to one of the following:
   1. Master Builders, product “MasterSeal CR 125”.
   2. Sika, product “Sikaflex 1C SL”.
   3. Tremco, product “Vulkem 45 SSL”.

E. Joint Sealer Type BPM (Modified polyurethane, Multi-component): Pouring grade, self-leveling bitumen modified two component urethane sealant, conforming to ASTM C920, Type M, Grade P or NS, Class 25 and FS SS-S-00227E, Type 1, Class A, with a minimum movement capability of +25/-25 percent, equal to one of the following:
   1. Pecora, product “Urexpan NR-300”.
   2. Tremco, product “Vulkem THC 900/901”.
   3. Sika, product “Sikaflex 2C NS TG”.

F. Joint Sealer Type FSB (Expanding Foam type backer sealant) for dual seal application: Low modulus secondary expanding foam sealant fabricated from stabilized acrylic impregnated expanding foam sealant and cross-linked ethylene vinyl acetate (EVA) closed cell foam equal to one of the following:

1. Emseal, product “Backerseal”.
2. Schul (Sealtite Brand), product “Sealtite B”.
3. Tremco, product “Willseal 600”.

G. Joint Sealer Type FJS (Expanding Foam Joint Sealant): Open cell polyurethane foam impregnated with an acrylic-polymer-modified, non-drying water-based asphalt emulsion.

1. Impregnation agent to have proven non-migratory characteristics.
2. Compression when expanded in joint shall be at approximately 25% of its uncompressed dimension (4x compression).
3. Material to be supplied in sticks or rolls, precompressed to less than joint size at mean temperature for ease of installation.
    a. Roll material will contain a nylon mesh (to reduce stretching) embedded into a pressure-sensitive adhesive on one side of the material.
    b. Stick material to contain a pressure-sensitive adhesive on one face for aide in application.
4. Color: Black.
5. Acceptable products, or approved equal:
    a. Emseal, product “25V”.
    b. Schul (Sealtite Brand), product “Sealtite Standard”.
    c. Tremco, product “WillSeal 600” or “ExoAir Trio”

H. Joint Sealer Type FCJ (Expanding Foam-Colored Joint): Low modulus, pre-coated silicone faced and impregnated preformed, pre-compressed, self-expanding, sealant system.

1. Performance Properties:
    a. Movement capability of +50 percent, -50 percent, (100 percent) of nominal material size.
    b. Shore A hardness per ASTM D2240: 15 pts.
    c. Staining per ASTM C510: None.
    d. Xenon arch weathermeter for 2000 hours per ASTM G26: No visible deterioration or performance change.
    e. Surface weathering for 6000 hours per ASTM G26: Minimal hardness change.
2. Expanding foam to be cellular foam impregnated with a water-based, non-drying, 100% acrylic dispersion.
3. Seal combines a factory-applied, low-modulus silicone with a backing of acrylic-impregnated expanding foam.

a. For inside and outside corner transitions use factory-manufactured universal 90 degree single units containing a minimum 12 inch long leg and a 6 inch long leg or custom leg on each side of the direction change or through field fabrication in strict accordance with published installation instructions.

4. Acceptable products, or approved equal:
   a. Emseal, product “ColorSeal”.
   b. Schul (Sealtite Brand), product “Color Econoseal”.
   c. Williams, product “Everlastic Wide Joint Seal”.
   d. Tremco, product “Color Coreseal SAF-V”.

I. Joint Sealer Type HL (Horizontal-self-Leveling, 1-component): Pouring grade self-leveling modified urethane or neutral cure silicone sealant, conforming to ASTM C920 Type S, Grade P, Class 25, with a minimum movement capability of ±25 percent, equal to the following:
   1. GE silicones, product “Tosseal 817” (silicone).
   2. Master Builders,, product, “MasterSeal SL1” (urethane).
   3. Pecora, product “Urexpan NR201” (urethane).
   4. Sika, product, “Sikaflex 1CSL” (urethane).
   5. Tremco, product “Vulkem 45 SSL” (urethane).

J. Joint Sealer Type HLM (Horizontal-self-Leveling, Multi-component): Pouring grade self-leveling multi-component urethane sealant, conforming to ASTM C920, with a minimum movement capability of ±25 percent, equal to the following:
   1. Master Builders, product, “MasterSeal SL2”.
   2. Pecora, product “DynaTrol II-SG”.
   3. Sika, product, “Sikaflex 2CSL”.
   4. Tremco, product, “THC-900 / THC-901”.

K. Joint Sealer Type HT (Horizontal-Trowel): Trowel grade multi-component modified-urethane or neutral-cure silicone paste sealant, conforming ASTM C920, with a minimum movement capability of ±25 percent, equal to the following:
   1. GE silicones, product “Tosseal 811” (silicone).
   2. Master Builders, product “Masterseal NP2” (urethane).
   3. Pecora, product “Dynatred” (urethane).
   4. Sika, product “Sikaflex 2CTG” (urethane).
   5. Tremco, product “THC-901” (urethane).

L. Joint Sealer Type PE (Polyether): Low modulus type, Single-component non-sagging gun-grade, low-odor, neutral curing polyether, sealant, conforming to ASTM C920, Type S, Class 25, Grade NS, use NT, T, M, G, A and O with a minimum movement capability of ±25 percent, equal to the following:
   1. Master Builders, product, “MasterSeal NP150”.
   2. STS Coatings, product “GreatSeal PE-150” Sealant.

3. Chem Link, product “MetaLink”.
4. York Manufacturing, product: “LT-100 Polyether Sealant”.

M. Joint Sealer Type PUM50 (Polyurethane, Multi-component, 50 percent movement): Low modulus type, Multi-component non-sagging gun-grade polyurethane sealant, conforming to ASTM C920, Type M, Class 50, Grade NS, use NT,M, A and O with a minimum movement capability of ±50 percent, equal to the following:

1. Tremco, product “Dymeric 240FC”. [50% movement]
2. Pecora, product “Dynatrol II”. [50% movement]

N. Joint Sealer Type SC (Silicone, general construction): One-part medium modulus, natural cure, synthetic sealant, having a useful life expectancy of at least 20 years, conforming to ASTM C920, Type S, NS, Class 50, use NT, G, A, M, O with a minimum movement capability of ±50 percent, equal to the following:

1. Dow Corning, product, “791”.
2. GE Silicones, product, “Silpruf”.
3. Pecora, product, “895”.
4. Sika, product, “Sika Sil-C 995”.
5. Tremco, product, “Spectrem 2”.

O. Joint Sealer Type SF (Silicone, Food contact): One component silicone rubber, acceptable to local health officials, conforming to U.S. Food and Drug Administration regulation 21 CFR 175.105 and 175.300, and ASTM C920, Type NS, Class 25, Use NT, G, O and A with a minimum movement capability of ±25 percent, and a Shore A minimum hardness of 20, equal to the following:

1. Dow Corning, product, "732".
2. GE Silicones, product "Series SCS1000".
3. Tremco, product “Tremsil 200”.

P. Joint Sealer Type SM (Silicone, Mildew-resistant): USDA approved one component acetoxy silicone rubber, mildew resistant, acceptable to local health officials, conforming to U.S. Food and Drug Administration regulation 21 CFR 177.2600, and ASTM C920, Type S, Class 25, Grade NS, use NT,G and A with a minimum movement capability of ±25 percent, and a Shore A hardness of 20, equal to the following:

1. Dow Corning, product "786".
2. GE Silicones, product "Sanitary 1700".
3. Tremco, product "Tremsil 200 Sanitary".
4. Pecora, product "898NST".

Q. Joint Sealer Type ST (Silicone, at Tile): medium modulus, neutral cure silicone sealant, having a useful life expectancy of at least 20 years, conforming to ASTM C920, Type S, NS, Class 25, Use: T1, T2, NT, I, M, G, A and O. with a minimum movement capability of +25 percent and -25 percent, equal to the following:

1. Mapei Corporation, Elk Grove IL., product: “Mapesil T”.

2. Custom Building Products, product: “Commercial 100% Silicone Sealant.”
3. Laticrete: product “Latasil.”

R. Joint Sealer Type SX (Silicone, Exterior construction): Medium modulus, neutral curing, low to no bleed silicone passing ASTM C1248, having a useful life expectancy of at least 20 years, conforming to ASTM C920, Type S, Grade NS, Class 50, with a minimum movement capability of +50 percent and -50 percent, equal to the following:

1. Dow Corning, product, “795”.
2. GE Silicones, product, “SCS9000 SilPruf NB”.
3. Sika, product “Sikasil-WS-295”.
4. Tremco, product “Spectrem 4-TS”.

2.3 ACCESSORIES

A. Compressible joint bead back-up: Compressible closed cell polyethylene, extruded polyolefin or polyurethane foam rod complying with ASTM C1330, Type C (losed cell material with a surface skin), 25 to 33 percent greater in diameter than width of joint. Shape and size of compressible back-up shall be as recommended by manufacturer for the specific condition used. Provide one of the following, or equal.

1. Construction Foam Products (Division of Nomaco, Inc.), Zebulon, NC, product “HBR Closed Cell”.
2. Industrial Thermo Polymers Ltd., Brampton, Ontario CN, product “ITP Standard Backer Rod”.
3. BASF Construction Chemicals (Sonneborn), Shakopee MN, product "Sonolastic Closed Cell Backer Rod".
4. W.R. Meadows Inc., Hampshire, IL, product “Sealtight Kool-Rod”.

B. Primers: Furnish and install joint primers of the types, and to the extent, recommended by the respective sealant manufacturers for the specific joint materials and joint function.

C. Bond-breaker tape, and temporary masking tape: Of types as recommended by the manufacturer of the specific sealant and caulking material used at each application, and completely free from contaminants which would adversely affect the sealant and caulking materials.

1. Liquid bond breaker and duct tape are not permitted.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine joints indicated to receive joint sealants, with Installer present, for compliance with requirements for joint configuration, installation tolerances, and other conditions affecting joint-sealant performance.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. General:

1. Weather conditions must be dry and of the temperature, as recommended by sealant manufacturer, during application operations.
2. Surface receiving work of this section must be absolutely dry and dust free. All joints receiving sealant/caulking materials and primers shall be subject to the approval of the sealant manufacturer for proper use of specified materials.

B. Thoroughly clean all joints, removing all loose mortar, oil, grease, dust, frost, and other foreign materials that will prevent proper adhesion of primers and sealant materials.

1. Clean ferrous metals of all rust and coatings by wire brush, grinding or sandblasting. Remove oil, grease and protective coatings with cleaners recommended by sealant manufacturer.

C. Prime joint substrates**,** as recommended in writing by joint-sealant manufacturer**,** as based on preconstruction joint-sealant-substrate tests or as based upon prior experience. Apply primer to comply with joint-sealant manufacturer's written instructions. Confine primers to areas of joint-sealant bond; do not allow spillage or migration onto adjoining surfaces.

D. Verify that joint backing and release tapes are compatible with sealant.

E. Perform preparation in accordance with ASTM C804 and C790 for solvent and latex base solvents, respectively.

3.3 INSTALLATION

A. General: Conform to SWRI requirements, and sealant manufacturer’s written requirements for installation.

B. Install joint bead back-up in all joints in excess of 5/8-inch depth, and joints that have no back-up therein, placing the joint bead in the joint in a manner that will assure a constant depth 1/8 inch greater than the sealant and caulking material depth tolerances.

1. Set beads into joints continuously, by slightly stretching during placement, to permit compression against sides of joint, without surface wrinkles or buckles.
2. Do not stretch back-up material into joints.

C. Install bond breaker in joints where shown in the Drawings and wherever recommended by the sealant manufacturer to prevent bond of the sealant to surfaces where such bond might impair the Work.

D. Apply masking tape or other precautions to prevent migration or spillage of materials onto adjoining surfaces.

E. Apply urethane sealants, silicone sealants, and latex caulking materials into joints in accordance with manufacturer's instructions, using mechanical or power caulking

gun equipped with nozzle of appropriate size, with sufficient pressure to completely fill the joints.

1. The depth of sealant and caulking materials shall be in accordance with manufacturer's recommendations for the specific joint function, but in no case exceed 1/2-inch in depth, nor less than 1/4-inch, regardless of the joint width.
2. Maintain the outer edge of the sealant and caulking materials, where side faces of joints are in the same plane, back 1/8-inch from the faces.
3. Apply sealant in continuous beads without open joints, voids or air pockets so as to provide a watertight and airtight seal for the entire joint length.
4. After placement of the sealant and caulking materials, concave-tool the surfaces to uniform density, using a water-wet tool. Do not use detergents or soapy water for the tooling operations.
5. Remove the temporary masking tape immediately after tooling, and before the sealant or caulking material has taken initial set.

F. Take care not to block-off weep tubes or any through wall opening constructed to allow weeping of accumulated water.

G. Apply pouring self-leveling urethane sealant (Sealant designation **HL**) into horizontal joints in accordance with manufacturer's instructions, to a level approximately 1/16 inch below adjacent surfaces.

1. Apply sealant without open joints, voids or air pockets so as to provide a watertight and airtight seal for the entire joint length.
2. After placement of the sealant and caulking materials, concave-tool the surfaces to uniform density, using a water-wet tool. Do not use detergents or soapy water for the tooling operations.
3. Remove the temporary masking tape immediately after tooling, and before the sealant has taken initial set.

3.4 INSTALLATION PRE-FORMED FOAM SEALANTS

A. General: The joint configuration and the joint surfaces shall be as detailed in the Drawings and in accordance with the current material Tech Data available from the Manufacturer. Field measurements of the depth and width of the joint shall be supplied to manufacturer before material is ordered.

B. Joint sealer/expansion joint material to be installed in strict accordance with the manufacturer's instructions.

1. Installed each length of sealant immediately after removing protective wrapping, taking care not to pull or stretch material.
2. Install in manner to provide seal continuity at ends, turns and intersections of joints.
3. Provide additional wet seal joints where required by manufacturer.

C. Remove all strip-off waste materials and excess foam sealant from site immediately upon completion of work.

3.5 CLEANING

A. Clean all surfaces of adjacent surfaces which have been marked or soiled by the work of this Section, removing all excess sealant and caulking materials with solvents which will not damage the surfaces in any way.

3.6 PROTECTION

A. During the operation of sealant work, protect the work of other trades against undue soilage and damage by the exercise of reasonable care and precautions. Repair or replace any work so damaged and soiled.

3.7 SCHEDULE

A. General: Seal joints indicated and all interior and exterior joints, seams, and intersections between dissimilar materials.

B. Sealant Type Groups:
   1. “A” sealants: Acrylic.
      a. Type AA: Acoustical.
      b. Type AP: Painter’s Caulk.
   2. “BP” sealants: Bitumen modified Polyurethane.
      a. Type BPM: Bitumen modified polyurethane, multi-component.
   3. “F” sealants: pre-compressed, expandable Foam.
      a. Type FSB: Expandable foam, backer sealant.
      b. Type FJS: Expandable foam Joint Sealant.
      c. Type FCJ: Expandable foam Joint Sealant having factory applied color.
      d. Type FCS: Expandable foam submersible joint sealant.
   4. “H” sealants: ‘Horizontal types’.
      a. Type HL: Self-leveling sealant, single-component.
      b. Type HLM: Self-leveling, multi-component.
      c. Type HT: Trowel (at sloped surfaces)
   5. “PE” sealants: Polyether.
      a. Type PE: concealed sealant at joints with flashings and air barriers
   6. “PU” sealants: Polyurethane.
      a. Type PU35: Polyurethane single component, 35% movement.
      b. Type PUM50: Polyurethane multi-component, 50% movement.
   7. “S” sealants: Silicone.
      a. Type SC: General construction silicone (at interiors).
      b. Type SF: Mildew resistant silicone suitable for food service.
      c. Type SM: Mildew resistant silicone (at bathrooms, showers, janitors, kitchens)
      d. Type ST: Silicone sealant for tile work.

e. Type SV: Stone veneer silicone, non-staining (at stone work).

f. Type SX: Medium modulus silicone sealant for designated exterior work.

C. Sealant Colors:

1. Colors for Sealant (typical): As selected by the Architect from manufacturer's standard colors, except as specified otherwise herein below.
2. Colors for Sealant Type "ST": Matching tile grout color.
3. Color for Sealant Types "AA" and "AP": White.
4. Color for Sealant Type "PE": Black.
5. In concealed installation, and in partially or fully exposed installation where so approved by the Architect, standard gray or black sealant may be used.

D. Specialty Joint Conditions:

1. Sealing termination bars and through-wall flashing in cavity walls: Sealant type: PE.
2. Sealant at tiling: Type ST.

E. Exterior joints (Listed by primary building material abutting sealant joints):

1. Concrete (including precast):

Joint Condition		Sealant Type
a.	Concrete to concrete, vertical control joints:	SX
b.	Concrete to concrete vertical expansion joints greater than 2 inch width:	FCJ
c.	Concrete foundation walls to abutting concrete, and other non-bituminous pavements, steps, platforms, and ends of ramp, (horizontal joints):	HLM
d.	Concrete slabs on grade to abutting non-bituminous pavements (horizontal joints, including pedestrian traffic surfaces):	HLM
e.	Concrete to concrete saw cut and tooled control and isolation joints in horizontal surfaces including pedestrian traffic surfaces:	HL or HLM
f.	Concrete to concrete control, expansion and isolation joints in horizontal vehicular traffic surfaces:	BPM
g.	Concrete and non-bituminous sloped (5% to 12%) pavement ramps (horizontal joint) at abutting concrete or masonry foundation walls:	HT
h.	Concrete to all items which penetrate exterior concrete walls, including, but not necessarily limited to, door frames, louver frames, pipes, vents, and similar items:	SX

i.	Precast concrete to abutting materials (vertical joints):	SV or SX
j.	Precast concrete to precast concrete at parapets, cornices, and ballustrades and protruding belt courses:	SV or SX

2. Exterior Masonry (Excluding Natural Stone):

Joint Condition		Sealant Type
a.	Masonry to masonry, expansion and control joints, 1 inch and less:	SX
a.	Masonry to masonry, expansion and control joints greater than 1 inch:	FSB+SX
b.	Masonry to masonry, expansion joints greater than 2 inch width:	FCJ
c.	Masonry to abutting masonry, or concrete:	SX
a.	Masonry to abutting stone:	SV
b.	Masonry to abutting non-porous materials (painted metals, anodized aluminum, mill finished aluminum, PVC, glass, and similar materials):	SE
c.	Masonry to all items which penetrate exterior masonry walls, including, but not necessarily limited to, door frames, louver frames, pipes, vents, and similar items:	SE

3. Exterior Stone:

Joint Condition		Sealant Type
a.	Stone to stone, expansion and control joints:	SV
b.	Stone to abutting masonry, stone or concrete:	SV
c.	Stone to abutting non-porous materials (painted metals, anodized aluminum, mill finished aluminum, PVC, glass, and similar materials):	SV
d.	Stone to all items which penetrate exterior stone walls, including, but not necessarily limited to, door frames, louver frames, pipes, vents, and similar items:	SV
e.	Stone to stone at parapets, cornices, and ballustrades and protruding belt courses:	PUM

4. EFS (Exterior Finish System):

Joint Condition		Sealant Type
a.	EFS to EFS, vertical control joints	SX
b.	EFS to abutting materials:	SX

c.	EFS to all items which penetrate EIFS walls, including, but not necessarily limited to, door frames, louver frames, pipes, vents, and similar items:	SX

5. Exterior Metal:

Joint Condition		Sealant Type
a.	Metal to metal:	SX
b.	Metal to glass:	SX

6. Exterior wood and plastic:

Joint Condition		Sealant Type
a.	Wood to wood (natural or stained finishes):	PU35
b.	Wood to wood (painted opaque finishes):	PU35
c.	Wood to metal:	PU35
d.	Wood to Cellular PVC:	PU35
e.	Cellular PVC to Cellular PVC:	PU35

7. Exterior PVC:

Joint Condition		Sealant Type
a.	PVC to PVC:	SC
b.	PVC to wood (natural or stained finishes):	SC
c.	PVC to wood (painted opaque finishes):	SC
d.	PVC to masonry:	SE

8. Fiber Cement siding, panels and trim elements:

Joint Condition		Sealant Type
a.	Fiber cement to fiber cement, vertical control joints	PUM50
b.	Fiber cement to abutting materials:	PUM50
c.	Fiber cement to all items which penetrate fiber cement siding and panels, including, but not necessarily limited to, door frames, louver frames, pipes, vents, and similar items:	PUM50

F. Interior joints (Listed by primary building material abutting sealant joints):

1. Interior Concrete:

Joint Condition		Sealant Type
a.	Concrete to concrete (including precast), vertical joints:	SC
b.	Concrete to concrete: horizontal walkable surfaces:	HLM

c.	Concrete to concrete horizontal vehicular traffic surfaces (including forklift):	BPM
d.	Concrete and non-bituminous pavement ramps (5 to 12 Percent) horizontal joints at abutting vertical concrete or masonry surfaces:	HT
e.	Concrete to all items which penetrate concrete walls, including, but not necessarily limited to, door frames, louver frames, pipes, vents, and similar items:	SC
f.	Precast concrete to abutting materials (vertical joints):	SC

2. Interior Masonry (excluding stone):
* Includes interior side of exterior masonry walls.

Joint Condition		Sealant Type
a.	Masonry to masonry control joints*:	SC
b.	Masonry* to Gypsum board:	SC
c.	Masonry to all items which penetrate masonry walls, including, but not necessarily limited to, window frames, door frames, louver frames, and similar items:	SC
d.	Masonry to all pipes, conduit and vents which penetrate non-rated masonry walls*:	SC

3. Gypsum Board:

Joint Condition		Sealant Type
a.	Gypsum board to metal or wood trim:	AP
b.	Gypsum board to abutting surfaces at exposed tops and bottoms partitions and walls:	AA
c.	Gypsum board to masonry:	SC
d.	At gaps and spaces between gypsum board to interior door and window frames, penetrating conduits and piping, building specialty items, ductwork, and similar items:	AP
e.	Gypsum board to plumbing fixtures:	SM

4. Plaster and veneer plaster:

Joint Condition		Sealant Type
a.	Plaster to metal or wood trim:	AP
b.	At gaps and spaces between plaster to interior door and window frames, penetrating conduits and piping, building specialty items, ductwork, and similar items:	AP
c.	Plaster to plumbing fixtures:	SM

5. Architectural millwork and casework:

Joint Condition	Sealant Type
a. Casework to abutting materials, kitchens, toilet rooms and similar “wet spaces”:	SM
b. Casework to abutting surfaces (except in “wet” spaces):	AP
c. Countertops to abutting wall surfaces and to abutting casework:	SM
d. Countertops to plumbing fixtures and fittings:	SM

6. Interior metal:

Joint Condition	Sealant Type
a. Metal to metal:	SC

7. Interior floor drains:

Joint Condition	Sealant Type
a. Floor drains to concrete slab:	SC or SX
b. Floor drains to resilient sheet flooring:	SC or SX

8. Acoustical ceilings:

Joint Condition	Sealant Type
a. Acoustical ceiling edge angle to irregular wall surface	AP

9. Tile:

Joint Condition	Sealant Type
a. Tile to tile vertical, and horizontal non-traffic joints:	ST
b. Tile to tile, horizontal pedestrian traffic joints:	ST
c. All tile to door frame or wood trim joints will be caulked	ST
d. All control joints in tile will be caulked.	ST

10. Sanitary plastic wall and ceiling panels to abutting surfaces

Joint Condition	Sealant Type
a. Sanitary plastic panels to abutting materials:	SF

11. Interior Wood:

Joint Condition	Sealant Type
a. Wood to wood (natural or stained finishes)	SC
b. Wood to wood (painted opaque finishes)	AP or SC
c. Wood to metal	SC
d. Wood base to wall surfaces	SC

End of Section

Section 07 95 13

CONSTRUCTION AND EXPANSION JOINTS

PART 1 - GENERAL

1.1 SUMMARY

A. Furnish and install pre-finished interior fire rated and non-rated joint assemblies for wall, floor, and ceiling surfaces to maintain required fire ratings and at all exposed joints.

1.2 RELATED REQUIREMENT

A. Section 01 60 00 - PRODUCT REQUIREMENTS: Listing of VOC requirements for adhesives, cleaning/maintenance materials, paints, coatings, and sealants.

B. Section 01 74 19 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL: Procedural and administrative requirements relating to recycling goals, waste management program and reporting.

C. Section 01 81 13 - SUSTAINABLE DESIGN REQUIREMENTS: Procedural and administrative requirements relating to required *Northeast CHPS Verified Program,* (NE-CHPS) Certification.

D. Section 04 20 00 - UNIT MASONRY: Placement of joint assembly frames in masonry.

E. Section 07 92 00 - JOINT SEALANTS: Expansion and control joint finishing utilizing a sealant.

F. Section 09 29 00 - GYPSUM BOARD: Installation of wall board construction.

1.3 REFERENCES

A. Referenced Standards: Comply with applicable requirements of the following standards and those others referenced in this Section, under the provisions of Section 01 42 00 - REFERENCES. The standards referenced herein are included to establish recognized minimum quality only. Where these standards conflict with other specified requirements, the most restrictive requirements shall govern. Equivalent quality and testing standards will be acceptable, subject to their timely submission, review and acceptance by the Architect.

1. ASTM B221 - Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Shapes, and Tubes.
2. ASTM C864 - Dense Elastomeric Compression Seal Gaskets, Setting Blocks, and Spacers.
3. ASTM C920 - Elastomeric Joint Sealants.
4. ASTM D1187 - Asphalt Base Emulsions for Use as Protective Coatings for Metal.
5. ASTM D2287 - Non-rigid Vinyl Chloride Polymer and Copolymer Molding and Extrusion Compounds.

6. ASTM E84 - Surface Burning Characteristics of Building Materials.
7. ASTM E119 - Test Methods of Building Construction and Materials.
8. ASTM E1399 - Cyclic Movement and Measuring the Minimum and Maximum Joint Widths of Architectural Joint Systems.
9. ASTM E1966 - Standard Test Method for Fire-Resistive Joint Systems.
10. NAAMM, applicable publications.

B. Sustainability Requirement Reference: The following sustainability requirements are hereby made a part of this Section by reference thereto:

1. High Performance Schools Exchange, Northeast Energy Efficiency Partnerships NE-CHPS, (referred to herein as “NE-CHPS”).

1.4 SUBMITTALS

A. Information and Review Submittals: Submit the following under provisions of Section 01 33 00 - SUBMITTAL PROCEDURES:

1. Literature: Manufacturer's product data sheets, specifications, profile dimensions, types of anchorage devices for each type of joint cover assembly furnished hereunder.
2. Manufacturer’s installation instructions: Indicate rough-in sizes; provide templates for cast-in or placed frames or anchors; required tolerances for item placement
3. Shop drawings: Large scale design details of joint assemblies showing joint and splice locations, miters, layout of the work, affected adjacent constructions, anchorage locations and complete installation details.
4. Selection samples: Finished metal samples, indicating Manufacturer's full range of colors available for selection by Architect.
5. Verification samples: 12 inch long samples of joint a cover assemblies, illustrating profile, dimension, color, and finish selected.
6. Sustainable Design Submittals: As required by NE CHPS.

1.5 QUALITY ASSURANCE

A. Obtain products required for the Work of this Section from a single manufacturer, except as otherwise acceptable to the Architect/Engineer.

B. Notify the Architect where conflicts apply between referenced standards, specified materials, and methods of construction.

1.6 DELIVERY, STORAGE AND HANDLING

A. Do not deliver items to the site, until all specified submittals have been submitted to, and approved by, the Architect.

B. Deliver materials in original packages, containers or bundles bearing brand name, identification of manufacturer or supplier.

1.7 FIELD MEASUREMENTS

A. Take field measurements before preparation of shop drawings and fabrication, where possible, to ensure proper fitting of Work.

B. Allow for adjustments within specified tolerances wherever taking of field measurements before fabrication might delay Work.

1.8 SEQUENCING AND SCHEDULING

A. Provide all necessary templates and rough-in measurements required for installation of expansion control assemblies. Coordinate formed blockouts and recesses in concrete to receive joint cover assemblies.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Subject to compliance with the requirements specified herein, manufacturers offering products which may be incorporated in the work include the following or approved equal:

1. MM Systems Corporation, Tucker, GA.
2. Balco, Metallines, Wichita, KS.
3. Construction Specialties, Muncy, PA.

2.2 EXPANSION JOINTS, GENERAL REQUIREMENTS

A. General: Provide expansion joint cover assemblies of design, basic profile, materials and operation indicated required to accommodate joint size variations in adjacent surfaces, and for anticipated structural movement.

1. Provide units comparable to those indicated or required to accommodate joint size, variations in adjacent surfaces, and dynamic structural movement without material degradation or fatigue when tested according to ASTM E 1399.
2. Furnish units in longest practicable lengths to minimize number of end joints. Provide hairline mitered corners where joint changes directions or abuts other materials.
    a. Include closer materials and transition pieces, tee-joints, corners, curbs, cross-connections, and other accessories to provide continuous joint cover assemblies.

B. Moisture Barrier Systems:

1. Provide manufacturer's continuous, standard, flexible vinyl moisture barrier under exterior covers at locations indicated.
2. Provide additional accessories for complete system drainage to building exterior for exterior covers.

C. Fire-Resistance Systems:

1. Provide expansion joint cover assemblies identical to those of assemblies whose fire resistance has been determined per ASTM E119 and E814, NFPA 251, or UL 263 including hose stream test at full-rated period.
    a. Thermal insulation: Include thermal insulation where necessary, in accordance with above tests, with factory cut miters and transitions.
2. Fire rating: Not less than rating of adjacent floor or wall construction.
3. Fire Barrier: Provide manufacturer's continuous standard flexible fire barrier to provide required fire-resistive rating not less than the rating of adjacent construction.
    a. For joint widths up to and including 150 mm (six inches), supply barrier in lengths up to 15000 mm (50 feet) to eliminate field splicing.
    b. For joint widths of seven inches and wider, supply barrier 3000 mm (10-foot) modules with overlapping ends for field splicing.
    c. For joints within enclosed spaces such as chase walls, include 1 mm (0.032-inch) thick galvanized steel cover where conventional expansion joint cover is not used.

D. Metal Floor-to-Floor Joint Cover Assemblies:
1. Provide continuous extruded metal frames of profile indicated with seating surface and concealed bolt and anchors embedded in concrete.
2. Provide assemblies formed to receive cover plates of design indicated. Furnish depth and configuration to suit type of construction and to produce a continuous flush wearing surface with adjoining finish floor surface.
3. Provide self-centering cover plates with concealed centering device secured in, or on top of frames.

E. Floor-to-Wall Joints: Provide one frame on floor side of joint only. Provide wall side frame where required by manufacturer's design.

F. Interior Wall, Ceiling, and Soffit Joint Cover Assemblies:
1. General: Interior wall and ceiling expansion joint cover assemblies shall be of same design and appearance. Interior wall and ceiling expansion joint cover assemblies shall have the following features:
    a. Provide cover assemblies designed for flush mounting with not exposed fasteners, except as specifically scheduled or indicated otherwise.
    b. Extend cover to lap each side of joint and to permit free movement on one side.
    c. Use angle cover plates at intersection of walls.

G. Joint Cover Assemblies with Preformed Seals: Joint cover assemblies consisting of continuously anchored aluminum extrusions and continuous extruded preformed seals of profile indicated or required to suit types of installation conditions shown. Furnish extrusions designed to be embedded in or attached to concrete with lugs. Vulcanize or heat-weld splices (if any) to ensure hermetic joint condition.

1. Cover Plate: Include extruded aluminum cover plate fastened to one side of joint and extend plate to lap each side of joint to permit free movement with cover in close contact with adjacent contact surfaces.

H. Compression Seals: Preformed, elastomeric extrusions having internal baffle system in sizes and profiles shown or as recommended by the manufacturer. Provide lubricant and adhesive for installation recommended by the manufacturer.

2.3 ACCESSORIES:

A. Fire Barrier: Manufacturer's standard type required for indicated fire resistance and fabricated of layers of ceramic fiber insulation, metallic insulation or silica fiber fabric.

B. Flame Sealant: Manufacturer's intumescent sealant to remain resilient to permit joint movement and, upon exposure to heat, resist penetration of fire through voids in construction.

C. Non-Shrink Grout: Premixed, factory packaged, non-ferrous aggregate, non-staining, shrinkage-resistant, non-corrosive, non-gaseous, ASTM C1107.

1. Minimum Strength at 28 Days: 5,000 PSI.

2.4 INTERIOR EXPANSION JOINTS

A. Expansion joint type 2A, floor to floor conditions: Expansion joint with clear anodized aluminum cover and base sized to accommodate abutting finish flooring thickness.

1. 2 inch joint size equal to MM Systems model number LAST 2-1.
2. Color of compression seal selected by Architect from manufacturer’s standard colors.

B. Expansion joint type 2B, wall to wall and wall to wall at corner conditions: Expansion joint occurring in masonry, surface mounted expansion joint with colored elastomeric compression seal:

1. 2 inch joint size, equal MM Systems, model number VSS-200.
2. Color of compression seal selected by Architect from manufacturer’s standard colors.

C. Expansion joint type 2C, wall to wall and ceiling to ceiling occurring in gypsum board, surface mounted, expansion joint with colored elastomeric compression seal

1. 2 inch joint size, equal MM Systems, VSW-200 series.
2. Color of compression seal selected by Architect from manufacturer’s standard colors.

D. Expansion joint type 2D, corner wall and corner-ceiling conditions, occurring in gypsum board, flush mounted expansion joint with colored elastomeric compression seal,

1. 2 inch joint size, equal MM Systems, model number VSWL-200.

2. Color of compression seal selected by Architect from manufacturer's standard colors.

E. Expansion joint type 2E, floor to wall conditions, occurring in gypsum base, flush mounted expansion joint with colored elastomeric compression seal,

1. 2 inch joint size, equal MM Systems, model number FSE-200.
2. Color of compression seal selected by Architect from manufacturer's standard colors.

2.5 FACTORY FINISHING

A. Exposed Aluminum Surfaces: Conform to Finish Designation system: AAMA 607.1.

1. Architectural Class I anodic coating, (AA designation M12C22A41) 0.7 mil thickness or greater, prepared with a mechanical M12, chemical C22 pre-treatment, clear anodized in color.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Inspect all surfaces and verify that they are in proper condition to receive the work of this Section. Verify that joint preparation and affected dimensions are acceptable.

B. Beginning of installation means acceptance of substrate and project conditions.

3.2 PREPARATION

A. Provide anchoring devices for installation and embedding, as detailed. Comply with manufacturer's instructions and recommendations for phases of Work, including preparing substrate, applying materials, and protecting installed units.

B. Coordinate and furnish anchorages, setting drawings, templates, and instructions for installation of expansion joint cover assemblies to be embedded in or anchored to concrete or to have recesses formed into edges of concrete slab for later placement and grouting-in of frames.

C. Fastening to In-Place Construction: Provide anchorage devices and fasteners where necessary to secure expansion joint cover assemblies to in-place construction, including threaded fasteners with drilled-in expansion shields for masonry and concrete where anchoring members are not embedded in concrete. Provide fasteners of metal, type, and size to suit type of construction indicated and provide for secure attachment of expansion joint cover assemblies

3.3 INSTALLATION

A. General:

1. Install components and accessories in strict accordance with manufacturer's instructions coordinated with abutting material installation.
   a. Perform all cutting, drilling, and fitting required to install expansion joint covers.

2. Align work plumb and level flush with adjacent finished surfaces.
    a. Set floor covers at elevations to be flush with adjacent finished floor materials, except as specifically indicated otherwise.
    b. Locate wall, ceiling, roof, and soffit covers in continuous contact with adjacent surfaces.
3. Securely anchor cover assembly frames to substrate to prevent misalignment. Install joint cover assemblies in true alignment and proper relationship to expansion joints and adjoining finished surfaces measured from established lines and levels.
    a. Securely attach in place with required accessories. Locate anchors at interval recommended by manufacturer, but not less than 3 inches from each end and not more than 24 inches on center.
4. Maintain continuity of expansion joints cover assemblies with a minimum number of end joints and align metal members mechanically using splice joints. Cut and fit ends to produce joints that will accommodate thermal expansion and contraction of metal to avoid buckling of frames
5. Adhere flexible filler materials (as detailed and appropriate to installed product) to frames with adhesive or pressure-sensitive tape as recommended by manufacturer.

B. Extruded Preformed Seals: Install seals complying with manufacturer's instructions and with minimum number of end joints. For straight sections provide preformed seals in continuous lengths. Vulcanize or heat-weld field splice joints in preformed seal material to provide watertight joints using procedures recommended by manufacturer. Apply adhesive, epoxy, or lubricant-adhesive approved by manufacturer to both frame interfaces before installing preformed seal. Seal transitions to manufacturer's instructions.

C. Fire Barriers: Install fire barriers in fire-resistance rated floors and walls according to manufacturer's instructions, and in compliance with tested assemblies. so that fire-rated construction is continuous. Provide transitions and end joints.

3.4 CLEANING

A. Upon completion of the work of this Section in any given area, remove tools, equipment and all rubbish and debris from the work area; leave area in broom-clean condition.

3.5 PROTECTION

A. Do not permit traffic over unprotected floor joint control assemblies; cover floor joints with plywood where wheel traffic occurs.

B. Provide removable strippable coating to protect finish surfaces. Do not remove strippable protective materials before all finish Work in adjacent areas is completed. Remove protective materials immediately prior to final inspection for Project Substantial Completion. When protective materials are removed, clean exposed metal surfaces to comply with manufacturer’s instructions.

End of Section

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Section 08 05 13

COMMON WORK RESULTS – DOOR AND HARDWARE INSTALLATION

PART 1 – GENERAL

1.1 SUMMARY

A. This Section includes general requirements for preparation, installation and temporary protection, for door frames, doors and door hardware. Work additionally includes:

1. Fitting and preparation of hardware for unfinished wood doors.
2. Installation of lock cylinders into special doors.

1.2 RELATED REQUIREMENTS

A. Section 01 74 19 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL: Procedural and administrative requirements relating to recycling goals, waste management program and reporting.

B. Section 01 81 13 - SUSTAINABLE DESIGN REQUIREMENTS: Procedural and administrative requirements relating to required *Northeast CHPS Verified Program,* (NE-CHPS) Certification.

C. Section 06 10 00 - ROUGH CARPENTRY: Wood Blocking.

D. Section 08 11 13 - HOLLOW METAL DOORS AND FRAMES.

E. Section 08 14 16 - FLUSH WOOD DOORS.

F. Section 08 34 73 - SOUND CONTROL DOORS.

G. Section 08 71 00 - DOOR HARDWARE.

H. Section 08 80 00 – GLAZING: Installation of field-installed glazing, with final installation of loosely-attached glazing stops.

1.3 REFERENCES

A. Referenced Standards: Comply with applicable requirements of the following standards and those others referenced in this Section, under the provisions of Section 01 42 00 - REFERENCES. The standards referenced herein are included to establish recognized minimum quality only. Where these standards conflict with other specified requirements, the most restrictive requirements shall govern. Equivalent quality and testing standards will be acceptable, subject to their timely submission, review and acceptance by the Architect.

1. ANSI A 117.1 - Specifications for Making Buildings and Facilities Accessible to and Usable by Physically Handicapped People.
2. ANSI/BHMA A156.115 - Hardware Preparation in Steel Doors or Steel Frames.

3. ANSI/BHMA A156.115W - Hardware Preparation in Wood Doors with Wood or Steel Frames
4. ANSI/SDI A250.8 – Recommended Specifications for Standard Steel Doors and Frames.
5. ANSI/SDI A250.11 – Recommended Erection Instructions for steel frames.
6. ASTM E119 - Standard Test Methods for Fire Tests of Building Construction and Materials.
7. NFPA publication 80 - Fire Doors and Windows.
8. WDMA Industry Standard IS 1A-13.
9. UBC 43.2 – Fire Tests of Door Assemblies.
10. UL 10B - Fire Tests of Door Assemblies.
11. UL 10C – Positive Pressure Fire Door Test Method.
12. Warnock-Hersey - Certification Listings for fire doors.
13. All applicable federal, state and municipal codes, laws and regulations for exits.

B. Sustainability Requirement Reference: The following sustainability requirements are hereby made a part of this Section by reference thereto:
1. High Performance Schools Exchange, Northeast Energy Efficiency Partnerships NE-CHPS, (referred to herein as “NE-CHPS”).

1.4 ADMINISTRATIVE REQUIREMENTS

A. Coordination:
1. General: Coordinate the work of this Section with the respective trades responsible for installing interfacing and adjoining work for proper sequence of installation, and ensure that the work performed hereunder is acceptable to such trades for the installation of their work.

B. Pre-Installation Meetings: At least two weeks prior to commencing the work of this Section, conduct a pre-installation conference at the Project site. Comply with requirements of Section 01 31 00 - PROJECT MANAGEMENT AND COORDINATION. Coordinate time of meeting to occur prior to installation of work under the related sections named below.
1. Required attendees: Owner or designated representative, Architect, General Contractor, and representatives of other related door and hardware trades as directed by the Architect or Contractor, and representatives for installers of related work specified under the following Sections:
a. Section 08 11 13 - Hollow Metal Doors and Frames.
b. Section 08 14 16 - Flush Wood Doors.
c. Section 08 34 73 - Sound Control Doors.
d. Section 08 71 00 - Door Hardware.
2. Agenda:
a. Scheduling of door and hardware installation.
b. Review of staging and material storage locations.

c. Coordination of work by other trades.

d. Installation procedures for ancillary equipment.

e. Protection of completed Work.

f. Establish weather and working temperature conditions to which Architect and Contractor must agree.

g. Emergency rain protection procedure.

h. Discuss process for manufacturer's inspection and acceptance of completed Work of this Section.

C. Sequencing:

1. Field Measurements

a. Take field measurements before preparation of shop drawings and fabrication, where possible, to ensure proper fitting of Work.

b. Allow for adjustments within specified tolerances wherever taking of field measurements before fabrication might delay Work.

D. Scheduling:

1. Coordinate schedule of construction, size of access and route to place of installation to prevent delay of installation due to physical impediments. Any work involving the demolition and reconstruction of partitions, walls, floors, roofing, windows, or doors to place and install the work of this Section shall be performed at no additional cost to the Owner.

1.5 SUBMITTALS

A. Information and Review Submittals: Submit the following under provisions of Section 01 33 00 - SUBMITTAL PROCEDURES:

1. Maintenance Material Submittals: Submit the following under provisions of Section 01 78 00 - Closeout Submittals. Clearly label and package extra materials securely to prevent damage.

2. Tools: Tools for maintenance: All special tools packaged with hardware items shall be saved, tagged/identified as to product use, and turned over to the Owner upon completion of the Work.

3. Sustainable Design Submittals: As required by NE CHPS.

B. Closeout Submittals: Submit the following under provisions of Section 01 78 00 - CLOSEOUT SUBMITTALS.

1. Operation and Maintenance Data:

2. Bonds and Warranty Documentation:

a. Manufacturer's Warranties and Guarantees as specified elsewhere herein this Section.

C. Maintenance Material Submittals: Submit the following under provisions of Section 01 78 00 - CLOSEOUT SUBMITTALS. Clearly label and package extra materials securely to prevent damage.

1. Spare Parts

2. Tools.

1.6 QUALITY ASURANCE

A. General: Notify the Architect where conflicts apply between referenced standards, specified materials, and methods of construction.

1.7 DELIVERY, STORAGE AND HANDLING

A. The Contractor is responsible to make certain that wood doors are not delivered until the building and storage areas are sufficiently dry so that the doors will not be damaged by excessive changes in ambient humidity and relative moisture content.

B. Delivery and Acceptance Requirements:

1. Do not deliver items to the site, until all specified submittals have been submitted to, and approved by, the Architect.
2. Deliver materials in original unopened packages, containers or bundles bearing brand name, and identification of manufacturer, with labels and package seals intact and legible.
    a. Tag or label packages with door opening number(s) coordinated with door and hardware schedule.
3. Inspect doors upon delivery for damage. Minor damage may be repaired provided the refinished items are equal in respects to new work and acceptable to the Architect; otherwise remove and replace damaged items.
4. Store wood doors flat on a level surface, in protected, elevated, dry areas; protect from exposure from all sources of light and moisture. When required to maintain manufacturer’s warranty, seal top and bottom edges if stored more than one week. Break packaging seal on-site to permit ventilation.

C. Storage and Handling Requirements:

1. Store and handle materials following manufacturer's recommended procedures, and in accordance with material safety data sheets.
2. Protect materials from damage due to moisture, direct sunlight, excessive temperatures, surface contamination, corrosion and damage from construction operations and other causes.

D. Packaging Waste Management: Comply with disposal and recycling requirements specified under Section 01 74 19 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL.

1. Shipping materials: Manufacturer shall utilize to the greatest extent possible packaging materials which are biodegradable and recyclable.
2. Jobsite packaging waste management: Recycle packaging materials coordinated with general construction waste management specified under Section 01 74 19 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL.

E. Damaged material: Remove any damaged or contaminated materials from job site immediately, including materials in broken packages, packages containing water marks, or show other evidence of damage, unless Architect specifically authorizes correction thereof and usage on project.

1.8 SITE CONDITIONS

A. Environmental Limitations: Do not deliver or install doors until spaces are enclosed and weather tight, wet work in spaces is complete and dry, and HVAC system is operating and maintaining ambient temperature and humidity conditions at occupancy levels during the remainder of the construction period

PART 2 - PRODUCTS

2.1 ACCESSORIES

A. Fasteners: Use fasteners furnished with hardware for installation.
   1. Where fasteners are not furnished with item, use fasteners of suitable size and type to harmonize with item as to material and finish and to suit material to which fastened.
   2. Use machine screws and metal expansion shields to secure hardware to concrete, ceramic or quarry tile, or solid masonry. Do not use fiber, plastic, and lead plugs or adhesives.
   3. Use non-ferrous metal fastenings exposed to weather.
      a. Brass/Bronze finish hardware: Bronze fasteners, matching finish of hardware.
      b. Aluminum, stainless steel and painted steel hardware: Type 302/304 stainless steel fasteners.
      c. Chrome finish hardware: Chrome plated brass/bronze fasteners.

B. Hinge Shims:
   1. Interior door shims:
      a. Typical hinges: steel shims in thickness for conditions required.
      b. Stainless steel hinges: Stainless steel, type 302 or 304, thickness for conditions required.
      c. Brass/bronze hinges with brass/bronze frames: Architectural bronze sheet in thickness for conditions required.
   2. Exterior door frame shims:
      a. All hinge materials: Stainless steel, type 302 or 304, thickness for conditions required.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verification of Conditions: Inspect all surfaces and verify that they are in proper condition to receive doors and frames.
   1. Verify that opening sizes and tolerances are acceptable and in compliance with these specifications and applicable codes.
   2. Beginning of installation means acceptance of existing substrate and project conditions.

3.2 PREPARATION

A. Protection of In-situ Conditions: During the operation of work of this Section, protect surrounding materials and finishes against undue soilage and damage by the exercise of reasonable care and precautions. Clean, or repair all in situ surfaces which are soiled or otherwise damaged by Work of this Section, to match indicated profiles and specified finishes. Materials and finishes which cannot be cleaned, or repaired shall be removed and replaced with new work in conformance with the Contract Documents.

3.3 GENERAL ERECTION/INSTALLATION FRAMES AND DOORS

A. General: Install frames and doors in accordance with the manufacturer's recommendations, ANSI/SDI-100, ANSI A250.8, SDI-105, NFPA-80.and the Door Hardware Institute recommendations. Install with a maximum diagonal distortion of 1/16 inch measured with a straight edge, corner to corner.

1. Install doors and frames plumb, square and level.

B. Installation of fire-resistance rated and smoke rated doors:

1. Install fire rated doors in accordance with NFPA 80.
2. Do not remove qualified testing and inspection agency label.

C. Final installation of loosely-attached glazing stops will be performed under Section 08 80 00 - GLAZING.

3.4 ERECTION/INSTALLATION METAL DOOR FRAMES

A. Steel Place in-position all steel frames, in accordance with the approved shop drawings and frame schedule.

1. During the installation of metal door frames, after the manufacturer’s steel shipping bars have been removed, install wood spreaders at door opening, carefully dimensioned to permit square and plumb installation of door frames and doors.
    a. Provide rigid temporary bracing for frames as required to ensure maintenance of positioning, and remove only after frames have been permanently anchored.
    b. For doors located in masonry work, maintain frame position with temporary bracing until frames are built-into-place, and grout has sufficiently cured to maintain frame position.
    c. Spreaders shall remain in place until doors are installed.
2. Coordinate installation of frames with the various trades installing abutting wall construction for anchor placement.
    a. Secure frames with the following number of anchors per jamb.
        1) For frames 7’-6” in height or less: 3 anchors per jamb.
        2) For frames 7’-6” in height or less and having doors exceeding 3’-0” feet width, and for cross corridor frames: 4 anchors per jamb.
        3) For frames greater than 7’-6”, up to 10’-0” in height: 4 anchors per jamb.

4) For frames greater than 7’-6”, up to 10’-0” in height, and having doors exceeding 3’-0” feet width, and for cross corridor frames: 5 anchors per jamb.
5) For frames over 10’-0’ in height: 5 anchors per jamb.

3. Secure frames, occurring in existing masonry, with expansion bolts and sleeves.
4. Where exposed fastener heads occur in frames, fill with automotive body filler and sand smooth.

3.5 GENERAL INSTALLATION DOORS AND HARDWARE

A. General: Install doors and door hardware in accordance with manufacturer's instructions and requirements of referenced organizations, and the requirements of Section 08 71 00 - DOOR HARDWARE.
1. Center doors in the opening or frame with contact surfaces fit tight and even without forcing or warping the components.
2. Do not hang wood doors in areas where materials are not sufficiently dry so as to not affect the dimensional stability of the door.
3. Replace doors and frames that do not conform to hardware height requirements.

B. Hang doors and install hardware when concrete work, plastering, tile setting, and other operations have been completed which increase humidity and dust in building.

C. Drill and tap screw holes in steel frames and doors for surface mounted hardware.

D. Install hardware at the location (heights) indicated on Drawings, or as otherwise required by regulatory requirements.

E. Install hardware (except hinges) after field painting of doors and frames, or field sealing of doors has been completed.

F. Carefully fit and securely attach hardware items to doors and frames.
1. For wood doors and wood frames: Pilot holes much be drilled for all screws that act as hardware attachments. Full-threaded wood screws shall be used.
a. Self-tapping or combination wood/metal screws are not to be used on wood doors, or wood frames.

G. Closers including those with hold-open features:
1. Where closers are mounted on doors, mount with hex nuts and bolts; fasten foot to frame with machine.
2. Mount to provide maximum door opening permitted by building construction or equipment.
3. Use regular arm mounting except where door swing is less than 90 degrees or closer is on interior of exterior door or door is equipped with roller latch.

H. Thresholds:

1. Install thresholds in a bed of sealant with machine screws and expansion shields.
2. Cut thresholds to closely fit jambs.
3. Drill and cut for door holders and bottom bolts where required.

I. Rain Drips: Install rain drips for heads of door frames not protected by canopy or soffit.

J. Weatherstripping and seals:

1. Accurately cut and fit weatherstrips and seals. Carefully aligned for full contact and tight seal and secure firmly to maintain weatherproof, waterproof, and lightproof seal without preventing smooth and easy operation of doors.
2. Provide suitable blocking where necessary to clear hardware; and make adjustments as required to meet special conditions encountered.
3. Prime paint wood surfaces which have been cut with wood sealer before weatherstrips are installed.
4. Light seals: Install seals on door frames for lightproof doors. Secure seals to door frames at jamb and heads with contact adhesive to prevent infiltration of light.
5. Sound control devices: Install sound rated door gasketing and bottom seal, and adjust to obtain the specified sound rating.
6. Automatic Door Bottoms: Install automatic door bottom so that gasket is automatically forced down to tightly seal instantly when the door is fully closed, and raised instantly when the door begins to open. Mount automatic door bottom to provide 5 mm (3/16 inch) clearance at door bottom.

3.6 FIELD FITTING AND INSTALLATION OF WOOD DOORS

A. Do not alter pre-fit and pre-finished doors.

B. Field-fitted doors:

1. Comply with specified installation tolerances.
2. Immediately after fitting and cutting of wood doors for hardware, seal edges of doors as specified in Section 09 91 00 - PAINTING.
3. Mortise wood doors for hardware using templates furnished under Section 08 71 00 – DOOR HARDWARE.
4. Cut sinkages for lock fronts, strikes, hinges and similar items same size as item installed.

3.7 INSTALLATION TOLERANCES

A. Gaps and Clearances, Swinging Doors:

1. Wood Doors (Fire Resistance Rated), includes stile and rail wood doors, flush wood doors, laminate faced doors and similar door construction:
   a. Trimming of Fire-resistant rated wood doors shall be in accordance with NFPA 80.
   b. Maximum clearance under bottom of door to floor: 3/4 inch.

c. Maximum clearance under bottom of door to saddle or threshold: 1/4 inch, plus or minus 1/8 inch.

d. Maximum clearance between door and frame: 1/8 inch.

e. Maximum clearance for meeting edges of doors is:

1) Pull side: 1/8 inch.

2) Push side (beveled edge doors): maximum 5/16 inch for every 2 inches of door thickness.

2. Wood Doors (Non-Rated Openings), includes stile and rail wood doors, flush wood doors, laminate faced doors and similar door construction:

a. Maximum clearance under bottom of door to floor: 3/4 inch, except where specific undercut is scheduled on Drawings.

b. Maximum clearance under bottom of door to saddle or threshold: 3/8 inch.

c. Maximum clearance between door and frame: 1/8 inch.

d. Maximum clearance for meeting edges of doors is:

1) Pull side: 1/8 inch.

2) Push side (beveled edge doors): maximum 5/16 inch for every 2 inches of door thickness.

3. Metal Doors (Fire Resistance Rated):

a. Maximum clearance under bottom of door: 3/4 inch.

b. Maximum clearance under bottom of door to saddle or threshold: 1/4 inch, plus or minus 1/8 inch.

c. Clearance between door and frame: 1/8 inch, plus or minus 1/16 inch.

d. Clearance for meeting edges of doors is 1/8 inch, plus or minus 1/16 inch.

4. Metal Doors (Non Rated):

a. Maximum clearance under bottom of door: 3/4 inch.

b. Maximum clearance under bottom of door to saddle: 3/8 inch.

c. Clearance between door and frame: 1/8 inch, plus or minus 1/16 inch.

d. Maximum clearance for meeting edges of doors is 3/16 inch (pull side), 3/8 inch (push side).

B. Gaps and Clearances, Vertical Sliding Doors (non-rated): Maximum clearance between door and wall when closed: 3/8 inch.

C. Gaps and Clearances, Horizontal Sliding Doors (non-rated):

1. Maximum clearance under bottom of door to floor: 3/4 inch.

2. Maximum clearance between door and wall when closed: 1/4 inch.

3.8 ADJUSTING

A. Adjust Doors, including hardware to operate as designed without binding or deformation of the members.

B. After installation, clean surfaces, remove temporary labels, paint spots and other defacement.

C. Clean prefinished and plated items and items fabricated from stainless steel, aluminum and copper alloys, as recommended by the manufacturer.

D. Prior to Final Inspection make final check and adjustment of all hardware, clean operating items as necessary to restore proper function and finish of hardware.

3.9 TOUCH-UP FINISHES

A. Field touch-up of doors, scheduled for opaque finishes, will be performed under Section 09 91 00 - PAINTING and includes the filling and touch-up of exposed job made nail or screw holes, refinish of raw surfaces resulting from fitting or job inflicted scratches and marks.

B. Field touch-up of doors, scheduled for transparent finishes, will be performed by an authorized representative of the door fabricator. Touch-up includes refinishing surfaces resulting from fitting, or job inflicted scratches and marks.

3.10 CLEANING

A. General: Clean work under provisions of Section 01 73 00 - EXECUTION.

B. Upon completion of the work of this Section in any given area, remove tools, equipment, packing materials, and all rubbish and debris from the work area; leave area in broom-clean condition.

1. Daily clean work areas by sweeping and disposing of debris.

C. Clean adjacent surfaces soiled by hardware installation.

D. Waste Management: Recycle or dispose of off-site waste materials and trash at intervals approved by the Owner and in compliance with waste management procedures specified in Section 01 74 19 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL.

3.11 PROTECTION

A. Protect doors and hardware from damage until completion of the project. Comply with provisions of Section 01 50 00 - TEMPORARY FACILITIES AND CONTROLS.

End of Section

Section 08 11 13

HOLLOW METAL DOORS AND FRAMES

PART 1 – GENERAL

1.1 SUMMARY

A. General: The work of this Section consists of hollow metal doors and frames where shown on the Drawings, as specified herein, and as required for a complete and proper installation.

B. Provide the following products:

1. Flush UL-Labeled and non-labeled steel doors and frames, complete with internal reinforcing, hardware cut-outs; and provided with glazing openings, where so indicated; installed under requirements of Section 08 05 13- COMMON WORK RESULTS – DOOR AND HARDWARE INSTALLATION
   a. Provide with louver openings where indicated, refer to Drawings.
2. Hollow metal frames for fixed-glazed lites, complete with internal reinforcing; installed under requirements of Section 08 05 13- COMMON WORK RESULTS – DOOR AND HARDWARE INSTALLATION.

C. Furnish glazing beads, loosely attached to hollow metal frames and glazing cut-outs in doors, where so indicated, for removal and permanent installation during glazing operations to be installed under Section 08 80 00 - GLAZING.

1.2 RELATED REQUIREMENTS

A. Section 01 74 19 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL: Procedural and administrative requirements relating to recycling goals, waste management program and reporting.

B. Section 01 81 13 - SUSTAINABLE DESIGN REQUIREMENTS: Procedural and administrative requirements relating to required *Northeast CHPS Verified Program,* (NE-CHPS) Certification.

C. Section 04 20 00 - UNIT MASONRY: Building-into masonry hollow metal door frames, placed and braced under Section 06 10 00 - Rough Carpentry.

D. Section 06 10 00 - ROUGH CARPENTRY:

1. Wood framing, blocking, and nailers.
2. Placement and temporary bracing of hollow metal frames built-into masonry.

E. Section 06 20 00 - FINISH CARPENTRY: Wood casing and trim.

F. Section 07 92 00 - JOINT SEALANTS.

G. Section 08 05 13 – COMMON WORK RESULTS – DOOR AND HARDWARE INSTALLATION: Installation of doors and frames.

H. Section 08 14 16 - FLUSH WOOD DOORS: Furnishing wood doors to be installed in hollow metal frames.

I. Section 08 71 00 - DOOR HARDWARE: Furnishing finish hardware, and installation templates for hardware cut-outs and reinforcing.

J. Section 08 80 00 - GLAZING: Furnishing and installing glass located in doors and frames.

K. Section 09 29 00 - GYPSUM BOARD: Gypsum grout fill for hollow metal frames occurring in gypsum drywall assemblies.

L. Section 09 91 00 - PAINTING: Applied finish coatings.

M. Division 26 – ELECTRICAL: Wiring connections for electrified door hardware.

N. Building-in of frame anchors to wall and partition construction: By trade responsible for wall and partition erection.

1.3 REFERENCES

A. Referenced Standards: Comply with applicable requirements of the following standards and those others referenced in this Section, under the provisions of Section 01 42 00 - REFERENCES. The standards referenced herein are included to establish recognized minimum quality only. Where these standards conflict with other specified requirements, the most restrictive requirements shall govern. Equivalent quality and testing standards will be acceptable, subject to their timely submission, review and acceptance by the Architect.

1. ANSI A 117.1 - Specifications for Making Buildings and Facilities Accessible to and Usable by Physically Handicapped People.
2. ANSI/SDI A250.4 - Test Procedure and Acceptance Criteria for Physical Endurance for Steel Doors, Frames, Frame Anchors and Hardware Reinforcing.
3. ANSI/SDI A250.8 – R2008 (formerly SDI 100) - Recommended Specifications for Standard Steel Doors and Frames.
4. ANSI/SDI A250.11 – Recommended Erection Instructions for Steel Frames.
5. ASCE-7 – Minimum Design Loads and Associated Criteria for Building and Other Structures.
6. ASTM A109/A109M – Standard Specification for Steel, Strip, Carbon (0.25 Maximum Percent), Cold-Rolled.
7. ASTM A568/A568M – Standard Specification for Steel, Sheet, Carbon, Structural, and High-Strength, Low-Alloy, Hot-Rolled and Cold-Rolled, General Requirements for.
8. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
9. ASTM A924/A924M - Standard Specification for General Requirements for Steel Sheet, Metallic-Coated by the Hot-Dip Process.

10. ASTM A1008/A1008M - Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, Solution Hardened, and Bake Hardenable.
11. ASTM A1011/A1011M - Standard Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength.
12. ASTM C1363 – Standard Test Method for Thermal Performance of Building Materials and Envelope Assemblies by Means of a Hot Box Apparatus.
13. ASTM E283/E283M – Standard Test Method for Determining Rate of Air Leakage Through Exterior Windows, Skylights, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen.
14. ASTM E1886 - Standard Test Method for Performance of Exterior Windows, Curtain Walls, Doors, and Impact Protective Systems Impacted by Missile(s) and Exposed to Cyclic Pressure Differentials.
15. ASTM E1996 - Standard Specification for Performance of Exterior Windows, Curtain Walls, Doors, and Impact Protective Systems Impacted by Windborne Debris in Hurricanes.
16. SDI 111 Series (111A-111F): Recommended Details, Steel Doors and Frames.
17. SDI 117-93: Manufacturing Tolerances for Standard Steel Doors and Frames.
18. NFPA publication 80 - Fire Doors and Windows.
19. NFPA publication 105 – Standard for the Installation of Smoke Door Assemblies.
20. UL publication 10B - Fire Tests of Door Assemblies.
21. UL publication 10C – Positive Pressure Fire Tests of Door Assemblies.
22. UL 1784 – Air Leakage Tests of Door Assemblies.
23. All applicable federal, state and municipal codes, laws and regulations for exits.

B. Sustainability Requirement Reference: The following sustainability requirements are hereby made a part of this Section by reference thereto:

1. High Performance Schools Exchange, Northeast Energy Efficiency Partnerships NE-CHPS, (referred to herein as “NE-CHPS”).

1.4 ADMINISTRATIVE REQUIREMENTS

A. Coordination:

1. General: Coordinate the work of this Section with the respective trades responsible for installing anchorages furnished by this Section; make arrangements for delivery, receipt and installation of inserts and anchorages to prevent delay of the Work.
2. Coordinate the work of this Section with the respective trades responsible for furnishing hardware and installing doors and frames.
3. Ensure that the work performed hereunder is coordinated with issued templates authorized by the hardware supplier.

4. Do not fabricate doors or frames before receiving a copy of the approved hardware schedule, submitted by the hardware supplier, reviewed by the Contractor and accepted by the Architect. Verify that issued templates are coordinated with the approved schedule; immediately notify the Architect, in writing, of any conflicts.

B. Pre-installation Meetings: Installer of the Work of this Section is required to attend pre-installation conference specified under Section 08 05 13 - COMMON WORK RESULTS – DOOR AND HARDWARE INSTALLATION.

1.5 SUBMITTALS

A. Information and Review Submittals: Submit the following under provisions of Section 01 33 00 - SUBMITTAL PROCEDURES:

1. Product Data: Manufacturer's product data sheets, specifications, for doors, frames and shop applied finishes.
2. Shop Drawings:
   a. Door and Frame Schedule: A complete schedule coordinated with, and using same identifier designations as, the door and frame schedule contained in the Contract Drawings.
   b. Large scale details of each type door and frame construction, indicating all gages, reinforcing, and anchorage.
      1) Indicated cutouts for glazing.
      2) Indicate cutouts for louvers.
3. Certificates: Manufacturer's written certification stating that doors, frames, and all related items to be furnished hereunder, meet or exceed the requirements specified under this Section; that specified galvanized and shop priming has been performed; and that all U.L. fire-resistive requirements for the indicated Labels have been met.
4. Sustainable Design Submittals: As required by NE CHPS.

1.6 REGULATORY REQUIREMENTS

A. Fire rated door construction shall conform to UL publication 10B or 10C as applicable.

B. Install fire rated door assemblies in compliance with NFPA 80.

C. Corridor doors shall be tested and listed per UL 1784.

1.7 DELIVERY, STORAGE AND HANDLING

A. Delivery and Acceptance Requirements:

1. Prior to shipping, identify each frame and door with a removable metal or plastic label which corresponds with door schedule identifying opening number and location.
2. Do not deliver items to the site, until all specified submittals have been submitted to, and approved by, the Architect.

3. Deliver doors and frames boxed or crated to provide protection during transit and job storage.
4. Inspect doors and frames upon delivery for damage. Minor damage may be repaired provided the refinished items are equal in respects to new work and acceptable to the Architect; otherwise remove and replace damaged items.

B. Storage and Handling Requirements:
1. Store and handle materials following manufacturer's recommended procedures.
2. Store doors and frames at the building site upright and under cover. Place the units on wood dunnage and cover in a manner that will prevent rust and damage.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Acceptable Manufacturers: Subject to compliance with the requirements specified herein, manufacturers offering products which may be incorporated in the work include the following, or approved equal:
1. Amweld Building Products, Inc., (A Division of Amweld International, LLC), Coppell TX.
2. Ceco Door Products (A Division of Assa Abloy Group Company), Milan TN.
3. Curries Company (A Division of Assa Abloy Group Company), Mason City IA.
4. De La Fountaine Industries, Woburn, MA.
5. Flemming Door Products, (A Division of Assa Abloy Group Company), Woodbridge, Ontario Canada.
6. Republic Doors and Frames, McKenzie TN.
7. Steelcraft (A Division of Allegion Company), Cincinnati OH.

B. Unless otherwise specifically accepted by Architect, all doors and frames shall be of one manufacturer.

2.2 DESCRIPTION

A. Regulatory Requirements:
1. Fire resistance rated door construction shall conform to UL publications 10B and 10C.
a. Oversize Fire-Rated Door Assemblies Construction: For units exceeding sizes of tested assemblies, attach construction label certifying doors are built to standard construction requirements for tested and labeled fire rated door assemblies except for size.
2. Fire resistance rated borrowed light assemblies: NFPA 80.
3. Corridor door assemblies shall be tested and listed per UL 1784.
4. Smoke Control Door Assemblies: Comply with NFPA 105.

a. Smoke "S" Label: Doors to bear “S” label, and include smoke and draft control gasketing applied to frame and on meeting stiles of pair doors

5. Install fire rated door assemblies in compliance with NFPA 80.

B. Sustainability Requirements:

1. Recycled content of Ferrous Metals: Use maximum available percentage of recycled steel. Steel incorporated into the work shall contain not less than 25 percent of recycled steel.

2.3 PERFORMANCE CRITERIA

A. Exterior Openings: Comply ASTM C1363 for minimum thermal ratings. Openings to be fabricated and tested as fully operable, thermal insulating door and frame assemblies.

1. Thermal Performance (Exterior Openings): Independent testing laboratory certification for exterior door assemblies being tested in accordance with ASTM C1363 and meet or exceed the following requirements:

a. Door Assembly Operable U-Factor and R-Value Ratings: U-Factor 0.29, R-Value 3.4, including insulated door, thermal-break frame and threshold.

1) Kerf Type Frames: Thermal properties to rate at a fully operable minimum U-Factor 0.36 and R-Value 2.7, including insulated door, kerf type frame, and threshold.

2. Air Infiltration (Exterior Openings): Independent testing laboratory certification for exterior door assemblies being tested in accordance with ASTM E283 to meet or exceed the following requirements:

a. Rate of leakage of the door assembly shall not exceed 0.25 cfm per square foot of static differential air pressure of 1.567 psf (equivalent to 25 mph wind velocity).

2.4 DOORS

A. General: Refer to the Drawings for design of doors, sizes, glazing cut-outs in doors, and details.

B. Construction: Full flush commercial type, 1-3/4 inches thick, unless noted otherwise, meeting or exceeding the materials, gages, construction, and testing requirements of the referenced ANSI and SDI publications.

1. Exterior Door Core Construction: Manufacturer's standard polyurethane core (at non-rated doors only). Fabricate exterior doors with specified R-value when tested according to ASTM C1363.

a. Core construction:

1) Manufacturer’s standard polyurethane complying with ASTM C 578

b. Thermal properties when tested in accordance with ASTM C 1363:

1) R-value: 10.0 (polyurethane core).

C. Exterior Doors: ANSI 250.8, Level 3, Model 2 (Seamless), ANSI A250.4 Physical Performance Level B, (Extra Heavy Duty) having 16-gage, 0.058 inch thick galvanized steel faces, with a minimum R factor of 14.

D. Glazing stops: Rectangular channel sections, not less than 20 gage; pre-drilled and loosely attached within the glazing cut-outs with countersunk tamper-resistant stainless steel screws; sized to properly accommodate the designated thicknesses of glass and glazing materials; and external edges set flush with, or slightly behind, door face. Modify glazing stops for UL Label doors to conform with UL fire rating requirements.

E. Hardware reinforcing: Welded in place steel reinforcement, hot rolled pickled and oiled steel per ASTM A569, with the following minimum gages:

1. Hinges, 8 gage, minimum 0.152 inch thick.
2. Kick plates, 18 gage, minimum 0.042 inch thick.
3. Closers, locks, and all other hardware: 10 gage, minimum 0.123 inch thick.
4. Locations for reinforcing shall be determined from information and templates provided under Section 08 71 00 - DOOR HARDWARE.

F. Provide UL approved welded steel astragal at each UL pair of fire doors.

G. Fabrication:

1. Fabricate exposed faces of door panels from cold-rolled steel only.
2. Fabricate concealed stiffeners, reinforcement, edge channels, louvers and moldings from either cold-rolled or hot-rolled steel (at manufacturer's option).
3. Fabricate doors with hardware reinforcement welded in place.
4. Attach fire rated label to each door unit.
5. Close top and bottom edge of exterior doors with flush end closure. Seal joints watertight.

2.5 HOLLOW METAL FRAMES

A. General: Refer to the Drawings for various types of frames, sizes, and profiles, UL fire-resistive Label frames, and other characteristics of frames and related items.

1. Frame type: Shop welded frames with mitered joints arc-welded, reinforced and ground smooth.
2. All door preparation related to the middle hinge position for doors with electrified door hardware specified shall also be provided for at all other door frames with middle hinges, whether or not the hardware set calls for electrified hinges. The work on all door frames will include through holes as required for door frames at the middle hinge position (for the future addition of electrified pass through hinges) and back boxes for the hinge wiring. The electrical Trade Contractor shall furnish and install ¾ inch conduit from the hinge frame back box to the accessible ceiling space above each door frame where this preparation work is completed.

B. Materials for frames, reinforcement, anchors, anchor clips and related items: commercial grade cold-rolled steel conforming to ASTM A109 or commercial grade hot-rolled and pickled steel conforming to ASTM A415.

1. Frame gage:

a. Interior frames for Level 1 doors: 16-gage, 0.042 inch thick , except as otherwise required for specific U.L. Label.

b. Exterior frames: 14-gage, 0.067 inch thick, thermally broken, with a zinc coating supplied by the hot-dip process conforming to ASTM A653, Grade 37, with coating applied in accordance with A 924.

2. Hinge, lock and strike reinforcement: 7 gage thick.
3. Door closer reinforcement: 12 gage, minimum 0.093 inch thick.
4. Floor clips: 16 gage thick.
5. Splice plates or channels: same gage as door frame.
6. Glazing stops: 16 gage, minimum 0.053 inch (1.3 mm) thick, except as otherwise required for specific UL Label.
7. Mortar guards: 26 gage, minimum 0.016 inch thick.

C. Frame construction:

1. Fire-rated frame assemblies: Modify specified construction to meet all construction requirements required for fire-resistive rating.
   a. Affix appropriate UL, FM or Warnock Hersey labels to each rated frame assembly, indicating applicable rating.
2. Shop-fabricate frames as whole single units per door opening, except when frame size is too large to ship as a single unit. Oversized frames may be shipped in large sections as practicable for field assembly with concealed splice plates or channels.
3. Frame corner construction: As specified in paragraph A, above.
4. Reinforcements, stiffeners, and base angle clips: Welded to interior surfaces of frames to provide a stable base and so as to not interfere with installation of hardware.
5. Provide mortar boxes, welded to frame, at back of hardware cutouts where mortar or other materials may obstruct hardware operation.
6. Appearance of finished frames: Strong, rigid, completely free from warp and buckle, with miters well-formed and in true alignment, and with surfaces smooth and free from defects of any kind.
7. Silencer holes: Punch three holes in stop of strike jamb of door frames for application of silencers.
8. Glazing beads: Carefully place to properly accommodate the various thicknesses of glass and glazing materials, and loosely-attach to frames with flathead galvanized steel screws through pre-drilled holes having countersunk depressions.

D. Anchorage:

1. Anchor clips for frames in metal stud partitions: 16-gage steel z-shaped clips, 1-1/2 inch upturned and downturned legs, or equivalent type standard with the manufacturer, contained within the frames, for screw attachment to metal studs under Section 09 22 16 - NON-STRUCTURAL METAL FRAMING.
2. Anchor clips for frames in cold-formed metal framed exterior walls: 12-gage steel z-shaped clips, 1-1/2 inch upturned and downturned legs, or equivalent

type standard with the manufacturer, contained within the frames, for screw attachment to metal studs under Section 05 40 00 - COLD-FORMED METAL FRAMING.

3. Anchors for frames in masonry walls: Adjustable, T-shaped, positively engaging the retainers on both flanges of each jamb member, when placed. The stem of the anchors shall be 2 inches wide by 12 gage, minimum, corrugated or perforated for mortar bond, and extend 10 inches into the masonry, unless otherwise indicated.
4. Anchors for fire-resistive rated frames: Conform to all UL requirements for the specific fire-resistive ratings.
5. Provide not less than 4 anchors, clips, or bolts, per jamb, as applicable.

2.6 FABRICATION TOLERANCES

A. Maximum variation for doors and frames: Maximum diagonal distortion 1/16 inch measured with straight edge, corner to corner.

2.7 FACTORY FINISHING

A. Preparation: Pressure-sand all surfaces of all doors, frames, accessory items, anchors, and related items, to remove blemishes and foreign matter and provide paint grip. Spot-fill imperfections with metallic filler, and sand smooth. Thoroughly clean the surfaces by applying hot or cold phosphate treatment standard with the manufacturer.

B. Following cleaning apply one dip or spray coat of rust-inhibitive metallic oxide, zinc chromate, or synthetic resin primer to all surfaces, including those which will be concealed after erection. Bake, or oven dry, the primer at time and temperature recommended by the manufacturer for developing maximum hardness and resistance to abrasion.

2.8 ACCESSORIES

A. For: Double-hollow metal frames for fixed-glazed acoustical window:
1. Acoustical gasket tape at splice plates: 5/16 inch thick by 1-1/2 inches wide, open cellular rubber reinforced and bonded to cellulose with a peel and stick backing: Equal to:
a. Acoustical Surfaces Inc., Chaska, MN., product: “Acousti-Gasket Tape”. (Basis of Design).
b. Full Compass Systems, Ltd., Madison WI, product: “Acoustic Geometry AGAGT” tape.
c. Armacell, Chapel Hill, NC., Product: “ArmaComfort MTD”.
2. Sealant Type “AA” and backing materials as specified under Section 07 92 00 - JOINT SEALANTS.

PART 3 - EXECUTION

3.1 ERECTION AND INSTALLATION

A. Installation of frames and doors, including all accessories and related items furnished hereunder, will be performed under Section 08 05 13 – COMMON WORK RESULTS – DOOR AND HARDWARE INSTALLATION.

1. Section 08 05 13 – COMMON WORK RESULTS – DOOR AND HARDWARE INSTALLATION shall place frames in correct position within specified tolerances, and provide temporary bracing (under Section 06 10 00 – Rough Carpentry) at locations where frames are indicated to be built-into masonry. Section 04 20 00 - UNIT MASONRY shall build and grout frames into masonry work.

B. Final installation of loosely-attached glazing stops will be performed under Section 08 80 00 - GLAZING.

End of Section

Section 08 14 16

FLUSH WOOD DOORS

PART 1 - GENERAL

1.1 SUMMARY

A. Provide the following products:

1. Flush solid core wood doors, complete with necessary blocking, hardware cut-outs; and provided with openings for glazing and louvers, where so indicated, installed under requirements of Section 08 05 13- Common Work Results – Door and Hardware Installation.
2. Glazing beads, loosely attached to glazing cut-outs in doors for removal and permanent installation under: Section 08 80 00 - GLAZING.

1.2 RELATED REQUIREMENTS

A. Section 01 74 19 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL: Procedural and administrative requirements relating to recycling goals, waste management program and reporting.

B. Section 01 81 13 - SUSTAINABLE DESIGN REQUIREMENTS: Procedural and administrative requirements relating to required *Northeast CHPS Verified Program,* (NE-CHPS) Certification.

C. Section 06 10 00 - ROUGH CARPENTRY: Wood blocking, and nailers.

D. Section 06 20 00 - FINISH CARPENTRY: Wood thresholds, frames, casing and trim.

E. Section 08 05 13 - COMMON WORK RESULTS – DOOR AND HARDWARE INSTALLATION.

F. Section 08 11 13 - HOLLOW METAL DOORS AND FRAMES: Hollow metal frames scheduled to receive wood doors.

G. Section 08 71 00 - DOOR HARDWARE: Furnishing finish hardware, and installation templates for hardware cut-outs.

H. Section 08 80 00 - GLAZING: Installation of glazing in doors.

I. Section 09 91 00 - PAINTING : Applied opaque finish coatings.

1.3 REFERENCES

A. Referenced Standards: Comply with applicable requirements of the following standards and those others referenced in this Section, under the provisions of Section 01 42 00 - REFERENCES. The standards referenced herein are included to establish recognized minimum quality only. Where these standards conflict with other specified requirements, the most restrictive requirements shall govern. Equivalent quality and testing standards will be acceptable, subject to their timely submission, review and acceptance by the Architect.

1. ANSI A 117.1 - Specifications for Making Buildings and Facilities Accessible to and Usable by Physically Handicapped People.
2. ANSI A 208.1 - Wood Particleboard.
3. ASTM C1036 - Standard Specification for Flat Glass.
4. ASTM C1048 - Standard Specification for Heat-Strengthened and Fully Tempered Flat Glass.
5. ASTM D523 - Standard Test Method for Specular Gloss.
6. ASTM D5456 – Standard Specification for Evaluation of Structural Composite Lumber Products.
7. ASTM E119 - Standard Test Methods for Fire Tests of Building Construction and Materials.
8. ASTM E2010 - Standard Test Method for Positive Pressure Fire Tests of Window Assemblies.
9. NFPA publication 80 - Fire Doors and Windows.
10. NFPA publication 252 – Standard Methods of Fire Tests of Door Assemblies.
11. UBC 43.2 – Fire Tests of Door Assemblies.
12. UL 10B - Fire Tests of Door Assemblies.
13. UL 10C – Positive Pressure Fire Door Test Method.
14. Warnock-Hersey - Certification Listings for fire doors.
15. All applicable federal, state and municipal codes, laws and regulations for exits.

B. Inclusionary References: The following reference materials are hereby made a part of this Section by reference thereto:

1. WDMA Industry Standard IS 1A-21 – Industry Standard for Interior Architectural Wood Flush Doors.

C. Sustainability Requirement Reference: The following sustainability requirements are hereby made a part of this Section by reference thereto:

1. High Performance Schools Exchange, Northeast Energy Efficiency Partnerships NE-CHPS, (referred to herein as “NE-CHPS”).

D. Definitions:

1. FSC: Forest Stewardship Council
2. NAUF: No added Urea Formaldehyde.

1.4 ADMINISTRATIVE REQUIREMENTS

A. Coordination:

1. General: Coordinate the work of this Section with the respective trades responsible for furnishing hardware and installing doors and frames. Ensure that the work performed hereunder is coordinated with issued templates authorized by the hardware supplier.

B. Pre-installation Meetings: Installer of the Work of this Section is required to attend pre-installation conference specified under Section 08 05 13 - COMMON WORK RESULTS – DOOR AND HARDWARE INSTALLATION.

C. Sequencing:

1. Field Measurements
    a. Take field measurements before preparation of shop drawings and fabrication, where possible, to ensure proper fitting of Work.
    b. Allow for adjustments within specified tolerances wherever taking of field measurements before fabrication might delay Work.

D. Scheduling:

1. Do not fabricate doors before receiving a copy of the approved hardware schedule, submitted by the hardware supplier, reviewed by the Contractor and approved by the Architect. Verify that issued templates are coordinated with the approved schedule; immediately notify the Architect, in writing, of any conflicts.

1.5 SUBMITTALS

A. Information and Review Submittals: Submit the following under provisions of Section 01 33 00 - SUBMITTAL PROCEDURES:

1. Literature: Fabricator’s product data sheets, specifications, and performance data.
2. Certification: Wood products lacking acceptable documentation for the following will be rejected and their removal required.
    a. General: Fabricator’s written certification stating that doors, meet or exceed the requirements specified under this Section; that specified shop finishing has been performed; and that all fire-resistive requirements for the indicated Labels have been met.
    b. Provide signed certification by agent of door manufacturer stating that machining, glazing and finishing of doors shall be performed by only by the manufacturer in its facilities.
    c. Chain-of-Custody: Written documentation providing evidence of compliance with Chain-of-Custody supply of wood products, and compliance with FSC standards (LEED Credit MR 7).
        1) Demonstrate that products are FSC-certified by providing vendor invoices. Invoices will contain the vendor’s chain of custody number and identify each chain of custody certified product on a line-item basis. A “vendor” is defined as the company that furnishes wood products to project contractors and/or subcontractors for on-site installation.
        2) Wood products lacking acceptable documentation will be rejected and their removal required.
3. Door schedule: All doors specified under this Section, coordinated with the both door and hardware schedules contained in the Contract Drawings.
    a. Indicate doors to be factory finished and finish requirements.

b. Indicate fire protection ratings for fire rated doors.

4. Shop drawings: Elevations, and large scale sections and details of door construction, indicating profiles, core construction, joinery, edges, and cut-outs for hardware, louvers, and glazing.
   a. Indicate dimensions and locations of mortises and holes for hardware.
   b. Indicate dimensions and locations of cutouts.
   c. Indicate requirements for veneer matching.
5. Verification samples:
   a. Corner section of specified flush type door, showing core construction and joinery.
   b. For transparent finishes: submit two 8 by 10 inch mounted finished samples of each species of veneer specified.
   c. Louver blade and frame sections, 6 inches (150 mm) long, for each material and finish specified.
   d. Frames for light openings, 6 inches (150 mm) long, for each material, type, and finish required.
6. Sustainable Design Submittals: As required by NE CHPS.

B. Closeout Submittals: Submit the following under provisions of Section 01 78 00 - CLOSEOUT SUBMITTALS.
   1. Bonds and Warranty Documentation:
      a. Manufacturer’s Warranties and Guarantees as specified elsewhere herein this Section.

C. Maintenance Material Submittals: Submit the following under provisions of Section 01 78 00 - CLOSEOUT SUBMITTALS. Clearly label and package extra materials securely to prevent damage.
   1. Touch up kits for doors. Furnish 1 touch-up kit for every 6 doors or fraction thereof.

1.6 QUALITY ASSURANCE

A. All materials and workmanship shall conform in all respects to the specified grades of the Window and Door Manufacturer’s Association (WDMA) Industry Standard IS 1A-21, except as modified herein.

B. Chain of Custody wood products: All wood products furnished under this Specification Section shall be “FSC certified” according to the rules of the Forest Stewardship Council (FSC).
   1. FSC Certification includes the following certification bodies of forests and forest products:
      a. SCS Global Services.
      b. SmartWood.
      c. SGS Qualifor.
      d. Soil Association.

C. Sole Source: Obtain doors specified in this Section from a single manufacturer.

1.7 DELIVERY, STORAGE AND HANDLING

A. Delivery and Acceptance Requirements:

1. Do not deliver items to the site, until all specified submittals have been submitted to, and approved by, the Architect.
2. The Contractor is responsible to make certain that wood doors are not delivered until the building and storage areas are sufficiently dry so that the doors will not be damaged by excessive changes in ambient humidity and relative moisture content.
3. Deliver wood doors in resilient non-staining moistureproof packaging, provide protection during transit and job storage. Clearly identify doors with door opening number, matching those indicated on the approved Door Schedule.
4. Inspect doors upon delivery for damage. Minor damage may be repaired provided the refinished items are equal in respects to new work and acceptable to the Architect; otherwise remove and replace damaged items.

B. Storage and Handling Requirements:

1. Store and handle materials following manufacturer's recommended procedures, and in accordance with material safety data sheets.
2. Store doors flat on a level surface, in protected, elevated, dry areas; protect from exposure from all sources of light and moisture. When required to maintain manufacturer’s warranty, seal top and bottom edges if stored more than one week. Break packaging seal on-site to permit ventilation.
3. Protect doors from damage due to moisture, direct sunlight, excessive temperatures, surface contamination, corrosion and damage from construction operations and other causes.

C. Packaging Waste Management: Comply with packaging requirements specified under Section 01 60 00 - PRODUCT REQUIREMENTS.

1. Shipping materials: Manufacturer shall utilize to the greatest extent possible packaging materials which are biodegradable and recyclable.
2. Jobsite packaging waste management: Recycle packaging materials coordinated with general construction waste management specified under Section 01 74 19 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL.

1.8 PROJECT CONDITIONS

A. Environmental Limitations: Do not deliver or install doors until spaces are enclosed and weather tight, wet work in spaces is complete and dry, and HVAC system is operating and maintaining ambient temperature and humidity conditions at occupancy levels during the remainder of the construction period

1.9 FIELD MEASUREMENTS

A. Verify that field measurements are as indicated on shop drawings.

1.10 WARRANTY

A. General: Submit the following warranties under provisions of Section 01 78 00 - CLOSEOUT SUBMITTALS, and in compliance with Section 01 78 36 – WARRANTIES.

1. Manufacturer's Warranty: Provide coverage for delamination of veneer, warping beyond specified installation tolerances, defective materials, and telegraphing core construction, all as defined by .
2. Warranty length:
   a. Interior doors: Manufacturer's lifetime warranty.
3. Warranty coverage shall include all labor and material costs of delivery, re-hanging, re-finishing, glass and glazing to produce a complete installation of replaced or repaired doors.

PART 2 - PRODUCTS

2.1 FLUSH FACED DOORS

A. Acceptable Manufacturers: Subject to compliance with the requirements specified herein, manufacturers offering products which may be incorporated in the work include the following, or approved equal:

1. Masonite Architectural, Tampa FL.
2. Lambton Doors, Lambton Quebec Canada.
3. Oshkosh Door Company, Oshkosh WI.
4. VT Industries Inc., Holstein IA.

B. General requirements: Conform to the requirements set forth in the designated Sections of the (WDMA) Industry Standard IS 1A-21 , and the applicable requirements of U.S. Commercial Standard CS 171, as amended. Refer to the Drawings for sizes, locations of each type door, glazing cutouts in doors, and other characteristics of doors to be furnished hereunder.

1. All wood veneers and matching edging materials shall be "Chain-of-Custody" certified as FSC Certified or CSA-SFM Certified.
2. Door Grade: Premium.
3. Door Facing:
   a. Face veneer: WDMA Industry Standard, "A' Grade veneer minimum 1/50 inch (0.6 mm) thick, mechanically spliced.
      1) Wood Species and cut: Select White Maple (Acer saccharum) {sapwood}, Plain Sliced.
      2) Matching of adjacent pieces of veneer: Book matched.
      3) Panel face assembly: Balanced.
   b. End match Transoms with door veneer (where occurs).
   c. Crossbanding: Hardwood veneer or composite product at least 1/16 inch thick.

2.2 FIRE-RESISTANCE RATED 45, 60 AND 90 MINUTE LABEL DOORS

A. General Construction: WDMA Industry Standard Veneer, Fire Rated Mineral Core, Premium Grade Door.
   1. Door thickness: 1-3/4 inches, unless indicated otherwise.
   2. WDMA Specification Descriptions.
      a. 90 minute “B” label doors: Type“FD-90 MIN-5, HPDL”.
      b. 60 minute label doors: Type“FD-60 MIN-5, HPDL”.
      c. 45 minute “C” label doors: Type“FD-45 MIN-5, HPDL”.

B. Regulatory Requirements:
   1. Fire rated door construction shall conform to UL publications 10B (neutral pressure testing) and 10C (positive pressure testing).
   2. Install doors in compliance with NFPA publication 80.
   3. Corridor door assemblies shall be tested and listed per UL 1784.

C. Door facing: As specified herein above under Article – “Flush Faced Doors”.

D. Core construction:
   1. Core: Fire resistant Non-combustible asbestos free, mineral composite material per label listing requirements. Positive pressure fire doors shall include intumescent when required, meeting UL Category A requirements. .
   2. Stiles: multiple-ply stiles with 1/4 inch solid hardwood outer ply matching face veneers for species and color.
   3. Top and bottom rails: Maple, birch, Structural Composite Lumber (SCL) or UL approved composite material to meet label requirements.
   4. Blocking:
      a. For doors scheduled to receive screw-mounted surface closers, provide top rail blocking.
      b. For doors scheduled to receive surface mounted fire exit devices or vertical rods, provide top, intermediate and bottom rail blocking for screw mounting.
      c. Provide additional blocking for all other surface mounted hardware.

E. Adhesives: Type 1 (waterproof) for both face and core assembly.

F. Accessories: For all fire-rated doors installed in pairs with both leaves active, provide 20-gage formed steel edges, without astragal, wrapped with veneer matching faces of doors.

2.3 FIRE-RESISTANCE RATED 20 MINUTE LABEL DOORS

A. General Construction: WDMA Industry Standard, Veneer, Fire Rated Mineral Core, Premium Grade Door.
   1. Door thickness: 1-3/4 inches, unless indicated otherwise.
   2. WDMA Specification Description: “FD-20 MIN”.

B. Door facing: As specified herein above under Article – “Flush Faced Doors”.

C. Core construction:

1. Core: Particleboard complying with ANSI A208.1 Type 1, Grade 1-LD-2 having a density of 33 pounds per cubic foot.
    a. Provide only formaldehyde free particleboard, equal to Rodman Industries, Oconomowoc, WI. Furnish certification of formaldehyde free products.
2. Stiles: Laminated strand lumber or hardwood mill option for inner ply of styles, minimum of 1-3/8 inches after trimming, with outer ply matching face veneer, or visually compatible hardwood species.
3. Top and bottom rails: Maple, Birch, Structural Composite Lumber (SCL) or UL approved composite material to meet label requirements, minimum 1-1/8 inch width.

D. Adhesives:

1. Face assembly: Type 1 (waterproof).
2. Core assembly: Type II (water resistant).

E. Accessories: For all fire-rated doors installed in pairs with both leaves active, provide 20-gage formed steel edges, without astragal, wrapped with veneer matching faces of doors.

2.4 NON-RATED SOLID-CORE DOORS

A. General Construction: WDMA Industry Standard I.S. 1-A-97, S-9 Veneer, Particleboard Core Bonded, Premium Grade Door.

1. WDMA Specification Description: “PC-5”.
2. Door thickness: 1-3/4 inches, unless indicated otherwise.

B. Door facing: As specified herein above under Article – “Flush Faced Doors”.

C. Core construction:

1. Core: Particleboard complying with ANSI A208.1 Type 1, Grade 1-LD-2 having a density of 33 pounds per cubic foot.
    a. Provide only formaldehyde free particleboard, equal to Rodman Industries, Oconomowoc, WI. Furnish certification of formaldehyde free products.
2. Stiles: Laminated strand lumber or hardwood mill option for inner ply of styles, continuously bonded to core with adhesives and abrasively planed before veneering, minimum of 1-3/8 inches after trimming, with 1/4 inch solid hardwood outer ply matching face veneer, or visually compatible hardwood species.
3. Top and bottom rails: Maple, Birch, Structural Composite Lumber (SCL) or UL approved composite material to meet label requirements, minimum 1-1/8 inch width.

D. Adhesives: Type 1 (waterproof) for both face and core assembly.

2.5 GLAZING BEADS

A. Glazing beads for “B” and “C” fire rated doors, manufacturers flush wood veneered: steel bead matching door facing, having nominal 1/2 inch sight line.

B. Glazing beads for 20 minute fire rated and non-fire rated doors: manufacturer’s standard wood bead matching door facing have 3/8 to 5/8 inch sight line.

2.6 LOUVERS

A. Louvers: Extruded aluminum fusible link louver, UL and Warnock Hersey International approved, maximum size 24 by 24 inches equal to Construction Specialties Inc., model Nº. “FL-138”.

1. Fabricated from 6063-T5 alloy aluminum, 0.05 inches thick, furnished with adjustable trim.
2. Fasteners: High strength aluminum or stainless steel, countersunk into trim.
3. Finish: Factory primed with baked enamel ready to receive field-applied finish.

2.7 FABRICATION

A. Fabricate doors in accordance with specified manufacturer’s requirements. Fabricated rated doors in compliance with WHI, or UL requirements as appropriate.

B. Laminate door facing, cross banding and assembled core in a hot press.

C. Bond stiles and rails to cores, sand for uniform thickness. Factory sand assembled door leaf.

D. Factory-machine doors to receive hardware from templates furnished under Section 08 71 00 - DOOR HARDWARE. Do not machine for surface hardware.

1. Provide inner blocks at lock edge and top of door for closer hardware reinforcement.

E. Factory fabricate doors for undercut where scheduled.

F. Factory cut lite openings as scheduled.

G. Factory cut all glazed openings as scheduled. Field cutting of openings is prohibited.

H. Fabrication tolerances: Maximum diagonal distortion (warp): 1/4 inch (6 mm) measured with straight edge from corner to corner over a maximum 42 by 84 inch surface area.

2.8 FACTORY FINISHING

A. General: Factory finish to be to comply with EPA Title 5 guidelines for Volatile Organic Compound (VOC) emissions limitations.

B. Transparent finish: WDMA Factory Finish System TR-6 Catalyzed Polyurethane, having water based stain and ultraviolet (UV) cured polyurethane sealer and topcoat, with a satin sheen of 31° to 35° gloss units per ASTM D523.

1. Finish system shall include the following:
   a. Finish sanding.
   b. Stain application.
   c. Stain curing.
   d. Sealer application - first coat.
   e. Sealer gel cure.
   f. Sealer application - second coat.
   g. Sealer gel cure
   h. Sealer application - third coat
   i. Sealer full cure
   j. Sealer sanding
   k. Topcoat application - first coat
   l. Topcoat application - second coat
   m. Topcoat full cure

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install wood doors, including all accessories and related items under the requirements of Section 08 05 13- COMMON WORK RESULTS – DOOR AND HARDWARE INSTALLATION.

B. Final installation of loosely-attached glazing stops will be performed under Section 08 80 00 - GLAZING.

End of Section

Section 08 31 00

ACCESS DOORS AND PANELS

PART 1 - GENERAL

1.1 SUMMARY

A. Fire resistive rated and non-rated access panels and frames, as specified under this Section, furnished by Sections requiring the same and installed under the following Sections:

1. Section 04 20 00 – UNIT MASONRY: Installation of access panels into masonry assemblies.
2. Section 09 29 00 - GYPSUM BOARD: Installation of access panels into drywall assemblies.
3. Section 09 30 00 - TILING: Installation of access panels into tiled walls.

B. Furnish non-rated acoustically rated access hatches for installation under Section 09 29 00 – GYPSUM BOARD. [Key note 08 31 00.13]

C. Furnish non-rated ceiling access hatches for installation under Section 09 29 00 – GYPSUM BOARD.

D. Furnish and install exterior access panels.

E. Furnish and install in-floor access doors.

1.2 RELATED REQUIREMENTS

A. Section 01 60 00– PRODUCT REQUIREMENTS: Listing of VOC requirements for adhesives, cleaning/maintenance materials, paints, coatings, and sealants.

B. Section 01 74 19 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL: Procedural and administrative requirements relating to recycling goals, waste management program and reporting.

C. Section 01 81 13 - SUSTAINABLE DESIGN REQUIREMENTS: Procedural and administrative requirements relating to required *Northeast CHPS Verified Program,* (NE-CHPS) Certification.

D. Section 04 20 00 – UNIT MASONRY: Installation of access panels into masonry assemblies.

E. Section 09 29 00 - GYPSUM BOARD: Installation of access panels into drywall assemblies.

F. Division 21 - FIRE SUPPRESSION: Furnishing access panels required for fire protection systems.

G. Division 22 - PLUMBING: Furnishing access panels required for plumbing systems.

H. Division 23 - HEATING, VENTILATING AND AIR CONDITIONING: Furnishing access panels required for heating/cooling systems.

I. Division 26 - ELECTRICAL: Furnishing access panels required for electrical systems.

1.3 SUBMITTALS

A. Information and Review Submittals: Submit the following under provisions of Section 01 33 00 - SUBMITTAL PROCEDURES:

1. Literature: Manufacturer's product data sheets, specifications and installation instructions.

2. Schedule: Submit Schedule of all access panels to be furnished hereunder, indicating locations for each size and type of access door.

a. The Contractor is responsible to ensure that all of the types/styles of panels and frames specified herein can be furnished by the manufacturer submitted.

b. Prior to submitting schedule, coordinate with the work of Division 21 - FIRE SUPPRESSION, Division 22 - PLUMBING, Division 23 - HEATING, VENTILATING AND AIR CONDITIONING and Division 26 - ELECTRICAL and meet with the Architect to determine exact quantities and locations required for the installation of access panels.

3. Shop drawings: Large scale details of access doors, indicating all sizes, gages and thickness; provide complete installation details, coordinated to the specific receiving conditions.

4. Sustainable Design Submittals: As required by NE CHPS.

1.4 DELIVERY, STORAGE AND HANDLING

A. Do not deliver access doors to the site, until all specified submittals have been submitted to, and approved by, the Architect.

B. Store access door units inside, under cover, and in manner to keep them dry, protected from weather, direct sunlight, surface contamination, corrosion and damage from construction traffic and other causes.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Acceptable Manufacturers: Subject to compliance with the requirements specified herein, manufacturers offering products which may be incorporated in the work include the following, or approved equal:

1. Acudor Products Inc., Cedar Grove, NJ.

2. Karp Associates Inc., Maspeth, NY.

3. Nystrom Products Company, Minneapolis, MN.
4. Williams Brothers Corporation of America, Front Royal, VA.

B. Single Source: All work of this Section shall be produced by a single manufacturer, unless otherwise approved by the Architect.

2.2 ACCESS PANELS - GENERAL

A. Access panels scheduled for placement in masonry: Furnish with masonry anchors attached to unit frames at factory.

2.3 ACCESS PANELS - FOR FIRE RESISTANCE RATED CONSTRUCTION

A. For fire-resistance rated wall and ceiling surfaces: Standard flush panel door meeting the following requirements:
   1. Panel and frame rating: UL “B” label for 90 minutes.
   2. Frame type:
      a. For ceramic tile walls: 16 gage Type 304 stainless steel flanged frame, with flange exposed to view 1 inch or less, equal to:
         1) Acudor FW-5050 series
         2) Karp KRP-150FR series.
         3) Nystrom IT series.
         4) Williams WB-FRSS Regular series.
      b. For masonry walls: 16 gage galvanized bonderized steel flanged frame, with flange exposed to view 1 inch or less.
         1) Acudor FW-5050 series
         2) Karp KRP-150FR series.
         3) Nystrom IT series.
         4) Williams WB-FR series.
      c. For gypsum board walls and ceilings: 16 gage galvanized bonderized steel frame, with 22 gage galvanized steel drywall bead.
         1) Acudor FW-5050DW
         2) Karp KRP-350FR series.
         3) Nystrom IW series.
         4) Williams WB-FR series.
   3. Door: Insulated Flush panel door as follows:
      a. Typical wall types : Flush door, Sandwich construction with 2 inch thick mineral wool fiber insulation between two layers of 20 gage galvanized bonderized steel.
      b. For ceramic tile walls only: Flush door, Sandwich construction with 2 inch thick mineral wool fiber insulation between two layers of 20 gage Type 304 stainless steel.

4. Hinge: Flush continuous piano hinge with stainless steel pin.
5. Closer: Spring closer.
6. Latch: Flush cam latch, operated by Allen or Torx head screwdriver.

2.4 ACCESS PANELS - FOR NON-RATED CONSTRUCTION

A. For non-rated wall and ceiling surfaces (typical): Flush panel door type meeting the following requirements:

1. Frame type:
   a. For tiled walls: 16 gage Type 304 stainless steel flanged frame, with flange exposed to view 1 inch or less, equal to:
      1) Acudor UF-5000 series.
      2) Karp DSC-214SM series.
      3) Nystrom NT series.
      4) Williams WB-GP series.
   b. For masonry walls: 16 gage galvanized bonderized steel flanged frame, with flange exposed to view 1 inch or less.
      1) Acudor UF-5000 series.
      2) Karp DSC-214SM series.
      3) Nystrom NT series.
      4) Williams WB-GP series.
   c. For gypsum board walls and ceilings: 16 gage galvanized bonderized steel frame, with 22 gage galvanized steel drywall bead.
      1) Acudor DW-5040 series.
      2) Karp KDW series.
      3) Nystrom NW series.
      4) Williams WB-PL series.
2. Door: Flush panel door as follows:
   a. Typical all wall types, except tile: 14 gage galvanized bonderized steel.
   b. For tiled walls: 14 gage type 304 stainless steel.
3. Hinge:
   a. Typical: Concealed spring hinge enabling door to open 175 degrees and permit removal of door from frame.
   b. Panels greater than 24 by 36 inches: Flush continuous piano hinge with stainless steel pin.
4. Latch: Flush cam latch, operated by Allen or Torx head screwdriver.

B. For non-rated gypsum board walls and ceilings (public areas): Recessed door type meeting the following requirements

1. Manufacturer's types:
    a. Acudor DW-5058 series.
    b. Karp:
        1) Walls: Karp RDW series.
        2) Ceilings: Karp KATR series.
    c. Nystrom RW series.
    d. Williams WB-DW series.
2. Frame type: 16 gage galvanized bonderized steel frame, with 22 gage galvanized steel drywall bead.
3. Door: Recessed 16 gage galvanized bonderized steel door. with 22 gage galvanized steel drywall bead.
4. Hinge: Concealed pivot rod hinge.
5. Latch: Flush cam latch, (operated by Allen or Torx head screwdriver) with steel grommet welded to door.

C. For non-fire rated, acoustically-rated, gypsum board walls and ceilings (where designated): Flush door type meeting the following requirements:

1. STC rating: 64
2. OITC rating 53
3. Manufacturer's types:
    a. Acudor DW-2064 series.
    b. Karp: model KRP-STC
    c. Williams WB-STC 650 series.
4. Frame type: 16 gage galvanized bonderized steel frame, with flush flange.
5. Door: Recessed 20 gage galvanized bonderized steel door.
6. Hinge: Concealed pivot rod hinge.
7. Latch: Flush cam latch, (operated by Allen or Torx head screwdriver) with steel grommet welded to door.

2.5 FACTORY FINISHING

A. Panel assemblies fabricated from stainless steel: Nº. 4 satin finish.

B. Panel assemblies fabricated from galvanized bonderized steel: Baked on rust inhibitive gray primer finish.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Inspect all surfaces and verify that they are in proper condition to receive the work of this Section. Verify that prepared openings are ready to receive the work of this Section and opening dimensions are as indicated on the shop drawings. Verify that all blocking is set in place and secure.

B. Beginning of installation means acceptance of project conditions.

3.2 INSTALLATION

A. Install access panels in accordance with manufacturer's instructions and direction from authorities having jurisdiction. Install miscellaneous specialties absolutely level and in true line, with units securely anchored to the surrounding construction.

B. Test each door and latching device, and make adjustments required to ensure a bind-free operation and proper latching.

End of Section

Section 08 33 26

OVERHEAD COILING GRILLES

PART 1 - GENERAL

1.1 SUMMARY

A. Furnish and install electrically-operated rolling grille assembly, complete with tracks, clip angles, guides, operating hardware and mechanisms, coil housing, operating control station, and all related items, at indicated interior locations.

1.2 RELATED REQUIREMENTS

A. Section 01 74 19 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL: Procedural and administrative requirements relating to recycling goals, waste management program and reporting.

B. Section 01 81 13 - SUSTAINABLE DESIGN REQUIREMENTS: Procedural and administrative requirements relating to required *Northeast CHPS Verified Program,* (NE-CHPS) Certification.

C. Section 04 20 00 - UNIT MASONRY: Concrete block wall veneer.

D. Section 05 12 00 - STRUCTURAL STEEL FRAMING: Steel framing.

E. Section 05 50 00 - METAL FABRICATIONS: Steel frame for grille opening.

F. Section 06 10 00 - ROUGH CARPENTRY: Wood [framing] [blocking] for grille opening.

G. Section 06 20 00 - FINISH CARPENTRY: Installation of cylinder locks in coiling grille[s].

H. Section 07 92 00 - JOINT SEALANTS: Perimeter sealant and backup materials.

I. Section 08 71 00 - DOOR HARDWARE: Furnishing cylinders for coiling grilles[s].

J. Section 09 91 00 - PAINTING: Field-applied finish coatings.

K. Division 26 - ELECTRICAL:

1. Conduit from electric circuit to grille operator and from grille operator to control station.
2. Electrical power wiring and conduit from the building power supply to the motors, and from the motors to the operating control stations.

1.3 REFERENCES

A. Referenced Standards: Comply with applicable requirements of the following standards and those others referenced in this Section, under the provisions of Section 01 42 00 - REFERENCES. The standards referenced herein are included to establish recognized minimum quality only. Where these standards conflict with other specified requirements, the most restrictive requirements shall govern.

Equivalent quality and testing standards will be acceptable, subject to their timely submission, review and acceptance by the Architect.

1. ANSI/UL 325 - Door, Drapery, Gate, Louver, and Window Operators and Systems.
2. NEMA 250 - Enclosures for Electrical Equipment.
3. NEMA ICS 2 - Standards for Industrial Control Devices, Controllers and Assemblies.
4. NEMA MG1 - Motors and Generators.
5. All Applicable federal, state and municipal codes, laws, and regulations for exits.

B. Sustainability Requirement Reference: The following sustainability requirements are hereby made a part of this Section by reference thereto:

1. High Performance Schools Exchange, Northeast Energy Efficiency Partnerships NE-CHPS, (referred to herein as “NE-CHPS”).

1.4 ADMINISTRATIVE REQUIREMENTS

A. Coordination:

1. General: Coordinate the work of this Section with the respective trades responsible for installing interfacing and adjoining work for proper sequence of installation, and ensure that the work performed hereunder is acceptable to such trades for the installation of their work.

B. Sequencing:

1. Field Measurements
   a. Take field measurements before preparation of shop drawings and fabrication, where possible, to ensure proper fitting of Work.
   b. Allow for adjustments within specified tolerances wherever taking of field measurements before fabrication might delay Work.

C. Scheduling:

1. Coordinate schedule of construction, size of access and route to place of installation to prevent delay of installation due to physical impediments. Any work involving the demolition and reconstruction of partitions, walls, floors, roofing, windows, or doors to place and install the work of this Section shall be performed at no additional cost to the Owner.

1.5 SUBMITTALS

A. Information and Review Submittals: Submit the following under provisions of Section 01 33 00 - SUBMITTAL PROCEDURES:

1. Literature: Manufacturer's product data sheets, specifications, and performance data.
2. Manufacturer's installation instructions. Indicate installation sequence and procedures, adjustment and alignment procedures and lubrication instructions.

3. Maintenance Data: Lubrication requirements and frequency, periodic adjustments required.
4. Warranty: Provide sample copies of manufacturers' actual warranties for all materials to be furnished under this Section, clearly defining all terms, conditions, and time periods for the coverage thereof.
5. Shop drawings: Fully-dimensioned, large scale details, tracks, guides, counterbalancing and operating mechanisms, electrical characteristics, hood enclosures, and related items; with complete installation details reflecting actual site conditions for each location.
6. Selection samples:
    a. Sample card indicating Manufacturer's full range of finishes available for selection by Architect.
    b. Provide additional samples as requested by Architect for initial selection of colors and finishes.
7. Verification samples:
    a. 12 x 12 inch samples of grille illustrating material and finish.
    b. 12 inch long samples of bottom bar.
8. Sustainable Design Submittals: As required by NE CHPS.
9. Qualification Submittals.

B. Closeout Submittals: Submit the following under provisions of Section 01 78 00 - CLOSEOUT SUBMITTALS.
1. Maintenance Contracts: Provide Installers maintenance contract commencing on Date of Substantial Completion and extending for a period of one year. Maintenance contract shall include the following:
    a. Emergency callback service for the grilles.
    b. Annual examinations of the installation during regular working hours by trained employees of the grille manufacturer.
    c. All necessary adjusting, greasing, and oiling.
    d. Cleaning supplies and parts necessary to keep the equipment in proper operation, except any parts needed due to misuse, accident, or neglect caused by others.
    e. Repair work shall be carried out only by the grille installer's personnel, using only standard parts furnished by the grille manufacturer. Maintenance shall be carried out directly by the installer and shall not be assigned or transferred to any agent.
2. Operation and Maintenance Data:
3. Bonds and Warranty Documentation:
    a. Manufacturer’s Warranties and Guarantees as specified elsewhere herein this Section.
4. Sustainable Design Submittals: As required by NE CHPS, version 4.0.

1.6 QUALIFICATIONS

A. Installer, with a minimum of 3 years documented experience demonstrating previously successful work of the type specified herein, and approved by product manufacturer.

1.7 WARRANTY

A. General: Submit the following warranties under provisions of Section 01 78 00 - CLOSEOUT SUBMITTALS, and in compliance with Section 01 78 36 – WARRANTIES.

B. Provide Manufacturer's 5 year warranty which shall include materials and workmanship, satisfactory operation, and contain any limitations of items specified herein.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Specified Manufacturer: To establish a standard of quality, design and function desired, Drawings and specifications have been based on Cornell Iron Works , Mountaintop, PA Model "Visionaire Series".

B. Acceptable Manufacturers: Subject to compliance with the requirements specified herein, manufacturers offering products which may be incorporated in the work include the following, or approved equal:

1. Cornell Iron Works, Inc., Mountaintop, PA.
2. Overhead Door Corporation, PA.
3. Kinnear Inc., Columbus, OH.
4. McKeon Rolling Steel Door Company (Division of Corbin-Hufcor), Brooklyn, NY.

C. Provide overhead coiling grilles in configurations as indicated on the Drawings and as follows:

1. Type OHG1 Interior – 5/6 Student Commons: 13 feet wide by 10 feet 6 inches high.

2.2 ROLLING GRILLE COMPONENTS

A. Curtain: Equal to Cornell Type V-9, In line grille pattern, comprised of 5/16 inch (8mm) round ASI series 300 stainless steel bars spaced not more than 2 inch vertical centers, flexibly connected by eyeleted 3/4 inch stainless steel vertical links, equipped with tube spacers to maintain vertical link alignment.

1. Spacing of horizontal bars: 2 inches (50 mm).
2. Spacing of vertical links: 6 inches (150 mm)

B. Bottom bar: Stainless steel angles, of sizes recommended by manufacturer.

C. Counterbalance: Oil tempered helical torsion springs, housed in steel pipe barrel, supporting the curtain with a deflection not exceeding 0.03 inch per foot of width,

equipped with ball or roller bearings, and adjustable by means of external tension wheel.

D. Brackets: Minimum 5/16-inch thick steel plate, for supporting barrel, counterbalance mechanism with a high factor of safety.

E. Hood: 16 gage stainless steel with No. 4 satin finish, beaded, and flanged, with reinforced top and bottom edges to prevent deflection. Provide 1/4 inch (6 mm) steel intermediate support brackets to prevent excessive sag.

F. Operator and Bracket Mechanism Cover: Provide 24 gage stainless steel sheet metal cover to enclose exposed moving operating components at coil area of unit. Finish to match door hood.

G. Guides: Heavy extruded aluminum shapes, of sizes indicated on the approved shop drawings, containing hard vinyl inserts to eliminate metal to metal contact, and equipped with double locking bars to engage end links and prevent grille from pulling out of guides under excessive pressure.

H. Locks: Pin tumble single unit mechanism, installed on one jamb, and designed to accommodate cylinders provided by Section 08 71 00 – DOOR HARDWARE.

I. Door Operation:

1. Motor: 3/4 HP 460 VAC three phase, totally enclosed, instant reversing, with electric interlock to prevent operation when lock bolts are engaged in guides equal to Cornell DH/DJ series.
2. Reversing contact: Heavy-duty, electrically and mechanically interlocked.
3. Limit switches: Adjustable rotary type, synchronized with door.
4. Control circuit: 24 VAC, Class 2.
5. Reduction: Worm gear running in oil bath, primary; chain and sprocket, secondary.
6. Clutch: Adjustable friction type.
7. Brake: Solenoid actuated drum type.
8. Mounting: Wall mounted.
9. Control stations: 3-button keyed.

J. Finishes:

1. Stainless steel: Number 4 satin factory finished.
2. Concealed steel and galvanized steel components: Manufacturer's standard baked-on prime coating, white, light tan, or light grey color, of a type which will readily accept field-applied finish coatings.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Inspect all surfaces and verify that they are in proper condition to receive the work of this Section. Verify that field measurements are as indicated on reviewed and approved shop drawings.

B. Beginning of installation means acceptance of existing project conditions.

3.2 INSTALLATION

A. Perform installation of all items furnished hereunder, except as otherwise specified, in accordance with the approved shop drawings and the recommendations of the manufacturer.

B. Set entire assembly including grilles, guides, and hardware, plumb and true to line, to assure smooth operation. Brace guides internally to provide a completely rigid installation. Attach jambs with not less than 3/8 inch steel bolts spaced not more than 30 inches apart.

C. Coordinate installation of electrical service for coiling grille with Division 16 - ELECTRICAL. Complete power and control wiring from disconnect to unit components.

3.3 TOLERANCES

A. Maintain dimensional tolerances and alignment with adjacent work. Maximum variation from plumb or level: 1/16 inch. Maximum variation in longitudinal or diagonal warp: 1/8 inch per 10 foot straight edge.

3.4 ADJUSTING

A. Adjust grilles, hardware and operating assembly as required to ensure a smooth operation without binding.

3.5 CLEANING

A. Remove all protective films and coverings from assembly components, and clean grilles and guides. Remove tools, equipment and all rubbish and debris from the work area, caused by the work of this Section; leave area in broom-clean condition.

End of Section

Section 08 34 73

SOUND CONTROL DOOR ASSEMBLIES

PART 1 - GENERAL

1.1 SUMMARY

A. Furnish and install sound control door and frame units, complete with internal reinforcing, hardware cut-outs and related acoustical insulated frames.

1.2 RELATED REQUIREMENTS

A. Section 01 74 19 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL: Procedural and administrative requirements relating to recycling goals, waste management program and reporting.

B. Section 01 81 13 - SUSTAINABLE DESIGN REQUIREMENTS: Procedural and administrative requirements relating to required *Northeast CHPS Verified Program,* (NE-CHPS) Certification.

C. Section 06 10 00 - ROUGH CARPENTRY: Wood blocking, and nailers; installation of hollow metal door frames.

D. Section 06 20 00 - FINISH CARPENTRY: Wood casing and trim; installation of doors and hardware.

E. Section 07 92 00 - JOINT SEALANTS.

F. Section 08 11 13 – HOLLOW METAL DOORS AND FRAMES.

G. Section 08 14 16 - FLUSH WOOD DOORS.

H. Section 08 71 00 – DOOR HARDWARE:

1. Thresholds and locksets for acoustical door units.
2. Templates for locksets.

I. Section 08 80 00 - GLAZING: Furnishing and installing glass located in doors and frames.

J. Section 09 22 16 - NON-STRUCTURAL METAL FRAMING: Non-load bearing partition framing for drywall systems.

K. Section 09 91 00 – PAINTING: Applied Finish Coatings.

1.3 REFERENCES

A. Referenced Standards: Comply with applicable requirements of the following standards and those others referenced in this Section, under the provisions of Section 01 42 00 - REFERENCES. The standards referenced herein are included to establish recognized minimum quality only. Where these standards conflict with other specified requirements, the most restrictive requirements shall govern.

Equivalent quality and testing standards will be acceptable, subject to their timely submission, review and acceptance by the Architect.

1. ANSI A 117.1 - Specifications for Making Buildings and Facilities Accessible to and Usable by Physically Handicapped People.
2. ANSI/SDI 100 - Standard Steel Doors and Frames.
3. ASTM A1008 – Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, Required Hardness, Solution Hardened, and Bake Hardenable.
4. ASTM A1011 - Standard Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength.
5. ASTM E90 – Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions.
6. ASTM E512 - Standard Practice for Combined, Simulated Space Environment Testing of Thermal Control Materials with Electromagnetic and Particulate Radiation.
7. ASTM E2074 (Withdrawn Standard) - Standard Test Method for Fire Tests of Door Assemblies, Including Positive Pressure Testing of Side-Hinged and Pivoted Swinging Door Assemblies.
8. ASTM E413 – Classification for Rating Sound Insulation.
9. NFPA Publication 80 - Fire Doors and Windows.
10. UL Publication 10B - Fire Tests of Door Assemblies.
11. All applicable federal, state and municipal codes, laws and regulations for exits.

B. Sustainability Requirement Reference: The following sustainability requirements are hereby made a part of this Section by reference thereto:

1. High Performance Schools Exchange, Northeast Energy Efficiency Partnerships NE-CHPS, (referred to herein as “NE-CHPS”).

1.4 ADMINISTRATIVE REQUIREMENTS

A. Coordination:

1. General: Coordinate the work of this Section with the respective trades responsible for installing interfacing and adjoining work for proper sequence of installation, and ensure that the work performed hereunder is acceptable to such trades for the installation of their work.

B. Pre-installation Meetings: Installer of the Work of this Section is required to attend pre-installation conference specified under Section 08 05 13 - COMMON WORK RESULTS – DOOR AND HARDWARE INSTALLATION.

C. Sequencing:

1. Field Measurements
   a. Take field measurements before preparation of shop drawings and fabrication, where possible, to ensure proper fitting of Work.

b. Allow for adjustments within specified tolerances wherever taking of field measurements before fabrication might delay Work.

2. Ensure that the work performed hereunder is coordinated with issued templates authorized by the hardware supplier.

D. Scheduling:

1. Do not fabricate doors or frames before receiving a copy of the approved hardware schedule, submitted by the hardware supplier, reviewed by the Contractor and accepted by the Architect. Verify that issued templates are coordinated with the approved schedule; immediately notify the Architect, in writing, of any conflicts.

2. Coordinate schedule of construction, size of access and route to place of installation to prevent delay of installation due to physical impediments. Any work involving the demolition and reconstruction of partitions, walls, floors, roofing, windows, or doors to place and install the work of this Section shall be performed at no additional cost to the Owner.

1.5 SUBMITTALS

A. Information and Review Submittals: Submit the following under provisions of Section 01 33 00 - SUBMITTAL PROCEDURES:

1. Literature: Manufacturer's product data sheets, specifications, and acoustical performance data for door units.

2. Test data: Manufacturer’s test data, showing test results taken within the past 5 years by an accredited NVLAP Laboratory demonstrating compliance with specified ASTM E90 STC acoustical ratings and that STC was determined in accordance with ASTM E413.

a. Test data certification must reference laboratory name, test report number and date of test; substitution of test data no in accordance with ASTM E90 and ASTM E413 will not be acceptable.

3. Certification for fire resistance: Certify that doors have been tested in accordance with ASTM E512 (UL-10b) for labeled fire doors and frames and comply with requirements of NFPA 80.

4. Shop drawings: A complete schedule of doors and frames, to be furnished hereunder, coordinated with the door and frame schedule contained in the Contract Drawings. Large scale details of each type door and frame construction, indicating, reinforcing, anchorage, and acoustical seals.

5. Manufacturer’s Instructions.

6. Sustainable Design Submittals: As required by NE CHPS.

7. Qualification Submittals.

B. Closeout Submittals: Submit the following under provisions of Section 01 78 00 - CLOSEOUT SUBMITTALS.

1. Operation and Maintenance Data:

2. Bonds and Warranty Documentation:

a. Manufacturer’s Warranties and Guarantees as specified elsewhere herein this Section.

1.6 QUALITY ASSURANCE

A. General: Notify the Architect where conflicts apply between referenced standards and existing materials, and existing methods of construction.

B. Sole Source: Obtain products required for the Work of this Section from a single manufacturer, or from manufacturers recommended by the prime manufacturer of acoustical doors.

C. Qualifications:

1. Manufacturers: Minimum of 10 years documented experience demonstrating previously successful work of the type specified herein.
2. Installer/Applicator: Minimum of 3 years documented experience demonstrating previously successful work of the type specified herein.
3. Testing Agencies: Acoustical testing shall be performed at laboratories that are accredited under the National Voluntary Laboratory Accreditation Program (NVLAP).

1.7 DELIVERY, STORAGE, AND HANDLING

A. Delivery and Acceptance Requirements:

1. Prior to shipping, identify each door unit with a removable metal or plastic label which corresponds with door schedule identifying opening number and location.
2. Do not deliver items to the site, until all specified submittals have been submitted to, and approved by, the Architect.
3. Deliver door units boxed or crated to provide protection during transit and job storage.
4. Inspect door units upon delivery for damage. Minor damage may be repaired provided the refinished items are equal in respects to new work and acceptable to the Architect; otherwise remove and replace damaged items.

B. Storage and Handling Requirements:

1. Store and handle materials following manufacturer's recommended procedures, and in accordance with material safety data sheets.
2. Protect materials from damage due to moisture, direct sunlight, excessive temperatures, surface contamination, corrosion and damage from construction operations and other causes.

C. Packaging Waste Management: Comply with packaging requirements specified under Section 01 60 00 - PRODUCT REQUIREMENTS.

1. Shipping materials: Manufacturer shall utilize to the greatest extent possible packaging materials which are biodegradable and recyclable.
2. Jobsite packaging waste management: Recycle packaging materials coordinated with general construction waste management specified under Section 01 74 19 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Specified Manufacturer: To establish a standard of quality, design and function desired, Drawings and specifications have been based on Overly Manufacturing Company, Series SC, Model 499723.

B. Acceptable Manufacturers: Subject to compliance with the requirements specified herein, manufacturers offering products which may be incorporated in the work include the following, or approved equal:

1. Ambico Limted, Ottawa, Ontario, Canada.
2. IAC Acoustics, a Division of Sound Seal, North Aurora, IL.
3. Krieger Steel Products, Pico Rivera CA.
4. Overly Manufacturing Company, Greensburg, PA.

1.2 PERFORMANCE REQUIREMENTS

A. Acoustical Rating: Doors shall have a sound transmission class rating (STC) of at least STC 48, tested in compliance with ASTM E90 and ASTM E413.

B. Fire resistance rating:

1. Acoustical door units shall be in compliance with NFPA 80 and tested in accordance with ASTM E413.
2. Underwriters Laboratories labeled doors shall be manufactured under the UL factory inspection program and in strict compliance with UL procedure R-3791, and shall provide the degree of fire protection, heat transmission and panic loading capability indicated by the opening class.
3. Labels shall be affixed to all Underwriters Laboratories classified doors for Class B openings, rated 1-1/2 hours.

2.2 ACOUSTICAL DOOR UNITS.

A. General: Provide doors complete with frame, sound seals, retainers and covers.

1. Sound gaskets: manufacturer’s standard with steel seal retainers.

B. General Provide doors complete with hinges, frame, sound seals, retainers and covers.

1. Hinges: Manufacturer’s standard cam-lift hinge.
   a. Number of Hinges required per door leaf:
      1) Non rated doors: 2 hinges.
      2) Rated doors: 1 hinge per 30 inch height, but not less than 2 hinges.
2. Door bottom: Semi-mortised automatic door bottom, equal to Overly Model “Super H”.
3. Door bottom: Semi-mortised automatic door bottom, Overly model #SM300.
4. Sound gaskets: Single compression felt-neoprene perimeter seal with metal retainer and cover equal to Overly Model “Single H”.

C. Doors shall be 1-3/4 inch thick, of hollow metal construction, fabricated of two 18-gage, roller-leveled, prime quality cold-rolled steel sheets having internal construction matching tested assemblies.

1. The vertical door edges shall be mechanically interlocked, welded and ground smooth. The vertical edge joint between the face sheets shall be completely filled and ground smooth to provide a door with no exposed seams.
2. The top and bottom of the doors shall be closed flush with 16-gage steel channels.

D. Doors:1-3/4 inch thick construction in sizes as indicated on Drawings with no visible seams on door faces. Face gauges, internal sound retardant core and perimeter door edge construction shall be manufacturer's standard for the specified model. Face veneer species cut and color to be as selected from manufacturer's full range of available colors and patterns. No lead or asbestos shall be permitted in door construction to achieve performance requirements.

1. Door Facing:
   a. Face veneer, where transparent finish is scheduled: WDMA Industry Standard, "A' Grade veneer minimum 1/50 inch (0.6 mm) thick, mechanically sliced Select White Maple (Acer saccharum) {sapwood}, Plain Sliced, cut with book matched grain.

2.3 DOOR FRAMES

A. Frames: Fabricate from minimum 14 gage commercial grade cold-rolled steel conforming to ASTM A1008 or commercial grade hot-rolled and pickled steel conforming to ASTM A1011.

1. Provide 26-gage steel mortar boxes, welded to frame at back of all finish hardware cutouts where mortar or other materials might obstruct hardware operation.
2. Reinforce frames for masonry partitions with 1/8 inch thick steel channel extending full length of frame head and welded thereto.
3. Fabricate frames with the proper depth between flanges to receive the full thickness of the finished partition.

B. Weld all assembly joints and grind smooth.

2.4 FINISH HARDWARE PREPARATION

A. Prepare doors to receive mortised and concealed finish hardware, including cutouts, reinforcing, drilling and tapping in accordance with final Finish Hardware Schedule and templates provided by hardware suppliers. Comply with applicable requirements of ANSI A115.

B. Reinforce doors to receive surface-applied hardware. Drilling and tapping for surface-applied hardware may be done at site.

C. Locate finish hardware in accordance with Contract Drawings, or in the absence of information in accordance with "Recommended Locations for Builders Hardware, " published by the National Builders Hardware Association.

2.5 FABRICATION TOLERANCES

A. Maximum variation for doors and frames: Maximum diagonal distortion 1/16 inch measured with straight edge, corner to corner.

2.6 FACTORY FINISHING

A. Preparation: Pressure-sand all surfaces of all doors, frames, accessory items, anchors, and related items, to remove blemishes and foreign matter and provide paint grip. Spot-fill imperfections with metallic filler, and sand smooth. Thoroughly clean the surfaces by applying hot or cold phosphate treatment standard with the manufacturer.

B. Following cleaning apply two dip or spray coats of rust-inhibitive metallic oxide, zinc chromate, or synthetic resin primer to all surfaces, including those which will be concealed after erection. Bake, or oven dry, the primer at time and temperature recommended by the manufacturer for developing maximum hardness and resistance to abrasion.

PART 3 - EXECUTION

3.1 ERECTION AND INSTALLATION

A. Installation of frames and doors, including all accessories and related items furnished hereunder, will be performed under Section 08 05 13 – COMMON WORK RESULTS – DOOR AND HARDWARE INSTALLATION.

1. Section 08 05 13 – COMMON WORK RESULTS – DOOR AND HARDWARE INSTALLATION shall place frames in correct position.
2. Specified Tolerance for Sound Control Doors: Maximum deviation from square, alignment, twist and plumb: +/- 0.75 mm (1/32”).

B. Install and adjust perimeter and bottom acoustic seals.

C. Adjust door for smooth and balanced door movement.

End of Section

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Section 08 35 15

SLIDING GLASS PANELS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Furnish and install sliding aluminum and glass panel system, including aluminum frames, glass panels, sliding and locking hardware, designed to provide an operable glass wall.

1.2 RELATED REQUIREMENTS

A. Section 01 74 19 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL: Procedural and administrative requirements relating to recycling goals, waste management program and reporting.

B. Section 01 81 13 - SUSTAINABLE DESIGN REQUIREMENTS: Procedural and administrative requirements relating to required *Northeast CHPS Verified Program,* (NE-CHPS) Certification.

C. Section 06 10 00 - ROUGH CARPENTRY: Wood blocking, and nailers.

1.3 REFERENCES

A. Referenced Standards: Comply with applicable requirements of the following standards and those others referenced in this Section, under the provisions of Section 01 42 00 - REFERENCES. The standards referenced herein are included to establish recognized minimum quality only. Where these standards conflict with other specified requirements, the most restrictive requirements shall govern. Equivalent quality and testing standards will be acceptable, subject to their timely submission, review and acceptance by the Architect.

1. AAMA 611-12 – Voluntary Specification for Anodized Architectural Aluminum.
2. AAMA 612-02 – Voluntary Specification, Performance Requirements, and Test Procedures for Combined Coatings of Anodic Oxide and Transparent Organic Coatings on Architectural Aluminum.
3. ASTM C 1036 - Flat Glass.
4. ASTM C 1048 - Heat-Treated Flat Glass - Kind HS, Kind FT Coated and Uncoated Glass.
5. ANSI Z97.1 - Safety Performance Specifications and Methods of Test for Safety Glazing Used in Buildings.
6. Federal Safety Standards for Architectural Glazing Materials 16CFR1201.
7. SGCC: Certified Products Directory, and Certification Guidelines.

B. Sustainability Requirement Reference: The following sustainability requirements are hereby made a part of this Section by reference thereto:

1. High Performance Schools Exchange, Northeast Energy Efficiency Partnerships NE-CHPS, (referred to herein as “NE-CHPS”).

1.4 SUBMITTALS

A. Information and Review Submittals: Submit the following under provisions of Section 01 33 00 - SUBMITTAL PROCEDURES:

1. Literature: Manufacturer's product data sheets, specifications, performance data, physical properties and installation instructions for each item furnished hereunder.
2. Manufacturer’s instructions: Manufacturer’s installation instructions indicating special procedures, and perimeter conditions.
3. Warranty: Provide sample copies of manufacturers' actual warranties for all materials to be furnished under this Section, clearly defining all terms, conditions, and time periods for the coverage thereof.
4. Shop drawings:
   a. 1/4 inch scale elevations and plans.
   b. Indicate dimensioning, general construction, component joining, connections and locations, and hardware locations.
5. Selection samples:
   a. Sample card indicating Manufacturer's full range of colors available for selection by Architect.
   b. Provide additional samples as requested by Architect for initial selection of colors and finishes.
6. Sustainable Design Submittals: As required by NE CHPS.

1.5 QUALITY ASSURANCE

A. Manufacturer: Provide complete, precision built, engineered, pre-fitted unit by a single manufacturer.

B. Notify the Architect where conflicts apply between referenced standards and existing materials, and existing methods of construction.

1.6 DELIVERY, STORAGE AND HANDLING

A. Do not deliver items to the site, until all specified submittals have been submitted to, and approved by, the Architect.

B. Store and handle materials following manufacturer's recommended procedures, and in accordance with material safety data sheets.

C. Protect materials from damage due to moisture, direct sunlight, excessive temperatures, surface contamination, corrosion and damage from construction operations and other causes.

1.7 FIELD MEASUREMENTS

A. Take field measurements before preparation of shop drawings and fabrication, where possible, to ensure proper fitting of Work.

B. Allow for adjustments within specified tolerances wherever taking of field measurements before fabrication might delay Work.

1.8 WARRANTY

A. Provide manufacturer's standard 10 year warranty for rollers and seal failure for insulated glass and 2 year warranty for all other components from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURER

A. Acceptable Manufacturers: Subject to compliance with the requirements specified herein, manufacturers offering products which may be incorporated in the work include the following, or approved equal:

1. DORMA, New York, NY, product, "HSW-GP".
2. Nana Wall Systems, Inc., Corte Madera, CA, product, "HSW45".

2.2 MATERIALS

A. Frame and Panels: From manufacturer's standard profiles, provide head jamb, side jambs, and panels with dimensions shown on drawings. Provide standard bottom rail width.

1. Aluminum: Extrusions with nominal thickness of .098 inch (2.5mm). Alloy specified as AlMgSi 0.5 with strength rated as 6063-T5 or F-22 (European standard).

B. Glass: Tempered safety glass 1/4 inch thick.

C. Glazing: Provide APTK or EPDM gaskets and extruded aluminum snap-in glazing bead for dry glazing per manufacturer's instructions. Stops to provide for specified glass thickness.

D. Sliding hardware: Provide manufacturer's standard combination sliding and bi-folding hardware with top and bottom tracks.

1. Provide four wheeled coated with toughened polyamide upper running carriage and lower guide carriage.
2. Adjustment: Provide system capable of specified amount of adjustments without removing panels from tracks.

E. Other Components:

1. Provide tapered pins or machine screws for connecting frame components.

2.3 ACCESSORIES

A. All anchors and fasteners, including screws, nuts, bolts, rivets, and other fastening devices shall be of tempered aluminum or non-magnetic type 302/304 stainless steel, warranted by the manufacturer to be non-corrosive and compatible with aluminum frame members. All such devices shall be of suitable type and adequate capacity for each intended purpose.

1. Finished aluminum work shall generally be without use of exposed fasteners. Provide exposed fasteners only where acceptable to Architect, finish to match surrounding aluminum.

2.4 FACTORY FINISHING

A. Aluminum finish coatings: Commercial anodic coatings conforming to AAMA 611-12, Class II, and performance criteria required in AAMA 612-02.

1. Exposed Aluminum Surfaces: (AA designation M12C22A31) Architectural Class II anodic coating, 10 microns (0.4 mil thickness or greater), prepared with a mechanical M12, chemical C22 pre-treatment, and A31 Anodized Finish, clear in color.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Inspect all surfaces and verify that they are in proper condition to receive the work of this Section.

B. Beginning of installation means acceptance of substrate and project conditions.

3.2 INSTALLATION

A. Perform the installation work in strict accordance with the approved shop drawings, and the manufacturers' installation instructions.

B. Installer to provide anchorage devices and to securely and rigidly fit frame in place, absolutely level, straight, plumb and square. Install frame in proper elevation, plane and location, and in proper alignment with other work.

1. If necessary, provide drain connections from lower track.
2. Install panels, and hardware in accordance with manufacturer's recommendations and installation instructions.

C. No permanent exposed to view labels of any kind will be permitted to remain on the panels, frames or glass.

3.3 TOLERANCES

A. Attach to structure to permit sufficient adjustment to accommodate construction tolerances and other irregularities. Erect panels plumb and level, free of warp or twist.

1. Install 1/16 inch per 10 feet, non cumulative, maximum variation from plumb.

2. Install 1/32 inch maximum misalignment of two adjoining members abutting in plane.

3.4 ADJUSTING

A. Adjust panels and hardware for smooth operation and tight fit. Lubricate hardware and other moving parts.

B. Touch-up all scratches, abrasions, and other defects in the prefinished metal surfaces with shop-coat finish material, supplied with the various items to be furnished hereunder.

3.5 CLEANING

A. Clean work under provisions of Section 01 73 00 – EXECUTION.

End of Section

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Section 08 35 23
ACCORDION FOLDING FIRE DOORS

PART 1 - GENERAL

1.1 SUMMARY083

A. Furnish and install electrically-operated horizontal sliding, accordion-type fire rated doors, complete with connection to fire alarm system, operating hardware and mechanisms, and all related items.

1.2 RELATED REQUIREMENTS

A. Section 01 74 19 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL: Procedural and administrative requirements relating to recycling goals, waste management program and reporting.

B. Section 01 81 13 - SUSTAINABLE DESIGN REQUIREMENTS: Procedural and administrative requirements relating to required *Northeast CHPS Verified Program,* (NE-CHPS) Certification.

C. Section 06 10 00 - ROUGH CARPENTRY: Wood blocking for accordion door.

D. Section 07 92 00 - JOINT SEALANTS: Perimeter sealant and backup materials.

E. Section 09 22 16 – NON-STRUCTURAL METAL FRAMING: Support for accordion door

F. Division 26 – ELECTRICAL: Electrical including power and fire alarm wiring to accordion door.

1.3 REFERENCES

A. Referenced Standards: Comply with applicable requirements of the following standards and those others referenced in this Section, under the provisions of Section 01 42 00 - REFERENCES. The standards referenced herein are included to establish recognized minimum quality only. Where these standards conflict with other specified requirements, the most restrictive requirements shall govern. Equivalent quality and testing standards will be acceptable, subject to their timely submission, review and acceptance by the Architect.

1. ASTM E 152 – Methods of Fire Tests of Door Assemblies.
2. NFPA publication 80 – Fire Tests of Door Assemblies.
3. UL 10B – Fire Tests of Door Assemblies.
4. Wamock-Hersey – Certification Listings for fire doors.

B. Sustainability Requirement Reference: The following sustainability requirements are hereby made a part of this Section by reference thereto:

1. High Performance Schools Exchange, Northeast Energy Efficiency Partnerships NE-CHPS, (referred to herein as “NE-CHPS”).

1.4 SUBMITTALS

A. Information and Review Submittals: Submit the following under provisions of Section 01 33 00 - SUBMITTAL PROCEDURES:

1. Literature: Fabricator's product data sheets, specifications, performance data, physical properties for each item furnished hereunder.
2. Shop drawings: Fully dimensioned, large scale sections and details of each type accordion door construction, tracks, guides, counterbalancing and operating mechanisms, electrical characteristics, and related items. Include complete installation details reflecting site conditions required for stacking depth, storage pocket width and height of header above finished floor.
3. Warranty: Provide sample copies of manufacturers' actual warranties for all materials to be furnished under this Section, clearly defining all terms, conditions, and time periods for the coverage thereof.

B. Closeout Submittals: Submit the following under provisions of Section 01 78 00 - CLOSEOUT SUBMITTALS.

1. Manufacturer's field quality control reports of field inspections, including, revised "as-built" shop drawings and manufacturer's final punch list.
2. Manufacturer's warranties: Include coverage of materials and installation and resultant damage from failure of installation to resist penetration of moisture.

1.5 QUALIFICATIONS

A. Installer, with a minimum of 3 years documented experience demonstrating previously successful work of the type specified herein, and approved by product manufacturer.

1.6 REGULATORY REQUIREMENTS

A. Fire doors shall be listed by Underwriters Laboratory as Special Purpose Fire Doors having a one and on-half hour fire-resistive rating in accordance with the requirements of UL 10B and ASTM E-152.

1.7 DELIVERY, STORAGE AND HANDLING

A. Do not deliver items to the site, until all specified submittals have been submitted to, and approved by, the Architect.

B. Deliver materials in original packages, containers or bundles bearing brand name, identification of manufacturer or supplier.

C. Protect materials from damage due to moisture, direct sunlight, excessive temperatures, surface contamination, corrosion and damage from construction operations and other causes.

1.8 COORDINATION

A. Electrical rough-in shall be in-place and ready for final connection when fire doors are erected. Assure access to and proper clearance for motor operators.

B. After testing the fire-alarm system, automatic-closing fire doors shall be re-set to the original position.

1.9 WARRANTY

A. Submit the following warranties under provisions of Section 01 78 00 - CLOSEOUT SUBMITTALS:

1. Guarantee all components to be free from defects in material and workmanship, under normal use, for a period of 12 months after Final Completion of the Project.
2. Repair or replace defective material free of charge. Parts replaced due to normal wear or abuse are excluded.
3. Signed acceptance or customer use of system shall commence the warranty period.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Basis of Design: To establish a standard of quality, design and function desired, Drawings and specifications have been based on Won-Door Corporation, Salt Lake City, UT, Product: “FireGuard model 60 with Flat Lead Post”

2.2 COMPONENTS

A. Construction: Shall consist of two parallel, accordion-type walls of panels independently suspended with no pantographs or interconnections except at the lead post.
   1. Fire rating shall be as listed UL for special purpose doors with a rating of 60 minutes.

B. Panels: Formed of 24 gage enamel coated steel and V-grooved for strength and resilience with full height 24 gage enamel coated steel hinges.

C. Suspension System: Two 14 gage cold rolled steel tracks on 8 inch centers attached to the overhead structural support.
   1. Panel Hangers: Panels shall be suspended by a steel hanger pin and ball bearing roller system.
   2. Flat Lead Post Hangers: 16-gauge steel structural tube frame with 18-gauge steel preformed cover. The lead post shall function as an integrated cover panel over the storage pocket opening when the fire door is in the open position

D. Perimeter Seal: Continuous extruded vinyl sweeps attached to the top and bottom of the fire doors

E. Hanging weight: 4.5 pounds per square foot.

2.3 AUTOMATIC CLOSURE SYSTEM

A. Automatic Closing System shall be listed to UL864 including capability to send and receive signals from the Fire Control Panel, and shall consist of the following:
   1. Microprocessor based Electronic Control box with the ability to:
      a. Monitor dual power sources continually for peak performance including:
         1) Detect a missing battery, bad battery, or low battery condition.
         2) Detect if the charging circuit is bad.
         3) Detect fuse failures.
         4) Detect high or low AC conditions.
      b. Monitor the health of the drive train.

c. Monitor inputs including faults associated with: door block, exit hardware, patron hardware, and key switches.

d. Run a “watch dog” monitoring circuit which will force a software restart in the event the software hangs, including tracking the number of resets that occur for diagnostic purposes.

e. Withstand voltages up to 120 volts AC on the fire alarm input circuit without damage including the ability to indicate that the alarm circuit has not been wired as a dry contact, “no voltage” circuit when errant voltages are applied to the circuit.

f. Communicate with other microprocessors on the system via an internal bus system.

g. Indicate faults or supervised information both locally and at a remote location.

B. Motor Operator Assembly including a DC gear-motor, drive sprocket, clutch, and position sensors. The motor shall drive the fire door by means of a chain attached to a stabilizer bar trolley.

1. A key switch shall be mounted on each side of the door and shall function as follows:

a. Close the door and/or clear fault conditions.

b. Open the door and/or temporarily mute the local horn.

2. Access Control: Shall inactivate Fire Exit Hardware and sound an audible alarm if an attempt is made to manually operate the door assembly. A key switch shall be provided for authorized operation of the door assembly. A signal from the smoke detector or fire alarm will automatically override the access control feature. Leading Edge shall be pressure sensitive such that contact with an obstruction shall cause the door to stop, pause for 3 seconds, then re-close when in alarm mode.

3. Remote Operation and Monitoring. Fire doors shall be remotely monitored and controlled through a building monitoring system (BMS) and interface with the BMS using MODBUS communication

a. MODBUS Door Controls shall include: Open, Close, Reset, Lock (with Access Control Option), Unlock (with Access Control Option).

b. MODBUS Monitor Status: Door position across opening width, Door Status (OPEN, CLOSED, OPENING, CLOSING), Errors, Battery Voltage, AC Voltage.

4. An additional auxiliary relay module (XRM) can be provided with two additional relays to indicate specific status and fault conditions including any two of the following: Open, Opening, Closed, Closing, Stopped, Locked, Exit Hardware Access, Secure Access, Forced Entry, TLS Failure, Key Switch Failures, Stuck switches, Power Failures, Communication Errors

C. Exit Hardware will be located on both sides of each fire door.

D. The header shall be provided as an integrated part of the door assembly and shall Include track, threaded rods and mechanical attachment hardware.

2.4 FABRICATION

A. Do not fabricate accordion door until all specified submittals have been submitted to, and approved by the Architect.

2.5 FINISH

A. Color shall be selected by the architect from manufacturer's standard colors.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Inspect all surfaces and verify that they are in proper condition to receive the work of this Section. Verify that field measurements are as indicated on reviewed and approved shop drawings.

B. Beginning of installation means acceptance of existing project conditions.

3.2 PREPERATION

A. Openings shall be to the dimensions shown on the approved shop drawings, plumb and level.

B. Headers shall be leveled with the finished floor to within +/-1/16” (.002) tolerance over the entire length of the opening.

3.3 INSTALLATION

A. Perform installation of all items furnished hereunder, except as otherwise specified, in accordance with the approved shop drawings and the recommendations of the manufacturer.

B. Set entire assembly including doors, track, and hardware, plumb and true to line, to assure smooth operation. Brace guides internally to provide a completely rigid installation.

C. Coordinate installation of sealants and backing materials at frame perimeter of coiling overhead door as specified in Section 07 92 00 – JOINT SEALANTS.

3.4 TOLERANCES

A. Maintain dimensional tolerances and alignment with adjacent work. Maximum variation from plumb or level: 1/16 inch. Maximum variation in longitudinal or diagonal warp: 1/8 inch per 10 foot straight edge.

3.5 ADJUSTING

A. Adjust for smooth, quiet operation. Verify that all operations are functional and meet the requirements of applicable codes and regulations.

End of Section

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Section 08 43 13
ALUMINUM-FRAMED STOREFRONTS

PART 1 - GENERAL

1.1 SUMMARY

A. Furnish and install the following:

1. Prefinished aluminum storefront framing systems, of the types specified herein, all required integral reinforcing, bracing members and related accessories for the framing systems, and all angles and clips, and other items required to anchor the systems to the building structure. Systems include:
    a. Exterior storefront framing systems.
    b. Interior storefront framing systems.
    c. Exterior fixed sash windows.
    d. Entrance Doors
    e. Operable windows in storefront system.
    f. Interior screw spline storefront framing systems.
2. Prefinished aluminum exterior entrance and interior storefront doors
3. Prefinished aluminum formed brake-metal work, mullion covers, closures, flashings, and similar items, in conjunction with aluminum entrance and storefront framing.
4. Sealant and compressible back-up beads for exterior perimeter joints between framing members furnished hereunder and surrounding dissimilar materials.
5. Metal to metal sealing of aluminum assemblies.
6. Shimming and fasteners required for installation.

B. Build-into place as work progresses, the following products and materials furnished under the indicated Sections:

1. Door Hardware furnished under Section 08 71 00 – DOOR HARDWARE.
2. Stainless steel sunshade support brackets furnished under Section 05 50 00 – METAL FABRICATIONS.
3. Exterior sun control devices furnished under Section 10 71 13 – EXTERIOR SUN CONTROL DEVICES.

C. The work of this Section is performance based, and shall be developed, tested and warranted by the Glazing Subcontractor to comply with design intent indicated on the Project Drawings, specified performance criteria and requirements, and relevant statutory and project requirements. In case of any conflict between Drawings and Specifications, including referenced standards and codes, the more stringent or onerous requirement shall apply. Where multiple standards or requirements apply, the more stringent or onerous shall apply. This specification

describes the work in accordance with the current stage of design and does not contain all information required to produce a full working installation. Further design development will be required by the Glazing Subcontractor..

D. Delegated-Design Services:

1. The products and systems addressed by this specification shall be delegated design.
2. Performance and Design Criteria: Where professional design services or certifications by a design professional are specifically required of Glazing Subcontractor by the Contract Documents, provide products and systems complying with specific performance and design criteria indicated.3.If criteria indicated are insufficient to perform services required, submit a written request for additional information to Architect.

E. System Requirements:

1. Vertical mullions shall be structurally reinforced with steel inserts, as required.
2. Movement that will occur in the primary building structure shall not be imposed on the glass, glazing, glazing components and gaskets. The primary building movement shall not impose unintended stresses in the glass.
3. The system shall incorporate two lines of seals (continuous primary air and water seal, secondary water seal), closure, and flashing to perimeter substrates and assemblies. Aluminum framing shall be provided with weeps to collect and drain bulk rainwater and condensation to the exterior.
4. Glazing systems shall be designed, fabricated and installed with the necessary provisions (e.g. continuous built-in gutter system) required to drain accumulated rainwater or condensation inside the system to the building exterior. Provide accessories required to complete the concealed gutter system including but not limited to seals, dams, tubes, sealants and diverters. Provide baffles as required to prevent the ingress of wind driven water as well as insects.
5. Finish of all exposed interior and exterior visible portions of extruded aluminum glazing frame members shall be custom color 3-coat PVDF coating system per AAMA 2605 to match Architect’s sample.
    a. Basis of Design: PPG Duranar XL.
6. Finish of all formed exterior aluminum sheet metals shall be custom color 3-coat PVDF coating system per AAMA 2605 to match Architect’s sample. a.Basis of Design: PPG Duranar XL.
7. Glass lites to be heat treated as required by load, code and or thermal effects.
8. All safety glass lites to be fully tempered (Type FT) or heat strengthened (Type HS) laminated. All fully tempered glass to be heat soak tested.
9. Integration with doors and associated hardware, including requirements for concealed door operators, hinges, and similar and necessary coordination of same with concealed flashing/waterproofing below at door thresholds. Provide all door hardware and associated devices for entrances and terrace doors.

10. Interface, movement joint, and flashing condition between the glazed system and adjacent walls, head of storefront and roof waterproofing.
11. All interface flashing conditions between primary exterior wall materials, components and systems.

F. Elements of the Work:

1. Storefronts and entrances as described above.
2. Operable vents, backpans and other assemblies occurring in the storefront system.
3. All anchors, fixings, miscellaneous steel and attachments to the primary structure and framing reinforcement except those specifically indicated as provided by other trades.
4. Exterior glass and glazing.
5. Thermally broken aluminum glazed entrances including all hardware and accessories required for a complete and operable assembly.
6. All thermal insulation attached to or within the Glazing Assembly inclusive of supports, bracketry, backing and reinforcement.
7. All firesafing insulation and smoke seals attached to the storefront assemblies including supports, backing, and reinforcements and back pans.
8. Mullion wrap fire-rated insulation at all spandrel areas.
9. Sound deadening at all horizontal surfaces.
10. All gaskets, sealants, elastomeric and metal flashing inclusive of sealing at all junctions with ground level waterproofing and building expansion joints and at all interfaces to other new and existing building envelope and waterproofing transitions.
11. End closures at all horizontal and vertical caps and projections and formed metal closures and insulated metal closure panels.
12. Finishes, protective coatings and treatments.
13. Provisions for electrical outlets and cutouts for lighting, conduits, heat tracing cable, and other electrical work.
14. Proposal drawings, data and samples.
15. Design engineering, shop drawings, calculations, engineering data and test reports.
16. Field measurements of adjacent and/or supporting construction and verification of existing conditions where feasible.
17. Scheduling and monitoring of the work.
18. Material samples.
19. On site testing of anchors and field air and water testing.
20. Coordination with the work of other trades.

21. Visual Mock-up as outlined in this section, including prototype drawings, verification of design, components, and total assembly.
22. Storage, handling, protection and cleaning prior to acceptance.
23. Guarantees, warranties and indemnities.
24. All final exterior and interior cleaning of the Glazing System."

1.2 RELATED REQUIREMENTS

A. Section 01 43 39 - MOCKUPS: Requirements for exterior wall mock-up assembly requiring work of this Section.

B. Section 01 45 29 – TESTING LABORATORY SERVICES: General construction test requirements.

C. Section 01 60 00 - PRODUCT REQUIREMENTS: Listing of VOC requirements for adhesives, cleaning/maintenance materials, paints, coatings, and sealants.

D. Section 01 73 00 - EXECUTION: Waste Management and Recycling during Final Cleaning.

E. Section 01 74 19 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL: Procedural and administrative requirements relating to recycling goals, waste management program and reporting.

F. Section 01 81 13 - SUSTAINABLE DESIGN REQUIREMENTS: Procedural and administrative requirements relating to required *Northeast CHPS Verified Program,* (NE-CHPS) Certification.

G. Section 03 30 00 – CAST-IN-PLACE CONCRETE.

H. Section 04 20 00 - UNIT MASONRY: Preparation of adjacent masonry work to receive work of this Section.

I. Section 05 50 00 – METAL FABRICATIONS: Furnishing stainless steel sunshade support brackets for installation under this Section.

J. Section 06 10 00 - ROUGH CARPENTRY: Wood blockings, nailers.

K. Section 07 21 00 - THERMAL INSULATION: Perimeter vapor and air seal between storefront frame and adjacent construction.

L. Section 07 27 13 – SELF-ADHERING SHEET AIR BARRIERS.

M. Section 07 92 00 - JOINT SEALERS: Requirements for sealant and back-up materials.

N. Section 08 44 13 – GLAZED ALUMINUM CURTAIN WALLS: Aluminum curtain wall construction.

O. Section 08 71 00 - DOOR HARDWARE: Furnishing finish hardware for the work of this Section.

P. Section 08 80 00 - GLAZING: Requirements for glass and specification of glass types used for aluminum storefront systems.

Q. Section 28 00 00 – ELECTRONIC SAFETY AND SECURITY: Access control and intrusion detection systems to be coordinated with the work of this Section.

1.3 REFERENCES

A. Referenced Standards: Comply with applicable requirements of the following standards and those others referenced in this Section, under the provisions of Section 01 42 00 - REFERENCES. The Work of this section shall comply with the requirements of Rhode Island State Building Code – SBC-1 (2018 International Building Code w/ RI Amendments), all referenced standards, and the following additional reference standards. All standards referenced in this Specification shall be the latest editions, including all amendments current at the date of this Document. Criteria specified herein that exceeds reference standards shall take precedence over such standard.

1. The active standards and publications of the American Institute of Steel Construction (AISC), including but not limited to:
    a. AISC 360 “Specification for Structural Steel Buildings”
    b. AISC 303 “Code of Standard Practice for Steel Buildings and Bridges”
2. “Aluminum Design Manual” and “Aluminum Standards and Data” issued by the Aluminum Association (AA).
3. “The Code for Welding in Building Construction” issued by the American Welding Society (AWS), including but not limited to:
    a. AWS D1.1 Structural Welding Code – Steel.
    b. AWS D1.2 Structural Welding Code – Aluminum.
    c. AWS D1.6 Structural Welding Code – Stainless Steel.
4. The specified active standards of the American Society for Testing and Materials (ASTM).
5. The active standards and publications of the American Architectural Manufacturers Association (AAMA), including but not limited to:
    a. The “Voluntary Guide Specifications for Structural Glazing issued by the American Architectural Manufacturers Association (AAMA).
    b. AAMA TIR-A9 Metal Curtain Wall Fasteners
    c. AAMA TIR-A11 Maximum Allowable Deflection of Framing Systems for Building Cladding Components at Design Wind Loads
    d. AAMA TIR-A1, Sound Control for Fenestration Products
6. The European Committee for Standardization (CEN):

a. EN 14179-1:2005 Glass in building - Heat soaked thermally toughened soda lime silicate safety glass - Part 1: Definition and description.

b. EN 14179-2:2005 Glass in building - Heat soaked thermally toughened soda lime silicate safety glass - Part 2: Evaluation of conformity/Product standard.

7. French Standard NF P 78-201-1/A1(DTU39) for determination of thermal stress in glass.

8. The active standards and publications of the American National Standards Institute (ANSI), including but not limited to:

   a. ANSI Z97.1 American National Standard For Safety Glazing Materials Used in Buildings - Safety Performance Specifications and Methods of Test.

9. The “Glazing Manual” and the "Laminated Glass Design Guide" as published by the Glass Association of North America Glazing Manual (GANA).

10. The “Sealant, Waterproofing and Restoration Institute: Sealants: The Professional's Guide” issued by the Sealant and Waterproofing Institute (SWRI).

11. The “North American Glazing Guidelines for Sealed Insulating Glass Units for Commercial and Residential Use” issued by the Insulating Glass Manufacturer’s Alliance (IGMA).

    a. IGMA TM-3000 North American Glazing Guidelines for Sealed Insulating Glass for Commercial and Residential Use.

12. The "Metal Finishes Manual for Architectural and Metal Products" as published by the National Association of Architectural Metal Manufacturers (NAAMM).

13. The specified documents of the Consumer Products Safety Commission (CPSC).

14. Guidelines of the Glass Architectural Spray Coaters Association (ASCA).

15. The "Architectural Sheet Metal Manual" published by the Sheet Metal and Air Conditioning Contractor’s National Association (SMACNA).

16. The hardware finish designations of the Building Hardware Manufacturers Association (BHMA).

17. The specified documents of the National Fenestration Registration Council (NFRC):

    a. NFRC 100 Procedure for Determining Fenestration Product U-Factors.

    b. NFRC Simulation Manual.

18. CPSC 16 CFR, Part 1201-03, Safety Standards for Architectural Glazing.

19. American Society of Civil Engineers (ASCE).

    a. ASCE 7: Minimum Design Loads for Buildings and Other Structures

20. International Code Council (ICC)

a. International Building Code (IBC)

21. Sustainability Requirement Reference: The following sustainability requirements are hereby made a part of this Section by reference thereto:

B. Sustainability Requirement Reference: The following sustainability requirements are hereby made a part of this Section by reference thereto:

1. High Performance Schools Exchange, Northeast Energy Efficiency Partnerships NE-CHPS, (referred to herein as “NE-CHPS”).

1.4 DRAWINGS AND SPECIFICATIONS

A. Information on Drawings and in Specifications establishes requirements for system's aesthetic effects as well as its performance characteristics. Aesthetic effects are indicated by dimensions, arrangements, alignment, and profiles of components and assemblies as they relate to sight lines and relationships to one another and to adjoining construction. Performance characteristics are indicated by criteria subject to verification by one or more methods including preconstruction testing, field testing, or in-service performance. The drawings are a graphic representation of design intent and do not claim to fully solve movement or structural requirements, pressure equalization, waterproofing, air sealing, thermal requirements, acoustic requirements, glass movement, seismic performance or thermal shock requirements. It is the Glazing Subcontractor’s responsibility to provide the final design and meet these requirements.

B. Do not modify intended aesthetic effects, as judged solely by Architect, except with Architect's approval. Where modifications are proposed, submit details to Architect for review.

C. Should the Glazing Subcontractor adopt the details or arrangements indicated on the Design Drawings it shall be deemed that he has checked the materials, their thicknesses, their buildability and performance in terms of this Specification, all relevant Regulations and codes of practice, and manufacturers' recommendations for any products referred to.

D. Where dimensions are not given, the drawings must not be scaled. The matter is to be referred to the Architect, the General Contractor, the Façade Consultant and the Client’s Representative.

1.5 PERFORMANCE REQUIREMENTS

A. General: Provide Storefront Assembly, including anchorage, that will meet or exceed the performance requirements specified herein, capable of withstanding, without failure, the effects of the following:

1. Structural loads.

2. Thermal movements.

3. Movements of supporting structure indicated according to the Movement and Tolerance Report by the Structural Engineer of Record including, but not

limited to, story drift, twist, column shortening, long-term creep, and deflection from uniformly distributed and concentrated live loads.

4. Storefront assembly shall be weather tight and have weather tight interfaces between other exterior wall system assemblies.
5. Dimensional tolerances of building frame and other adjacent construction.
6. Failure includes, but is not limited to the following:
   a. Material failures.
   b. Deflection exceeding specified limits.
   c. Noise or vibration created by wind and thermal and structural movements.
   d. Loosening or weakening of fasteners, attachments, and other components.

B. Structural Loads:

1. Systems shall be designed to withstand loads indicated according to ASCE 7 and as required by the applicable Building Code, whichever is more stringent.
   a. Wind Loads for components and cladding: Determined according to the applicable Building Code and ASCE 7-10 per the design data and loads determined by Project's Structural Engineer:
      1) Basic Wind Speed (V.ult): 133 mph (three second gust)
      2) Exposure Category: C
      3) Occupancy Category: III
      4) Importance Factor: 1.00
   b. Snow Loads: Determined according to ASCE 7 per the design data and loads determined by Project's Structural Engineer:
      1) Ground Snow Load (Pg) = 30 psf
      2) Flat Roof Snow Load (Pf) = 30 psf
      3) Snow Exposure Factor (Ce) = 1.0
      4) Thermal Factor (Ct) = 1.0
      5) Snow Load Importance Factor (I) = 1.1
   c. Seismic loads: Determined according to ASCE 7 per the design data and loads determined by Project's Structural Engineer.
      1) Seismic Design Category: C, Per Structural
      2) Occupancy Category: III, Per Structural
      3) Site Class: E
      4) Component Importance Factor: Ip
         a) Glazing at egress stair enclosures: 1.5[BD1]
         b) All other Cladding and Component: 1.25[BD2]
      5) Component amplification factor, ap: 3.0

6) Component response modif. factor, Rp: 3.0

2. Design Storefront Assembly to transfer wind loads to building structure.
3. Design frames and connections of storefront assemblies to accommodate deflections and other building movements.
4. Dead loads: Self weight of construction.
5. In addition to the minimum design live loads prescribed by the applicable Building Code, glazing systems shall be designed to safely support the following live loads.
   a. A concentrated loading of 250lbs projected over one square foot on all horizontal surfaces including skylights and framing, and projecting features, sills and canopies extending horizontally more than 8".
      1) A concentrated loading of 300 lbs projected over one square foot or 40psf evenly distributed load on all skylights which may be accessed for maintenance.
   b. A line loading of 50lbs per lineal foot acting either downward or outward on all window sills, including on trim components attached at back of sills.
   c. At locations where the façade acts as a guard, located at or near the open sides of an elevated walking surface or slab edge, that minimizes the possibility of a fall from the walking surface to a lower level:
      1) 50 plf at 42 inch above occupied floor surface.
      2) 200 lbf concentrated load applied in the direction and at location of worst effect. When applied to panel surfaces, concentrated load may be distributed over a 4 inch x 4 inch tributary area.
      3) These loads need not be superimposed.
   d. A uniformly distributed load of 20 psf on all canopies.
   e. A concentrated load of 10 lbs at any point, over a 1 inch x 1 inch tributary area, on snap-engaged components.
   f. These live loading requirements do not need to be superimposed with each other.
6. Other Loads:
   a. Self-straining stresses or forces due to thermal gradients, thermal expansion and contraction, or other effects inherent in the design.
   b. Dynamic loading due to operable components.
   c. Temporary and construction loads:
      1) Design the glazing systems to allow for all handling and installation loads without causing overstress, permanent deflection or warping.
      2) No permanent deformation of panels, channel legs and the like during installation to enable panels to fit into place will be allowed on the project.

C. Structural Performance:

1. When tested according to ASTM E 330 at positive and negative wind-load design pressures, systems do not evidence deflection exceeding specified limits
2. When tested at 150 percent of positive and negative wind-load design pressures:
    a. Framing member residual deflection after pressure or load is removed shall not exceed 0.002 times distance between supports or cantilever length.
    b. Glazing systems, including but not limited to glass, sealants, gaskets, and anchorage, shall not evidence disengagement, material failures, structural distress, or permanent deformation of any component.

D. Deflection of Framing Members: AAMA TIR-A11

1. Deflection Normal to Wall Plane: Limited to L/175 of clear span for spans up to 13 feet 6 inches (4.1 m) and to L/240 of clear span plus 1/4 inch (6.35 mm) for spans greater than 13 feet 6 inches or an amount that restricts edge deflection of individual glazing lites to 3/4 inch, whichever is less.
2. Deflection Parallel to Glazing Plane: Limited to the lesser of L/360 of clear span or 1/8”, or amount not exceeding that which reduces glazing bite to less than 75 percent of design dimension, or which reduces edge clearance between framing members and glazing or other fixed components to run or contact block, or which reduces the minimum edge clearance required to accommodate movements.
    a. In-plane deflections of horizontal members supporting operable components shall be limited to less than 1/16 inch (1.5 mm) or L/360 whichever is less.
3. The anticipated movement of the framing members must not exceed the movement capabilities of adjoining sealants.
4. The movement of the framing members must not cause disengagement of applied snap covers or trim.
5. The design of the framing members must accommodate differential movement in adjacent framing members such as might occur at jambs, parapets, unusual geometries and other similar conditions.
6. The framing members must be able to resist any secondary bending moments resulting from axial loads acting through eccentricities caused by large deflections, such as, P-Delta effects.
7. In order to prevent disengagement of the infill material, design of systems incorporating large infill panels must also address the center deflection of the infill panels in conjunction with the framing deflection.

E. Glass Design

1. Comply with 088000 “Glazing”.

2. System shall be designed for actual glass thickness, rather than nominal thickness, to ensure proper sealing of compression gaskets.

F. Metal Panel Design (Integral to Glazed Storefront):

1. The deflection of sheet metal backpans shall be limited to 1/4 inch.

a. If stiffening members are required on backside of metal panel to limit deflection, stiffening members are to be separated from the storefront framing system to prevent panel curvature (oil canning) by way of thermal expansion. The stiffeners must be free to expand and contract due to changes in temperature.

G. Resistance to progressive collapse

1. Failure of a single component should not lead to more extensive collapse of a wall or roof. The building envelope should have sufficient redundancy that in the event of failure of a component the remaining components are able to prevent collapse.

2. The Glazing Subcontractor shall provide a risk assessment and strategy for mitigation of progressive collapse should the bottom panel of a stacked configuration fail.

H. Falling snow and ice mitigation

1. The Glazing Subcontractor shall provide a risk assessment and strategy for mitigation of falling hazard associated with snow and ice accumulation.

I. Air Infiltration:

1. Provide fixed glazing systems with permanent resistance to air leakage through system of not more than 0.06 cfm/sq.ft. of fixed wall area when tested according to ASTM E283 at a minimum uniform static air pressure differential of 6.24 lbf/sq.ft.

2. Provide operable glazing systems with permanent resistance to air leakage through system of not more than 0.3 cfm per square foot of area when tested according to ASTM E283 at a minimum uniform static air pressure differential of 6.24 lbf/sq.ft.

3. Provide entrance doors with permanent resistance to air leakage through system of not more than the following air leakage rates when tested according to ASTM E283 at a minimum uniform static air pressure differential of 1.57 lbf/sq.ft:

a. Double doors: 1.0 cfm per square foot of area

b. Single doors: 0.5 cfm per square foot of area

4. The glazed systems, including all joints between it and other works shall be designed to prevent air flow, from the exterior surface to the interior surface, through the joints of the storefront assembly.

J. Water Penetration Resistance:

1. Storefront Assembly: Provide fixed window glazing that do not evidence water leakage when tested according to the following:
   a. ASTM E 331 at differential pressure of 12 [BD3]lbf/sq.ft.
   b. AAMA 501.1 under dynamic pressure of 12 [BD4]lbf/sq.ft.
2. Definition of Uncontrolled Water Penetration and Test Specimen Failure shall be as published by ASTM with the following additions:
   a. There shall be no water penetration inboard of the air barrier plane, nor visible from the interior, and the assembly shall provide rapid drainage resulting in no retained water in cavities outboard of the air barrier. There shall be no uncontrolled water infiltrating system or migration of water into the concealed spaces of any exterior wall cavity not intended to function as a “wet zone” in the design of the above-grade building envelope. Water controlled by flashing and gutters that is drained back to the exterior and cannot damage adjacent materials and finishes is not considered water leakage.
3. Additional Requirements:
   a. The glazed assemblies, any incorporated opening lites, including all joints between it and other works shall be designed to prevent leakage of water onto the internal face of the Façade.
   b. The glazed assemblies, any incorporated opening lites, including all joints between it and other works, shall be designed to prevent water entry into those parts of the external cladding that would be adversely affected by the presence of water.
   c. The glazed assemblies, including any incorporated opening lites components and interfaces, shall be designed to be drained and ventilated or pressure equalized, such that any water which enters the framing system shall be drained to the exterior via an appropriately designed water management system. No traces of water are permitted at any time beyond the air seal line. The discharge of all such water shall avoid producing unsightly staining or deposits. The ventilation and drainage provision shall take into account the sloping nature of the facades without retaining water or compromising the weather performance in any way. Face sealed, barrier systems with only one line of defense against water penetration will not be acceptable.
   d. Expansion / Movement joints must be installed to be fully engaged at all times, and is to be permanently watertight and airtight under all conditions and to operate without binding or causing noise or vibration
4. Rainwater disposal:
   a. Where necessary, the Glazing Subcontractor will be responsible for verifying the size of the drainage channels and rainwater outlets in accordance with the MEP engineer drawings and specification. The Glazing Subcontractor shall provide calculations to demonstrate that the proposed profiles and outlets can accommodate the anticipated levels of rainfall and that there are sufficient numbers of rainwater outlets for each roof area.

b. The Glazing Subcontractor shall submit his rainwater gutter and outlet design calculations to the Architect for review.

K. Thermal Movements:

1. Provide glazing systems that allow for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures acting on glass framing members and glazing components. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
   a. Temperature Change (Range): 120 deg F (67 deg C), ambient; 180 deg F (100 deg C), material surfaces.
2. Provide for all thermal movement to take place freely in the plane of the exterior wall system without causing harmful buckling, stress on glass, stone, metal, or joint seals, undue stress on structural elements or glass, excess loads on fasteners, reduction of performance or other detrimental effects.
3. Full movement allowances including assembly and installation tolerances shall be incorporated into all junction/components at each expansion joint or assembly.
4. Where necessary carry out checks in respect of the influence of thermal movement on air permeability and water penetration performances of the installation.
5. The dimensions shown on the drawings are to be based on a design temperature of 72ºF. Fabrication, assembly and erection shall therefore take into account the possible thermal movements due to the ambient temperature during fabrication, assembly and installation.
6. Shadow boxes shall be designed for an exposed surface metal temperature (including paint coating system) range of -20 deg. F to +235 deg. F. Design glass seals, gaskets, sealant, etc. to perform under these high temperatures. Seal entire shadow box back pan perimeter. Shadow box should be designed to control condensation that may form in the interstitial space and vent to the exterior. The metal back panel shall exhibit no distress (buckling or distortion) nor shall fastener failure occur as a result of temperature exposure.

L. Energy Performance:

1. Storefront Assembly shall meet or exceed the requirements of the applicable Energy Conservation Code.
2. Provide Storefront Assembly with performance properties specified based on test data or computer simulation and engineering with performance values in accordance with the Project Energy Model, or listed herein, whichever is more stringent.
   a. Maximum assembly thermal transmittance [BD5]including framing (U-Value):
      1) Storefront Fixed Glazed Assemblies: 0.35 Btu/hr.ft².ºF in winter.
      2) Storefront Operable Window Assemblies: 0.36 Btu/hr.ft².ºF in winter

3) Storefront Opaque Assemblies: 0.11 Btu/hr.ft².ºF in winter

4) Storefront Glazed Entrance Door Assemblies: 0.60 Btu/hr.ft².ºF in winter

b. Solar Heat Gain Coefficient: Glazing shall have a solar heat gain coefficient no greater than the basis of design values specified in spec section 088000.

3. Thermal conductance shall be verified by AAMA 1503-09 or NFRC 100 laboratory test or by computer simulation where achievable in accordance with NFRC guidelines. The model shall include glass panels, areas with and without insulated back-pans, typical and atypical mullion and gasket arrangements, thermal bridges, and interface conditions. Where computer simulations are used analysis shall include two dimensional analyses or where appropriate and assemblies have conditions where three-dimensional heat flow exists then three dimensional analyses shall also be performed.

M. Condensation Resistance:

1. Condensation is defined as water, frost, or ice forming on any interior surface of any one component or water that is not collected and positively drained to the exterior through the condensation drainage gutter.

2. The Glazing Subcontractor shall submit a Condensation Resistance Test report according to the AAMA 1503 test method for each Storefront Assembly. Or computer simulation where achievable in accordance with NFRC guidelines. The modelling shall include glass panels, areas with and without insulated back-pans and typical mullion and gasket arrangements, thermal bridges, interface conditions, and atypical details and adjacent constructions. Where required two dimensional or three dimensional heat transfer analysis shall be used.

3. The Glazing Subcontractor shall request confirmation of the boundary conditions below in writing, including but not limited to wind velocity, and exterior and interior temperature and relative humidity from the MEP Engineer.

a. Exterior Temp: 5ºF (winter)

89ºF (summer)

Mean wind speed: 12.3 mph

b. Interior Temp and Humidity: 72ºF, 30% RH (winter)

75ºF, 55% RH (summer)

4. The submitted condensation report shall be assessed by the Architect on a case by case basis. Assessment will be based but not limited to best practice principles of moisture management, location of condensation, incidence, and occurrence, and surface area of condensation.

a. Condensation shall be assessed case by case as specified herein. No condensation on exposed interior surfaces is allowed.

5. Condensation Resistance within glass spandrel cavities and within insulated cavities.
    a. The venting design of spandrel cavities shall ensure that no condensation occurs within the system cavities throughout yearly climatic conditions.
    b. The venting design shall be proposed by Glazing Subcontractor based on the Glazing Subcontractor's proposed system and the specified requirements.

N. Story Drift: Provide EGA systems that accommodate design displacement of adjacent stories according to the Structural Drawings by The Structural Engineer of Record.
1. Serviceability: When tested in accordance with AAMA 501.4-18 at 1.0x design wind drift, or 1.0x design elastic seismic displacement, whichever is greater:
    a. No visible damage to framing or trim components or assemblies is allowed.
    b. No glass breakage or glass fallout is allowed.
    c. Full disengagement of gaskets or weatherseals is not allowed at any location.
    d. Air infiltration and water penetration resistance shall remain within specified allowable limits without adjustment or repair.
    e. No wall components may fall off.
2. Ultimate: When tested in accordance with AAMA 501.4-18 at 1.5x design wind drift, or 1.0x design inelastic seismic displacement, whichever is greater:
    a. Glass shall be retained completely in the glazed opening with no glass fallout.
    b. No wall components may fall off.
3. Comply with ASCE 7, Section 13.5.9 "Glass in Glazed Curtain Walls, Glazed Storefronts, and Glazed Partitions."

O. Outdoor-Indoor Transmission Class: Provide the following minimum OITC for glazed system assemblies (frame and glass) when tested for laboratory sound transmission loss according to ASTM E 90 and determined by ASTM E 1332:
1. OITC 27[BD6][KK7]

P. Acoustical Performance: Storefront Assembly system shall meet and / or exceed requirements of project acoustic report, or code required minimums, whichever is more stringent. Glazing Subcontractor shall provide calculations and glass supplier testing data to verify that acoustic performance targets will be achieved. IN the absence of supplier data, the Glazing Subcontractor shall perform necessary acoustic testing to verify performance targets will be achieved.

Q. Self Generated Noise:

1. Design and install glazing systems and all component parts to provide for noiseless movement caused by thermal expansion, and when subject to dynamic load caused by external wind pressure and in the operation of operable components. The system shall not generate noise due to creaking, drumming, or rattle.
2. Metal to metal contact between inter-locking members is not permitted unless specifically indicated on the structural drawings.

R. Fire Performance:

1. General:
    a. Where required by code, exterior wall systems shall be tested in accordance with, and comply with, the acceptance criteria of NFPA285. Such testing shall be performed on the total wall systems.
2. Surface Burning Characteristics
    a. The Storefront Assembly shall not be composed of any materials which readily support combustion, add significantly to the fire load, and/or give off toxic fumes. Foamed core insulation and metal composite material panels are not permitted.
    b. All materials used internally and externally shall have a Class 1 surface burning to ASTM E 84 classification. Façade/Cladding/Roof Glazing system shall have a flame spread index of not more than 25 and a smoke developed index of not more than 450 when tested as an assembly in the maximum thickness intended for use in accordance with ASTM E 84 or UL 723.
3. Fire-Resistance Ratings: Where required comply with ASTM E 119; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
    a. Indicate design designations from UL's "Fire Resistance Directory" or from the listings of another qualified testing agency
4. Fire Stopping between Floors and along Mullions
    a. The junction of the floor and the exterior façade or roofing shall preserve the integrity and insulation of compartmentation, to prevent fire spread from floor to floor.
    b. Where required by the Design Drawings, the junction of the mullion and the partition wall shall preserve the integrity and insulation of compartmentation, to prevent fire spread between rooms or zones.
    c. Spandrel panels must be designed and anchored in a manner that keeps them in place and prevents passage of smoke, flame and hot gasses when exposed to the ASTM E 119 time-temperature curve.
    d. Materials used to complete the junctions shall accommodate movement between slab edge and cladding, and their fire resisting performance shall not be affected by water from sprinkler discharge.

e. The Glazing Subcontractor is responsible for the provision of all horizontal cavity barriers in the facade system and for fire stopping, as specified, at the junction of the external wall with all other fire-resisting elements of the structure. Continuous smoke seal (sealant) over fire stopping is required.

f. All fire and smoke stops shall be positively fixed in position in such a manner that they shall not become dislodged in the event of a fire. The fixing shall secure the stop in position for a period at least equal to that required for the compartment wall or floor against which the works abut.

g. Any insulation in the external wall construction that is exposed in a ventilated cavity shall be of limited combustibility.

h. Cavity barriers shall be incorporated into the envelope construction so as to prevent the transmission of fire or smoke through voids in the envelope assembly from bypassing any of the fire stops.

1.6 STRUCTURAL REQUIREMENTS

A. General:

1. Except for anchors embedded in concrete and glass design, allowable stress design (ASD) and load and resistance factor design (LRFD) are acceptable.

a. LRFD shall be used for anchors embedded in concrete.

b. ASD shall be used for glass design.

2. Loads shall be considered in accordance with the load combinations specified by the applicable Building Code.

B. Building Movements:

1. Provide moveable joints to accommodate the full range of movement requirements including manufacturing tolerances, construction tolerances, thermal movement, lateral movement, floor sag, beam sag, live load deflection, and column settlement.

2. Allowance for movement shall be in addition to allowance for building construction tolerances.

3. Joints shall accommodate the worst possible combination of erection tolerances and anticipated movements to prevent loads of any kind being transferred from the building into the glazing systems, excessive movements of any joints or failure of weather seals.

4. Design movement joint and select sealant products to accommodate all required expansion and contraction within joint tolerances indicated on the approved shop drawings and within the sealant movement limits recommended by the sealant manufacturer under loaded and unloaded conditions.

5. All movement allowances shall be consistent and applied across all junctions and/or components for each expansion joint system or assembly.

6. Basic preliminary criteria for movements including criteria for envelope of vertical deflections of building structure and span ratios for typical deflections of concrete:
    a. Floor slab deflection along perimeter:
        1) Due to Construction Stage: ??[BD8]" maximum*
        2) Due to Dead Load: 0.8" maximum*
        3) Due to Service Live Load: 0.6" maximum*

            *Special condition at long span roof and floor girders at exterior adjacent to B8 – 2.75" maximum total deflection.
    b. Maximum horizontal inter-story differential movement (lateral drift):
        1) Due to 50-year wind event: H/500
            a) Academic Level 2: 3/16"
            b) Academic Level 3: 3/16"
            c) Academic Level 4: 3/16"
            d) Academic Roof: 3/16"
            e) Performing Arts Level 2: 1/8"
            f) Performing Arts Level 3: 1/8"
            g) Performing Arts Roof: 1/4"
        2) Due to seismic event (service elastic):
            a) Academic Level 2: 1/2"
            b) Academic Level 3: 1/2"
            c) Academic Level 4: 1/2"
            d) Academic Roof: 1/2"
            e) Performing Arts Level 2: 3/16"
            f) Performing Arts Level 3: 3/16"
            g) Performing Arts Roof: 1/2"
    c. Glazing Subcontractor to confirm that creep assumptions are consistent with the construction schedule.
    d. Displacements indicated above are preliminary and provided for reference only. Glazing Subcontractor is responsible for requesting design displacements and tolerances for each slab, and at all necessary locations along each slab edge, from the structural engineer of record (EOR), and ensuring the façade system can accommodate them.
7. Joint widths shall accommodate structural movements and tolerances, in addition to compressibility of joint filler.
8. The use of shoring, pre-loading, or other methods to limit or control building movements during installation is the responsibility of the Glazing Subcontractor. See section 1.9 Action Submittals for requirements for submittal of erection procedure and supporting calculation by Glazing Subcontractor.

C. Long Term Building Movements:

1. Design the glazing system to accommodate the absolute relative vertical deflections and horizontal movements that may occur due to panel rotations due to the following displacements occurring between successive floors:
   a. Column and core shortening.
   b. Beam or slab edge displacement.
   c. Axial Shortening of edge beams.
   d. Floor to floor drift of the building due to wind and/or earthquake loads.

D. Primary Structure Tolerance:

1. Minimum +/- 1.5 [BD9]inch in all directions.
2. Steel: AISC tolerances.
3. Concrete: ACI tolerances.

1.7 ACTION SUBMITTALS

A. General Submittals

1. Comply with Conditions of the Construction Contract and Division 1 Specification Sections.
2. Submissions shall be complete and comprehensive and include all shop drawings, samples, material data submissions, and engineering calculations for each system specified herein, and shall include fully coordinated interface details between each system and the adjacent construction such that air/moisture barrier continuity between the materials, components and systems that comprise the above-grade building envelope can be reasonably evaluated by the Architect-of-Record against the design intent of the contract documents. All work shall be coordinated by the General Contractor prior to submission. Incomplete, non-conforming, or uncoordinated submissions shall be subject to rejection or return without action by the Architect.
3. Analysis: All requirements specified herein shall be analytically and mathematically proven, except for those requirements called for to be proven exclusively by physical testing methods. Calculations and related data and their application in engineering, fabrication, assembly and installation shall be the responsibility of the Glazing Subcontractor’s registered Professional Engineer.

B. Shop Drawings: Shall clearly indicate but not be limited to: Show fabrication and installation of glazed aluminum, steel, and glass exterior wall systems including plans, elevations, sections, details of components, and attachments to other units of Work.

1. Shop Drawings shall clearly illustrate all aspects of the exterior wall system including the relationship of the Work to the structure, waterproofing, roofing, paving, and other adjacent construction and interface conditions; the

arrangement of components; and the sequence and details of fabrication, assembly and erection.

2. Shop drawings shall clearly identify locations of steel reinforcing within the storefront framing on building elevations.
3. Shop drawings shall include details of all connections to contiguous work as approved by the Glazing Subcontractor for the work adjacent and as coordinated by the General Contractor.
4. Details drawings in the shop drawings shall be full size and not scaled.
5. Coordinate installation of anchors for glazing members that connect to the work of other trades. Furnish setting drawings, templates, and directions for installing anchors, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry or attached to wood.
6. Submit full analysis and complete details of proposed cladding design movement allowances based on the base structure information contained in the Contract Documents. Indicate all cladding design movements and required clearances to adjacent construction on shop drawings.
7. Brackets, anchors, and related components shall be scheduled and described in detail on shop drawings. Show details, including computations, of all related components and connections to areas by others.
8. Submit a schedule of fabrication tolerances for all major glazing system components. Indicate extremes of allowable base-structure tolerances on shop drawings.
9. Exposed fasteners, where approved, shall be indicated on the shop drawings.
10. Clearly indicate all revisions to shop drawings on re-submissions.
11. Shop Drawings shall clearly show internal and concealed sealant joinery. Isometrics to be provided at design team’s request.
12. Signed and Sealed Engineering calculations shall be submitted concurrently with the corresponding shop drawings. Shop Drawings will not be reviewed unless this requirement has been met.
13. All shop drawing sheets shall be of one size and shall bear the seal of a Professional Engineer currently licensed in the licensing jurisdiction of the project.

C. Structural Design Calculations:

1. All structural calculation submissions shall bear the seal of a Professional Engineer currently licensed in the licensing jurisdiction of the project.
2. Submit for review by the A/E structural design calculations for all components of the glazing assemblies, including, but not limited to panels, framing, and connections. Indicate direction, location, and magnitude of all connected loads to the building structure coordinated to the building structure as shown in the Contract Documents.

3. Submittal of loads imposed on primary structure shall include location, magnitude and direction of imposed loads, graphically represented in their appropriate locations on a copy of the Contract Document structural framing plans or elevations as appropriate. Detail references indicating the connections applicable at each location shall be noted on the submittal drawings.
    a. Where Glazing Subcontractor loads imposed exceed and/or connection conditions differ from what is shown in the structural drawings, submit for approval to Structural Engineer of Record loads imposed on the primary structural frame due to the dead, live, and wind/seismic loads indicated on the Contract Documents.
4. Calculations shall demonstrate compliance with applicable sections of the applicable Building Code and the appropriate material reference specification for each component considered.
5. Structural Sealant:
    a. Submit certification from the sealant manufacturer that they have reviewed all sealant details and that when exposed to the specified loads the stress in the silicone sealant of dimensions shown does not exceed manufacturer’s recommendations.
    b. Engineer structural silicone glazing systems specifically for this Project. Stock or standard engineering information is not acceptable.

D. Thermal Performance and Condensation Calculations:
1. Submit calculations and/or test data demonstrating condensation resistance of glazing assemblies.
2. Submit calculations and/or test data demonstrating solar shading and thermal transfer values across exterior wall system assemblies.

E. Engineering Judgement for Perimeter Fire Containment Systems:
1. Submit project-specific engineering judgement prepared by a professional engineer licensed in the Rhode Island that demonstrates the storefront assembly satisfies the specified fire resistance requirements and will be capable of providing an ASTM E 2307 compliant perimeter fire containment system.

F. Product Data: Submit manufacturer's product data for each product included in the work, including test data, manufacturer's quality assurance documentation, and preparation and installation recommendations. Also include details of construction relative to materials, dimensions of individual components, profiles, and finishes.
1. Include product data for:
    a. Glass and glazing accessories.
    b. Sealants, setting blocks, gaskets and glazing accessories, membranes, vapor barriers, including all compatibility test reports.
    c. All proprietary accessory hardware and fasteners.

d. Metals and metal alloys, including welding materials.

e. Applied finishes, including preparation and pre-treatment, application, curing, and maintenance procedures.

f. Thermal and Firesafing insulation.

1) For non-UL assemblies used as fire separation between floors, provide engineering judgement from manufacturer.

g. Smoke seals.

h. Grades of all bolts, nuts, washers, screws, pins, and rivets.

i. Submit safety glazing letter from manufacturer. Permanent etched safety label on glass shall not be permitted unless required by code. Removable sticker safety label is permitted.

j. Complete information, as applicable, concerning materials, dimensions, coatings, manufacturing process, and installation procedures.

k. The method of packaging and identifying the Glazing components shall be indicated by manufacturer. Identification shall include the evaluation report number and notice of any product installation limitations.

l. Any products included in the work, but not listed above.

G. Samples: Submit samples for verification of each type of exposed finish required in manufacturer's standard U.S. sizes. Where finishes involve normal color and texture variations, include sample sets showing the full range of variations expected.

1. Samples of production materials shall be of the following sizes:

a. Color samples: 12 inches x 12 inches, each color.

b. Finished extrusions: 12 inches in length.

c. Glass: comply with Section 088000 "Glazing".

d. Finished sheet metal (aluminum): 12 inches x 12 inches, each type.

e. Finish hardware: each type.

f. Fastening devices, each type.

g. Flashing (coated aluminum, stainless steel and non-metallic membranes): 12 inches x 12 inches, each type.

h. Gaskets and joint fillers: 12 inches long, each type, 12 inches x 12 inches, each corner.

i. Sealants: Cured sample-12 inches long, each type, with approved backer rod or similar joint back-up.

j. Range samples shall be provided to define any visual acceptance criteria, including colors, gloss, flatness, presence of die lines, etc. All finishes of extrusions to be from hardened dies. Min 12 inches long.

1) All Aluminum Painted Finishes.

1.8 INFORMATIONAL SUBMITTALS

A. Certificates:

1. Submit product and installer certificates signed by the respective manufacturers certifying that all materials of the glazing systems comply with fabrication, erection, approved shop drawings, structural computations and specified requirements.
2. Submit all shop drawings to the following manufacturers for their review and provide written confirmation from them that the manufacturer's products are appropriate for the proposed use and are being used in accordance with the manufacturer's recommendations.
    a. Glass
    b. Sealants
3. Separate certifications are not required for glazing materials bearing manufacturer's permanent labels designating type and thickness of glass, provided labels represent a quality control program of a recognized certification agency or independent testing agency acceptable to authorities having jurisdiction.
4. Submit written certification that welded anchors have been designed and tested and will comply with specified performance requirements.
5. Submit welder certificates indicating that welders have satisfactorily passed AWS qualification tests for welding processes involved and who are currently certified for these processes.
6. Submit installer certificates signed by manufacturer certifying that installers comply with requirements in "Quality Assurance" Article.

B. Product Test Reports:

1. For each glazing system, submit test reports from the approved independent testing laboratory showing compliance of the individual components and parts of each glazing system with the performance requirements indicated. Test reports to be within 10 years and without changes to the system specified.
2. Test reports shall be submitted in a timely manner and well before execution of any related component of the storefront system.
3. Test Reports shall include:
    a. Glazing.
    b. Fasteners, bolts (each size, length, and type), nuts, washers, and hardware, including manufacturer's certification of conformance for each and every lot. When requested by Engineer, submit samples to Testing Agency for testing prior to start of any work or delivery of materials to job site or stockyards.
    c. Expansion anchors.
    d. Mechanical fasteners.

e. Miscellaneous structural clips and accessories.

4. Materials Testing Reports:

a. Sealants: Comply with Section 079200 “Joint Sealants”.

b. Staining: Include ASTM C1248 stain response testing for sealant and primers in direct contact with natural stone, concrete, or wood.

c. Structural silicone: Provide Project specific adhesion testing. Stock or standard testing is not acceptable. Test each material to which structural silicone is adhered.

C. Submit Manufacturers’ Quality Assurance Inspection and Production Testing Programs.

1. Inspection and production testing programs are subject to the Owner’s Representative’s approval.

2. Submit detailed description of inspection and production testing programs and inspection reports for:

a. Shop fabricated glazed steel and aluminum exterior wall and assemblies.

b. Insulating glass units fabrication.

c. Structural silicone glazing.

d. Organic coatings.

e. Mill reports for structural steel.

D. Installation Procedures Manual:

1. Submit a comprehensive manual containing all installation procedures, equipment and personnel required for acceptance prior to the commencement of installation works. Comply with requirements in “Quality Assurance” Article.

2. The Glazing Subcontractor shall submit an erection procedure, prepared under the supervision of the Glazing Subcontractor’s Engineer for review. This procedure should consider any shoring, pre-loading, or other temporary means necessary for the sequence of installation of the Storefront Assemblies and related scope of work including compatibility of any loads applied to the primary structure because of these temporary means. The erection procedure and supporting calculations shall be submitted for review and shall bear the seal of a Professional Engineer currently licensed in the licensing jurisdiction of the project.

E. As-Built Record Shop Drawings and Documents:

1. Submit final approved shop drawings and BIM models in electronic format.

2. Prepare as-built drawings, photographs and other records progressively as the work proceeds.

3. Record Shop Drawings: At the completion of the project, submit electronic copies of all final approved shop drawings prepared under the supervision of

and signed and sealed by the Professional Engineer currently licensed in the licensing jurisdiction of the project.

F. Operation and Maintenance Manual: At the completion of the project, submit electronic copy of a maintenance manual describing the various materials, equipment and procedures for cleaning and maintaining the work of this Section. Include the manufacturer's data for all components of each glazing system and type, with supplier/source and contact information included for future reference. Clearly provide replacement procedures, replacement components and methods of replacement of damaged components of glazed steel and aluminum exterior wall systems to ensure full service capability of the work. Include copies of glazing systems guarantees and warranties.

G. Sustainable Design Submittals: As required by NE CHPS.

1.9 QUALITY ASSURANCE

A. The work of this section shall be performed by a company which specializes in the type of Storefront work and Design Assist process required for this Project, with a minimum of 10 years of documented successful experience and shall be performed by skilled workmen thoroughly experienced in the necessary crafts.

1. Work shall be performed in compliance with Owner's insurance underwriters' requirements and UL approvals and testing for materials, assemblies, and procedures.

B. Manufacturer shall specialize in manufacturing the type of glazed systems specified in this section, with a minimum of 10 years of documented successful experience, and have the facilities capable of meeting all requirements of Contract Documents as a single-source responsibility and warranty.

C. The Work of this Section shall be the responsibility of one Subcontractor.

D. The Glazing Subcontractor for the Work of this Section shall have proven achievement and experience in similar work and is subject to approval by the Architect.

E. Manufacturers and suppliers of all materials and components of the Work of this Section are subject to approval by the Architect.

F. All products and individual or aggregate components of the Storefront Assembly for which acceptable engineering or test data are not available shall be physically tested.

G. Engineering services are defined as those performed for the design and installation of all exterior glazing systems and types specified herein or otherwise included in the contract documents for this project.

1. Engineering Responsibility: Engage a qualified Professional Engineer currently licensed in the licensing jurisdiction of the project to prepare, or supervise the preparation of, drawings, calculations, and data for the Work of

this Section to include a comprehensive engineering analysis that demonstrates full compliance requirements of the contract documents.

2. Installer's responsibilities include providing professional engineering services needed to assume engineering responsibility.

H. Source Limitations: Obtain each type of exterior glazing system from one source, and by a single manufacturer.

I. Source Limitations for Glass: Obtain glass from single source from single manufacturer and single plant for each glass type.

J. Source Limitations for Glazing Accessories: Obtain from single source from single manufacturer for each product and installation method.

K. Pre-Installation Conference: Conduct conference at Project site to comply with requirements of Division 1 Section "Project Meetings”. Meeting shall include General Contractor, Owner, Architect, Glazing Subcontractor, Sealant Subcontractor, as well as any other subcontractors or material technical service representatives whose work, or products, must be coordinated with the storefront work. Review methods and procedures related to glazed aluminum exterior wall system including, but not limited to, the following:

1. Review and discuss condition of substrate and other preparatory work performed by other trades.
2. Review erection procedure prepared by Glazing Subcontractor and discuss coordination of procedure with previously installed scope of work.
3. Review structural loading limitations.
4. Review and discuss the sequence of work required to construct a watertight and weather tight exterior building envelope.
5. Review and finalize construction schedule and verify availability of materials, Glazing Subcontractor's personnel, equipment, and facilities needed to make progress and avoid delays.
6. Review required inspecting, testing, and certifying procedures and coordinate with installation schedule and work of individual trades to avoid delays in the Work.
7. Review weather and forecasted weather conditions, and procedures established to mitigate the impact of unfavorable weather conditions on the quality and progress of the Work.

L. Prior to the start of fabrication, the Glazing Subcontractor shall submit a comprehensive Quality Control Program covering all phases of the exterior wall system including, but not necessarily limited to, the following:

1. Procurement of materials including quality control programs of major suppliers.
2. Verification of compliance with International Standards Organization (ISO) or similar agency authorized or otherwise qualified and accredited to provide

periodic, independent review and certification of each supplier/manufacturer's Quality Assurance program.

3. Fabrication of components, to include milestone inspections and written certification that components and finishes meet or exceed the requirements of the contract documents and recognized industry standards specified herein, and that pre-finished components and parts are free of any visible scratches, gouges, dents, blemishes and similar damage considered by the Architect to be unacceptable for the project.
4. Final assembly of components, to include milestone inspections and written certification that internal end-dams, zone-dams, and critical seals have been installed in accordance with the contract documents and recognized industry standards specified herein.
5. Installation and site quality control, to include a sample of the intended Field Report format and intended method to track or otherwise monitor and correct all non-conforming work in a manner that is consistent with the requirements of the contract documents, and available on site for review and independent verification by the Architect and Owner.
6. Periodic, in-house evaluation and performance testing of completed systems and assemblies to verify compliance of glazing systems and assemblies during production, prior to shipment to project site.
7. The QC Programs submitted by each of the Glazing Subcontractors, suppliers, manufacturers shall be included by the GC/CM into a comprehensive and fully integrated, project-specific Building Envelope Quality Assurance Program.
8. The submittal shall include the identification of a single, qualified Quality Assurance Manager representing the GC/CM who will be in responsible charge of developing and administering the Building Envelope Quality Assurance Program (BEQAP) throughout the duration of the project.
9. The BEQAP shall be subject to review and approval by the Architect, Owner, and Owner's building envelope technical representative.
10. The Architect and Owner shall be allowed access to the Glazing Subcontractor's facilities and those of the major suppliers and subcontractors to monitor QC procedures. The Glazing Subcontractor shall make available to the Owner and the Architect all QC Program records upon request.

M. The Certification Entities shall be accredited as operating in compliance with International Standards Organization (ISO) or similar agency authorized or otherwise qualified and accredited to provide periodic, independent review and certification of each Certification Agency's Quality Assurance program.

N. Production testing programs for coatings and finishes:

1. AAMA 2605 for Coatings.

O. NAAMM /NOMMA 500-06, Metal Finishes Manual for Architectural and Metal Products for fabrication and finishing of stainless steel. Testing Agency Qualifications: Qualified according to ASTM E 699 for testing indicated.

P. Testing Agency Qualifications: Qualified according to ASTM E 699 for testing indicated.

Q. AAMA QAG 1 Quality Assurance Processing Guide or equal for poured, de-bridged, and crimped thermal breaks.

R. Manufacturer Qualifications: A manufacturer capable of fabricating glazed steel and aluminum exterior walls that meet or exceed performance requirements indicated and of documenting this performance by certification, labeling, and inclusion in lists.

S. Manufacturer Qualifications for Insulating-Glass Units with Sputter-Coated, Low-E Coatings: A qualified insulating-glass manufacturer who is approved by coated-glass manufacturer.

T. Installer Qualifications: Manufacturer's authorized representative who is trained and approved for installation of units required for this Project and certified under the National Glass Association's Certified Glass Installer Program.

U. Sealant Testing Agency Qualifications: An independent testing agency qualified according to ASTM C 1021 to conduct the testing indicated.

V. AISC “Code of Standard Practice,” latest edition, Section 10 as amended herein.

W. Welding Qualifications: Qualify procedures and personnel according to the following:

1. AWS D1.1/D1.1M, "Structural Welding Code - Steel”.
2. AWS D1.2/D1.2M, "Structural Welding Code - Aluminum”.
3. AWS D1.6/D1.6M, “Structural Welding Code – Stainless Steel”.

X. Independent Inspections: General Contractor shall employ Independent Agent to perform Independent Inspections for, including but not limited to, field welds, shop welds, bolts, and anchors as specified in General Conditions Division 01.

Y. Manufacturer’s identification tags or marks are not acceptable on surfaces which will remain exposed to view after installation.

1. Evidence of “patching” after removal of tags or marks is not acceptable.

1.10 MOCK-UP

A. Provide mock-up elements for field panel in accordance with Section 01 43 39 – MOCKUPS at exterior location where directed by Architect. Mock-up will demonstrate quality of work, construction methods, relationship to other work.

1.11 PRE-INSTALLATION CONFERENCE

A. Installer of the Work of this Section is required to attend pre-installation conference specified under Section 04 20 00 - UNIT MASONRY.

1.12 DELIVERY, STORAGE AND HANDLING

A. Comply with General Conditions and Division 1 Section “Product Requirements”.

B. Deliver glazing systems and components complete with factory applied protections, removable labeling, and packaging to comply with manufacturer/fabricator’s requirements and adequately protected from damage during shipment.

C. Protect glazing systems and components from adverse job conditions before, during, and after installation, including but not limited to:

1. Condensation, temperature changes, direct exposure to sun, or other causes that could otherwise damage the assemblies.
2. The work of other trades before, during, and after installation (e.g. weld slag, concrete spray, run-down staining/etching of aluminum and glass surfaces and similar).
3. Adhere to insulating glass fabricator’s recommendations for venting and sealing to avoid hermetic seal ruptures.

D. Storage:

1. Coordinate storage requirements and logistics with the General Contractor before shipping materials.
2. Components shall be stored on elevated platforms, skids, or pallets; covered with tarpaulins or other suitable weather-tight covering. Covering material shall allow for air circulation about the components. Store panel components so that water accumulation drains freely.
3. Neatly stack (in a manner that will not affect the components) system assemblies in locations designated by the General Contractor. Isolate panel assemblies at all contact points; store assemblies to prevent permanent damage, deformation, and similar distress.
4. Do not store system materials in contact with other materials that might cause scratching, gouging, staining, and etching of aluminum and glass surfaces, denting, surface damage, or other deleterious effect.

E. Handling:

1. Take into account the restrictions imposed on the delivery of pre-fabricated elements by the existing building's dimensions and site access.
2. Care shall be exercised to properly brace and reinforce prefabricated assemblies against racking during hoisting and installation.

F. Field Measurements: Verify actual locations of structural supports for glazed systems by field measurements before fabrication and indicate measurements on Shop Drawings.

1. Established Dimensions: Where field measurements cannot be made without delaying the Work, establish dimensions and proceed with fabricating glazed aluminum storefront systems without field measurements. Coordinate

construction to ensure that actual dimensions correspond to established dimensions.

G. Sequencing: Coordinate the storefront fabrication and installation with the General Contractor / Construction Manager and the Air Barrier Subcontractor sequence to ensure that the air barrier tie-in shown on the drawings is achieved. Work with the General Contractor to represent proper sequencing on Construction Schedule.

1. Do not order or deliver any materials until all submittals, required hereunder, have been received and approved by the Architect.
2. Arrange keying, and schedule delivery of keys, with Owner.

1.13 WARRANTY

A. Comply with Section 01 78 00 - CLOSEOUT SUBMITTALS, and in compliance with Section 01 78 36 – WARRANTIES. The more stringent requirements of the contract documents shall apply.

B. Installer’s Warranty:

1. Provide a warranty for materials and workmanship of the Exterior Glazed Assemblies Contract from Date of Completion for a period of ten (10) years (the "warranty period"). Provide all manufacturer's pass through warranties. Also provide a warranty to cover all the costs of materials, labor, and equipment to remove any defective components of the glazing systems and replace them.
2. This warranty shall also cover the costs associated with removing and replacing internal finishes trims and services so that remedial works can be carried out. The content of each warranty is to be approved by the Architect.

C. Manufacturer’s Warranty: Submit a written warranty executed by the manufacturer agreeing to repair or replace components of a glazed exterior envelope system that fail in materials or workmanship within the specified warranty period, at no cost to the Owner.

1. Failures include, but are not limited to, the following:
   a. Structural failures including, but not limited to, excessive deflection.
   b. Noise or vibration caused by design loads, thermal or other movements.
   c. Thermal stresses transferring to building structure.
   d. Failure of system to meet performance requirements.
   e. Failure of operating components to function normally.
   f. Loosening or weakening of fasteners, attachments, hardware, and other components.
   g. Water leakage.
   h. Failure of glazing due to non-impact breakage including breakage due to Nickel Sulfide, thermal stress, or any other non-impact breakage.

i. Failure of insulating glass edge seal as evidenced by frost, condensation, water, dust, corrosion, haloing or low-e coating damage within sealed air space.

j. Insulating glass spacer migration.

k. De-lamination or discoloration of laminated glass or panels.

l. Cracking, pitting, or discoloration of glass decorative and low-e coatings.

m. Deterioration, fading, excessive non-uniformity, pitting, cracking, peeling, crazing or discoloration of finishes and other materials beyond normal weathering.

n. Loss of effective glass bite due to shifting of glass or loss of effective glass bearing of setting blocks due to shifting of glass and/or blocks.

o. Adhesive or cohesive sealant failures or crazing/ bulging on surface of sealant.

p. Gaskets or weather strips hardening, discoloration, or disengagement.

q. Collapse, slumping or loosening of support of thermal insulation or fire safing insulation.

2. Warranty Period: Ten (10) years from date of Substantial Completion.

D. High Performance Organic Coatings: Submit a warranty for a period as listed below, warranting the integrity of film and permanence of color of the high performance organic coatings for the following:

1. Color fade not to exceed 5 delta E units (Hunter) as calculated in accordance with ASTM D 2244 on exposed surfaces cleaned with clean water and a soft cloth.

2. Degree of chalking not to exceed rating No. 8 when measured in accordance with ASTM D 4214 on exposed unwashed surfaces.

3. Will not crack, check, or peel.

4. Warranty Period for Exterior Coatings systems for Metal: 20 years

5. Warranty Period for Interior Coatings systems for Metal: 5 years

E. Material Manufacturer’s Guarantee:

1. Submit written guarantee signed by the respective manufacturer agreeing to furnish replacements for those glass units, finishes, or components that deteriorate from the point of manufacture, during shipping, during storage on site and in the installed condition, within specified period indicated below. Guarantee covers only deterioration due to normal conditions of use and not to handling, installing, and cleaning practices contrary to glass manufacturer’s published instructions. Guarantee for Structural Silicone and Weather-Sealant shall include full material costs for failure incurred.

a. Glass: Comply with 088000 “Glazing”

b. Weather-Sealant: 20 years

c. Aluminum Panels: 10 years

2. Warranty does not include damage caused by vandalism, or natural conditions exceeding the performance requirements.

F. Owner's Rights:

1. The Guarantees submitted under this section shall not deprive the Owner of other rights or remedies that the Owner may have under other provisions of the Contract Documents and is in addition to and runs concurrent with other guarantees made by the Glazing Subcontractor under requirements of the Contract Documents.

2. Inspections Upon and After Substantial Completion: Owner's Inspecting Agent (Agent) shall inspect entire system at six months and twelve months after the date of Substantial Completion and provide a written report to the Contractor and Architect. Systems will be evaluated during actual wind-driven rain events at the discretion of the Agent. Glazing Subcontractor shall promptly replace defective work.

1.14 ATTIC STOCK

A. At the completion of the project, provide the following attic stock:

1. A minimum of one percent, but not less than two lites, of each typical size for each glass type. Total amount of required attic stock to be determined by Owner.

2. Attic stock is intended for use in the event of damage after completion of the project and shall not be used to replace materials damaged during construction.

PART 2 - PRODUCTS

2.1 MANUFACTURER

A. Manufacturer: To establish a standard of quality, design and function desired, Drawings and specifications have been based on EFCO Corporation, Monett, MO, product "Series 433".

B. Subject to compliance with the requirements specified herein, manufacturers offering products which may be incorporated in the work include the following, or approved equal:

1. EFCO Corp., Monett, MO.

2. Kawneer Manufacturing Company, Norcross GA.

3. Wausau Metals Corporation, Wausau, WI.

4. YKK AP America Inc., Austell, GA.

2.2 DESCRIPTION

A. The Glazing Subcontractor shall engineer, test, fabricate, deliver, install, and warranty all construction necessary to provide all Storefront Assembly systems including all measures that may be required to that end, notwithstanding any omissions or inadequacies of the Contract Documents. The work of this Section shall include all materials, components and systems necessary and incidental to the weather-tight installation.

B. System Descriptions:

1. TYPE 1: Stick Built Storefront
    a. System Type: Stick Built, Thermally Broken, Screw-Spline
    b. Framing Type: Aluminum
    c. Glass Edge Support: 4 Side
    d. Capture Type: Fully Captured
    e. Basis of Design: EFCO Series 403
        1) 2” x 4-1/2” nominal dimension
        2) Thermal
        3) Center Plane
        4) Stick Built
        5) Outside Glazed
    f. Glass Type: Glass Type A, B, and C. Refer to Section 088000 “Glazing”. See Architectural Drawings for glass type locations.
    g. Finish: 3-coat PVDF to meet AAMA 2605, Custom metallic color as selected by Architect.
    h. Provide exterior glazed operable windows as shown on drawings. See Part 2 “Operable Windows (Vents)”.
        1) Glass Type: Glass Type A and B, refer to Section 088000 “Glazing”.
    i. Provide exterior glazed spandrels as shown on drawings. See Part 2 “Glass Spandrel Constructions”.
        1) Glass Type: Glass Type ??[BD10], refer to Section 088000 “Glazing”.
    j. Provide exterior glazed entrance doors at ground floor storefront. See Part 2 “Exterior Entrance Doors”.
        1) Glass Type: Glass Type B, refer to Section 088000 “Glazing”.
2. TYPE 2: Stick Built Storefront
    a. System Type: Stick Built, Thermally Broken, Screw-Spline
    b. Framing Type: Aluminum
    c. Glass Edge Support: 4 Side
    d. Capture Type: Fully Captured

e. Basis of Design: EFCO Series 406
   1) 2” x 6-1/2” nominal dimension
   2) Thermal
   3) Center Plane
   4) Stick Built
   5) Outside Glazed

f. Glass Type: Glass Type A, B, and C. Refer to Section 088000 “Glazing”. See Architectural Drawings for glass type locations.

g. Finish: 3-coat PVDF to meet AAMA 2605, Custom metallic color as selected by Architect.

h. Provide exterior glazed operable windows as shown on drawings. See Part 2 “Operable Windows (Vents)”.
   1) Glass Type: Glass Type A and B, refer to Section 088000 “Glazing”.

i. Provide exterior glazed spandrels as shown on drawings. See Part 2 “Glass Spandrel Construction”.
   1) Glass Type: Glass Type ??[BD11], refer to Section 088000 “Glazing”.

j. Provide exterior glazed entrance doors at ground floor storefront. See Part 2 “Exterior Entrance Doors”.
   1) Glass Type: Glass Type B, refer to Section 088000 “Glazing”.

2.3 GLASS AND GLAZING

A. Glass and Glazing: Comply with Section 088000 "Glazing”.

2.4 ALUMINUM

A. Aluminum Extrusions: ASTM B221, Provide extrusions of the alloy, temper, and thickness recommended by the manufacturer to comply with the following:
   1. Alloy 6063-T6, 6063-T5, or 6061-T6, tempered as required by calculations.
      a. Extrusions (anodic finish): 6063 T5 or T6, ASTM B221.
      b. Extrusions (painted or conversion coat finish): 6063-T5 or T6, 6061-T6, ASTM B221.
   2. Dimensional tolerances for all aluminum extrusions regarding thickness, straightness, twisting and flatness shall be held to better than one-half of those published under Sections 11 and 12 of the Aluminum Association’s Publication No. 1 “Aluminum Standards and Data” wherever possible.
   3. Minimum Wall Thickness for Primary (Structural) Extrusions: As required to satisfy the performance requirements inclusive of deflections and stress but not less than 0.09 inch.
   4. Minimum Wall Thickness for Trim (Non-Structural) Extrusions: As determined relative to die size:

a. For dies less than 4 inches in diameter; 0.062 inches.

b. For dies 4 inches to 6 inches in diameter; 0.080 inches.

c. For dies greater than 6 inches in diameter; 0.093 inches.

5. Extrusion tempers shall be as recommended by the producer and fabricator based on the end-use and requirements for the component part.

6. Welding of aluminum alloys shall be in accordance with the Aluminum Design Manual and AWS D1.2 Structural Welding Code - Aluminum.

B. Aluminum Sheets and Plates: ASTM B209, Alloy 3003-H14 for paint finish, and AA5005-H34 for anodized finish. Sizes and minimum gauges as shown or specified, or as required to provide adequate structural characteristics and suitable for forming and finishing as specified. Dimensional tolerances for aluminum sheet shall be held to better than those published under applicable AA Standards and Data.

1. Minimum Gauges for Sheet Fabrication of Components:

a. Exposed Panels, Typical: 0.125” (3mm).

2. All sheet for exposed or semi-exposed applications is to be provided annealed to relieve work hardening stress prior to fabrication.

3. Metal panels shall follow the profiles indicated on the Contract Documents.

4. Panels shall be fabricated to ensure that the grain of all contiguous panels is oriented in the same direction upon installation.

5. Prior to installation the finished panels shall be laid out and viewed under a uniform daylight source and reviewed for uniformity in color and tonality.

6. Panel support construction shall result in a panel visual flatness acceptable to the Architect.

7. Extruded aluminum stiffeners or any alternate panel stiffening devices shall be designed to prevent 'telegraphing' of the stiffening device on the exposed face of the panel.

C. Fasteners: As required by design and calculations with specific torque values identified in the shop drawings where required.

D. Non-conductive spacers: (except at bolted slip-joints): Non-corrosive gaskets shall provide a barrier to prevent galvanic corrosion between dissimilar metals. Gaskets shall contain temperature and moisture properties as required to suit specified performance criteria.

E. Slide Bearings (At slip-joints in exterior wall): Wherever materials are subject by engineering design to movement, provide suitable low friction material(s) such as:

1. Polytetrafluoroethylene fluoropolymer: ASTM D4894, Teflon as manufactured by Dupont or equal.

2. Acetal homopolymer: ASTM D6100, Delrin as manufactured by Dupont or equal.

3. Nylon: ASTM D4066.
4. Low-friction materials shall be dimensionally-stable, impact-resistant and impervious to moisture.
5. Mating surfaces: PTFE/AHP and PTFE/AHP or PTFE/AHP and mirror finish stainless steel.

2.5 MILD (FERROUS) STEEL

A. General:

1. The Work of this Section shall include the design, supply, fabrication, surface treatment, storage, delivery, and erection of all the exterior wall support steelwork (typically not shown or shown for reference only on the Contract Documents). This also includes the supply and installation of all anchors used to support the steelwork, the grouting of base plates, the provision of cleats and drilling of holes for the attachment of the glazing system, and repairs to damaged surfaces during construction.
2. All visible steel components including but not limited to mullions, anchors, plates, bars, and shapes shall be installed and fabricated to AESS requirements prescribed herein.
    a. Steel framing shall be straight and true with allowable dimensional tolerances one half of those permitted under ASTM A6 for shapes and bars.
    b. Steel framing shall be straight and true with allowable dimensional tolerances one quarter of those permitted under ASTM A6 for plates.
3. Steel Plates, Shapes, and Bars: ASTM A36 or ASTM A992.
4. Cold Formed Hollow Structural Sections: ASTM A500.
5. Steel Pipe: ASTM A53.
6. Hot and cold rolled finished bars: ASTM A108.
7. Steel Sheet, Cold Rolled: ASTM A1008.
8. Steel castings: ASTM A27 or ASTM A148.
9. Coordinate and provide holes in members as required by the Work of other trades or contracts. All holes shall be accurately drilled or punched in the factory. Holes that must be enlarged shall be reamed. Holes for the attachment of work by others shall be coordinated for factory preparation. Holes shall be drilled or punched at right angles to the surface of the metal, in accordance with AISC Specification. Holes shall not be made or enlarged by burning. Holes shall be clean-cut without torn or ragged edges. Outside burrs resulting from drilling operations shall be removed with a suitable tool. The use of manual gas-cutting in the shop may be used only if automatic or semi-automatic methods are not possible. The use of manual gas cutting torch in the field will not be permitted without the specific approval of the Engineer.

10. Members shall be supplied in a single stock length. Splicing of members is not permitted unless it is shown on the Contract Drawings, or it has been approved in writing from the Architect.

B. Structural Steel Hardware and Fittings:

1. Connectors:

a. Nuts and Bolts: ASTM A307 Grade A, A325 Type 1, and shall be the regular hexagon-bolt type. Hex head nuts, ASTM A 563. Round washers shall conform to ASTM F436. Washers in contact with high-strength bolt heads and nuts shall be hardened in accordance with ASTM Standard A325 and AISC requirements. Beveled washers shall be square, smooth and sloped so that contact surfaces with the bolt head and nut are parallel.

b. Carbon steel connectors shall be permitted for use at the interior side of the air seal only and must be plated, hot dip or mechanically galvanized, or polymer coated to provide protection against corrosion.

2. Metal Fittings: ASTM A36, Fabricated of machined and welded materials ground smooth and finished to visual uniformity. Finish as noted on the contract documents.

3. Stainless Steel Fasteners, Bolts, Nuts, and Washers:

a. Stainless steel bolts and nuts shall comply with ASTM F593 and F594, series 300, non-magnetic.

b. Stainless steel washers shall comply with ASTM A276, Grade 316.

c. All fasteners located to the exterior side of the air seal shall be stainless steel, series 300 non-magnetic.

4. Studs: Shear studs shall be Nelson Studs or approved equivalent welded to the structural steel in accordance with manufacturer requirements.

5. Concrete Anchors:

a. Mechanical masonry anchors are to be Hilti HSL or Ramset Trubolts, or Power Wedge Bolts. Chemical anchors are to be Hilti HVA or Ramset Chemset Injection anchors. All anchors are to be installed in accordance with the manufacturer’s requirements. The Glazing Subcontractor is responsible for confirming that all edge distance, spacing, and embedment requirements are satisfied.

b. The Glazing Subcontractor shall be responsible for ensuring that where concrete anchors clash with reinforcement, there is an alternative anchor set out that satisfies the design requirements. Slotting of holes and flame cutting are not permitted. Holes in the concrete are to be repaired by dry packing with a 6000psi cementitious non-shrink grout.

6. Connectors, bolts, and fasteners shall be tested in accordance with ASTM F606.

7. Fasteners subject to vibration, primarily wind induced, can loosen over time. Prevention of loosening shall be achieved through use of lock washers or other locking anchor systems that shall prevent loosening of fasteners.
8. Epoxy or resin bonded anchors: not permitted for use in permanent tension without approval by the Architect. General Contractor shall employ Independent Agent to perform Independent Inspections and tests for all such anchors specified in General Conditions Division 01.

C. Welding:

1. Welding of carbon steel shall be in accordance with AWS D1.1 Structural Welding Code - Steel.
2. Method and Type of welding indicated on the Contract Drawings or the approved shop drawings shall be electric arc welding and shall comply in all respects with the codes and Specifications herein noted covering the Specifications for design, fabrication, and inspection of welded structures and the qualifications of welders and supervisors.
3. The head, input, length of weld, and sequence of weld and cooling process shall be controlled to prevent distortions. For welds comprised of plates in more than one plane, and of configuration that could cause restraint to uniform cooling of the weld, take precautions. Use stress relieving techniques where necessary. Each welder shall mark his identification symbol on his work. Welds found deficient in dimensions but not in quality may be enlarged by additional welding, or removed by chipping or melting and remade if deficient.
4. Tack welds: May only be used with express approval. Tack welds to be minimum 2” long.
5. Butt welds: Shall be full penetration welds between prepared fusion faces, unless otherwise specified. Carry out back chipping, grinding or gouging of the deposited weld as required to obviate imperfections in the root run. Grind butt welds flush without loss of parent metal.
6. Fillet welds: Deposit fillet welds to the required length, throat thickness and with partial or full penetration as specified.
7. Temporary attachment: Do not weld temporary attachments to principle joints. Obtain approval of the position of welds for temporary attachments.

D. Grout for Base Plates: Grout for member base plates shall be proprietary type cementitious non-shrink grout with a minimum compressive strength of 6000 psi. Data sheets, installation procedures and other supporting information for flowing and dry pack grout are to be submitted to the Architect for written acceptance before use.

2.6 BRACKETS AND ANCHORS

A. General:

1. Anchors and connections that are engineered for movement shall include suitable low friction materials specified in this section, as or recommend by the manufacturer.
2. All components are to be designed for the maximum tolerance of the system relative to the base structure, including but not limited to those referenced in Section “Building Movements”, and due consideration shall be given to additional forces from prying action and bolt group effects.
3. Connections between different materials, or different alloys of the same metal, shall be engineered to accommodate the differential thermal movement of the materials to be connected.
4. Design fixing brackets for the worst possible panel eccentricity, packing location, and uneven load sharing. Include prying effects on bolt groups.
5. Use self-locking devices where fasteners are subject to loosening or turning out from thermal and structural movements, wind loads, or vibration.
6. Do not use explosive shot fired devices unless approved in writing before commencing installation.

B. Brackets:

1. There shall be no direct fastening or close contact between any part of the glazing systems and the base structure or interior construction, except through approved bracket connections.
2. Design and install brackets so that all glazing system loads are transmitted through brackets to the base building structure, and prevent transfer of loads to adjacent panels unless specifically designed to do so.
3. Brackets shall be designed to provide three-dimensional adjustment and accurate location of the work, and be rigidly fastened after the work is finally positioned within the specified erection tolerances.

C. Anchors:

1. Provide all required anchors to attach glazing systems to the base structure which:
    a. Are compatible with the bracket assembly and together provide three-way adjustment to accommodate fabrication and construction tolerances.
    b. Secure the glass wall system in its correct position providing for building and glazing system movements.
    c. Are structurally adequate to carry the design loads for the worst possible bracket positioning.
    d. Provide anchor adjustment capability for full range of specified tolerances for building structure, but not less than one inch in all directions.
2. Base Building Substrates: Provide contingency design and installation procedures for all typical substrate conditions and deficiencies including:
    a. Reinforcement clash.

b. Excessive out-of-tolerance concrete and stone.

c. Clash with other structural details.

d. Mislocated, missed and incorrect embeds and epoxy anchors.

2.7 GASKETS/WEATHERSTRIPPING

A. Where gaskets combine to form a continuous seal around all four edges of the lite or panel, all corners and abutted ends of weather stripping gaskets shall be vulcanized, heat-welded, or injection molded to form a positive seal.

B. All material shall be non-staining, UV stabilized and ozone-resistant.

C. All gaskets other than in glazing are to be silicone or silicone compatible EPDM. All gaskets shall have continuous mechanical engagement to framing members; adhesive attachment is not acceptable. All gaskets shall be continuous and contiguous.

1. Silicone or silicone compatible EPDM gaskets shall meet ASTM C509, Option 2, Type 2 for soft gaskets, and ASTM C864 for dense gaskets.
2. Silicone compatible EPDM gaskets shall meet ASTM C864 for dense gaskets.
3. Silicone gaskets shall be profiled to form a positive seal, ASTM C 1115.
4. Silicone Glazing Spacers shall be custom profiled, gray silicone to form a positive seal, ASTM C 1115, Type C (70 ±5 Shore A Durometer). Color to match IGU seals.

2.8 SEALANTS (WEATHERSEAL)

A. Comply with Section 079200 “Joint Sealants”.

B. All joints, which are sealed with sealant as part of the fabrication or erection procedure, shall be sealed with silicone (exposed or concealed) sealant in color to match the adjoining surfaces or as required by the Architect. All perimeter sealant (metal to adjacent construction) shall be low or medium modulus silicone sealant.

C. Seals to air barrier and membrane wall materials medium modulus silicone complying with ASTM C920 as recommended by the sealant and air barrier manufacturer. The sealant shall be designed for adhering to low energy surfaces common in sheet or peel and stick weather resistant barriers. Compatibility and adhesion of sealants with air barrier materials shall be demonstrated by the sealant and membrane manufacturers, based on testing and shall be submitted in writing. Test procedure shall be as indicated below and as specified herein.

1. Adhesion: ASTM C794 Standard Test Method for Adhesion-in-Peel of Elastomeric Joint Sealants
2. Compatibility: ASTM C1087 Standard Test Method for Determining Compatibility of Liquid-Applied Sealants with Accessories Used in Structural Glazing Systems.

D. Sealants shall have a VOC content of 250 g/L or less.

E. Sealant shall comply with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers".

F. Care shall be exercised to insure against "Three Surface Adhesion". Bond breakers shall be provided.

1. Comply with ASTM C 1193 Standard Guide for Use of Joint Sealants.

G. Provide two lines of weather seal:

1. Primary seal shall be both an air and water seal.
2. Secondary seal shall be water seal.

H. Provide non-staining sealant when sealing to porous substrates such as natural stone, wood, or concrete.

I. Provide sealants from one of the following acceptable sealant manufacturers or equal:

1. Dow Corning Corporation.
2. GE / Momentive.
3. Sika.

2.9 ELASTOMERIC SHEET MATERIAL

A. Elastomeric sheet shall be a complete engineered membrane system, consisting primarily of:

1. Low-modulus pre-cured silicone extrusion and sealant for bonding extrusions to substrates:
    a. Hardness: 30 to 70 durometer hardness, Shore A, tested in accordance with ASTM D2240.
    b. Tensile strength: 800 to 1,400 psi, tested in accordance with ASTM D412.
    c. Elongation: Not less than 500 percent, tested in accordance with ASTM D412.
    d. Tear strength, die B: 75 to 130 ppi, tested in accordance with ASTM D624.
    e. Adhesive: Compatible approved silicone recommended by manufacturer.
    f. Thickness: Not less than 65 mils.
    g. Color: Translucent.
    h. Provide elastomeric sheet metal from one of the following manufacturers or equal:

1) General Electric Silicones.
2) Dowsil.

2. Non-corrosive termination bars and fasteners.

B. Bonding, splicing adhesives, and Sealants: Comply with Comply with Section 079200 “Joint Sealants” and ASTM C920.

1. Primers, setting cement, putty, sealants, and all other materials as recommended by the manufacturer of the membrane system.

2.10 INTERIOR ENTRANCE DOORS

A. Aluminum doors shall be extruded aluminum, pre-glazed, single acting, hinged doors, narrow stile and rail type. Subject to compliance with the requirements specified herein, products which may be incorporated in the work include, the following:

1. EFCO model: “D200 Narrow Stile Door.
2. Kawneer model: “190”.
3. Vistawall model: “NS-212”.
4. YKK AP America: “20D” system.

B. Entrance doors:

1. Wall thickness of stile and rail extrusions: not less than 0.125 inch.
2. Wall thickness of glazing stops: not less than 0.050 inch.
3. Thickness of door: 1-3/4 inches.
4. Width of door stiles: 2-1/8 inches minimum.
5. Width of top rail: 2-1/4 inches minimum.
6. Width of bottom rail: 10 inches minimum (in conformance with 2010 ADA).
7. Fabricate doors with hairline joints at corners of stiles and rails; provide heavy concealed reinforcement brackets secured with screws and welded.
8. Weatherstripping: Wool pile type.

C. Door frame: Nominal 2 inch width by 4-1/2 inches deep.

1. Wall thickness of frame extrusions: not less than 0.125 inch.
2. Utilize shear block type construction throughout. No visible raw edges are permitted at joints.
3. Weatherstripping: Wool pile type.

2.11 EXTERIOR ENTRANCE DOORS

A. General: Supply and install aluminum framed glass doors as required for the Storefront System as specified hereinafter or as indicated on the Drawings and all

other finish hardware that will be required to make the Storefront System complete."

B. Entrance doors shall be extruded aluminum, pre-glazed, single acting, hinged doors, heavy duty, wide stile-and-rail type; acceptable products are:

1. EFCO model “D318 DuraStile”.
2. Kawneer mode: “Tuffline 350 Series”.
3. Oldcastle: “Rugged MS 375”.
4. Wausau “Monumental, Medium Stile,” door.”
5. YKK: “40M Monumental Door”.

C. Entrance doors:

1. Wall thickness of stile and rail extrusions: not less than 0.1875 inch.
2. Wall thickness of glazing stops: not less than 0.050 inch.
3. Thickness of door: Nominal 2 inches.
4. Width of door stiles: Nominal 3-3/4 inches, 4-1/16 inches maximum.
5. Width of top rail: Nominal 3-3/4 inches, 4-1/16 inches maximum.
6. Width of bottom rail: 10 inches minimum (in conformance with 2010 ADA).
7. Fabricate doors with hairline joints at corners of stiles and rails; provide heavy concealed reinforcement brackets secured with screws and welded.
8. Weatherstripping: Wool pile type.

D. Door frame: Nominal 2 inch width by 4-1/2 inches deep, or 6-1/2 inches deep for compatibility with adjacent storefront, refer to Drawing.

1. Wall thickness of frame extrusions: not less than 0.1875 inch.
2. Utilize shear block type construction throughout. No visible raw edges are permitted at joints.
3. Weatherstripping: Bulb polymeric type.

E. Frames and Door Panels: Fabricated from aluminum extrusions complying with AAMA/WDMA/CSA 101/I.S.2/A440

1. Thermally Broken Construction: Fabricate frames and door panels with an integral, concealed, low-conductance thermal barrier located between exterior and interior surfaces in a manner that eliminates direct metal-to-metal contact.

F. Threshold: Provide extruded-aluminum threshold of thickness, dimensions, and profile indicated; designed to comply with performance requirements indicated and to drain to the exterior; with manufacturer's standard finish.

1. Low-Profile Threshold: ADA-ABA compliant.

G. Finish: 3-coat fluoropolymer finish complying with AAMA 2605 and with Section “Aluminum Finishes”. Custom metallic color as selected by Architect

H. Glass and Glazing Materials: Comply with Section 088000 “Glazing”.

I. Hardware: Comply with Section 087100 “Door Hardware”.

J. Fabrication:

1. Fabricate doors in sizes indicated. Include a complete system for assembling components and anchoring doors.
2. Fabricate doors that are reglazable without dismantling panel framing.
3. Weep Holes: Provide weep holes and internal drainage passages to conduct infiltrating water to exterior.
4. Complete fabrication, assembly, finishing, hardware application, and other work in the factory to greatest extent possible. Disassemble components only as necessary for shipment and installation.
5. Factory-Glazed Fabrication: Glaze architectural doors in the factory where practical and possible for applications indicated. Comply with requirements within this specification and with AAMA/WDMA/CSA 101/I.S.2/ A440."

2.12 HARDWARE

A. Hardware shall be furnished under Section 08 71 00 - DOOR HARDWARE, and installed by aluminum entrance and storefront framing system manufacturer unless otherwise indicated herein, conforming to governing laws and building codes.

1. Provide aluminum storefront manufacturer’s recommended door bottoms at all exterior doors as part of the work of this Section.
2. Install all reinforcing required and prepare doors for finished hardware specified herein below.

2.13 OPERABLE WINDOWS (VENTS)

A. Outswing Casement windows (vents) in storefront system.

1. Specified Manufacturer/model: EFCO Series “WV-430”, Thermally broken, Outswing casement window.
2. Performance Requirements: Provide aluminum windows of performance indicated that comply with AAMA/WDMA/CSA 101/I.S.2/A440 (NAFS).
   a. Performance Class and Grade: AW-PG65-H
3. Materials
   a. Extruded aluminum profiles shall be 6063-T5 alloy and temper (ASTM B221 G.S. 10A-T5).
   b. The frame adaptor depth shall be not less than 2¼ inches: The ventilator depth shall not be less than 2 inches.

c. All framing members shall have minimum wall thickness of 0.125 inch and shall provide the structural strength sufficient to meet the specified performance requirements.

d. All references to dimensions for wall thicknesses and other cross-sectional dimensions of window members are nominal and in compliance with ANSI H35.2-1990.

4. Accessories

a. Fasteners: Where exposed, shall be 300 Series, Stainless Steel.

b. Perimeter Anchors: Aluminum. When steel anchors are used, provide insulation between steel material and aluminum material to prevent galvanic action.

5. Hardware:

a. Stainless Steel 4-Bar Hinges.

b. Cast White Bronze Air Conditioning (Custodial) Locks with Removable Handle.

6. Finish: High-Performance Organic Finish: Three-coat fluoropolymer finish complying with AAMA 2605 and containing not less than 70 percent PVDF resin by weight. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions

7. Glass and Glazing Materials: Comply with Section 088000 “Glazing”.

8. Weather Stripping: Provide woven-pile weather stripping of wool, polypropylene, or nylon pile and resin-impregnated backing fabric. Comply with AAMA 701/702.

a. Weather Seals: Provide weather stripping with integral barrier fin or fins of semi-rigid, polypropylene sheet or polypropylene-coated material. Comply with AAMA 701/702."

B. Screens: Provide manufacturer’s standard aluminum framed screen matching finish of curtainwall framing.

1. Construct Insect screens with extruded frames, rigidly joined at the corners.

a. Splines shall be extruded vinyl removable to permit rescreening.

b. Screen frames shall be finished to match the aluminum window.

c. Provide sliding screen wickets.

2. Insect screening: FS RR-W-365A, woven 0.011 inch blackened aluminum in an 18 by 16 mesh size as manufactured by Phifer Wire Products, Tuscaloosa, AL, or approved equal.

C. Fabrication:

1. Framing Members, General: Fabricate components that, when assembled, have the following characteristics:

a. Profiles that are sharp, straight, and free of defects or deformations.

b. Accurately fit joints; make joints flush, hairline and weatherproof.

c. Means to drain water passing joints, condensation within framing members, and moisture migrating within the system to exterior.

d. Physical and thermal isolation of glazing from framing members.

e. Accommodations for thermal and mechanical movements of glazing and framing to maintain required glazing edge clearances.

f. Provisions for field replacement of glazing.

g. Fasteners, anchors, and connection devices that are concealed from view to greatest extent possible.

2. Fabricate aluminum windows in sizes indicated. Include a complete system for assembling components and anchoring windows.

3. Fabricate aluminum windows that are re-glazable without dismantling sash or framing.

4. Thermally Improved Construction: Fabricate aluminum windows with an integral, concealed, low-conductance thermal barrier; located between exterior materials and window members exposed on interior side; in a manner that eliminates direct metal-to-metal contact. Thermal barriers shall be designed in accordance with AAMA TIR A8.

   a. Frame thermal barrier shall be polyamide with a minimum of 1” (25.4 mm) separation, installed continuously and mechanically bonded to the aluminum.

   b. Sash thermal barrier shall be polyamide with a minimum of 1/2” (12 mm) separation, installed continuously and mechanically bonded to the aluminum.

5. Weather Stripping: Provide full-perimeter weather stripping for each operable sash.

6. Weep Holes: Provide weep holes and internal passages in window frames to conduct infiltrating water to exterior.

7. Provide water-shed members as required above lines of natural water penetration.

8. Mullions: Provide mullions and cover plates as shown, matching window units, complete with anchors for support to structure and installation of window units. Allow for erection tolerances and provide for movement of window units due to thermal expansion and building deflections, as indicated. Provide mullions and cover plates capable of withstanding design loads of window units.

9. Sub frames: Provide sub frames with anchors for window units as shown, of profile and dimensions indicated but not less than 0.093-inch (2.4-mm) thick extruded aluminum. Miter or cope corners, and join with concealed mechanical joint fasteners. Finish to match window units. Provide sub frames capable of withstanding design loads of window units.

10. Factory-Glazed Fabrication: Glaze aluminum windows in the factory where practical and possible for applications indicated. Comply with requirements in

Section 088010 Exterior Glass and Glazing and with AAMA/WDMA/CSA 101/I.S.2/A440 (NAFS).

11. Glazing Stops: Provide snap-on glazing stops coordinated with Section 088010 Exterior Glass and Glazing. Provide glazing stops to match sash."

2.14 MISCELLANEOUS MATERIALS

A. General: Provide products of material, size, and shape complying with referenced glazing standard, requirements of manufacturers of glass and other glazing materials for application indicated, and with a proven record of compatibility with surfaces contacted in installation.

B. Thermal break construction:

1. When low conductance thermal barrier is capable of holding glazing assembly in position and provides composite structural performance the thermal break composite shall conform to the following:

a. Thermal break assemblies shall be tested in conformance with AAMA TIR A8-08 for composite structural performance.

b. Thermally broken assemblies shall pass AAMA 505 Dry Shrinkage and Composite Performance Thermal Cycling Test Procedure for dry shrinkage thermal cycling.

c. Thermal breaks shall be mechanically locked in the metal frames to provide composite action and the mechanical locks shall restrain the thermal break material in all directions to resist shear, flexural bending, thermal loads, and other forces that can be imposed on the member.

d. Manufacturers shall conform to AAMA QAG 1 Quality Assurance Processing Guide.

e. Minimum 3/8 inch separation of inside and outside by material with conductivity less than 2.2 Btu.in/hr/ft2/oF or air.

f. The thermal break shall be aligned with the building insulation and insulating glass units.

2. When low conductance thermal barrier is used only as a thermal separation (Thermal break) and does not comply with the Section “Miscellaneous Materials” paragraph “Thermal break construction” , the thermal separation material and framing member shall not be considered as a composite element in the design of the system.

a. In such case provide connections or mechanical connections between the thermal break and metal framing elements that will accommodate the differential movement between different materials or that are strong enough to resist structural and cyclic thermal loads.

3. Thermal break materials and assemblies shall not degrade under UV and Ozone exposure when tested in accordance with ASTM G155 and G151.

4. Acceptable thermal break materials:

a. Thermal breaks systems as manufactured by Technoform-Bautec.

b. Two or more strips of crimped in place, mechanically locked, glass fiber reinforced polyamide nylon thermal barriers.

c. Insulbar thermal break systems as manufactured by Ensinger.

d. GFRP and CFRP pultruded shapes, plates, and profiles of polyester resin reinforced with glass and carbon fibers.

e. Polyethylene or PVC thermal isolators.

C. Setting blocks: ASTM C1115, Provide setting blocks at the sill quarter points of all glass lites, or as recommended by the glass manufacturer and proven by analysis. Setting blocks shall be dense silicone or heat cured silicone rubber with a hardness of 85 ±5 Shore A Durometer and color to match IGU seals. Minimum length of 4" or length determined in inches by multiplying the glass area in feet by 0.1 per GANA guidelines, and a minimum width which will provide a bearing surface for both the inboard and outboard glass lites without interrupting or otherwise creating a discontinuity in the silicone weather sealant at each IGU perimeter.

D. Edge Blocks: Elastomeric material to limit glass lateral movement (side walking). ASTM C1115, 65-75 Shore A Durometer. Minimum length of 4" and a minimum width which will provide a bearing surface for both the inboard and outboard glass lites without interrupting or otherwise creating a discontinuity in the silicone weather sealant at each IGU perimeter. Color to match IGU seals.

E. All products in contact with IGU secondary sealant shall be demonstrated to be compatible.

F. Cylindrical Glazing Sealant Backing: ASTM C 1330, Type B (Bi-cellular material) or Type C (Closed cell material), jacketed, non-gassing, compatible with sealant and primer, and of a resilient nature, "Sof-Rod" made by Nomaco Inc. or equal, twenty-five (25) percent wider than joint width, of size and density to control glazing sealant depth and otherwise produce optimum glazing sealant performance.

1. Shape: Selected for each joint type; round for common butt type joints or triangular for fillet type sealant joint.

G. Glazing tapes: Back-Bedding Mastic Glazing Tapes: Preformed, butyl-based, 100 percent solids elastomeric tape; non-staining and non-migrating in contact with nonporous surfaces; with or without spacer rod as recommended in writing by tape and glass manufacturers for application indicated; and complying with ASTM C 1281 and AAMA 800.

H. Bond Breaker Tape: Provide bond breakers, where required, of polyethylene tape as recommended by manufacturer of sealant.

I. Weep Hole Baffle: PVC-coated, reticulated open-cell urethane foam, 45 pores per 1 linear inch; filter to be installed compressed to 50 percent of original width.

J. Expanding Foam Sealant: Preformed, expanding, adhesive-backed, closed-cell polyurethane foam impregnated with water repellant material conforming to AAMA

812. The foam sealant shall have a pressure build not more than 0.05psi when tested according to AAMA 812.

1. Minimum thermal resistance of 5.5 degF.ft2.hr/BTU.in, aged values in accordance with ASTM C1303 Part A.
2. Density: Not less than 2.0 pounds per cubic feet when tested according to ASTM D 1622.
3. Closed-Cell Content: 90 percent when tested according to ASTM D 2856.

K. Provide straps, plates, and brackets, built-in inserts, as required for support and anchorage of the fabricated items to adjacent surfaces.

L. Provide aluminum brackets, clips, high density plastic shims and reinforcements as required.

M. Flashing required within the system shall be aluminum and of approved design.

N. Flashing required to join the system to adjacent construction shall be aluminum.

O. Cleaners, Primers, and Sealers: Types compatible and recommended by sealant or gasket manufacturer.

2.15 GLASS SPANDREL CONSTRUCTION

A. Storefront spandrels, as indicated on design drawings.

1. Steel back pan: Installed at spandrel panels as indicated on design drawing.
   a. Galvanized sheet shall comply with requirements in Section “Mild (Ferrous) Steel” with a minimum thickness of 0.060” (1.52 mm).
   b. Finish: Galvanized per ASTM A525 (G90).
2. Maintain a minimum clear dimension of two inches from the back surface of the glass.
3. Opaque spandrel glazing shall receive full coat coverage ceramic frit.
4. Provide means of mechanically capturing insulation inside of spandrel cavity.

2.16 INSULATION, FIRESAFING, AND SOUND DEADENING

A. Thermal Insulation: Comply with Section 072100 “Thermal Insulation”.

B. Provide insulation where shown.

C. Utilize foil faced Storefront spandrel insulation and unfaced Safing Insulation. For foil faced insulation apply vapor retarder tape over all joints in Storefront Assembly insulation and where Storefront Assembly insulation abuts framing. Seal all joints in Storefront Assembly insulation with vapor retarder tape. Apply vapor retarder tape at intersection of storefront insulation with storefront framing, floor slab, and similar intersections to insure a vapor tight seal. Repair all tears in Storefront Assembly insulation foil facing with vapor retarder tape.

D. All fire safing insulation shall comply with ASTM E84, ASTM E2307 (2 hours), ASTM E136.

E. High Density Semi Rigid Mineral Fiber Safing and Thermal Insulation:

1. Faced or unfaced as required, ASTM C 612, maximum flame-spread and smoke- /developed indexes of 15 and 0, respectively; passing ASTM E 136 for combustion characteristics.
2. Nominal density of 8 lb/cu. ft. (128 kg/cu. m), Type III, thermal resistivity of 4.2 deg F x h x sq. ft./Btu x in. at 75 deg F.
3. Passes ASTM C 665 corrosion test.
4. Insulate spandrels with Thermafiber Firespan 90 or equal exterior wall insulation with minimum thickness as shown on Drawings and as required to meet specified thermal performance and foil vapor barrier (permeability not to exceed 0.020 Perms) at interior surface and all edges. Locate foil surface of insulation flush with innermost surface of vertical framing members. Butt joints are acceptable. Each piece of insulation shall be retained at a minimum of two opposite edges.
5. Provide Thermafiber Firespan 90 or equal for firesafing insulation with minimum thickness as required to meeting specified firesafing performance.
6. Insulation shall be retained by steel impaling pin assemblies with bases fastened to frames with screws or adhesive applied.
7. Seal all edges, joints, punctures and tears in vapor barrier with aluminum foil tape to insure continuous vapor barrier.

F. Smoke Seal Compound

1. Caulking compound specifically intended for inhibiting the passage of smoke, Hilti CP, 3M Firebarrier Spray, or Specified Technologies Inc.
2. Sound-deadening: Acoustical board, thickness and density as required by design, non-combustible waterproof type, approved by Architect.

2.17 STOREFRONT FABRICATION AND ASSEMBLY

A. General:

1. All work shall be of the highest quality, in accordance with the best trade practices, and performed by skilled workmen. All work shall be accomplished to the satisfaction of the Architect and Owner.
2. To the fullest extent practicable, fabrication and assembly shall be executed in the shop. All Work that is not shop-assembled shall be shop-fitted.
3. The design of the Storefront shall endeavor to keep site operations to a minimum. Manufacturing, finishing, and assembly processes shall, wherever possible, be carried out off-site and under controlled environmental conditions.
4. To the extent possible, all fabrication shall be done prior to finishing. Any exposed mill finish edges shall be finished to match adjacent construction.

5. All components exposed in the finished work shall be free from warping and oil-canning effects, the telegraphing of welds and other fasteners, cut marks, streaks, tool and die marks.
6. Form aluminum shapes before finishing.
7. Glazing Pockets: Provide minimum clearances for thickness and type of glass indicated according to GANA's "Glazing Manual".
8. Fabricate components that, when assembled, have the following characteristics:
    a. Sharp profiles, straight and free of defects or deformations, including but not limited to, warping; oil-canning effects; the telegraphing of welds, studs, and other fasteners; streaks; and tool or die marks.
    b. Accurately fitted joints with ends coped or mitered.
    c. Internal guttering systems or other means to drain water passing joints, condensation occurring within framing members, and moisture migrating within the system to exterior.
    d. Physical and thermal isolation of glazing from framing members.
    e. Accommodations for thermal and mechanical movements of glazing and framing to prevent glazing-to-glazing contact and to maintain required glazing edge clearances.
    f. Provisions for reglazing from exterior.

B. Fabrication Tolerances:
1. Tolerances at joints and junctions shall take precedence over tolerances for components or assemblies.
2. Unless otherwise specified, tolerances shall be:
    a. Joint width: ± 1/16 inch.
    b. Length and width of major components: ± 1/32 inch.
    c. Diagonals of major components: ± 1/16 inch.
    d. Aluminum extrusions: 50% Aluminum Association standards.
    e. Misalignment of mating surfaces: ± 1/16 inch.
3. In addition to special care used to handle and fabricate assemblies, employ the following fabrication techniques.
    a. Welds ground smooth: Fabricator shall grind welds smooth. For groove welds, the weld shall be made flush to the surfaces each side and be within +1/32 inch, minus 0 inch of plate thickness.
    b. Contouring and blending of welds: Where fillet welds are indicated to be ground-contoured, or blended, oversize welds as required and grind to provide a smooth transition and to match profile on approved mock-up.

c. Minimize Weld Show Through: At locations where welding on the far side of an exposed connection occurs, grind distortion and marking of the steel to a smooth profile with adjacent material.

d. Rolled Members: Member specified to be rolled to a final curved shape shall be fully shaped in the shop and tied during shipping to prevent stress relieving. Distortion of the web or stem, and of outstanding flanges or legs of angles shall be visibly acceptable to the Architect from a distance of 10 feet under any lighting condition determined by the Architect.

C. Holes:

1. Provide holes and connections for site assembly and to accommodate work of others as required. Holes shall be drilled, or punched and reamed, perpendicular to the surface. Holes will not be permitted in areas where the completed Work will remain visible.

D. Joinery:

1. Accurately fit and firmly secure all exposed metal joints with metal to metal hairline contracts.
2. All fastenings shall be installed at an approved spacing. Fasteners shall not penetrate gutter and drainage systems.
3. All jointing and splicing of members shall be concealed.
4. Conceal all joint sealants except as noted on the drawings.
5. All work shall be properly reinforced to resist all loads imposed upon them by all doors, hardware, anchors, and other attachments.
6. Exposed Fasteners:
   a. Exposed fasteners shall occur only where expressly permitted by the Architect.
   b. Spacing and location of all fasteners shall be as approved by the Architect.
   c. No self-drilling fasteners shall be allowed outboard of the air-seal line.
   d. Where exposed in finished and visible surfaces, fasteners shall be countersunk or counter bored with allen or pozidrive head unless indicated on the Drawings or as approved by the Architect. Exposed portions of the fastener shall match the adjacent surface.

E. Built-up Members and Reinforcement:

1. Where two or more sections of aluminum are used in built-up members, contact surfaces shall be smooth, true and even, in continuous alignment, and secured so that the joints are tight without the use of filling materials.
2. Steel reinforcement of aluminum members shall be hot-dip galvanized with shop primer and completely enclosed and separated from aluminum as specified herein.

F. Aluminum Welding:

1. General: Weld before finishing components. Weld in concealed locations to greatest extent possible to minimize distortion or discoloration of finish. Remove weld spatter and welding oxides from exposed surfaces by descaling or grinding.
2. Welded joints shall typically be confined to concealed locations. Any exposed joints shall be subject to Architect's approval.
3. Procedures:
   a. Submit details of proposed welding procedures before commencing.
   b. Other than site welds indicated on approved shop drawings, do not weld on site without prior approval. Where practical, locate site welds in positions for down hand welding.
   c. Do not weld:
      1) Finished surfaces.
      2) Adjacent to finished surfaces or glass, unless adequately protected from damage, as recommended by appropriate manufacturers.
4. Finish: Welds shall be de-scaled and free of surface and internal cracks, slag inclusion, and porosity.
5. Welding Dissimilar Metals:
   a. Do not commence until approved in writing. Submit details of welding of dissimilar metals, including:
      1) Type and thickness of materials to be welded.
      2) Proposed joint preparation and welding procedures.
      3) Proposed filler metal.
      4) Expected dilution (proportion of fused parent metal in the weld metal).
   b. After fabrication, clearly mark components to identify their locations in Project according to Shop Drawings. Marking shall be of a type that can be removed with water or solvents after assembly. Marking should be positioned on unexposed surfaces where possible.

2.18 GLAZING SYSTEMS ATTACHMENTS

A. Internal Gutters, diverters, and seals:

1. Provide all required internal weeps, baffles, joint plugs, end dams, zone dams, internal sealant, and similar as required to prevent the air and water penetration through the completed assembly. Where visible, provide matching materials and finishes.
2. Construct weep holes as required to drain water passing joints within the system to the exterior. Provide weep hole baffles.
3. Apply sealants and gaskets under the climatic conditions recommended by the manufacturer(s). Sealant shall not be installed when substrates are wet or

when ambient temperature is below 40°F. All surfaces to receive sealants shall be treated (cleaned, primed or unprimed) in accordance with the recommendations of the sealant manufacturer. Use no sealant that has started to set in its container, or any sealant that has exceeded the shelf life published by the manufacturer.

4. Protect all joining surfaces not to receive sealants against staining by masking and/or other methods. Sealant joints shall be concealed from view to the extent possible.

B. Perimeter Flashing:

1. Comply with the "Architectural Sheet Metal Manual" as issued by SMACNA for flashing recommendations.
2. Install flashing using skilled workmen in strict accordance with the recommendations and directions of the manufacturer.
3. Fabricate and install metal flashing work in accordance with details and specifications of above Reference Standard, with manufacturer's instructions, and as herein specified, to provide a watertight installation. Apply metal flashing to smooth, even, sound, clean, dry surfaces free from defects. Make provisions to allow for expansion and contraction of metal flashing work. Wherever practicable, shop form all metal flashing work and deliver ready for installation. Form metal flashing work accurately to required profiles, with flat surfaces, straight edges, and corners, free from defects.
4. All flashings shall be cut and folded to approved profiles out of non-corrosive materials, with protective coatings as required. Flashing shall be factory fabricated in long lengths where practical, and pre-painted on visible surfaces.
5. Install, in as long lengths as practical, at concealed locations only, with as few joints as possible, and without wrinkles, buckles or distortions.
6. Where anchors or other materials penetrate the flashing, solidly fill the penetrations with the sealer to insure a fully watertight condition.
7. Where flashing is installed to provide air barrier continuity between the glazing system and surrounding construction, flashing shall be painted aluminum or stainless steel as specified herein to provide sufficient rigidity to resist potential fluctuations in air pressure, unless otherwise determined through pre-construction mock-up testing.
8. All flashings shall be continuous and air (where required for air barrier continuity) and water tight, allowing for thermal movement at splices and terminations. Inside and outside corners and end damns shall be prefabricated watertight. Provide mechanically engaged, continuously sealed splice plates at joints in flashing.
9. Flashing of isolated openings shall extend 12" past each jamb of the opening and turn up 3" and then extend from the outer face of the wall to the inside face of the wall where it shall be turned up 3" vertically and be bedded in sealant. Turn up head and sill flashing at sides to form a pan.
10. Where flashings are fitted to pre-formed rebates, coordinate cast-in grooves or reglets as required.

11. Materials:
    a. Unexposed metal flashing: ASTM A240 or A666, Type 304, dead soft fully annealed except where harder temper required for forming or performance; not less than 0.025 in. thick (24ga) unless otherwise shown, finish No. 2D. Provide 60-40 tin/led solder, with acid-chloride type flux, except use rosin flux over tinned surfaces in accordance with ASTM B32. Aluminum sheet, not less than 0.062” gauge (1.02 mm). Provide 80-20 tin/led solder if flashing can be visible in occupied areas.
    b. Exposed metal flashing, fascias, coping attachments, roof curb flashing and covers: Unless otherwise indicated on the Drawings, types and locations shall be stainless steel not less than 0.079” thick (2 mm) with non-directional bead blast satin finish and aluminum sheet not less than 0.125” (3 mm) thick with high performance organic coating.
        1) Provide thickness required to prevent oil canning.
        2) Location of seams to be approved by Architect with shop drawings.
        3) Seams: As shown or minimum 1-inch flat lock seams.
        4) Cleats: Minimum 2-inches long in seam.
        5) Minimum 2 fasteners per cleat.
        6) Thermal movements perpendicular to seams: Accommodate within seams
        7) Thermal movements parallel to seams: Allow sheet metal to slide at attachment cleats.
        8) Do not penetrate visible panels with fasteners and do not expose fasteners.
        9) Fold seams to shed water.
        10) Align all joints and seams.
    c. Fasteners for sheet metal flashing: AISI, Types 304 and 316 stainless steel fastener system suitable for substrate.
    d. Uncured EPDM Strip: Permitted in exposed or unexposed locations.
    e. Uncured Neoprene strip: Permitted only in unexposed locations as alternate flexible flashing.
    f. Self-Adhering, High-Temperature Underlayment Sheet for use under sheet metal flashing: Minimum 60 mils (1.5 mm) thick, consisting of slip-resisting polyethylene-film top surface laminated to layer of butyl or SBS-modified asphalt adhesive, with release-paper backing; cold applied. Provide primer when recommended by underlayment manufacturer.
        1) Thermal Stability: ASTM D 1970; stable after testing at 240 deg F.
        2) Low-Temperature Flexibility: ASTM D 1970; passes after testing at minus 20 deg F.

C. Aluminum “Break Metal” and “Panning Work”
    1. Fabricate and install all extruded aluminum and formed sheet aluminum “brake-metal” work in conjunction with the aluminum window and storefront

work as detailed and as reasonably required to complete the work including sill extensions, snap trim pieces, jamb and sill trim, closures, coverings, flashings and other miscellaneous extruded and formed “brake-metal” work in conjunction with aluminum windows.

a. Provide extruded shapes wherever possible, reserving formed work for conditions where extrusions are not applicable.

b. Provide sheet metal panning not less than 0.060 inch thick.

c. Fasten trim clips, at no more than 16 inches on center.

2. Protect surfaces from marring when forming work. Provide sufficient material thickness with all necessary concealed reinforcement and anchorage to prevent “oil canning” or deformation of the finished work. Material deemed defective by the architect will be replaced at no cost to the Owner.

2.19 ALUMINUM FINISHES

A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations relative to applying and designating finishes.

B. Appearance: Unless more stringent requirement exist in the “Metal Finishes Manual for Architectural and Metal Products”, when viewing abutting or adjacent pieces, significant visible color variation from a minimum distance of 10 feet, shall not be apparent. Provide samples of color variation for review during submittal process.

C. Material shall not be shipped, delivered, or supplied when the finish of that material:

1. Has not been inspected and tested in the manner and by the means prescribed herein and as approved.

2. Does not meet all specifications for the finishes set forth in the alloy manufacturer’s instructions.

3. Does not fall within the color and tonality range approved by the Architect.

4. Has been rejected by the Architect or Owner.

5. Has not otherwise been processed in accordance with these instructions.

6. The Architect shall have final authority to accept or reject any or all material that does not conform to these finishes standards or any of the other requirements of the drawings and specifications.

7. To ensure consistency of color and tonality in the finished work, the Glazing Subcontractor shall implement a quality control program to the approval of the Architect. The quality control program shall be vertically integrated and include controls by the alloy manufacturer and the finisher, as well as the Glazing Subcontractor to provide three independent checks of color and tonality at the point of finishing, during assembly, and during installation.

8. No production finishing shall commence prior to approval of the quality control program by the Architect. Notwithstanding the implementation of an approved

quality control program, any installed work with defects in finish or variation in color or tonality in excess of the approved range shall be subject to rejection.

9. A full-time supervisor shall be assigned to each production shift; the inspector shall inspect all production materials and maintain a complete record of all inspections.

D. Superior-Performance Organic Coating Finish for shapes, plates, and sheets exterior and interior side: AA-C12C42R1x cleaned with inhibited chemicals, corrosion coated with an acid-chromate-fluoride-phosphate treatment, and painted with organic coating specified below. Apply finish in strict compliance with paint manufacturer's instructions using a licensed applicator.

1. Fluorocarbon High Performance Organic Coating, Three-Coat Metallic PVDF System: Manufacturer's standard three-coat, thermo-cured pigmented polyvinylidene fluoride resin (PVDF) coating system consisting of specially formulated inhibitive primer and fluoropolymer color topcoat, containing not less than 70 percent of the fluoropolymer resin Kynar 500 or Hylar 5000 by weight; complying with AAMA 2605.

   a. The coating system shall be spray applied under factory conditions to pretreated base metal in a three-coat process in strict accordance with the coating system manufacturers recommendations, and to the minimum standards of AAMA 2605 "Voluntary Specification, Performance Requirements, and Test Procedures for Superior Performing Organic Coatings on Aluminum Extrusions and Panels".

   b. The coating system shall be applied by a licensed applicator approved by the coating system manufacturer. The applicator shall propose a program of records and samples of the entire coating production for approval by the Architect, and which records and samples shall be made available to the Architect or Owner upon request.

   c. Provide and furnish a compatible field touch-up PVDF coating system formulated for air-dying at ambient temperature, based on the Kynar ADS fluoropolymer resin, in color match the factory applied finish. Submit applied coating system, subject to sample approval procedures described herein. Such repairs shall match the original finish for color and glass and shall adhere to the original finish when tested in accordance with AAMA 2605 Dry Adhesion.

   d. Warrant that the organic coating shall not peel, check, crack, chalk or change color for a period of twenty (20) years from the Completion Date stipulated in the Certificate of Substantial Completion and that the finish exceeds or meets the standards set out in AAMA 2605-05 which include, but are not limited to the following:

      1) Three-coat PVDF finish system thickness shall be a minimum of 1.85 mils DFT.

2. An acceptable organic coating is PPG Industries Duranar XL or equal.

   a. Custom metallic color to match Architect's sample.

E. Aluminum finish on structural silicone adhesion surfaces shall be a minimum Alodine conversion coating or other suitable adhesion substrates.

F. Aluminum not exposed to view shall receive, as a minimum, the chromium phosphate chemical conversion coat associated with organic coating.

G. All chemical conversion coatings shall meet the minimum requirements of ASTM D1730, Type B, Method 5 with a minimum coating weight of 40 mg/ft2.

1. Remove die markings on any exposed architectural surfaces prior to finishing operations. Where necessary to remove die markings from any part of the work, all members must be finished by the same process, whether or not die markings exist. Perform this work in addition to the finish specified. Scratches, abrasions, dents and similar defects are unacceptable.
2. All aluminum, whether concealed or exposed shall be finished. No mill finish aluminum shall be permitted.
3. Finishing of all components exposed to view shall be done after the completion of all fabrication processes.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Prior to start of installation, inspect the building and verify as-built conditions and dimensions as being acceptable to receive the Work of this Section. Verify elevations of concrete and structural steel framing, and location of embeds and other anchorages for compliance with the Work of this Section.

B. Should any conditions be found that may prohibit proper execution of the Work, the Glazing subcontractor shall immediately notify the Architect in writing of these conditions. Installation shall not proceed until a recommended course of remedial action has been submitted and approved in writing by the Architect, prior to execution in the field.

C. Provide a complete site survey of existing conditions to ensure the accuracy of layout and dimensional information.

D. Joint widths as noted in the Contract Documents are the design joint width at the ambient temperature of 75°F. Installation procedures should be adjusted to take into account the ambient temperature at the time of installation.

3.2 PREPARATION

A. Provide connections for temporary shoring, bracing, and supports only where noted on the approved shop drawings. Temporary connections not shown shall be made at locations not exposed to view in the final structure or as approved by the Architect. Handle, lift and align pieces using padded slings and/or other protection required to maintain the appearance of the glazing systems through the process of erection.

B. Clean glazing channels and other framing members receiving glass immediately before glazing. Remove coatings not firmly bonded to substrates.

C. Examine glazing units to locate exterior and interior surfaces. Label or mark units as needed so that exterior and interior surfaces are readily identifiable. Do not use materials that will leave visible marks in the completed work.

3.3 ANCHORS AND CONNECTIONS:

A. Coordinate relationship between brackets and concrete reinforcement.

B. Supply anchorage items to be embedded in or attached to other construction. Provide embed layouts, setting diagrams, templates, instructions and directions as required for installation.

C. After system components are positioned, fix connections to building structure as indicated on approved Shop Drawings. Provide separators and isolators to prevent metal corrosion and electrolytic deterioration.

D. Connections between different materials shall be designed to allow for the differential thermal movement of the respected materials.

E. Self-drilling, self-threading fasteners shall not be permitted for use into concrete or masonry.

F. Avoid excess shimming that may induce additional stress on the fastener. The total thickness (t) of a shim pack shall not exceed a dimension equal to the diameter (d) of the fastener/anchor. Where t>d, the fastener/anchor shall be recalculated to take into account the additional stress from bending on the fastener with the assumption that the shim does not contribute to resistance to fastener bending. Additional stress due to bending shall be added to tension stress and the tension/shear interaction analyzed.

G. Anchorages to Structural Steel shall not induce rotational forces in supporting members.

H. Shim packs that resist compressive forces only may be high-impact plastic, Korolath type, or equal. Shim packs subject to shear shall be stainless steel or HFG steel plates pinned together to form a monolithic shim.

3.4 GLAZED ALUMINUM EXTERIOR WALL SYSTEMS

A. General:

1. Use no materials, equipment, or practices that may adversely affect the functioning, appearance or durability of the completed Storefront Assembly and related construction.

2. The Storefront Assembly shall be accomplished in compliance with the specified criteria without buckling, opening of joints, undue stress on

fasteners, sealants, and gaskets, opening of welds, cracking of glass, leakage, noises, or other harmful effects.

3. Conform strictly to the materials, finishes, shapes, profiles, sizes, thickness, and joint locations required by the Drawings and Specifications.
4. Match all materials to produce continuity of line, texture, and color.
5. All work shall be of the highest quality, in accordance with the best trade practices, and performed by skilled workmen. All work shall be accomplished to the satisfaction of the Architect and Owner.
6. To the fullest extent practicable, fabrication and assembly shall be executed in the shop. All Work that is not shop-assembled shall be shop-fitted.
7. To the extent possible, all fabrication shall be done prior to finishing. Any exposed mill finish edges shall be finished to match adjacent construction.
8. All components exposed in the finished work shall be free from warping and oil-canning effects, the telegraphing of welds, studs, and other fasteners, and streaks, tool and die marks.
9. Exposed metal edges shall be finished to match typical finished surfaces.
10. Storefront Assembly design shall typically incorporate an outside weatherseal and an inside air-seal, and provide a pressure-equalized drainage system.
11. Fit joints to produce hairline joints free of burrs and distortion.
12. Rigidly secure non-movement joints.
13. Install anchors with separators and isolators to prevent metal corrosion and electrolytic deterioration and to prevent impeding movement of moving joints.
14. Weld components in concealed locations to minimize distortion or discoloration of finish. Protect glazing surfaces from welding.
15. Seal joints watertight, unless otherwise indicated.

B. Fabrication and Assembly

1. The design of the Storefront Assembly shall endeavor to keep site operations to a minimum. Manufacturing, finishing, and assembly processes shall, wherever possible, be carried out off-site and under controlled environmental conditions.
2. Assembly procedures to be carried out on site shall be simple to execute and capable of execution within the time(s) allowed in the Master Construction Program.

C. Manufacturer’s Standards

1. Materials, components, and systems incorporated in the Work shall be mixed, applied, installed and otherwise used in strict accordance with the recommended standards and procedures of the respective manufacturers.

D. Storage and Handling

1. Materials shall be stored in a dry, well-ventilated location. Handling of materials shall be kept to a minimum, and all materials shall be carefully protected from soiling and from condensation and other harmful moisture.

E. Jointing and Reinforcing

1. Accurately fit and firmly secure all exposed metal joints with metal to metal hairline contacts.
2. All fastenings shall be installed at an approved spacing. Fasteners shall not penetrate gutters and drainage systems.
3. Exposed fasteners shall occur only where expressly permitted by the Architect. Where exposed in finished surfaces, screw heads shall be Phillips oval-head countersunk type, finish to match adjacent surfaces.
4. All jointing and splicing of members shall be concealed.
5. Accommodation of thermal expansion and contraction shall be resolved within the Storefront Assembly. No loads due to thermal variation may be transferred to the building structure.
6. Conceal all joint sealants except as noted on the drawings.
7. All work shall be properly reinforced to resist all loads imposed upon them by all doors, hardware, anchors, and other attachments.

F. Metal Protection

1. Where dissimilar metals contact, protect against galvanic action by painting contact surfaces with primer or by applying sealant or tape or installing nonconductive spacers as recommended by manufacturer for this purpose.
2. Where aluminum will contact concrete or masonry, protect against corrosion by painting contact surfaces with bituminous paint or with high solids epoxy coating equal to Amerlock 400.

G. Install components to drain water passing joints, condensation occurring within framing members, and moisture migrating within the system to exterior.

H. Erection Tolerances: Install glazed aluminum exterior wall systems plumb, level, square, and true, and to comply with the following maximum tolerances:

1. Plumb: 1/8 inch (3 mm).
2. Level: 1/8 inch (3 mm).
3. Alignment:
    a. Where surfaces abut in line or are separated by reveal or protruding element up to 3 inch (76 mm) wide, limit offset from true alignment to 1/32 inch (.8 mm). Otherwise limit offset to 1/16 inch (3.2 mm).
    b. Location: Limit variation from plane to 1/8 inch in 12 feet (3 mm in 3.7 m); but no greater than 1/2 inch (12.7 mm) over total length.

3.5 GLAZING

A. General: Comply with combined written instructions of manufacturers of glass, sealants, gaskets, and other glazing materials, unless more stringent requirements are indicated, including those in referenced glazing publications.

1. Glazing channel dimensions as indicated on Drawings provide necessary bite on glass, minimum edge and face clearances, and adequate sealant thicknesses, with reasonable tolerances. Adjust according to requirements in referenced glazing publications, including the “Glass Manual” as issued by GANA.
2. Prior to glazing, all structural silicone glazed glass shall receive a continuous 1 inch wide skim coat of silicone at the perimeter of the lite to conceal sealant and glazing accessories. Color to be determined by Architect.
3. Protect glass edges from damage during handling and installation. Remove damaged glass from Project site and legally dispose of off Project site. Damaged glass is glass with edge damage or other imperfections that, when installed, could weaken glass and impair performance and appearance.
4. Provide temporary marking, if required, with an approved removable marking for visibility during construction, by a method that does not harm the glass, and remove all traces on completion.
5. Setting blocks in sill rabbets, sized and located to comply with referenced glazing publications, unless otherwise required by glass manufacturer. Set blocks in thin course of compatible sealant suitable for heel bead.
6. Do not exceed edge pressures stipulated by glass manufacturers for installing glass lites.
7. Never permit direct glass to frame contact.
8. Provide spacers for glass lites where length plus width is larger than 50 inches.
9. Provide edge blocking where indicated or needed to prevent glass lites from moving sideways in glazing channel, as recommended in writing by glass manufacturer and according to requirements in referenced glazing publications.
10. Install glass and glazing materials under the climate conditions recommended by the fabricator and manufacturer.

B. Sample Section of Sealant:

1. At the beginning of sealant installation work in exterior wall, the manufacturer of sealant shall send his representative to the site, under whose supervision a section of the wall (used as "control section") shall be completed for purposes of determining performance characteristics of sealant in joints. Architect shall be informed of time and place of such installation of control section.
2. Control section shall be installed according to specification given herein and shall not be considered as acceptable until written acceptance is provided by the Architect.

3. Accepted control section shall be standard to which all other sealant work must conform.

C. Supervision: Submit to the Architect written certification from the sealant manufacturer that the applicators have been instructed in the proper application of their materials. Use only skilled and experienced workmen for installation of sealant.

D. Install glass and glazing materials under the climate conditions recommended by the fabricator.

E. The location, type, size and position of all setting blocks shall be inspected for compliance with the approved shop drawings before IGU installation, and again prior to the installation of structural silicone sealant and exterior weatherseals.

F. Install the glass unit in the opening using temporary glass retainers. Care shall be exercised not to set fingerprints on the glass and glazing materials in the structural silicone sealant bond area during installation.

G. Glazing rabbets shall be clean, dry, and free of any materials that might adversely affect the bond and seal of the glazing materials or the drainage of the rabbet.

H. The insulating glass unit shall be fully supported by framing members in the installed position. Inboard and outboard glass lites shall be fully supported by the setting blocks prior to the application of structural silicone sealant.

3.6 GLAZING SEALANTS

A. General: Site glazing shall be carried out and evaluated by approved glaziers in accordance with ASTM C 1394 and ASTM C 1401, and other referenced standards. An approved glazing supervisor shall supervise all work.

1. Comply with the sealant manufacturer's recommendations regarding surface preparation, priming, pot-life, sealant bead application, and the acceptable range in surface temperature and humidity at time of application and for a period at least eight hours following sealant application.
2. Cleaning: Surfaces to receive glazing materials shall be thoroughly cleaned of all dirt, dust, grease, finger-prints and extraneous materials. Where recommended by the glass manufacturer, contact surfaces shall be wiped with Isopropyl Alcohol or equivalent allowed by sealant and glass manufacturer to a dry condition.
    a. Clean joint surfaces immediately before installation of backing rod and again before applying the sealant as recommended by sealant manufacturer.
    b. Remove protective tape or removable films and ensure that no residue remains.
    c. Joint areas to be protected with masking shall be cleaned before application of tape or film.

d. Glass:
    1) Cleaning compounds shall be applied with clean lint-free disposable towels. A two-wipe method of application shall be employed, where one towel is used to wipe the surface dry and clean, and the second is used to apply the cleaning compound. The cleaning compound shall not be allowed to air-dry on the substrate.

e. Porous substrates, concrete, stone:
    1) Clean where necessary by grinding, mechanical abrasion, detergent washing or a combination of methods to ensure a clean sound interface.
    2) Remove laitance mechanically. Remove oils by blast cleaning. Remove loose particles that remain in joints following mechanical surface preparation by blasting with oil free compressed air.
    3) Clean and etch masonry joint surfaces as recommended by sealant manufacturer.

f. Acid washing shall not be used unless approved in writing by the Architect.

3. Priming: Apply primers to joint surfaces where required for adhesion of sealants, as determined by preconstruction sealant-substrate testing.
    a. Do not allow primer/sealer to spill or migrate onto adjoining surfaces. Areas adjacent to joints to be sealed shall be protected where there is likelihood that contamination by cleaning compound, primer, or sealant could occur.
    b. If recommended by the sealant manufacturer, roughen surfaces to remove protective coatings or imperfections that may prohibit provision of clean, sound base surface for sealant adhesion.
4. Application and tooling: Refer to Section 079200 “Joint Sealants”, unless otherwise specified in this section. Install sealants using proven techniques that comply with the following and at the same time backings are installed:
    a. Place sealants so they directly contact and fully wet joint substrates.
    b. Completely fill recesses in each joint configuration.
    c. Produce uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability.
    d. Exposed sealants shall be installed so that the top surfaces of the sealant beads are sloped to drain water away from the glass. Exposed sealant surfaces shall be tooled smooth.
5. Care shall be exercised to prevent three sided adhesion and cohesive failure of joint sealant in all movement joints. Provide bond breakers where necessary.
6. Curing:

a. Cure sealants in compliance with manufacturer's recommendations, to obtain high early bond strength, internal cohesive strength, and surface durability.

b. Do not relocate sealed components within the factory or on-site, until the joint has developed sufficient bond strength and cohesive integrity.

c. Do not field test for adhesion or water penetration until joints are fully cured.

7. Exposed sealants shall be installed so that the top surfaces of the sealant beads are sloped to drain water away from the glass. Exposed sealant surfaces shall be tooled smooth. Sealant that has started to set in its container shall not be used and be discarded.

8. Do not use sealant that has exceeded the shelf life published by the manufacturer.

9. Do not install sealant if the ambient temperature is below 40°F. Maintain this temperature during and 48 hours after installation of sealant.

10. Replace sealants that have accumulated debris prior to full cure.

11. Remove any masking material and excess sealant immediately after application of sealant bead is complete and "clean-down" adjacent surfaces as work progresses. All finished work shall be left in a neat and clean condition.

B. Field Applied Weather Sealants: Install continuous spacers, or spacers combined with cylindrical sealant backing, between glass lites and glazing stops to maintain glass face clearances and to prevent sealant from extruding into glass channel and blocking weep systems until sealants cure. Secure spacers or spacers and backings in place and in position to control depth of installed sealant relative to edge clearance for optimum sealant performance.

1. Tool exposed surfaces of sealants to provide a substantial wash away from glass and to eliminate voids and to ensure complete wetting or bond of sealant to glass and channel surfaces.

C. Gasket Glazing (Dry): Fabricate compression gaskets in lengths recommended by gasket manufacturer to fit openings exactly, with allowance for stretch during installation. Comply with gasket requirements in “Glass Manual” as issued by GANA.

1. Insert soft compression gasket between glass and frame or fixed stop so it is securely in place with joints miter cut and bonded together at corners.

2. Center glass lites in openings on setting blocks and press firmly against soft compression gasket. Install dense vulcanized compression gaskets, corner molds, and pressure-glazing stops, applying pressure uniformly to compression gaskets for form continuous weather-stripping. Compress gaskets to produce a weathertight seal without developing bending stresses in glass. Seal gasket joints with sealant recommended by gasket manufacturer.

3. Install gaskets so they protrude past face of glazing stops.

D. Setting blocks shall be the full width of the rabbet, and placed at the glass quarter points. They shall be of a length recommended by the glass manufacturer and be configured in such a way as not to impede water drainage of the glazing rabbet.

E. Anti-walk blocks shall be used to prevent glass from moving out of alignment so that glass bite is maintained.

F. Jamb blocks shall be used for each glass unit supported on four sides.

G. Glass shall be centered in each opening to provide the purchases and clearances recommended by the glass manufacturer and approved by the Architect.

3.7 DOORS

A. Examine doors and installed door frames before hanging doors.

1. Verify that frames comply with indicated requirements for type, size, location, and swing characteristics and have been installed with level heads and plumb jambs.
2. Reject doors with defects.
3. Proceed with installation only after unsatisfactory conditions have been corrected.

B. Hardware: For installation, see Section 087100 – Door Hardware.

C. Install doors to comply with manufacturer's written instructions and the referenced quality standard, and as indicated.

D. Job-Fitted Doors: Align and fit doors in frames with uniform clearances; do not trim stiles and rails.

E. Clearances: Provide 1/8 inch at heads, jambs, and between pairs of doors. Provide 1/8 inch from bottom of door to top of decorative floor finish or covering unless otherwise indicated. Where threshold is shown or scheduled, provide 1/4 inch from bottom of door to top of threshold unless otherwise indicated.

F. Rehang or replace doors that do not operate freely.

G. Install to produce weathertight enclosure and tight fit at weatherstripping.

H. Replace doors that are damaged or that do not comply with requirements. Doors may be repaired or refinished if work complies with requirements and shows no evidence of repair or refinishing.

3.8 CORROSION PROTECTION

A. Ensure by design that no metals, including alloys of the same base metal, are placed together in a manner, combination, or location likely to give rise to damage by electrolytic action or other corrosion. In particular, avoid metal to metal contact between aluminum and metals other than an appropriate grade and composition of

stainless steel as per the recommendations of the metal manufacturer and to the approval of the Architect. Ensure that dissimilar aluminum alloys in contact with each other are compatible with each other or isolated. Any other dissimilar materials are to be treated or protected in such a manner as necessary to prevent corrosive action.

B. Isolation of dissimilar metal surfaces to prevent electrolytic action shall be accomplished by materials which are impervious to moisture and non-absorptive.

C. Aluminum surfaces in contact with mortar, concrete, fireproofing, plaster, masonry, or absorptive materials of any kind shall be coated with an anti-galvanic material, impervious to moisture.

3.9 FLASHINGS

A. Elastomeric or metal flashing connecting to work of other Sections shall be provided by the Glazing Subcontractor for the work of this Section, including the attachment to this Work and to other work.

1. Comply with flashing manufacturer’s instructions and recommendations.
2. Clean substrates prior to installation of flashings.
3. Make flashings waterproof and air tight.
4. Make flashings continuous.
5. Make flashings collect, control, and direct water to the exterior and to weeps.
6. Shingle seams to best shed water.
7. Inspect all flashings prior to covering or concealing.
8. Ensure flashings are continuous, waterproof, and air tight.

B. Where indicated on the Drawings and where required to accommodate movement, an elastomeric flashing system shall be used.

C. Where elastomeric or metal flashing connects to roofing and waterproofing work provide 8 inches of flashing beyond the point of attachment to the Work of this Section.

D. Elastomeric flashing shall be carefully bonded to the substrates without blistering; joints shall be neat and as infrequent as possible. Adhered flashing shall have a minimum 90 degree peel adhesion of 6 pounds per linear inch when tested in accordance with ASTM D3330 Method F or ASTM D 903.

E. Elastomeric flashing not supported by substrate material shall receive another layer of 60 mil flashing for reinforcement, fully bonded to the finish layer and the substrate, and extending at least 1 inch beyond the unsupported area.

F. Connect air and vapor barrier in glazed exterior wall assembly continuously to the air barrier of the roof, to concrete below-grade structures, walls, exterior doors and

other intersection conditions and perform sealing of penetrations, using accessory materials and in accordance with the manufacturer's recommendations.

G. Flashing Slope:

1. Slope all flashings at least 5 percent to drain to the exterior.
2. Ponding on flashings is not acceptable at any location.
3. Grout or shim under flashings to create slope.
4. Do not use any organic material to create slope.

H. Discontinuous Horizontal Flashings - Flashing Pans: Where horizontal flashings are not continuous:

1. Provide flashing pans with three vertical walls.
2. Make pan walls 4 inches high to the greatest extent possible.
3. Never make pan walls less than 1.5 inches high.
4. Make corners permanently waterproof. Sealant sealed corner is not acceptable.
5. Extend flashings the entire width of the obstruction to downward flow of water.
6. Ensure jamb flashings drop into pan flashings.

I. Metal Flashing Installation:

1. Reference Standard: Conform to the requirements of 5th Edition of the Sheet Metal and Air Conditioning Contractors Association (SMACNA) Architectural Sheet Metal Manual.
2. Fabricate and install metal flashing work in accordance with details and specifications of above Reference Standard, with manufacturer's instructions, and as herein specified, to provide a watertight installation. Apply metal flashing to smooth, even, sound, clean, dry surfaces free from defects. Make provisions to allow for expansion and contraction of metal flashing work. Wherever practicable, shop form all metal flashing work and deliver ready for installation. Form metal flashing work accurately to required profiles, with flat surfaces, straight edges, and corners, free from defects. Fold exposed metal edges back not less than 1/2" and form drip.
3. Isolate dissimilar metals.
4. Fully solder seams and joints.
5. Clean metal to bare metal prior to soldering.
6. Use flux when soldering.
7. Do not damage flexible flashing when soldering metal near flexible flashing.
8. Slip Joints: Locate slip joints not more than 24 feet apart and not more than eight (8) feet from corners. Form slip joints as slip-type-joint, or loose lock joint in accordance with SSINA "Standard Practices for Roofing, Flashing, and Copings".

J. Flexible Flashing Installation:

1. Install flashing using skilled workmen in strict accordance with the recommendations and directions of the manufacturer.
2. Do not install fabric flashing when the temperature is 32 deg. F. and falling.
3. Install, in as long lengths as practical, at concealed locations only, with as few joints as possible, and without wrinkles, buckles or distortions.
4. Set flashing in a full and continuous troweled-on bed of setting cement, with joints lapped a min. of 4". Where flexible flashing meets metal flashing, it shall overlap at least 4" with laps completely buttered and pressure applied for perfect adhesion.
5. Seal holes with a “patch” of flashing.
6. Extend flashing “patch” at least 4 inches onto adjacent undamaged areas on all sides.
7. Where anchors or other materials penetrate the flashing, solidly fill the penetrations with the sealer to insure a fully watertight condition.
8. Provide mechanically fastened non-corrosive metal sheet to span gaps in substrate plane and to make a smooth transition from one plane to the other. Membrane shall be continuously supported by substrate.
9. At through-wall flashings, provide an additional 6 inch wide strip of manufacturer’s recommended membrane counterflashing to seal top of through-wall flashing to membrane. Seal exposed top edge of strip with non-corrosive termination bar and sealant.
10. Do not allow materials to come in contact with chemically incompatible materials.
11. Inspect installation prior to enclosing assembly and repair punctures, damaged areas, and inadequately lapped seams with a patch of membrane lapped as recommended by manufacturer.
12. Meet specified installed, in place, peel adhesion performance.
13. Extruded Silicone Flexible Flashing and Transition: Comply with manufacturer’s instructions and recommendations.
    a. Clean substrates to remove all contamination and bond breakers.
    b. Confirm substrate moisture and temperature are within manufacturer’s recommended limits.
    c. Apply primer to substrates recommended by flashing manufacturer.
    d. For visible locations, mask installation area to control spillage and migration.
    e. Provide continuous adhesive/sealant to bond flashing into place.
    f. Provide bonding area shown or, if not shown, minimum 0.75 inch on each side of joint.
    g. Embed flashing into uncured, fresh adhesive/sealant.

h. Roll installed flashings into adhesive/sealant with pressure.

i. Hold flashing in place until adhesive/sealant grabs and holds.

j. Complete horizontal work before vertical work.

k. Remove masking and spilled adhesive/sealant.

l. Provide uniform, straight, flashings free from wrinkles, fish mouths, and distortion.

m. Provide well adhered flashings which meet manufacturer's adhesion performance.

n. Provide 100 percent waterproof assemblies including terminations and intersections.

14. Limitations: Use sheet metal flashings and non-flexible flashings at the following locations and conditions.

a. Where flashing is visible.

b. Where flashing is exposed to sunlight and manufacturer restricts sunlight exposure.

c. Where sealant is shown adhered to the flashing.

d. Where metal flashing is shown, indicated, or identified.

e. Where flashing is in contact with materials containing creosote or coal tar, or pressure treated wood.

f. Where flexible flashing cannot be practically installed due to its self-adhesive properties.

g. When environmental conditions during installation are outside flashing manufacturer's limits.

3.10 FIELD QUALITY CONTROL

A. Structural Requirements: The Owner will engage an independent testing and inspecting agency to perform field inspections and tests and to prepare test reports. Refer to Division 1 section "Independent Inspections" or "Special Inspections" for detailed bolt and weld testing requirements and coordination. The P.E. responsible for the design and engineering of the Storefront Assembly of this section shall be responsible for preparing the Statement of Special Inspection required by the building code.

B. Field Air infiltration and Water Penetration Chamber Testing:

1. Owner will engage an independent, fully accredited testing agency to field test the Work of this Section for air leakage and water penetration at 1.0 times the rate specified in "Performance Requirements" Article of this specification, tested according to AAMA 503-08:

a. For storefront systems, air infiltration test shall be ASTM E783 and water penetration test shall be ASTM E1105. The Glazing Subcontractor shall

propose the testing scope, location, and schedule for review by the Architect and Owner.

b. Tests shall include:

1) Storefront Fixed Assemblies: Three (3) vertical assemblies during each stage.

2) Storefront Operable Windows: Two (2) vertical assemblies during each stage.

c. Tests shall be performed at the beginning, middle and end stages of installation for each system.

d. Wherever possible, test area shall incorporate interface conditions with adjacent cladding systems.

e. Insect screens shall be removed prior to commencing testing.

f. Interior side of test area shall be left open and unobstructed, permitting the full length of all joints to be examined from the indoor side.

2. Water infiltration criteria shall conform to the requirements of Part 1.

3. In the event of failure, additional field testing in accordance with AAMA 501.2 may be required to isolate the point(s) of entry and leak path(s) so that appropriate corrective action can be developed and implemented by the Glazing Subcontractor.

4. Failure shall be defined as air leakage rate greater than allowable and uncontrolled water penetration as defined in “Performance Requirements” Article of this Specification.

5. In the event of failure, corrective measures shall be made, and additional testing shall be performed until a passing result is achieved.

6. All recommended corrective measures (if required) shall be approved in writing by the Architect and/or the Owner’s Designated Representative.

a. Repair or remove work where test results indicate air/water infiltration of systems.

b. Perform additional testing to determine air/water infiltration resistance of replaced or additional work.

c. Corrective work and subsequent retesting shall be performed at no additional cost to the Owner. Glazing Subcontractor shall also pay any additional fees and expenses incurred by the Architect, and their consultants.

d. Perform an additional test at one new location for each failure, at no cost to the Owner. Glazing Subcontractor shall also pay any additional fees and expenses incurred by the Architect, and their consultants.

e. All corrective measures required to pass testing shall be implemented throughout the remainder of the project where applicable.

C. Field Water Hose Testing:

1. Owner will engage an independent, fully accredited testing agency to field test the Work of this Section for water penetration resistance in accordance with the following:
    a. Water tests shall be performed at the beginning and end stages of installation for each of the following systems:
        1) Storefront Fixed Assembly: At least three (3) “initially successful” tests at each of the beginning and end stages of installation.
    b. When possible, typical and non-typical areas (such as corners) shall be tested for each wall type.
    c. Wherever possible, test area shall incorporate interface conditions with adjacent cladding systems.
    d. Interior side of test area shall be left open and unobstructed, permitting the full length of all joints to be examined from the indoor side.
    e. Water infiltration criteria shall conform to the requirements of Part 1.
    f. Test installed glazing in accordance with AAMA 501.2. Testing shall include:
        1) At vertical façade, minimum 35 linear feet, including minimum 15 feet horizontal joints and minimum 10 feet vertical joints. Tested joints must include corner joinery.
2. In the event of failure, additional field testing in accordance with AAMA 501.2 may be required to isolate the point(s) of entry and leak path(s) for uncontrolled water penetration observed during initial field testing so that appropriate corrective action can be developed and implemented by the Glazing Subcontractor.
3. Failure shall be defined as uncontrolled water penetration, as defined in “Performance Requirements” Article of this Specification.
4. In the event of failure, corrective measures shall be made, and additional testing shall be performed until a passing result is achieved.
5. All recommended corrective measures (if required) shall be approved in writing by the Architect and/or the Owner’s Designated Representative.
    a. Repair or remove work where test results indicate water penetration of systems.
    b. Perform additional testing to determine water penetration resistance of replaced or additional work.
    c. Corrective work and subsequent retesting shall be performed at no additional cost to the Owner. Glazing Subcontractor shall also pay any additional fees and expenses incurred by the Architect, and their consultants.
    d. Perform an additional test at one new location for each failure, at no cost to the Owner. Glazing Subcontractor shall also pay any additional fees and expenses incurred by the Architect, and their consultants.

e. All corrective measures required to pass testing shall be implemented throughout the remainder of the project where applicable.

D. Field Adhesion Testing for Sealants:

1. Field test joint-sealant adhesion to joint substrates as follows:

a. Extent of Testing: Test completed and cured sealant joints as follows:

1) Perform ten tests for the first 1000 feet of joint length for each type of sealant and joint substrate.

2) Perform one test for each 1000 feet of joint length thereafter.

b. Tests shall be performed by the sealant manufacturer(s) whose product(s) are being supplied for the sealant joint(s).

c. Test Method: Test joint sealants according to Method A, Field-Applied Sealant Joint Hand Pull Tab, in ASTM C 1521.

d. For joints with dissimilar substrates, verify adhesion to each substrate separately; extend cut along one side, verifying adhesion to opposite side. Repeat procedure for opposite side.

e. Inspect tested joints and report on the following:

1) Whether sealants filled joint cavities and are free of voids.

2) Whether sealant dimensions and configurations comply with specified requirements.

3) Whether sealants in joints connected to pulled-out portion failed to adhere to joint substrates or tore cohesively. Include data on pull distance used to test each kind of product and joint substrate. Compare these results to determine if adhesion passes sealant manufacturer's field-adhesion hand-pull test criteria.

f. Record test results in a field-adhesion-test log. Include dates when sealants were installed, names of persons who installed sealants, test dates, test locations, whether joints were primed, adhesion results and percent elongations, sealant fill, sealant configuration, and sealant dimensions.

g. Repair sealants pulled from test area by applying new sealants following same procedures used originally to seal joints. Ensure that original sealant surfaces are clean and that new sealant contacts original sealant.

h. Evaluation of Field-Adhesion Test Results: Sealants not evidencing adhesive failure from testing or noncompliance with other indicated requirements will be considered satisfactory. Remove sealants that fail to adhere to joint substrates during testing or to comply with other requirements. Retest failed applications until test results prove sealants comply with indicated requirements.

3.11 ADJUSTING, CLEANING AND PROTECTION

A. Adjusting:

1. Adjust operating sashes, screens, hardware, and accessories for a tight fit at contact points and weather stripping for smooth operation and weather tight closure. Lubricate hardware and moving parts.

B. Protection:

1. Protect exterior glass and exposed aluminum finishes from damage immediately after installation by attaching crossed streamers to framing held away from glass. Do not apply markers to glass surface. Remove nonpermanent labels, and clean surfaces.
2. Protect glass from contact with contaminating substances resulting from construction operations, including weld splatter. If, despite such protection, contaminating substances do come into contact with glass, remove substances immediately as recommended by glass manufacturer.
3. Remove and replace glass that is broken, chipped, cracked, or abraded or that is exposed to weld splatter, permanently etched, damaged from natural causes, accidents, and vandalism, during the construction period.
4. Comply with GANA TD-03-1003 “Construction Site Protection of Architectural Glass” and glass manufacturer’s recommendations.
5. Alkaline including ammonia and trisodium phosphate can etch glass.
    a. Phosphoric and hydrofluoric acids sometimes used to clean concrete can quickly etch glass and should not come in contact with glass, glazing, and frame assemblies.
    b. Touchup Painting: Cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint shall bcompleted to blend with the adjacent surfaces of the Storefront Assembly. Such touch up work shall be done in accordance with manufacturer’s instructions as specified herein.
    c. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing to comply with ASTM A780.

C. Cleaning:

1. Examine glass surfaces adjacent to or below exterior concrete and other masonry surfaces at frequent intervals during construction, but not less than once a month, for buildup of dirt, scum, alkaline deposits, or stains; remove as recommended in writing by glass manufacturer. Clean the glass according to the glass manufacturer’s recommendations.
2. Use only glazing gasket lubricants recommended by gasket manufacturers.
    a. Do not use soap and liquid cleaners, which can etch glass, as lubricants.
3. At completion of installation, clean the work area and the Work of this Section to remove all marks, soiling and the like, according to the glass manufacturer’s recommendations.
4. At the completion of all adjacent work by others, including services work, attend the Site, inspect the work areas generally, and repair all damage,

complete or make good finishing, trimming and sealing, and replace any damaged or dislodged work

5. Finished work shall be free from defects and mechanical imperfections such as scratches, scrapes, dents, and abrasion.

6. Wash glass on both exposed surfaces in each area of Project not more than four days before date scheduled for inspections that establish date of Substantial Completion. Wash glass as recommended in writing by glass manufacturer.

3.12 PROJECT CLOSE-OUT

A. Repair and Replacement: Repair or remove and replace work that does not conform to specified requirements. Repairs made in one area shall be incorporated into all other similar areas as applicable.

B. Site Modifications: Finished work that contains unauthorized site modifications, or work not in accordance with the approved shop drawings, or submittals specified herein, may require additional modification in the field, or removal and replacement at no additional cost to the Owner. Any additional calculations and testing required for approval by the Architect shall also be provided at no additional cost to the owner.

C. Acceptance of the completed installation of the exterior wall system requires that the installation be structurally sound, weather tight, and free from defects of materials and workmanship.

End of Section

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Section 08 43 15

BULLET RESISTANT ALUMINUM STOREFRONT FRAMING SYSTEM

PART 1 - GENERAL

1.1 SUMMARY

A. The work of this Section consists of bullet-resistant aluminum framed glazing system, where shown on the Drawings, as specified herein, and required for a complete and proper installation.

B. Furnish and install the following:

1. Factory finished bullet-resistant aluminum framed glazing, of the types specified herein, all required integral reinforcing, bracing members and related accessories for the framing systems, and all angles, clips, and other items required to anchor the systems to the building structure.
2. Prefinished exterior aluminum formed brake-metal work, mullion covers, closures, flashings, and similar components, in conjunction with storefront system.
3. Metal to metal sealing of exterior aluminum assemblies.
4. All glass, including insulated panels, and glazing materials for the storefront system.
5. Bullet resistant two way communication speaker/microphone.
6. Shimming and fasteners required for installation.
7. Sealant and compressible back-up beads for exterior perimeter joints between framing members furnished hereunder and surrounding dissimilar materials.

C. Build-into place as work progresses, the following products and materials furnished under the indicated Sections:

1. Door Hardware furnished under Section 08 71 00 – DOOR HARDWARE.
2. Stainless steel sunshade support brackets furnished under Section 05 50 00 – METAL FABRICATIONS.
3. Exterior sun control devices furnished under Section 10 71 13 – EXTERIOR SUN CONTROL DEVICES.

D. The work of this Section is performance based, and shall be developed, tested and warranted by the Glazing Subcontractor to comply with design intent indicated on the Project Drawings, specified performance criteria and requirements, and relevant statutory and project requirements. In case of any conflict between Drawings and Specifications, including referenced standards and codes, the more stringent or onerous requirement shall apply. Where multiple standards or requirements apply, the more stringent or onerous shall apply. This specification describes the work in accordance with the current stage of design and does not contain all information required to produce a full working installation. Further design development will be required by the Glazing Subcontractor..

E. Delegated-Design Services:

1. The products and systems addressed by this specification shall be delegated design.
2. Performance and Design Criteria: Where professional design services or certifications by a design professional are specifically required of Glazing Subcontractor by the Contract Documents, provide products and systems complying with specific performance and design criteria indicated.3.If criteria indicated are insufficient to perform services required, submit a written request for additional information to Architect.

F. System Requirements:

1. Vertical mullions shall be structurally reinforced with steel inserts, as required.
2. Movement that will occur in the primary building structure shall not be imposed on the glass, glazing, glazing components and gaskets. The primary building movement shall not impose unintended stresses in the glass.
3. The system shall incorporate two lines of seals (continuous primary air and water seal, secondary water seal), closure, and flashing to perimeter substrates and assemblies. Aluminum framing shall be provided with weeps to collect and drain bulk rainwater and condensation to the exterior.
4. Glazing systems shall be designed, fabricated and installed with the necessary provisions (e.g. continuous built-in gutter system) required to drain accumulated rainwater or condensation inside the system to the building exterior. Provide accessories required to complete the concealed gutter system including but not limited to seals, dams, tubes, sealants and diverters. Provide baffles as required to prevent the ingress of wind driven water as well as insects.
5. Finish of all exposed interior and exterior visible portions of extruded aluminum glazing frame members shall be custom color 3-coat PVDF coating system per AAMA 2605 to match Architect’s sample.
   a. Basis of Design: PPG Duranar XL.
6. Finish of all formed exterior aluminum sheet metals shall be custom color 3-coat PVDF coating system per AAMA 2605 to match Architect’s sample. a.Basis of Design: PPG Duranar XL.
7. Glass lites to be heat treated as required by load, code and or thermal effects.
8. All safety glass lites to be fully tempered (Type FT) or heat strengthened (Type HS) laminated. All fully tempered glass to be heat soak tested.
9. Integration with doors and associated hardware, including requirements for concealed door operators, hinges, and similar and necessary coordination of same with concealed flashing/waterproofing below at door thresholds. Provide all door hardware and associated devices for entrances and terrace doors.
10. Interface, movement joint, and flashing condition between the glazed system and adjacent walls, head of storefront and roof waterproofing.
11. All interface flashing conditions between primary exterior wall materials, components and systems.

G. Elements of the Work:

1. Storefronts and entrances as described above.

2. Operable vents, backpans and other assemblies occurring in the storefront system.
3. All anchors, fixings, miscellaneous steel and attachments to the primary structure and framing reinforcement except those specifically indicated as provided by other trades.
4. Exterior glass and glazing.
5. Thermally broken aluminum glazed entrances including all hardware and accessories required for a complete and operable assembly.
6. All thermal insulation attached to or within the Glazing Assembly inclusive of supports, bracketry, backing and reinforcement.
7. All firesafing insulation and smoke seals attached to the storefront assemblies including supports, backing, and reinforcements and back pans.
8. Mullion wrap fire-rated insulation at all spandrel areas.
9. Sound deadening at all horizontal surfaces.
10. All gaskets, sealants, elastomeric and metal flashing inclusive of sealing at all junctions with ground level waterproofing and building expansion joints and at all interfaces to other new and existing building envelope and waterproofing transitions.
11. End closures at all horizontal and vertical caps and projections and formed metal closures and insulated metal closure panels.
12. Finishes, protective coatings and treatments.
13. Provisions for electrical outlets and cutouts for lighting, conduits, heat tracing cable, and other electrical work.
14. Proposal drawings, data and samples.
15. Design engineering, shop drawings, calculations, engineering data and test reports.
16. Field measurements of adjacent and/or supporting construction and verification of existing conditions where feasible.
17. Scheduling and monitoring of the work.
18. Material samples.
19. On site testing of anchors and field air and water testing.
20. Coordination with the work of other trades.
21. Visual Mock-up as outlined in this section, including prototype drawings, verification of design, components, and total assembly.
22. Storage, handling, protection and cleaning prior to acceptance.
23. Guarantees, warranties and indemnities.
24. All final exterior and interior cleaning of the Glazing System."

1.2 RELATED REQUIREMENTS

A. Section 01 43 39 - MOCKUPS: Requirements for exterior wall mock-up assembly requiring work of this Section.

B. Section 01 45 29 – TESTING LABORATORY SERVICES: General construction test requirements.

C. Section 01 60 00 - PRODUCT REQUIREMENTS: Listing of VOC requirements for adhesives, cleaning/maintenance materials, paints, coatings, and sealants.

D. Section 01 73 00 - EXECUTION: Waste Management and Recycling during Final Cleaning.

E. Section 01 74 19 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL: Procedural and administrative requirements relating to recycling goals, waste management program and reporting.

F. Section 01 81 13 - SUSTAINABLE DESIGN REQUIREMENTS: Procedural and administrative requirements relating to required *Northeast CHPS Verified Program,* (NE-CHPS) Certification.

G. Section 03 30 00 – CAST-IN-PLACE CONCRETE.

H. Section 04 20 00 - UNIT MASONRY: Preparation of adjacent masonry work to receive work of this Section.

I. Section 05 50 00 – METAL FABRICATIONS: Furnishing stainless steel sunshade support brackets for installation under this Section.

J. Section 06 10 00 - ROUGH CARPENTRY: Wood blockings, nailers.

K. Section 07 21 00 - THERMAL INSULATION: Perimeter vapor and air seal between storefront frame and adjacent construction.

L. Section 07 27 13 – SELF-ADHERING SHEET AIR BARRIERS.

M. Section 07 92 00 - JOINT SEALERS: Requirements for sealant and back-up materials.

N. Section 08 44 13 – GLAZED ALUMINUM CURTAIN WALLS: Aluminum curtain wall construction.

O. Section 08 71 00 - DOOR HARDWARE: Furnishing finish hardware for the work of this Section.

P. Section 08 80 00 - GLAZING: Requirements for glass and specification of glass types used for aluminum storefront systems.

Q. Section 28 00 00 – ELECTRONIC SAFETY AND SECURITY: Access control and intrusion detection systems to be coordinated with the work of this Section.

1.3 REFERENCES

A. Referenced Standards: Comply with applicable requirements of the following standards and those others referenced in this Section, under the provisions of Section 01 42 00 - REFERENCES. The Work of this section shall comply with the requirements of Rhode Island State Building Code – SBC-1 (2018 International Building Code w/ RI Amendments), all referenced standards, and the following

additional reference standards. All standards referenced in this Specification shall be the latest editions, including all amendments current at the date of this Document. Criteria specified herein that exceeds reference standards shall take precedence over such standard.

1. The active standards and publications of the American Institute of Steel Construction (AISC), including but not limited to:
    a. AISC 360 “Specification for Structural Steel Buildings”
    b. AISC 303 “Code of Standard Practice for Steel Buildings and Bridges”
2. “Aluminum Design Manual” and “Aluminum Standards and Data” issued by the Aluminum Association (AA).
3. “The Code for Welding in Building Construction” issued by the American Welding Society (AWS), including but not limited to:
    a. AWS D1.1 Structural Welding Code – Steel.
    b. AWS D1.2 Structural Welding Code – Aluminum.
    c. AWS D1.6 Structural Welding Code – Stainless Steel.
4. The specified active standards of the American Society for Testing and Materials (ASTM).
5. The active standards and publications of the American Architectural Manufacturers Association (AAMA), including but not limited to:
    a. The “Voluntary Guide Specifications for Structural Glazing issued by the American Architectural Manufacturers Association (AAMA).
    b. AAMA TIR-A9 Metal Curtain Wall Fasteners
    c. AAMA TIR-A11 Maximum Allowable Deflection of Framing Systems for Building Cladding Components at Design Wind Loads
    d. AAMA TIR-A1, Sound Control for Fenestration Products
6. The European Committee for Standardization (CEN):
    a. EN 14179-1:2005 Glass in building - Heat soaked thermally toughened soda lime silicate safety glass - Part 1: Definition and description.
    b. EN 14179-2:2005 Glass in building - Heat soaked thermally toughened soda lime silicate safety glass - Part 2: Evaluation of conformity/Product standard.
7. French Standard NF P 78-201-1/A1(DTU39) for determination of thermal stress in glass.
8. The active standards and publications of the American National Standards Institute (ANSI), including but not limited to:
    a. ANSI Z97.1 American National Standard For Safety Glazing Materials Used in Buildings - Safety Performance Specifications and Methods of Test.
9. The “Glazing Manual” and the "Laminated Glass Design Guide" as published by the Glass Association of North America Glazing Manual (GANA).
10. The “Sealant, Waterproofing and Restoration Institute: Sealants: The Professional's Guide” issued by the Sealant and Waterproofing Institute (SWRI).

11. The “North American Glazing Guidelines for Sealed Insulating Glass Units for Commercial and Residential Use” issued by the Insulating Glass Manufacturer’s Alliance (IGMA).
    a. IGMA TM-3000 North American Glazing Guidelines for Sealed Insulating Glass for Commercial and Residential Use.
12. The "Metal Finishes Manual for Architectural and Metal Products" as published by the National Association of Architectural Metal Manufacturers (NAAMM).
13. The specified documents of the Consumer Products Safety Commission (CPSC).
14. Guidelines of the Glass Architectural Spray Coaters Association (ASCA).
15. The "Architectural Sheet Metal Manual" published by the Sheet Metal and Air Conditioning Contractor’s National Association (SMACNA).
16. The hardware finish designations of the Building Hardware Manufacturers Association (BHMA).
17. The specified documents of the National Fenestration Registration Council (NFRC):
    a. NFRC 100 Procedure for Determining Fenestration Product U-Factors.
    b. NFRC Simulation Manual.
18. CPSC 16 CFR, Part 1201-03, Safety Standards for Architectural Glazing.
19. American Society of Civil Engineers (ASCE).
    a. ASCE 7: Minimum Design Loads for Buildings and Other Structures
20. International Code Council (ICC)
    a. International Building Code (IBC)

B. Inclusion References The following reference materials are hereby made a part of this Section by reference thereto:
    1. UL 752 Specifications and Ammunition, 11th Edition, Standard for Bullet Resisting Equipment published September 9, 2005, revised December 21, 2006, Level 4

C. Sustainability Requirement Reference: The following sustainability requirements are hereby made a part of this Section by reference thereto:
    1. High Performance Schools Exchange, Northeast Energy Efficiency Partnerships NE-CHPS, (referred to herein as “NE-CHPS”).

1.4 DRAWINGS AND SPECIFICATIONS

A. Information on Drawings and in Specifications establishes requirements for system's aesthetic effects as well as its performance characteristics. Aesthetic effects are indicated by dimensions, arrangements, alignment, and profiles of components and assemblies as they relate to sight lines and relationships to one another and to adjoining construction. Performance characteristics are indicated by criteria subject to verification by one or more methods including preconstruction testing, field testing, or in-service performance. The drawings are a graphic representation of design intent and do not claim to fully solve movement or

structural requirements, pressure equalization, waterproofing, air sealing, thermal requirements, acoustic requirements, glass movement, seismic performance or thermal shock requirements. It is the Glazing Subcontractor's responsibility to provide the final design and meet these requirements.

B. Do not modify intended aesthetic effects, as judged solely by Architect, except with Architect's approval. Where modifications are proposed, submit details to Architect for review.

C. Should the Glazing Subcontractor adopt the details or arrangements indicated on the Design Drawings it shall be deemed that he has checked the materials, their thicknesses, their buildability and performance in terms of this Specification, all relevant Regulations and codes of practice, and manufacturers' recommendations for any products referred to.

D. Where dimensions are not given, the drawings must not be scaled. The matter is to be referred to the Architect, the General Contractor, the Façade Consultant and the Client's Representative.

1.5 PERFORMANCE REQUIREMENTS

A. General: Provide Storefront Assembly, including anchorage, that will meet or exceed the performance requirements specified herein, capable of withstanding, without failure, the effects of the following:

1. Structural loads.
2. Thermal movements.
3. Movements of supporting structure indicated according to the Movement and Tolerance Report by the Structural Engineer of Record including, but not limited to, story drift, twist, column shortening, long-term creep, and deflection from uniformly distributed and concentrated live loads.
4. Storefront assembly shall be weather tight and have weather tight interfaces between other exterior wall system assemblies.
5. Dimensional tolerances of building frame and other adjacent construction.
6. Failure includes, but is not limited to the following:
    a. Material failures.
    b. Deflection exceeding specified limits.
    c. Noise or vibration created by wind and thermal and structural movements.
    d. Loosening or weakening of fasteners, attachments, and other components.

B. Structural Loads:

1. Systems shall be designed to withstand loads indicated according to ASCE 7 and as required by the applicable Building Code, whichever is more stringent.
    a. Wind Loads for components and cladding: Determined according to the applicable Building Code and ASCE 7-10 per the design data and loads determined by Project's Structural Engineer:

1) Basic Wind Speed (V.ult): 133 mph (three second gust)
2) Exposure Category: C
3) Occupancy Category: III
4) Importance Factor: 1.00

b. Snow Loads: Determined according to ASCE 7 per the design data and loads determined by Project's Structural Engineer:
   1) Ground Snow Load (Pg) = 30 psf
   2) Flat Roof Snow Load (Pf) = 30 psf
   3) Snow Exposure Factor (Ce) = 1.0
   4) Thermal Factor (Ct) = 1.0
   5) Snow Load Importance Factor (I) = 1.1

c. Seismic loads: Determined according to ASCE 7 per the design data and loads determined by Project's Structural Engineer.
   1) Seismic Design Category: C, Per Structural
   2) Occupancy Category: III, Per Structural
   3) Site Class: E
   4) Component Importance Factor: Ip
      a) Glazing at egress stair enclosures: 1.5
      b) All other Cladding and Component: 1.25
   5) Component amplification factor, ap: 3.0
   6) Component response modif. factor, Rp: 3.0

2. Design Storefront Assembly to transfer wind loads to building structure.
3. Design frames and connections of storefront assemblies to accommodate deflections and other building movements.
4. Dead loads: Self weight of construction.
5. In addition to the minimum design live loads prescribed by the applicable Building Code, glazing systems shall be designed to safely support the following live loads.
   a. A concentrated loading of 250lbs projected over one square foot on all horizontal surfaces including skylights and framing, and projecting features, sills and canopies extending horizontally more than 8”.
      1) A concentrated loading of 300 lbs projected over one square foot or 40psf evenly distributed load on all skylights which may be accessed for maintenance.
   b. A line loading of 50lbs per lineal foot acting either downward or outward on all window sills, including on trim components attached at back of sills.
   c. At locations where the façade acts as a guard, located at or near the open sides of an elevated walking surface or slab edge, that minimizes the possibility of a fall from the walking surface to a lower level:
      1) 50 plf at 42 inch above occupied floor surface.
      2) 200 lbf concentrated load applied in the direction and at location of worst effect. When applied to panel surfaces, concentrated load may be distributed over a 4 inch x 4 inch tributary area.

3) These loads need not be superimposed.

d. A uniformly distributed load of 20 psf on all canopies.

e. A concentrated load of 10 lbs at any point, over a 1 inch x 1 inch tributary area, on snap-engaged components.

f. These live loading requirements do not need to be superimposed with each other.

6. Other Loads:

a. Self-straining stresses or forces due to thermal gradients, thermal expansion and contraction, or other effects inherent in the design.

b. Dynamic loading due to operable components.

c. Temporary and construction loads:

1) Design the glazing systems to allow for all handling and installation loads without causing overstress, permanent deflection or warping.

2) No permanent deformation of panels, channel legs and the like during installation to enable panels to fit into place will be allowed on the project.

C. Structural Performance:

1. When tested according to ASTM E 330 at positive and negative wind-load design pressures, systems do not evidence deflection exceeding specified limits

2. When tested at 150 percent of positive and negative wind-load design pressures:

a. Framing member residual deflection after pressure or load is removed shall not exceed 0.002 times distance between supports or cantilever length.

b. Glazing systems, including but not limited to glass, sealants, gaskets, and anchorage, shall not evidence disengagement, material failures, structural distress, or permanent deformation of any component.

D. Deflection of Framing Members: AAMA TIR-A11

1. Deflection Normal to Wall Plane: Limited to L/175 of clear span for spans up to 13 feet 6 inches (4.1 m) and to L/240 of clear span plus 1/4 inch (6.35 mm) for spans greater than 13 feet 6 inches or an amount that restricts edge deflection of individual glazing lites to 3/4 inch, whichever is less.

2. Deflection Parallel to Glazing Plane: Limited to the lesser of L/360 of clear span or 1/8”, or amount not exceeding that which reduces glazing bite to less than 75 percent of design dimension, or which reduces edge clearance between framing members and glazing or other fixed components to run or contact block, or which reduces the minimum edge clearance required to accommodate movements.

a. In-plane deflections of horizontal members supporting operable components shall be limited to less than 1/16 inch (1.5 mm) or L/360 whichever is less.

3. The anticipated movement of the framing members must not exceed the movement capabilities of adjoining sealants.

4. The movement of the framing members must not cause disengagement of applied snap covers or trim.
5. The design of the framing members must accommodate differential movement in adjacent framing members such as might occur at jambs, parapets, unusual geometries and other similar conditions.
6. The framing members must be able to resist any secondary bending moments resulting from axial loads acting through eccentricities caused by large deflections, such as, P-Delta effects.
7. In order to prevent disengagement of the infill material, design of systems incorporating large infill panels must also address the center deflection of the infill panels in conjunction with the framing deflection.

E. Glass Design
1. Comply with 088000 “Glazing”.
2. System shall be designed for actual glass thickness, rather than nominal thickness, to ensure proper sealing of compression gaskets.

F. Metal Panel Design (Integral to Glazed Storefront):
1. The deflection of sheet metal backpans shall be limited to 1/4 inch.
   a. If stiffening members are required on backside of metal panel to limit deflection, stiffening members are to be separated from the storefront framing system to prevent panel curvature (oil canning) by way of thermal expansion. The stiffeners must be free to expand and contract due to changes in temperature.

G. Resistance to progressive collapse
1. Failure of a single component should not lead to more extensive collapse of a wall or roof. The building envelope should have sufficient redundancy that in the event of failure of a component the remaining components are able to prevent collapse.
2. The Glazing Subcontractor shall provide a risk assessment and strategy for mitigation of progressive collapse should the bottom panel of a stacked configuration fail.

H. Falling snow and ice mitigation
1. The Glazing Subcontractor shall provide a risk assessment and strategy for mitigation of falling hazard associated with snow and ice accumulation.

I. Air Infiltration:
1. Provide fixed glazing systems with permanent resistance to air leakage through system of not more than 0.06 cfm/sq.ft. of fixed wall area when tested according to ASTM E283 at a minimum uniform static air pressure differential of 6.24 lbf/sq.ft.
2. Provide operable glazing systems with permanent resistance to air leakage through system of not more than 0.3 cfm per square foot of area when tested according to ASTM E283 at a minimum uniform static air pressure differential of 6.24 lbf/sq.ft.

3. Provide entrance doors with permanent resistance to air leakage through system of not more than the following air leakage rates when tested according to ASTM E283 at a minimum uniform static air pressure differential of 1.57 lbf/sq.ft:
    a. Double doors: 1.0 cfm per square foot of area
    b. Single doors: 0.5 cfm per square foot of area
4. The glazed systems, including all joints between it and other works shall be designed to prevent air flow, from the exterior surface to the interior surface, through the joints of the storefront assembly.

J. Water Penetration Resistance:
1. Storefront Assembly: Provide fixed window glazing that do not evidence water leakage when tested according to the following:
    a. ASTM E 331 at differential pressure of 12 lbf/sq.ft.
    b. AAMA 501.1 under dynamic pressure of 12 lbf/sq.ft.
2. Definition of Uncontrolled Water Penetration and Test Specimen Failure shall be as published by ASTM with the following additions:
    a. There shall be no water penetration inboard of the air barrier plane, nor visible from the interior, and the assembly shall provide rapid drainage resulting in no retained water in cavities outboard of the air barrier. There shall be no uncontrolled water infiltrating system or migration of water into the concealed spaces of any exterior wall cavity not intended to function as a “wet zone” in the design of the above-grade building envelope. Water controlled by flashing and gutters that is drained back to the exterior and cannot damage adjacent materials and finishes is not considered water leakage.
3. Additional Requirements:
    a. The glazed assemblies, any incorporated opening lites, including all joints between it and other works shall be designed to prevent leakage of water onto the internal face of the Façade.
    b. The glazed assemblies, any incorporated opening lites, including all joints between it and other works, shall be designed to prevent water entry into those parts of the external cladding that would be adversely affected by the presence of water.
    c. The glazed assemblies, including any incorporated opening lites components and interfaces, shall be designed to be drained and ventilated or pressure equalized, such that any water which enters the framing system shall be drained to the exterior via an appropriately designed water management system. No traces of water are permitted at any time beyond the air seal line. The discharge of all such water shall avoid producing unsightly staining or deposits. The ventilation and drainage provision shall take into account the sloping nature of the facades without retaining water or compromising the weather performance in any way. Face sealed, barrier systems with only one line of defense against water penetration will not be acceptable.

d. Expansion / Movement joints must be installed to be fully engaged at all times, and is to be permanently watertight and airtight under all conditions and to operate without binding or causing noise or vibration

4. Rainwater disposal:

a. Where necessary, the Glazing Subcontractor will be responsible for verifying the size of the drainage channels and rainwater outlets in accordance with the MEP engineer drawings and specification. The Glazing Subcontractor shall provide calculations to demonstrate that the proposed profiles and outlets can accommodate the anticipated levels of rainfall and that there are sufficient numbers of rainwater outlets for each roof area.

b. The Glazing Subcontractor shall submit his rainwater gutter and outlet design calculations to the Architect for review.

K. Thermal Movements:

1. Provide glazing systems that allow for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures acting on glass framing members and glazing components. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.

a. Temperature Change (Range): 120 deg F (67 deg C), ambient; 180 deg F (100 deg C), material surfaces.

2. Provide for all thermal movement to take place freely in the plane of the exterior wall system without causing harmful buckling, stress on glass, stone, metal, or joint seals, undue stress on structural elements or glass, excess loads on fasteners, reduction of performance or other detrimental effects.

3. Full movement allowances including assembly and installation tolerances shall be incorporated into all junction/components at each expansion joint or assembly.

4. Where necessary carry out checks in respect of the influence of thermal movement on air permeability and water penetration performances of the installation.

5. The dimensions shown on the drawings are to be based on a design temperature of 72^{o}F. Fabrication, assembly and erection shall therefore take into account the possible thermal movements due to the ambient temperature during fabrication, assembly and installation.

6. Shadow boxes shall be designed for an exposed surface metal temperature (including paint coating system) range of -20 deg. F to +235 deg. F. Design glass seals, gaskets, sealant, etc. to perform under these high temperatures. Seal entire shadow box back pan perimeter. Shadow box should be designed to control condensation that may form in the interstitial space and vent to the exterior. The metal back panel shall exhibit no distress (buckling or distortion) nor shall fastener failure occur as a result of temperature exposure.

L. Energy Performance:

1. Storefront Assembly shall meet or exceed the requirements of the applicable Energy Conservation Code.

2. Provide Storefront Assembly with performance properties specified based on test data or computer simulation and engineering with performance values in accordance with the Project Energy Model, or listed herein, whichever is more stringent.
   a. Maximum assembly thermal transmittance [BD1]including framing (U-Value):
      1) Storefront Fixed Glazed Assemblies: 0.35 Btu/hr.ft².ºF in winter.
      2) Storefront Operable Window Assemblies: 0.36 Btu/hr.ft².ºF in winter
      3) Storefront Opaque Assemblies: 0.11 Btu/hr.ft².ºF in winter
      4) Storefront Glazed Entrance Door Assemblies: 0.60 Btu/hr.ft².ºF in winter
   b. Solar Heat Gain Coefficient: Glazing shall have a solar heat gain coefficient no greater than the basis of design values specified in spec section 088000.
3. Thermal conductance shall be verified by AAMA 1503-09 or NFRC 100 laboratory test or by computer simulation where achievable in accordance with NFRC guidelines. The model shall include glass panels, areas with and without insulated back-pans, typical and atypical mullion and gasket arrangements, thermal bridges, and interface conditions. Where computer simulations are used analysis shall include two dimensional analyses or where appropriate and assemblies have conditions where three-dimensional heat flow exists then three dimensional analyses shall also be performed.

M. Condensation Resistance:
1. Condensation is defined as water, frost, or ice forming on any interior surface of any one component or water that is not collected and positively drained to the exterior through the condensation drainage gutter.
2. The Glazing Subcontractor shall submit a Condensation Resistance Test report according to the AAMA 1503 test method for each Storefront Assembly. Or computer simulation where achievable in accordance with NFRC guidelines. The modelling shall include glass panels, areas with and without insulated back-pans and typical mullion and gasket arrangements, thermal bridges, interface conditions, and atypical details and adjacent constructions. Where required two dimensional or three dimensional heat transfer analysis shall be used.
3. The Glazing Subcontractor shall request confirmation of the boundary conditions below in writing, including but not limited to wind velocity, and exterior and interior temperature and relative humidity from the MEP Engineer.
   a. Exterior Temp: 5ºF (winter)
      89ºF (summer)
      Mean wind speed: 12.3 mph
   b. Interior Temp and Humidity: 72ºF, 30% RH (winter)
      75ºF, 55% RH (summer)
4. The submitted condensation report shall be assessed by the Architect on a case by case basis. Assessment will be based but not limited to best practice

principles of moisture management, location of condensation, incidence, and occurrence, and surface area of condensation.

a. Condensation shall be assessed case by case as specified herein. No condensation on exposed interior surfaces is allowed.

5. Condensation Resistance within glass spandrel cavities and within insulated cavities.
   a. The venting design of spandrel cavities shall ensure that no condensation occurs within the system cavities throughout yearly climatic conditions.
   b. The venting design shall be proposed by Glazing Subcontractor based on the Glazing Subcontractor's proposed system and the specified requirements.

N. Story Drift: Provide EGA systems that accommodate design displacement of adjacent stories according to the Structural Drawings by The Structural Engineer of Record.
   1. Serviceability: When tested in accordance with AAMA 501.4-18 at 1.0x design wind drift, or 1.0x design elastic seismic displacement, whichever is greater:
      a. No visible damage to framing or trim components or assemblies is allowed.
      b. No glass breakage or glass fallout is allowed.
      c. Full disengagement of gaskets or weatherseals is not allowed at any location.
      d. Air infiltration and water penetration resistance shall remain within specified allowable limits without adjustment or repair.
      e. No wall components may fall off.
   2. Ultimate: When tested in accordance with AAMA 501.4-18 at 1.5x design wind drift, or 1.0x design inelastic seismic displacement, whichever is greater:
      a. Glass shall be retained completely in the glazed opening with no glass fallout.
      b. No wall components may fall off.
   3. Comply with ASCE 7, Section 13.5.9 "Glass in Glazed Curtain Walls, Glazed Storefronts, and Glazed Partitions."

O. Outdoor-Indoor Transmission Class: Provide the following minimum OITC for glazed system assemblies (frame and glass) when tested for laboratory sound transmission loss according to ASTM E 90 and determined by ASTM E 1332:
   1. OITC 27

P. Acoustical Performance: Storefront Assembly system shall meet and / or exceed requirements of project acoustic report, or code required minimums, whichever is more stringent. Glazing Subcontractor shall provide calculations and glass supplier testing data to verify that acoustic performance targets will be achieved. IN the absence of supplier data, the Glazing Subcontractor shall perform necessary acoustic testing to verify performance targets will be achieved.

Q. Self Generated Noise:

1. Design and install glazing systems and all component parts to provide for noiseless movement caused by thermal expansion, and when subject to dynamic load caused by external wind pressure and in the operation of operable components. The system shall not generate noise due to creaking, drumming, or rattle.
2. Metal to metal contact between inter-locking members is not permitted unless specifically indicated on the structural drawings.

R. Fire Performance:

1. General:
   a. Where required by code, exterior wall systems shall be tested in accordance with, and comply with, the acceptance criteria of NFPA285. Such testing shall be performed on the total wall systems.
2. Surface Burning Characteristics
   a. The Storefront Assembly shall not be composed of any materials which readily support combustion, add significantly to the fire load, and/or give off toxic fumes. Foamed core insulation and metal composite material panels are not permitted.
   b. All materials used internally and externally shall have a Class 1 surface burning to ASTM E 84 classification. Façade/Cladding/Roof Glazing system shall have a flame spread index of not more than 25 and a smoke developed index of not more than 450 when tested as an assembly in the maximum thickness intended for use in accordance with ASTM E 84 or UL 723.
3. Fire-Resistance Ratings: Where required comply with ASTM E 119; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
   a. Indicate design designations from UL's "Fire Resistance Directory" or from the listings of another qualified testing agency
4. Fire Stopping between Floors and along Mullions
   a. The junction of the floor and the exterior façade or roofing shall preserve the integrity and insulation of compartmentation, to prevent fire spread from floor to floor.
   b. Where required by the Design Drawings, the junction of the mullion and the partition wall shall preserve the integrity and insulation of compartmentation, to prevent fire spread between rooms or zones.
   c. Spandrel panels must be designed and anchored in a manner that keeps them in place and prevents passage of smoke, flame and hot gasses when exposed to the ASTM E 119 time-temperature curve.
   d. Materials used to complete the junctions shall accommodate movement between slab edge and cladding, and their fire resisting performance shall not be affected by water from sprinkler discharge.
   e. The Glazing Subcontractor is responsible for the provision of all horizontal cavity barriers in the facade system and for fire stopping, as specified, at the junction of the external wall with all other fire-resisting

elements of the structure. Continuous smoke seal (sealant) over fire stopping is required.

f. All fire and smoke stops shall be positively fixed in position in such a manner that they shall not become dislodged in the event of a fire. The fixing shall secure the stop in position for a period at least equal to that required for the compartment wall or floor against which the works abut.

g. Any insulation in the external wall construction that is exposed in a ventilated cavity shall be of limited combustibility.

h. Cavity barriers shall be incorporated into the envelope construction so as to prevent the transmission of fire or smoke through voids in the envelope assembly from bypassing any of the fire stops.

1.6 STRUCTURAL REQUIREMENTS

A. General:

1. Except for anchors embedded in concrete and glass design, allowable stress design (ASD) and load and resistance factor design (LRFD) are acceptable.
   a. LRFD shall be used for anchors embedded in concrete.
   b. ASD shall be used for glass design.
2. Loads shall be considered in accordance with the load combinations specified by the applicable Building Code.

B. Building Movements:

1. Provide moveable joints to accommodate the full range of movement requirements including manufacturing tolerances, construction tolerances, thermal movement, lateral movement, floor sag, beam sag, live load deflection, and column settlement.
2. Allowance for movement shall be in addition to allowance for building construction tolerances.
3. Joints shall accommodate the worst possible combination of erection tolerances and anticipated movements to prevent loads of any kind being transferred from the building into the glazing systems, excessive movements of any joints or failure of weather seals.
4. Design movement joint and select sealant products to accommodate all required expansion and contraction within joint tolerances indicated on the approved shop drawings and within the sealant movement limits recommended by the sealant manufacturer under loaded and unloaded conditions.
5. All movement allowances shall be consistent and applied across all junctions and/or components for each expansion joint system or assembly.
6. Basic preliminary criteria for movements including criteria for envelope of vertical deflections of building structure and span ratios for typical deflections of concrete:
   a. Floor slab deflection along perimeter:
      1) Due to Construction Stage: ??[BD2]” maximum*
      2) Due to Dead Load: 0.8” maximum*

3) Due to Service Live Load: 0.6” maximum*

*Special condition at long span roof and floor girders at exterior adjacent to B8 – 2.75” maximum total deflection.

b. Maximum horizontal inter-story differential movement (lateral drift):
   1) Due to 50-year wind event: H/500
      a) Academic Level 2: 3/16"
      b) Academic Level 3: 3/16"
      c) Academic Level 4: 3/16"
      d) Academic Roof: 3/16"
      e) Performing Arts Level 2: 1/8”
      f) Performing Arts Level 3: 1/8”
      g) Performing Arts Roof: 1/4"
   2) Due to seismic event (service elastic):
      a) Academic Level 2: 1/2"
      b) Academic Level 3: 1/2"
      c) Academic Level 4: 1/2"
      d) Academic Roof: 1/2"
      e) Performing Arts Level 2: 3/16”
      f) Performing Arts Level 3: 3/16”
      g) Performing Arts Roof: 1/2"

c. Glazing Subcontractor to confirm that creep assumptions are consistent with the construction schedule.

d. Displacements indicated above are preliminary and provided for reference only. Glazing Subcontractor is responsible for requesting design displacements and tolerances for each slab, and at all necessary locations along each slab edge, from the structural engineer of record (EOR), and ensuring the façade system can accommodate them.

7. Joint widths shall accommodate structural movements and tolerances, in addition to compressibility of joint filler.

8. The use of shoring, pre-loading, or other methods to limit or control building movements during installation is the responsibility of the Glazing Subcontractor. See section 1.9 Action Submittals for requirements for submittal of erection procedure and supporting calculation by Glazing Subcontractor.

C. Long Term Building Movements:

1. Design the glazing system to accommodate the absolute relative vertical deflections and horizontal movements that may occur due to panel rotations due to the following displacements occurring between successive floors:
   a. Column and core shortening.
   b. Beam or slab edge displacement.
   c. Axial Shortening of edge beams.
   d. Floor to floor drift of the building due to wind and/or earthquake loads.

D. Primary Structure Tolerance:

1. Minimum +/- 1.5 inch in all directions.
2. Steel: AISC tolerances.
3. Concrete: ACI tolerances.

1.7 ACTION SUBMITTALS

A. General Submittals

1. Comply with Conditions of the Construction Contract and Division 1 Specification Sections.
2. Submissions shall be complete and comprehensive and include all shop drawings, samples, material data submissions, and engineering calculations for each system specified herein, and shall include fully coordinated interface details between each system and the adjacent construction such that air/moisture barrier continuity between the materials, components and systems that comprise the above-grade building envelope can be reasonably evaluated by the Architect-of-Record against the design intent of the contract documents. All work shall be coordinated by the General Contractor prior to submission. Incomplete, non-conforming, or uncoordinated submissions shall be subject to rejection or return without action by the Architect.
3. Analysis: All requirements specified herein shall be analytically and mathematically proven, except for those requirements called for to be proven exclusively by physical testing methods. Calculations and related data and their application in engineering, fabrication, assembly and installation shall be the responsibility of the Glazing Subcontractor's registered Professional Engineer.

B. Shop Drawings: Shall clearly indicate but not be limited to: Show fabrication and installation of glazed aluminum, steel, and glass exterior wall systems including plans, elevations, sections, details of components, and attachments to other units of Work.

1. Shop Drawings shall clearly illustrate all aspects of the exterior wall system including the relationship of the Work to the structure, waterproofing, roofing, paving, and other adjacent construction and interface conditions; the arrangement of components; and the sequence and details of fabrication, assembly and erection.
2. Shop drawings shall clearly identify locations of steel reinforcing within the storefront framing on building elevations.
3. Shop drawings shall include details of all connections to contiguous work as approved by the Glazing Subcontractor for the work adjacent and as coordinated by the General Contractor.
4. Details drawings in the shop drawings shall be full size and not scaled.
5. Coordinate installation of anchors for glazing members that connect to the work of other trades. Furnish setting drawings, templates, and directions for installing anchors, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry or attached to wood.

6. Submit full analysis and complete details of proposed cladding design movement allowances based on the base structure information contained in the Contract Documents. Indicate all cladding design movements and required clearances to adjacent construction on shop drawings.
7. Brackets, anchors, and related components shall be scheduled and described in detail on shop drawings. Show details, including computations, of all related components and connections to areas by others.
8. Submit a schedule of fabrication tolerances for all major glazing system components. Indicate extremes of allowable base-structure tolerances on shop drawings.
9. Exposed fasteners, where approved, shall be indicated on the shop drawings.
10. Clearly indicate all revisions to shop drawings on re-submissions.
11. Shop Drawings shall clearly show internal and concealed sealant joinery. Isometrics to be provided at design team's request.
12. Signed and Sealed Engineering calculations shall be submitted concurrently with the corresponding shop drawings. Shop Drawings will not be reviewed unless this requirement has been met.
13. All shop drawing sheets shall be of one size and shall bear the seal of a Professional Engineer currently licensed in the licensing jurisdiction of the project.

C. Structural Design Calculations:

1. All structural calculation submissions shall bear the seal of a Professional Engineer currently licensed in the licensing jurisdiction of the project.
2. Submit for review by the A/E structural design calculations for all components of the glazing assemblies, including, but not limited to panels, framing, and connections. Indicate direction, location, and magnitude of all connected loads to the building structure coordinated to the building structure as shown in the Contract Documents.
3. Submittal of loads imposed on primary structure shall include location, magnitude and direction of imposed loads, graphically represented in their appropriate locations on a copy of the Contract Document structural framing plans or elevations as appropriate. Detail references indicating the connections applicable at each location shall be noted on the submittal drawings.
    a. Where Glazing Subcontractor loads imposed exceed and/or connection conditions differ from what is shown in the structural drawings, submit for approval to Structural Engineer of Record loads imposed on the primary structural frame due to the dead, live, and wind/seismic loads indicated on the Contract Documents.
4. Calculations shall demonstrate compliance with applicable sections of the applicable Building Code and the appropriate material reference specification for each component considered.
5. Structural Sealant:
    a. Submit certification from the sealant manufacturer that they have reviewed all sealant details and that when exposed to the specified loads

the stress in the silicone sealant of dimensions shown does not exceed manufacturer’s recommendations.

b. Engineer structural silicone glazing systems specifically for this Project. Stock or standard engineering information is not acceptable.

D. Thermal Performance and Condensation Calculations:

1. Submit calculations and/or test data demonstrating condensation resistance of glazing assemblies.
2. Submit calculations and/or test data demonstrating solar shading and thermal transfer values across exterior wall system assemblies.

E. Engineering Judgement for Perimeter Fire Containment Systems:

1. Submit project-specific engineering judgement prepared by a professional engineer licensed in the Rhode Island that demonstrates the storefront assembly satisfies the specified fire resistance requirements and will be capable of providing an ASTM E 2307 compliant perimeter fire containment system.

F. Product Data: Submit manufacturer's product data for each product included in the work, including test data, manufacturer's quality assurance documentation, and preparation and installation recommendations. Also include details of construction relative to materials, dimensions of individual components, profiles, and finishes.

1. Include product data for:
   a. Glass and glazing accessories.
   b. Sealants, setting blocks, gaskets and glazing accessories, membranes, vapor barriers, including all compatibility test reports.
   c. All proprietary accessory hardware and fasteners.
   d. Metals and metal alloys, including welding materials.
   e. Applied finishes, including preparation and pre-treatment, application, curing, and maintenance procedures.
   f. Thermal and Firesafing insulation.
      1) For non-UL assemblies used as fire separation between floors, provide engineering judgement from manufacturer.
   g. Smoke seals.
   h. Grades of all bolts, nuts, washers, screws, pins, and rivets.
   i. Submit safety glazing letter from manufacturer. Permanent etched safety label on glass shall not be permitted unless required by code. Removable sticker safety label is permitted.
   j. Complete information, as applicable, concerning materials, dimensions, coatings, manufacturing process, and installation procedures.
   k. The method of packaging and identifying the Glazing components shall be indicated by manufacturer. Identification shall include the evaluation report number and notice of any product installation limitations.
   l. Any products included in the work, but not listed above.

G. Samples: Submit samples for verification of each type of exposed finish required in manufacturer's standard U.S. sizes. Where finishes involve normal color and texture variations, include sample sets showing the full range of variations expected.

1. Samples of production materials shall be of the following sizes:
    a. Color samples: 12 inches x 12 inches, each color.
    b. Finished extrusions: 12 inches in length.
    c. Glass: comply with Section 088000 "Glazing".
    d. Finished sheet metal (aluminum): 12 inches x 12 inches, each type.
    e. Finish hardware: each type.
    f. Fastening devices, each type.
    g. Flashing (coated aluminum, stainless steel and non-metallic membranes): 12 inches x 12 inches, each type.
    h. Gaskets and joint fillers: 12 inches long, each type, 12 inches x 12 inches, each corner.
    i. Sealants: Cured sample-12 inches long, each type, with approved backer rod or similar joint back-up.
    j. Range samples shall be provided to define any visual acceptance criteria, including colors, gloss, flatness, presence of die lines, etc. All finishes of extrusions to be from hardened dies. Min 12 inches long.
        1) All Aluminum Painted Finishes.

1.8 INFORMATIONAL SUBMITTALS

A. Certificates:

1. Submit product and installer certificates signed by the respective manufacturers certifying that all materials of the glazing systems comply with fabrication, erection, approved shop drawings, structural computations and specified requirements.
2. Submit all shop drawings to the following manufacturers for their review and provide written confirmation from them that the manufacturer's products are appropriate for the proposed use and are being used in accordance with the manufacturer's recommendations.
    a. Glass
    b. Sealants
3. Separate certifications are not required for glazing materials bearing manufacturer's permanent labels designating type and thickness of glass, provided labels represent a quality control program of a recognized certification agency or independent testing agency acceptable to authorities having jurisdiction.
4. Submit written certification that welded anchors have been designed and tested and will comply with specified performance requirements.
5. Submit welder certificates indicating that welders have satisfactorily passed AWS qualification tests for welding processes involved and who are currently certified for these processes.

6. Submit installer certificates signed by manufacturer certifying that installers comply with requirements in “Quality Assurance” Article.

B. Product Test Reports:

1. For each glazing system, submit test reports from the approved independent testing laboratory showing compliance of the individual components and parts of each glazing system with the performance requirements indicated. Test reports to be within 10 years and without changes to the system specified.
2. Test reports shall be submitted in a timely manner and well before execution of any related component of the storefront system.
3. Test Reports shall include:
    a. Glazing.
    b. Fasteners, bolts (each size, length, and type), nuts, washers, and hardware, including manufacturer’s certification of conformance for each and every lot. When requested by Engineer, submit samples to Testing Agency for testing prior to start of any work or delivery of materials to job site or stockyards.
    c. Expansion anchors.
    d. Mechanical fasteners.
    e. Miscellaneous structural clips and accessories.
4. Materials Testing Reports:
    a. Sealants: Comply with Section 079200 “Joint Sealants”.
    b. Staining: Include ASTM C1248 stain response testing for sealant and primers in direct contact with natural stone, concrete, or wood.
    c. Structural silicone: Provide Project specific adhesion testing. Stock or standard testing is not acceptable. Test each material to which structural silicone is adhered.

C. Submit Manufacturers’ Quality Assurance Inspection and Production Testing Programs.

1. Inspection and production testing programs are subject to the Owner’s Representative’s approval.
2. Submit detailed description of inspection and production testing programs and inspection reports for:
    a. Shop fabricated glazed steel and aluminum exterior wall and assemblies.
    b. Insulating glass units fabrication.
    c. Structural silicone glazing.
    d. Organic coatings.
    e. Mill reports for structural steel.

D. Installation Procedures Manual:

1. Submit a comprehensive manual containing all installation procedures, equipment and personnel required for acceptance prior to the commencement of installation works. Comply with requirements in “Quality Assurance” Article.

2. The Glazing Subcontractor shall submit an erection procedure, prepared under the supervision of the Glazing Subcontractor's Engineer for review. This procedure should consider any shoring, pre-loading, or other temporary means necessary for the sequence of installation of the Storefront Assemblies and related scope of work including compatibility of any loads applied to the primary structure because of these temporary means. The erection procedure and supporting calculations shall be submitted for review and shall bear the seal of a Professional Engineer currently licensed in the licensing jurisdiction of the project.

E. As-Built Record Shop Drawings and Documents:

1. Submit final approved shop drawings and BIM models in electronic format.
2. Prepare as-built drawings, photographs and other records progressively as the work proceeds.
3. Record Shop Drawings: At the completion of the project, submit electronic copies of all final approved shop drawings prepared under the supervision of and signed and sealed by the Professional Engineer currently licensed in the licensing jurisdiction of the project.

F. Operation and Maintenance Manual: At the completion of the project, submit electronic copy of a maintenance manual describing the various materials, equipment and procedures for cleaning and maintaining the work of this Section. Include the manufacturer's data for all components of each glazing system and type, with supplier/source and contact information included for future reference. Clearly provide replacement procedures, replacement components and methods of replacement of damaged components of glazed steel and aluminum exterior wall systems to ensure full service capability of the work. Include copies of glazing systems guarantees and warranties.

G. Sustainable Design Submittals: As required by NE CHPS.

1.9 QUALITY ASSURANCE

A. The work of this section shall be performed by a company which specializes in the type of Storefront work and Design Assist process required for this Project, with a minimum of 10 years of documented successful experience and shall be performed by skilled workmen thoroughly experienced in the necessary crafts.

1. Work shall be performed in compliance with Owner's insurance underwriters' requirements and UL approvals and testing for materials, assemblies, and procedures.

B. Manufacturer shall specialize in manufacturing the type of glazed systems specified in this section, with a minimum of 10 years of documented successful experience, and have the facilities capable of meeting all requirements of Contract Documents as a single-source responsibility and warranty.

C. The Work of this Section shall be the responsibility of one Subcontractor.

D. The Glazing Subcontractor for the Work of this Section shall have proven achievement and experience in similar work and is subject to approval by the Architect.

E. Manufacturers and suppliers of all materials and components of the Work of this Section are subject to approval by the Architect.

F. All products and individual or aggregate components of the Storefront Assembly for which acceptable engineering or test data are not available shall be physically tested.

G. Engineering services are defined as those performed for the design and installation of all exterior glazing systems and types specified herein or otherwise included in the contract documents for this project.

1. Engineering Responsibility: Engage a qualified Professional Engineer currently licensed in the licensing jurisdiction of the project to prepare, or supervise the preparation of, drawings, calculations, and data for the Work of this Section to include a comprehensive engineering analysis that demonstrates full compliance requirements of the contract documents.
2. Installer's responsibilities include providing professional engineering services needed to assume engineering responsibility.

H. Source Limitations: Obtain each type of exterior glazing system from one source, and by a single manufacturer.

I. Source Limitations for Glass: Obtain glass from single source from single manufacturer and single plant for each glass type.

J. Source Limitations for Glazing Accessories: Obtain from single source from single manufacturer for each product and installation method.

K. Pre-Installation Conference: Conduct conference at Project site to comply with requirements of Division 1 Section "Project Meetings”. Meeting shall include General Contractor, Owner, Architect, Glazing Subcontractor, Sealant Subcontractor, as well as any other subcontractors or material technical service representatives whose work, or products, must be coordinated with the storefront work. Review methods and procedures related to glazed aluminum exterior wall system including, but not limited to, the following:

1. Review and discuss condition of substrate and other preparatory work performed by other trades.
2. Review erection procedure prepared by Glazing Subcontractor and discuss coordination of procedure with previously installed scope of work.
3. Review structural loading limitations.
4. Review and discuss the sequence of work required to construct a watertight and weather tight exterior building envelope.
5. Review and finalize construction schedule and verify availability of materials, Glazing Subcontractor's personnel, equipment, and facilities needed to make progress and avoid delays.
6. Review required inspecting, testing, and certifying procedures and coordinate with installation schedule and work of individual trades to avoid delays in the Work.

7. Review weather and forecasted weather conditions, and procedures established to mitigate the impact of unfavorable weather conditions on the quality and progress of the Work.

L. Prior to the start of fabrication, the Glazing Subcontractor shall submit a comprehensive Quality Control Program covering all phases of the exterior wall system including, but not necessarily limited to, the following:

1. Procurement of materials including quality control programs of major suppliers.
2. Verification of compliance with International Standards Organization (ISO) or similar agency authorized or otherwise qualified and accredited to provide periodic, independent review and certification of each supplier/manufacturer's Quality Assurance program.
3. Fabrication of components, to include milestone inspections and written certification that components and finishes meet or exceed the requirements of the contract documents and recognized industry standards specified herein, and that pre-finished components and parts are free of any visible scratches, gouges, dents, blemishes and similar damage considered by the Architect to be unacceptable for the project.
4. Final assembly of components, to include milestone inspections and written certification that internal end-dams, zone-dams, and critical seals have been installed in accordance with the contract documents and recognized industry standards specified herein.
5. Installation and site quality control, to include a sample of the intended Field Report format and intended method to track or otherwise monitor and correct all non-conforming work in a manner that is consistent with the requirements of the contract documents, and available on site for review and independent verification by the Architect and Owner.
6. Periodic, in-house evaluation and performance testing of completed systems and assemblies to verify compliance of glazing systems and assemblies during production, prior to shipment to project site.
7. The QC Programs submitted by each of the Glazing Subcontractors, suppliers, manufacturers shall be included by the GC/CM into a comprehensive and fully integrated, project-specific Building Envelope Quality Assurance Program.
8. The submittal shall include the identification of a single, qualified Quality Assurance Manager representing the GC/CM who will be in responsible charge of developing and administering the Building Envelope Quality Assurance Program (BEQAP) throughout the duration of the project.
9. The BEQAP shall be subject to review and approval by the Architect, Owner, and Owner's building envelope technical representative.
10. The Architect and Owner shall be allowed access to the Glazing Subcontractor's facilities and those of the major suppliers and subcontractors to monitor QC procedures. The Glazing Subcontractor shall make available to the Owner and the Architect all QC Program records upon request.

M. The Certification Entities shall be accredited as operating in compliance with International Standards Organization (ISO) or similar agency authorized or otherwise qualified and accredited to provide periodic, independent review and certification of each Certification Agency's Quality Assurance program.

N. Production testing programs for coatings and finishes:

1. AAMA 2605 for Coatings.

O. NAAMM /NOMMA 500-06, Metal Finishes Manual for Architectural and Metal Products for fabrication and finishing of stainless steel. Testing Agency Qualifications: Qualified according to ASTM E 699 for testing indicated.

P. Testing Agency Qualifications: Qualified according to ASTM E 699 for testing indicated.

Q. AAMA QAG 1 Quality Assurance Processing Guide or equal for poured, de-bridged, and crimped thermal breaks.

R. Manufacturer Qualifications: A manufacturer capable of fabricating glazed steel and aluminum exterior walls that meet or exceed performance requirements indicated and of documenting this performance by certification, labeling, and inclusion in lists.

S. Manufacturer Qualifications for Insulating-Glass Units with Sputter-Coated, Low-E Coatings: A qualified insulating-glass manufacturer who is approved by coated-glass manufacturer.

T. Installer Qualifications: Manufacturer's authorized representative who is trained and approved for installation of units required for this Project and certified under the National Glass Association's Certified Glass Installer Program.

U. Sealant Testing Agency Qualifications: An independent testing agency qualified according to ASTM C 1021 to conduct the testing indicated.

V. AISC "Code of Standard Practice," latest edition, Section 10 as amended herein.

W. Welding Qualifications: Qualify procedures and personnel according to the following:

1. AWS D1.1/D1.1M, "Structural Welding Code - Steel".
2. AWS D1.2/D1.2M, "Structural Welding Code - Aluminum".
3. AWS D1.6/D1.6M, "Structural Welding Code – Stainless Steel".

X. Independent Inspections: General Contractor shall employ Independent Agent to perform Independent Inspections for, including but not limited to, field welds, shop welds, bolts, and anchors as specified in General Conditions Division 01.

Y. Manufacturer's identification tags or marks are not acceptable on surfaces which will remain exposed to view after installation.

1. Evidence of "patching" after removal of tags or marks is not acceptable.

1.10 MOCK-UP

A. Provide mock-up elements for field panel in accordance with Section 01 43 39 – MOCKUPS at exterior location where directed by Architect. Mock-up will demonstrate quality of work, construction methods, relationship to other work.

1.11 PRE-INSTALLATION CONFERENCE

A. Installer of the Work of this Section is required to attend pre-installation conference specified under Section 04 20 00 - UNIT MASONRY.

1.12 DELIVERY, STORAGE AND HANDLING

A. Comply with General Conditions and Division 1 Section “Product Requirements”.

B. Deliver glazing systems and components complete with factory applied protections, removable labeling, and packaging to comply with manufacturer/fabricator’s requirements and adequately protected from damage during shipment.

C. Protect glazing systems and components from adverse job conditions before, during, and after installation, including but not limited to:

1. Condensation, temperature changes, direct exposure to sun, or other causes that could otherwise damage the assemblies.
2. The work of other trades before, during, and after installation (e.g. weld slag, concrete spray, run-down staining/etching of aluminum and glass surfaces and similar).
3. Adhere to insulating glass fabricator’s recommendations for venting and sealing to avoid hermetic seal ruptures.

D. Storage:

1. Coordinate storage requirements and logistics with the General Contractor before shipping materials.
2. Components shall be stored on elevated platforms, skids, or pallets; covered with tarpaulins or other suitable weather-tight covering. Covering material shall allow for air circulation about the components. Store panel components so that water accumulation drains freely.
3. Neatly stack (in a manner that will not affect the components) system assemblies in locations designated by the General Contractor. Isolate panel assemblies at all contact points; store assemblies to prevent permanent damage, deformation, and similar distress.
4. Do not store system materials in contact with other materials that might cause scratching, gouging, staining, and etching of aluminum and glass surfaces, denting, surface damage, or other deleterious effect.

E. Handling:

1. Take into account the restrictions imposed on the delivery of pre-fabricated elements by the existing building's dimensions and site access.
2. Care shall be exercised to properly brace and reinforce prefabricated assemblies against racking during hoisting and installation.

F. Field Measurements: Verify actual locations of structural supports for glazed systems by field measurements before fabrication and indicate measurements on Shop Drawings.

1. Established Dimensions: Where field measurements cannot be made without delaying the Work, establish dimensions and proceed with fabricating glazed aluminum storefront systems without field measurements. Coordinate construction to ensure that actual dimensions correspond to established dimensions.

G. Sequencing: Coordinate the storefront fabrication and installation with the General Contractor / Construction Manager and the Air Barrier Subcontractor sequence to ensure that the air barrier tie-in shown on the drawings is achieved. Work with the General Contractor to represent proper sequencing on Construction Schedule.

1. Do not order or deliver any materials until all submittals, required hereunder, have been received and approved by the Architect.
2. Arrange keying, and schedule delivery of keys, with Owner.

1.13 WARRANTY

A. Comply with Section 01 78 00 - CLOSEOUT SUBMITTALS, and in compliance with Section 01 78 36 – WARRANTIES. The more stringent requirements of the contract documents shall apply.

B. Installer’s Warranty:

1. Provide a warranty for materials and workmanship of the Exterior Glazed Assemblies Contract from Date of Completion for a period of ten (10) years (the "warranty period"). Provide all manufacturer's pass through warranties. Also provide a warranty to cover all the costs of materials, labor, and equipment to remove any defective components of the glazing systems and replace them.
2. This warranty shall also cover the costs associated with removing and replacing internal finishes trims and services so that remedial works can be carried out. The content of each warranty is to be approved by the Architect.

C. Manufacturer’s Warranty: Submit a written warranty executed by the manufacturer agreeing to repair or replace components of a glazed exterior envelope system that fail in materials or workmanship within the specified warranty period, at no cost to the Owner.

1. Failures include, but are not limited to, the following:
   a. Structural failures including, but not limited to, excessive deflection.
   b. Noise or vibration caused by design loads, thermal or other movements.
   c. Thermal stresses transferring to building structure.
   d. Failure of system to meet performance requirements.
   e. Failure of operating components to function normally.
   f. Loosening or weakening of fasteners, attachments, hardware, and other components.
   g. Water leakage.

h. Failure of glazing due to non-impact breakage including breakage due to Nickel Sulfide, thermal stress, or any other non-impact breakage.

i. Failure of insulating glass edge seal as evidenced by frost, condensation, water, dust, corrosion, haloing or low-e coating damage within sealed air space.

j. Insulating glass spacer migration.

k. De-lamination or discoloration of laminated glass or panels.

l. Cracking, pitting, or discoloration of glass decorative and low-e coatings.

m. Deterioration, fading, excessive non-uniformity, pitting, cracking, peeling, crazing or discoloration of finishes and other materials beyond normal weathering.

n. Loss of effective glass bite due to shifting of glass or loss of effective glass bearing of setting blocks due to shifting of glass and/or blocks.

o. Adhesive or cohesive sealant failures or crazing/ bulging on surface of sealant.

p. Gaskets or weather strips hardening, discoloration, or disengagement.

q. Collapse, slumping or loosening of support of thermal insulation or fire safing insulation.

2. Warranty Period: Ten (10) years from date of Substantial Completion.

D. High Performance Organic Coatings: Submit a warranty for a period as listed below, warranting the integrity of film and permanence of color of the high performance organic coatings for the following:

1. Color fade not to exceed 5 delta E units (Hunter) as calculated in accordance with ASTM D 2244 on exposed surfaces cleaned with clean water and a soft cloth.

2. Degree of chalking not to exceed rating No. 8 when measured in accordance with ASTM D 4214 on exposed unwashed surfaces.

3. Will not crack, check, or peel.

4. Warranty Period for Exterior Coatings systems for Metal: 20 years

5. Warranty Period for Interior Coatings systems for Metal: 5 years

E. Material Manufacturer’s Guarantee:

1. Submit written guarantee signed by the respective manufacturer agreeing to furnish replacements for those glass units, finishes, or components that deteriorate from the point of manufacture, during shipping, during storage on site and in the installed condition, within specified period indicated below. Guarantee covers only deterioration due to normal conditions of use and not to handling, installing, and cleaning practices contrary to glass manufacturer’s published instructions. Guarantee for Structural Silicone and Weather-Sealant shall include full material costs for failure incurred.

a. Glass: Comply with 088000 “Glazing”

b. Weather-Sealant: 20 years

c. Aluminum Panels: 10 years

2. Warranty does not include damage caused by vandalism, or natural conditions exceeding the performance requirements.

F. Owner's Rights:

1. The Guarantees submitted under this section shall not deprive the Owner of other rights or remedies that the Owner may have under other provisions of the Contract Documents and is in addition to and runs concurrent with other guarantees made by the Glazing Subcontractor under requirements of the Contract Documents.
2. Inspections Upon and After Substantial Completion: Owner's Inspecting Agent (Agent) shall inspect entire system at six months and twelve months after the date of Substantial Completion and provide a written report to the Contractor and Architect. Systems will be evaluated during actual wind-driven rain events at the discretion of the Agent. Glazing Subcontractor shall promptly replace defective work.

1.14 ATTIC STOCK

A. At the completion of the project, provide the following attic stock:

1. A minimum of one percent, but not less than two lites, of each typical size for each glass type. Total amount of required attic stock to be determined by Owner.
2. Attic stock is intended for use in the event of damage after completion of the project and shall not be used to replace materials damaged during construction.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Basis of Design: To establish a standard of quality, design and function desired, Drawings and specifications have been based on the following products by Armortex, Inc., Schertz, TX:

1. Framing System: Armortex, product "TH600."
2. Door System: Armortex, product "HP500."
3. Passive voice device: Armortex, product "SP-CS-NV-06."

B. Acceptable Manufacturers: Subject to compliance with the requirements specified herein, manufacturers offering products which may be incorporated in the work include the following, or approved equal:

1. Armortex, Inc., Schertz, TX.
2. Insulgard Security Products, Brighton, MI.
3. Total Security Systems, Fowlerville, MI.

2.2 DESCRIPTION

A. The Glazing Subcontractor shall engineer, test, fabricate, deliver, install, and warranty all construction necessary to provide all Storefront Assembly systems including all measures that may be required to that end, notwithstanding any

omissions or inadequacies of the Contract Documents. The work of this Section shall include all materials, components and systems necessary and incidental to the weather-tight installation.

B. General Description: Bullet Resistant Aluminum Curtainwall Framing System: flush-glazed, outside glazed, stick fabricated system. Vertical and horizontal framing members shall be of shear block construction.

C. Ballistic Protection Requirements Performance Criteria:

1. Frame: Ballistic Level 5, tested to UL 752.
2. Doors: Ballistic Level 5, tested to UL 752.
3. Glazing: Ballistic Level 5, tested to UL 752.
4. GSA P-100, Classifications C Blast Resistant.
5. FEMA 361 – Safe Rooms for Tornadoes and Hurricanes.

D. Door Hardware:

1. SL 11 HD continuous hinge.
2. Adams Rite MS1850, Lock.
3. Manufacturer’s standard 9 inch pull handle and push bar.
4. LCN 4000 series closer.

E. Bullet resistant two way communication speaker/microphone: Natural voice speak Thru provide voice transmission along with security for 4 inch to 6 inch diameter hole with 7 inch stainless steel face plates secured from the safe side to avoid tampering from exterior. Provide painted ballistic steel to provided protection level required to match storefront system.

2.3 GLASS AND GLAZING

A. Glass and Glazing: Comply with Section 088000 "Glazing”.

B. Glass Type 7: Glazing shall be UL Listed Level 5 per UL 752, Laminated glass with PVB interlayers.

1. Clear Laminated Glass: Consisting of multiple plies of glass and PVB interlayers.

2.4 ALUMINUM

A. Aluminum Extrusions: ASTM B221, Provide extrusions of the alloy, temper, and thickness recommended by the manufacturer to comply with the following:

1. Alloy 6063-T6, 6063-T5, or 6061-T6, tempered as required by calculations.
   a. Extrusions (anodic finish): 6063 T5 or T6, ASTM B221.
   b. Extrusions (painted or conversion coat finish): 6063-T5 or T6, 6061-T6, ASTM B221.
2. Dimensional tolerances for all aluminum extrusions regarding thickness, straightness, twisting and flatness shall be held to better than one-half of those published under Sections 11 and 12 of the Aluminum Association’s Publication No. 1 “Aluminum Standards and Data” wherever possible.

3. Minimum Wall Thickness for Primary (Structural) Extrusions: As required to satisfy the performance requirements inclusive of deflections and stress but not less than 0.09 inch.
4. Minimum Wall Thickness for Trim (Non-Structural) Extrusions: As determined relative to die size:
   a. For dies less than 4 inches in diameter; 0.062 inches.
   b. For dies 4 inches to 6 inches in diameter; 0.080 inches.
   c. For dies greater than 6 inches in diameter; 0.093 inches.
5. Extrusion tempers shall be as recommended by the producer and fabricator based on the end-use and requirements for the component part.
6. Welding of aluminum alloys shall be in accordance with the Aluminum Design Manual and AWS D1.2 Structural Welding Code - Aluminum.

B. Aluminum Sheets and Plates: ASTM B209, Alloy 3003-H14 for paint finish, and AA5005-H34 for anodized finish. Sizes and minimum gauges as shown or specified, or as required to provide adequate structural characteristics and suitable for forming and finishing as specified. Dimensional tolerances for aluminum sheet shall be held to better than those published under applicable AA Standards and Data.
   1. Minimum Gauges for Sheet Fabrication of Components:
      a. Exposed Panels, Typical: 0.125” (3mm).
   2. All sheet for exposed or semi-exposed applications is to be provided annealed to relieve work hardening stress prior to fabrication.
   3. Metal panels shall follow the profiles indicated on the Contract Documents.
   4. Panels shall be fabricated to ensure that the grain of all contiguous panels is oriented in the same direction upon installation.
   5. Prior to installation the finished panels shall be laid out and viewed under a uniform daylight source and reviewed for uniformity in color and tonality.
   6. Panel support construction shall result in a panel visual flatness acceptable to the Architect.
   7. Extruded aluminum stiffeners or any alternate panel stiffening devices shall be designed to prevent 'telegraphing' of the stiffening device on the exposed face of the panel.

C. Fasteners: As required by design and calculations with specific torque values identified in the shop drawings where required.

D. Non-conductive spacers: (except at bolted slip-joints): Non-corrosive gaskets shall provide a barrier to prevent galvanic corrosion between dissimilar metals. Gaskets shall contain temperature and moisture properties as required to suit specified performance criteria.

E. Slide Bearings (At slip-joints in exterior wall): Wherever materials are subject by engineering design to movement, provide suitable low friction material(s) such as:
   1. Polytetrafluoroethylene fluoropolymer: ASTM D4894, Teflon as manufactured by Dupont or equal.

2. Acetal homopolymer: ASTM D6100, Delrin as manufactured by Dupont or equal.
3. Nylon: ASTM D4066.
4. Low-friction materials shall be dimensionally-stable, impact-resistant and impervious to moisture.
5. Mating surfaces: PTFE/AHP and PTFE/AHP or PTFE/AHP and mirror finish stainless steel.

2.5 MILD (FERROUS) STEEL

A. General:

1. The Work of this Section shall include the design, supply, fabrication, surface treatment, storage, delivery, and erection of all the exterior wall support steelwork (typically not shown or shown for reference only on the Contract Documents). This also includes the supply and installation of all anchors used to support the steelwork, the grouting of base plates, the provision of cleats and drilling of holes for the attachment of the glazing system, and repairs to damaged surfaces during construction.
2. All visible steel components including but not limited to mullions, anchors, plates, bars, and shapes shall be installed and fabricated to AESS requirements prescribed herein.
    a. Steel framing shall be straight and true with allowable dimensional tolerances one half of those permitted under ASTM A6 for shapes and bars.
    b. Steel framing shall be straight and true with allowable dimensional tolerances one quarter of those permitted under ASTM A6 for plates.
3. Steel Plates, Shapes, and Bars: ASTM A36 or ASTM A992.
4. Cold Formed Hollow Structural Sections: ASTM A500.
5. Steel Pipe: ASTM A53.
6. Hot and cold rolled finished bars: ASTM A108.
7. Steel Sheet, Cold Rolled: ASTM A1008.
8. Steel castings: ASTM A27 or ASTM A148.
9. Coordinate and provide holes in members as required by the Work of other trades or contracts. All holes shall be accurately drilled or punched in the factory. Holes that must be enlarged shall be reamed. Holes for the attachment of work by others shall be coordinated for factory preparation. Holes shall be drilled or punched at right angles to the surface of the metal, in accordance with AISC Specification. Holes shall not be made or enlarged by burning. Holes shall be clean-cut without torn or ragged edges. Outside burrs resulting from drilling operations shall be removed with a suitable tool. The use of manual gas-cutting in the shop may be used only if automatic or semi-automatic methods are not possible. The use of manual gas cutting torch in the field will not be permitted without the specific approval of the Engineer.
10. Members shall be supplied in a single stock length. Splicing of members is not permitted unless it is shown on the Contract Drawings, or it has been approved in writing from the Architect.

B. Structural Steel Hardware and Fittings:

1. Connectors:
    a. Nuts and Bolts: ASTM A307 Grade A, A325 Type 1, and shall be the regular hexagon-bolt type. Hex head nuts, ASTM A 563. Round washers shall conform to ASTM F436. Washers in contact with high-strength bolt heads and nuts shall be hardened in accordance with ASTM Standard A325 and AISC requirements. Beveled washers shall be square, smooth and sloped so that contact surfaces with the bolt head and nut are parallel.
    b. Carbon steel connectors shall be permitted for use at the interior side of the air seal only and must be plated, hot dip or mechanically galvanized, or polymer coated to provide protection against corrosion.
2. Metal Fittings: ASTM A36, Fabricated of machined and welded materials ground smooth and finished to visual uniformity. Finish as noted on the contract documents.
3. Stainless Steel Fasteners, Bolts, Nuts, and Washers:
    a. Stainless steel bolts and nuts shall comply with ASTM F593 and F594, series 300, non-magnetic.
    b. Stainless steel washers shall comply with ASTM A276, Grade 316.
    c. All fasteners located to the exterior side of the air seal shall be stainless steel, series 300 non-magnetic.
4. Studs: Shear studs shall be Nelson Studs or approved equivalent welded to the structural steel in accordance with manufacturer requirements.
5. Concrete Anchors:
    a. Mechanical masonry anchors are to be Hilti HSL or Ramset Trubolts, or Power Wedge Bolts. Chemical anchors are to be Hilti HVA or Ramset Chemset Injection anchors. All anchors are to be installed in accordance with the manufacturer’s requirements. The Glazing Subcontractor is responsible for confirming that all edge distance, spacing, and embedment requirements are satisfied.
    b. The Glazing Subcontractor shall be responsible for ensuring that where concrete anchors clash with reinforcement, there is an alternative anchor set out that satisfies the design requirements. Slotting of holes and flame cutting are not permitted. Holes in the concrete are to be repaired by dry packing with a 6000psi cementitious non-shrink grout.
6. Connectors, bolts, and fasteners shall be tested in accordance with ASTM F606.
7. Fasteners subject to vibration, primarily wind induced, can loosen over time. Prevention of loosening shall be achieved through use of lock washers or other locking anchor systems that shall prevent loosening of fasteners.
8. Epoxy or resin bonded anchors: not permitted for use in permanent tension without approval by the Architect. General Contractor shall employ Independent Agent to perform Independent Inspections and tests for all such anchors specified in General Conditions Division 01.

C. Welding:

1. Welding of carbon steel shall be in accordance with AWS D1.1 Structural Welding Code - Steel.
2. Method and Type of welding indicated on the Contract Drawings or the approved shop drawings shall be electric arc welding and shall comply in all respects with the codes and Specifications herein noted covering the Specifications for design, fabrication, and inspection of welded structures and the qualifications of welders and supervisors.
3. The head, input, length of weld, and sequence of weld and cooling process shall be controlled to prevent distortions. For welds comprised of plates in more than one plane, and of configuration that could cause restraint to uniform cooling of the weld, take precautions. Use stress relieving techniques where necessary. Each welder shall mark his identification symbol on his work. Welds found deficient in dimensions but not in quality may be enlarged by additional welding, or removed by chipping or melting and remade if deficient.
4. Tack welds: May only be used with express approval. Tack welds to be minimum 2” long.
5. Butt welds: Shall be full penetration welds between prepared fusion faces, unless otherwise specified. Carry out back chipping, grinding or gouging of the deposited weld as required to obviate imperfections in the root run. Grind butt welds flush without loss of parent metal.
6. Fillet welds: Deposit fillet welds to the required length, throat thickness and with partial or full penetration as specified.
7. Temporary attachment: Do not weld temporary attachments to principle joints. Obtain approval of the position of welds for temporary attachments.

D. Grout for Base Plates: Grout for member base plates shall be proprietary type cementitious non-shrink grout with a minimum compressive strength of 6000 psi. Data sheets, installation procedures and other supporting information for flowing and dry pack grout are to be submitted to the Architect for written acceptance before use.

2.6 BRACKETS AND ANCHORS

A. General:

1. Anchors and connections that are engineered for movement shall include suitable low friction materials specified in this section, as or recommend by the manufacturer.
2. All components are to be designed for the maximum tolerance of the system relative to the base structure, including but not limited to those referenced in Section “Building Movements”, and due consideration shall be given to additional forces from prying action and bolt group effects.
3. Connections between different materials, or different alloys of the same metal, shall be engineered to accommodate the differential thermal movement of the materials to be connected.
4. Design fixing brackets for the worst possible panel eccentricity, packing location, and uneven load sharing. Include prying effects on bolt groups.

5. Use self-locking devices where fasteners are subject to loosening or turning out from thermal and structural movements, wind loads, or vibration.
6. Do not use explosive shot fired devices unless approved in writing before commencing installation.

B. Brackets:

1. There shall be no direct fastening or close contact between any part of the glazing systems and the base structure or interior construction, except through approved bracket connections.
2. Design and install brackets so that all glazing system loads are transmitted through brackets to the base building structure, and prevent transfer of loads to adjacent panels unless specifically designed to do so.
3. Brackets shall be designed to provide three-dimensional adjustment and accurate location of the work, and be rigidly fastened after the work is finally positioned within the specified erection tolerances.

C. Anchors:

1. Provide all required anchors to attach glazing systems to the base structure which:
   a. Are compatible with the bracket assembly and together provide three-way adjustment to accommodate fabrication and construction tolerances.
   b. Secure the glass wall system in its correct position providing for building and glazing system movements.
   c. Are structurally adequate to carry the design loads for the worst possible bracket positioning.
   d. Provide anchor adjustment capability for full range of specified tolerances for building structure, but not less than one inch in all directions.
2. Base Building Substrates: Provide contingency design and installation procedures for all typical substrate conditions and deficiencies including:
   a. Reinforcement clash.
   b. Excessive out-of-tolerance concrete and stone.
   c. Clash with other structural details.
   d. Mislocated, missed and incorrect embeds and epoxy anchors.

2.7 GASKETS/WEATHERSTRIPPING

A. Where gaskets combine to form a continuous seal around all four edges of the lite or panel, all corners and abutted ends of weather stripping gaskets shall be vulcanized, heat-welded, or injection molded to form a positive seal.

B. All material shall be non-staining, UV stabilized and ozone-resistant.

C. All gaskets other than in glazing are to be silicone or silicone compatible EPDM. All gaskets shall have continuous mechanical engagement to framing members; adhesive attachment is not acceptable. All gaskets shall be continuous and contiguous.

1. Silicone or silicone compatible EPDM gaskets shall meet ASTM C509, Option 2, Type 2 for soft gaskets, and ASTM C864 for dense gaskets.
2. Silicone compatible EPDM gaskets shall meet ASTM C864 for dense gaskets.
3. Silicone gaskets shall be profiled to form a positive seal, ASTM C 1115.
4. Silicone Glazing Spacers shall be custom profiled, gray silicone to form a positive seal, ASTM C 1115, Type C (70 ±5 Shore A Durometer). Color to match IGU seals.

2.8 SEALANTS (WEATHERSEAL)

A. Comply with Section 079200 “Joint Sealants”.

B. All joints, which are sealed with sealant as part of the fabrication or erection procedure, shall be sealed with silicone (exposed or concealed) sealant in color to match the adjoining surfaces or as required by the Architect. All perimeter sealant (metal to adjacent construction) shall be low or medium modulus silicone sealant.

C. Seals to air barrier and membrane wall materials medium modulus silicone complying with ASTM C920 as recommended by the sealant and air barrier manufacturer. The sealant shall be designed for adhering to low energy surfaces common in sheet or peel and stick weather resistant barriers. Compatibility and adhesion of sealants with air barrier materials shall be demonstrated by the sealant and membrane manufacturers, based on testing and shall be submitted in writing. Test procedure shall be as indicated below and as specified herein.
   1. Adhesion: ASTM C794 Standard Test Method for Adhesion-in-Peel of Elastomeric Joint Sealants
   2. Compatibility: ASTM C1087 Standard Test Method for Determining Compatibility of Liquid-Applied Sealants with Accessories Used in Structural Glazing Systems.

D. Sealants shall have a VOC content of 250 g/L or less.

E. Sealant shall comply with the testing and product requirements of the California Department of Public Health’s “Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers”.

F. Care shall be exercised to insure against "Three Surface Adhesion". Bond breakers shall be provided.
   1. Comply with ASTM C 1193 Standard Guide for Use of Joint Sealants.

G. Provide two lines of weather seal:
   1. Primary seal shall be both an air and water seal.
   2. Secondary seal shall be water seal.

H. Provide non-staining sealant when sealing to porous substrates such as natural stone, wood, or concrete.

I. Provide sealants from one of the following acceptable sealant manufacturers or equal:

1. Dow Corning Corporation.
2. GE / Momentive.
3. Sika.

2.9 ELASTOMERIC SHEET MATERIAL

A. Elastomeric sheet shall be a complete engineered membrane system, consisting primarily of:
   1. Low-modulus pre-cured silicone extrusion and sealant for bonding extrusions to substrates:
      a. Hardness: 30 to 70 durometer hardness, Shore A, tested in accordance with ASTM D2240.
      b. Tensile strength: 800 to 1,400 psi, tested in accordance with ASTM D412.
      c. Elongation: Not less than 500 percent, tested in accordance with ASTM D412.
      d. Tear strength, die B: 75 to 130 ppi, tested in accordance with ASTM D624.
      e. Adhesive: Compatible approved silicone recommended by manufacturer.
      f. Thickness: Not less than 65 mils.
      g. Color: Translucent.
      h. Provide elastomeric sheet metal from one of the following manufacturers or equal:
         1) General Electric Silicones.
         2) Dowsil.
   2. Non-corrosive termination bars and fasteners.

B. Bonding, splicing adhesives, and Sealants: Comply with Comply with Section 079200 “Joint Sealants” and ASTM C920.
   1. Primers, setting cement, putty, sealants, and all other materials as recommended by the manufacturer of the membrane system.

2.10 INTERIOR ENTRANCE DOORS

A. Aluminum doors shall be extruded aluminum, pre-glazed, single acting, hinged doors, narrow stile and rail type. Subject to compliance with the requirements specified herein, products which may be incorporated in the work include, the following:
   1. EFCO model: “D200 Narrow Stile Door.
   2. Kawneer model: “190”.
   3. Vistawall model: “NS-212”.
   4. YKK AP America: “20D” system.

B. Entrance doors:
   1. Wall thickness of stile and rail extrusions: not less than 0.125 inch.

2. Wall thickness of glazing stops: not less than 0.050 inch.
3. Thickness of door: 1-3/4 inches.
4. Width of door stiles: 2-1/8 inches minimum.
5. Width of top rail: 2-1/4 inches minimum.
6. Width of bottom rail: 10 inches minimum (in conformance with 2012 ADA).
7. Fabricate doors with hairline joints at corners of stiles and rails; provide heavy concealed reinforcement brackets secured with screws and welded.
8. Weatherstripping: Wool pile type.

C. Door frame: Nominal 2 inch width by 4-1/2 inches deep.
1. Wall thickness of frame extrusions: not less than 0.125 inch.
2. Utilize shear block type construction throughout. No visible raw edges are permitted at joints.
3. Weatherstripping: Wool pile type.

2.11 EXTERIOR ENTRANCE DOORS

A. General: Supply and install aluminum framed glass doors as required for the Storefront System as specified hereinafter or as indicated on the Drawings and all other finish hardware that will be required to make the Storefront System complete."

B. Entrance doors shall be extruded aluminum, pre-glazed, single acting, hinged doors, heavy duty, wide stile-and-rail type; acceptable products are:
1. EFCO model “D318 DuraStile”.
2. Kawneer mode: “Tuffline 350 Series”.
3. Oldcastle: “Rugged MS 375”.
4. Wausau “Monumental, Medium Stile,” door.”
5. YKK: “40M Monumental Door”.

C. Entrance doors:
1. Wall thickness of stile and rail extrusions: not less than 0.1875 inch.
2. Wall thickness of glazing stops: not less than 0.050 inch.
3. Thickness of door: Nominal 2 inches.
4. Width of door stiles: Nominal 3-3/4 inches, 4-1/16 inches maximum.
5. Width of top rail: Nominal 3-3/4 inches, 4-1/16 inches maximum.
6. Width of bottom rail: 10 inches minimum (in conformance with 2012 ADA).
7. Fabricate doors with hairline joints at corners of stiles and rails; provide heavy concealed reinforcement brackets secured with screws and welded.
8. Weatherstripping: Wool pile type.

D. Door frame: Nominal 2 inch width by 4-1/2 inches deep, or 6-1/2 inches deep for compatiblity with adjacent storefront, refer to Drwing.
1. Wall thickness of frame extrusions: not less than 0.1875 inch.

2. Utilize shear block type construction throughout. No visible raw edges are permitted at joints.
3. Weatherstripping: Bulb polymeric type.

E. Frames and Door Panels: Fabricated from aluminum extrusions complying with AAMA/WDMA/CSA 101/I.S.2/A440
1. Thermally Broken Construction: Fabricate frames and door panels with an integral, concealed, low-conductance thermal barrier located between exterior and interior surfaces in a manner that eliminates direct metal-to-metal contact.

F. Threshold: Provide extruded-aluminum threshold of thickness, dimensions, and profile indicated; designed to comply with performance requirements indicated and to drain to the exterior; with manufacturer's standard finish.
1. Low-Profile Threshold: ADA-ABA compliant.

G. Finish: 3-coat fluoropolymer finish complying with AAMA 2605 and with Section “Aluminum Finishes”. Custom metallic color as selected by Architect

H. Glass and Glazing Materials: Comply with Section 088000 “Glazing”.

I. Hardware: Comply with Section 087100 “Door Hardware”.

J. Fabrication:
1. Fabricate doors in sizes indicated. Include a complete system for assembling components and anchoring doors.
2. Fabricate doors that are reglazable without dismantling panel framing.
3. Weep Holes: Provide weep holes and internal drainage passages to conduct infiltrating water to exterior.
4. Complete fabrication, assembly, finishing, hardware application, and other work in the factory to greatest extent possible. Disassemble components only as necessary for shipment and installation.
5. Factory-Glazed Fabrication: Glaze architectural doors in the factory where practical and possible for applications indicated. Comply with requirements within this specification and with AAMA/WDMA/CSA 101/I.S.2/ A440."

2.12 HARDWARE

A. Hardware shall be furnished under Section 08 71 00 - DOOR HARDWARE, and installed by aluminum entrance and storefront framing system manufacturer unless otherwise indicated herein, conforming to governing laws and building codes.
1. Provide aluminum storefront manufacturer’s recommended door bottoms at all exterior doors as part of the work of this Section.
2. Install all reinforcing required and prepare doors for finished hardware specified herein below.

2.13 OPERABLE WINDOWS (VENTS)

A. Outswing Casement windows (vents) in storefront system.

1. Specified Manufacturer/model: EFCO Series “WV-430”, Thermally broken, Outswing casement window.
2. Performance Requirements: Provide aluminum windows of performance indicated that comply with AAMA/WDMA/CSA 101/I.S.2/A440 (NAFS).
    a. Performance Class and Grade: AW-PG65-H
3. Materials
    a. Extruded aluminum profiles shall be 6063-T5 alloy and temper (ASTM B221 G.S. 10A-T5).
    b. The frame adaptor depth shall be not less than 2¼ inches: The ventilator depth shall not be less than 2 inches.
    c. All framing members shall have minimum wall thickness of 0.125 inch and shall provide the structural strength sufficient to meet the specified performance requirements.
    d. All references to dimensions for wall thicknesses and other cross-sectional dimensions of window members are nominal and in compliance with ANSI H35.2-1990.
4. Accessories
    a. Fasteners: Where exposed, shall be 300 Series, Stainless Steel.
    b. Perimeter Anchors: Aluminum. When steel anchors are used, provide insulation between steel material and aluminum material to prevent galvanic action.
5. Hardware:
    a. Stainless Steel 4-Bar Hinges.
    b. Cast White Bronze Air Conditioning (Custodial) Locks with Removable Handle.
6. Finish: High-Performance Organic Finish: Three-coat fluoropolymer finish complying with AAMA 2605 and containing not less than 70 percent PVDF resin by weight. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions
7. Glass and Glazing Materials: Comply with Section 088000 “Glazing”.
8. Weather Stripping: Provide woven-pile weather stripping of wool, polypropylene, or nylon pile and resin-impregnated backing fabric. Comply with AAMA 701/702.
    a. Weather Seals: Provide weather stripping with integral barrier fin or fins of semi-rigid, polypropylene sheet or polypropylene-coated material. Comply with AAMA 701/702."

B. Screens: Provide manufacturer’s standard aluminum framed screen matching finish of curtainwall framing.
1. Construct Insect screens with extruded frames, rigidly joined at the corners.
    a. Splines shall be extruded vinyl removable to permit rescreening.
    b. Screen frames shall be finished to match the aluminum window.
    c. Provide sliding screen wickets.

2. Insect screening: FS RR-W-365A, woven 0.011 inch blackened aluminum in an 18 by 16 mesh size as manufactured by Phifer Wire Products, Tuscaloosa, AL, or approved equal.

C. Fabrication:

1. Framing Members, General: Fabricate components that, when assembled, have the following characteristics:
   a. Profiles that are sharp, straight, and free of defects or deformations.
   b. Accurately fit joints; make joints flush, hairline and weatherproof.
   c. Means to drain water passing joints, condensation within framing members, and moisture migrating within the system to exterior.
   d. Physical and thermal isolation of glazing from framing members.
   e. Accommodations for thermal and mechanical movements of glazing and framing to maintain required glazing edge clearances.
   f. Provisions for field replacement of glazing.
   g. Fasteners, anchors, and connection devices that are concealed from view to greatest extent possible.
2. Fabricate aluminum windows in sizes indicated. Include a complete system for assembling components and anchoring windows.
3. Fabricate aluminum windows that are re-glazable without dismantling sash or framing.
4. Thermally Improved Construction: Fabricate aluminum windows with an integral, concealed, low-conductance thermal barrier; located between exterior materials and window members exposed on interior side; in a manner that eliminates direct metal-to-metal contact. Thermal barriers shall be designedin accordance with AAMA TIR A8.
   a. Frame thermal barrier shall be polyamide with a minimum of 1” (25.4 mm) separation, installed continuously and mechanically bonded to the aluminum.
   b. Sash thermal barrier shall be polyamide with a minimum of 1/2” (12 mm) separation, installed continuously and mechanically bonded to the aluminum.
5. Weather Stripping: Provide full-perimeter weather stripping for each operable sash.
6. Weep Holes: Provide weep holes and internal passages in window frames to conduct infiltrating water to exterior.
7. Provide water-shed members as required above lines of natural water penetration.
8. Mullions: Provide mullions and cover plates as shown, matching window units, complete with anchors for support to structure and installation of window units. Allow for erection tolerances and provide for movement of window units due to thermal expansion and building deflections, as indicated. Provide mullions and cover plates capable of withstanding design loads of window units.
9. Sub frames: Provide sub frames with anchors for window units as shown, of profile and dimensions indicated but not less than 0.093-inch (2.4-mm) thick

extruded aluminum. Miter or cope corners, and join with concealed mechanical joint fasteners. Finish to match window units. Provide sub frames capable of withstanding design loads of window units.

10. Factory-Glazed Fabrication: Glaze aluminum windows in the factory where practical and possible for applications indicated. Comply with requirements in Section 088010 Exterior Glass and Glazing and with AAMA/WDMA/CSA 101/I.S.2/A440 (NAFS).
11. Glazing Stops: Provide snap-on glazing stops coordinated with Section 088010 Exterior Glass and Glazing. Provide glazing stops to match sash."

2.14 MISCELLANEOUS MATERIALS

A. General: Provide products of material, size, and shape complying with referenced glazing standard, requirements of manufacturers of glass and other glazing materials for application indicated, and with a proven record of compatibility with surfaces contacted in installation.

B. Thermal break construction:

1. When low conductance thermal barrier is capable of holding glazing assembly in position and provides composite structural performance the thermal break composite shall conform to the following:
    a. Thermal break assemblies shall be tested in conformance with AAMA TIR A8-08 for composite structural performance.
    b. Thermally broken assemblies shall pass AAMA 505 Dry Shrinkage and Composite Performance Thermal Cycling Test Procedure for dry shrinkage thermal cycling.
    c. Thermal breaks shall be mechanically locked in the metal frames to provide composite action and the mechanical locks shall restrain the thermal break material in all directions to resist shear, flexural bending, thermal loads, and other forces that can be imposed on the member.
    d. Manufacturers shall conform to AAMA QAG 1 Quality Assurance Processing Guide.
    e. Minimum 3/8 inch separation of inside and outside by material with conductivity less than 2.2 Btu.in/hr/ft2/oF or air.
    f. The thermal break shall be aligned with the building insulation and insulating glass units.
2. When low conductance thermal barrier is used only as a thermal separation (Thermal break) and does not comply with the Section “Miscellaneous Materials” paragraph “Thermal break construction” , the thermal separation material and framing member shall not be considered as a composite element in the design of the system.
    a. In such case provide connections or mechanical connections between the thermal break and metal framing elements that will accommodate the differential movement between different materials or that are strong enough to resist structural and cyclic thermal loads.
3. Thermal break materials and assemblies shall not degrade under UV and Ozone exposure when tested in accordance with ASTM G155 and G151.

4. Acceptable thermal break materials:
    a. Thermal breaks systems as manufactured by Technoform-Bautec.
    b. Two or more strips of crimped in place, mechanically locked, glass fiber reinforced polyamide nylon thermal barriers.
    c. Insulbar thermal break systems as manufactured by Ensinger.
    d. GFRP and CFRP pultruded shapes, plates, and profiles of polyester resin reinforced with glass and carbon fibers.
    e. Polyethylene or PVC thermal isolators.

C. Setting blocks: ASTM C1115, Provide setting blocks at the sill quarter points of all glass lites, or as recommended by the glass manufacturer and proven by analysis. Setting blocks shall be dense silicone or heat cured silicone rubber with a hardness of 85 ±5 Shore A Durometer and color to match IGU seals. Minimum length of 4" or length determined in inches by multiplying the glass area in feet by 0.1 per GANA guidelines, and a minimum width which will provide a bearing surface for both the inboard and outboard glass lites without interrupting or otherwise creating a discontinuity in the silicone weather sealant at each IGU perimeter.

D. Edge Blocks: Elastomeric material to limit glass lateral movement (side walking). ASTM C1115, 65-75 Shore A Durometer. Minimum length of 4" and a minimum width which will provide a bearing surface for both the inboard and outboard glass lites without interrupting or otherwise creating a discontinuity in the silicone weather sealant at each IGU perimeter. Color to match IGU seals.

E. All products in contact with IGU secondary sealant shall be demonstrated to be compatible.

F. Cylindrical Glazing Sealant Backing: ASTM C 1330, Type B (Bi-cellular material) or Type C (Closed cell material), jacketed, non-gassing, compatible with sealant and primer, and of a resilient nature, "Sof-Rod" made by Nomaco Inc. or equal, twenty-five (25) percent wider than joint width, of size and density to control glazing sealant depth and otherwise produce optimum glazing sealant performance.

1. Shape: Selected for each joint type; round for common butt type joints or triangular for fillet type sealant joint.

G. Glazing tapes: Back-Bedding Mastic Glazing Tapes: Preformed, butyl-based, 100 percent solids elastomeric tape; non-staining and non-migrating in contact with nonporous surfaces; with or without spacer rod as recommended in writing by tape and glass manufacturers for application indicated; and complying with ASTM C 1281 and AAMA 800.

H. Bond Breaker Tape: Provide bond breakers, where required, of polyethylene tape as recommended by manufacturer of sealant.

I. Weep Hole Baffle: PVC-coated, reticulated open-cell urethane foam, 45 pores per 1 linear inch; filter to be installed compressed to 50 percent of original width.

J. Expanding Foam Sealant: Preformed, expanding, adhesive-backed, closed-cell polyurethane foam impregnated with water repellant material conforming to AAMA

812. The foam sealant shall have a pressure build not more than 0.05psi when tested according to AAMA 812.

1. Minimum thermal resistance of 5.5 degF.ft2.hr/BTU.in, aged values in accordance with ASTM C1303 Part A.
2. Density: Not less than 2.0 pounds per cubic feet when tested according to ASTM D 1622.
3. Closed-Cell Content: 90 percent when tested according to ASTM D 2856.

K. Provide straps, plates, and brackets, built-in inserts, as required for support and anchorage of the fabricated items to adjacent surfaces.

L. Provide aluminum brackets, clips, high density plastic shims and reinforcements as required.

M. Flashing required within the system shall be aluminum and of approved design.

N. Flashing required to join the system to adjacent construction shall be aluminum.

O. Cleaners, Primers, and Sealers: Types compatible and recommended by sealant or gasket manufacturer.

2.15 GLASS SPANDREL CONSTRUCTION

A. Storefront spandrels, as indicated on design drawings.

1. Steel back pan: Installed at spandrel panels as indicated on design drawing.
   a. Galvanized sheet shall comply with requirements in Section “Mild (Ferrous) Steel” with a minimum thickness of 0.060” (1.52 mm).
   b. Finish: Galvanized per ASTM A525 (G90).
2. Maintain a minimum clear dimension of two inches from the back surface of the glass.
3. Opaque spandrel glazing shall receive full coat coverage ceramic frit.
4. Provide means of mechanically capturing insulation inside of spandrel cavity.

2.16 INSULATION, FIRESAFING, AND SOUND DEADENING

A. Thermal Insulation: Comply with Section 072100 “Thermal Insulation”.

B. Provide insulation where shown.

C. Utilize foil faced Storefront spandrel insulation and unfaced Safing Insulation. For foil faced insulation apply vapor retarder tape over all joints in Storefront Assembly insulation and where Storefront Assembly insulation abuts framing. Seal all joints in Storefront Assembly insulation with vapor retarder tape. Apply vapor retarder tape at intersection of storefront insulation with storefront framing, floor slab, and similar intersections to insure a vapor tight seal. Repair all tears in Storefront Assembly insulation foil facing with vapor retarder tape.

D. All fire safing insulation shall comply with ASTM E84, ASTM E2307 (2 hours), ASTM E136.

E. High Density Semi Rigid Mineral Fiber Safing and Thermal Insulation:

1. Faced or unfaced as required, ASTM C 612, maximum flame-spread and smoke- /developed indexes of 15 and 0, respectively; passing ASTM E 136 for combustion characteristics.
2. Nominal density of 8 lb/cu. ft. (128 kg/cu. m), Type III, thermal resistivity of 4.2 deg F x h x sq. ft./Btu x in. at 75 deg F.
3. Passes ASTM C 665 corrosion test.
4. Insulate spandrels with Thermafiber Firespan 90 or equal exterior wall insulation with minimum thickness as shown on Drawings and as required to meet specified thermal performance and foil vapor barrier (permeability not to exceed 0.020 Perms) at interior surface and all edges. Locate foil surface of insulation flush with innermost surface of vertical framing members. Butt joints are acceptable. Each piece of insulation shall be retained at a minimum of two opposite edges.
5. Provide Thermafiber Firespan 90 or equal for firesafing insulation with minimum thickness as required to meeting specified firesafing performance.
6. Insulation shall be retained by steel impaling pin assemblies with bases fastened to frames with screws or adhesive applied.
7. Seal all edges, joints, punctures and tears in vapor barrier with aluminum foil tape to insure continuous vapor barrier.

F. Smoke Seal Compound

1. Caulking compound specifically intended for inhibiting the passage of smoke, Hilti CP, 3M Firebarrier Spray, or Specified Technologies Inc.
2. Sound-deadening: Acoustical board, thickness and density as required by design, non-combustible waterproof type, approved by Architect.

2.17 STOREFRONT FABRICATION AND ASSEMBLY

A. General:

1. All work shall be of the highest quality, in accordance with the best trade practices, and performed by skilled workmen. All work shall be accomplished to the satisfaction of the Architect and Owner.
2. To the fullest extent practicable, fabrication and assembly shall be executed in the shop. All Work that is not shop-assembled shall be shop-fitted.
3. The design of the Storefront shall endeavor to keep site operations to a minimum. Manufacturing, finishing, and assembly processes shall, wherever possible, be carried out off-site and under controlled environmental conditions.
4. To the extent possible, all fabrication shall be done prior to finishing. Any exposed mill finish edges shall be finished to match adjacent construction.
5. All components exposed in the finished work shall be free from warping and oil-canning effects, the telegraphing of welds and other fasteners, cut marks, streaks, tool and die marks.
6. Form aluminum shapes before finishing.
7. Glazing Pockets: Provide minimum clearances for thickness and type of glass indicated according to GANA's "Glazing Manual”.

8. Fabricate components that, when assembled, have the following characteristics:
    a. Sharp profiles, straight and free of defects or deformations, including but not limited to, warping; oil-canning effects; the telegraphing of welds, studs, and other fasteners; streaks; and tool or die marks.
    b. Accurately fitted joints with ends coped or mitered.
    c. Internal guttering systems or other means to drain water passing joints, condensation occurring within framing members, and moisture migrating within the system to exterior.
    d. Physical and thermal isolation of glazing from framing members.
    e. Accommodations for thermal and mechanical movements of glazing and framing to prevent glazing-to-glazing contact and to maintain required glazing edge clearances.
    f. Provisions for reglazing from exterior.

B. Fabrication Tolerances:
1. Tolerances at joints and junctions shall take precedence over tolerances for components or assemblies.
2. Unless otherwise specified, tolerances shall be:
    a. Joint width: ± 1/16 inch.
    b. Length and width of major components: ± 1/32 inch.
    c. Diagonals of major components: ± 1/16 inch.
    d. Aluminum extrusions: 50% Aluminum Association standards.
    e. Misalignment of mating surfaces: ± 1/16 inch.
3. In addition to special care used to handle and fabricate assemblies, employ the following fabrication techniques.
    a. Welds ground smooth: Fabricator shall grind welds smooth. For groove welds, the weld shall be made flush to the surfaces each side and be within +1/32 inch, minus 0 inch of plate thickness.
    b. Contouring and blending of welds: Where fillet welds are indicated to be ground-contoured, or blended, oversize welds as required and grind to provide a smooth transition and to match profile on approved mock-up.
    c. Minimize Weld Show Through: At locations where welding on the far side of an exposed connection occurs, grind distortion and marking of the steel to a smooth profile with adjacent material.
    d. Rolled Members: Member specified to be rolled to a final curved shape shall be fully shaped in the shop and tied during shipping to prevent stress relieving. Distortion of the web or stem, and of outstanding flanges or legs of angles shall be visibly acceptable to the Architect from a distance of 10 feet under any lighting condition determined by the Architect.

C. Holes:
1. Provide holes and connections for site assembly and to accommodate work of others as required. Holes shall be drilled, or punched and reamed,

perpendicular to the surface. Holes will not be permitted in areas where the completed Work will remain visible.

D. Joinery:

1. Accurately fit and firmly secure all exposed metal joints with metal to metal hairline contracts.
2. All fastenings shall be installed at an approved spacing. Fasteners shall not penetrate gutter and drainage systems.
3. All jointing and splicing of members shall be concealed.
4. Conceal all joint sealants except as noted on the drawings.
5. All work shall be properly reinforced to resist all loads imposed upon them by all doors, hardware, anchors, and other attachments.
6. Exposed Fasteners:
    a. Exposed fasteners shall occur only where expressly permitted by the Architect.
    b. Spacing and location of all fasteners shall be as approved by the Architect.
    c. No self-drilling fasteners shall be allowed outboard of the air-seal line.
    d. Where exposed in finished and visible surfaces, fasteners shall be countersunk or counter bored with allen or pozidrive head unless indicated on the Drawings or as approved by the Architect. Exposed portions of the fastener shall match the adjacent surface.

E. Built-up Members and Reinforcement:

1. Where two or more sections of aluminum are used in built-up members, contact surfaces shall be smooth, true and even, in continuous alignment, and secured so that the joints are tight without the use of filling materials.
2. Steel reinforcement of aluminum members shall be hot-dip galvanized with shop primer and completely enclosed and separated from aluminum as specified herein.

F. Aluminum Welding:

1. General: Weld before finishing components. Weld in concealed locations to greatest extent possible to minimize distortion or discoloration of finish. Remove weld spatter and welding oxides from exposed surfaces by descaling or grinding.
2. Welded joints shall typically be confined to concealed locations. Any exposed joints shall be subject to Architect’s approval.
3. Procedures:
    a. Submit details of proposed welding procedures before commencing.
    b. Other than site welds indicated on approved shop drawings, do not weld on site without prior approval. Where practical, locate site welds in positions for down hand welding.
    c. Do not weld:
        1) Finished surfaces.

2) Adjacent to finished surfaces or glass, unless adequately protected from damage, as recommended by appropriate manufacturers.

4. Finish: Welds shall be de-scaled and free of surface and internal cracks, slag inclusion, and porosity.
5. Welding Dissimilar Metals:
   a. Do not commence until approved in writing. Submit details of welding of dissimilar metals, including:
      1) Type and thickness of materials to be welded.
      2) Proposed joint preparation and welding procedures.
      3) Proposed filler metal.
      4) Expected dilution (proportion of fused parent metal in the weld metal).
   b. After fabrication, clearly mark components to identify their locations in Project according to Shop Drawings. Marking shall be of a type that can be removed with water or solvents after assembly. Marking should be positioned on unexposed surfaces where possible.

2.18 GLAZING SYSTEMS ATTACHMENTS

A. Internal Gutters, diverters, and seals:
   1. Provide all required internal weeps, baffles, joint plugs, end dams, zone dams, internal sealant, and similar as required to prevent the air and water penetration through the completed assembly. Where visible, provide matching materials and finishes.
   2. Construct weep holes as required to drain water passing joints within the system to the exterior. Provide weep hole baffles.
   3. Apply sealants and gaskets under the climatic conditions recommended by the manufacturer(s). Sealant shall not be installed when substrates are wet or when ambient temperature is below 40°F. All surfaces to receive sealants shall be treated (cleaned, primed or unprimed) in accordance with the recommendations of the sealant manufacturer. Use no sealant that has started to set in its container, or any sealant that has exceeded the shelf life published by the manufacturer.
   4. Protect all joining surfaces not to receive sealants against staining by masking and/or other methods. Sealant joints shall be concealed from view to the extent possible.

B. Perimeter Flashing:
   1. Comply with the "Architectural Sheet Metal Manual" as issued by SMACNA for flashing recommendations.
   2. Install flashing using skilled workmen in strict accordance with the recommendations and directions of the manufacturer.
   3. Fabricate and install metal flashing work in accordance with details and specifications of above Reference Standard, with manufacturer's instructions, and as herein specified, to provide a watertight installation. Apply metal flashing to smooth, even, sound, clean, dry surfaces free from defects. Make provisions to allow for expansion and contraction of metal flashing work.

Wherever practicable, shop form all metal flashing work and deliver ready for installation. Form metal flashing work accurately to required profiles, with flat surfaces, straight edges, and corners, free from defects.

4. All flashings shall be cut and folded to approved profiles out of non-corrosive materials, with protective coatings as required. Flashing shall be factory fabricated in long lengths where practical, and pre-painted on visible surfaces.
5. Install, in as long lengths as practical, at concealed locations only, with as few joints as possible, and without wrinkles, buckles or distortions.
6. Where anchors or other materials penetrate the flashing, solidly fill the penetrations with the sealer to insure a fully watertight condition.
7. Where flashing is installed to provide air barrier continuity between the glazing system and surrounding construction, flashing shall be painted aluminum or stainless steel as specified herein to provide sufficient rigidity to resist potential fluctuations in air pressure, unless otherwise determined through pre-construction mock-up testing.
8. All flashings shall be continuous and air (where required for air barrier continuity) and water tight, allowing for thermal movement at splices and terminations. Inside and outside corners and end damns shall be prefabricated watertight. Provide mechanically engaged, continuously sealed splice plates at joints in flashing.
9. Flashing of isolated openings shall extend 12" past each jamb of the opening and turn up 3" and then extend from the outer face of the wall to the inside face of the wall where it shall be turned up 3" vertically and be bedded in sealant. Turn up head and sill flashing at sides to form a pan.
10. Where flashings are fitted to pre-formed rebates, coordinate cast-in grooves or reglets as required.
11. Materials:
    a. Unexposed metal flashing: ASTM A240 or A666, Type 304, dead soft fully annealed except where harder temper required for forming or performance; not less than 0.025 in. thick (24ga) unless otherwise shown, finish No. 2D. Provide 60-40 tin/led solder, with acid-chloride type flux, except use rosin flux over tinned surfaces in accordance with ASTM B32. Aluminum sheet, not less than 0.062” gauge (1.02 mm). Provide 80-20 tin/led solder if flashing can be visible in occupied areas.
    b. Exposed metal flashing, fascias, coping attachments, roof curb flashing and covers: Unless otherwise indicated on the Drawings, types and locations shall be stainless steel not less than 0.079” thick (2 mm) with non-directional bead blast satin finish and aluminum sheet not less than 0.125” (3 mm) thick with high performance organic coating.
        1) Provide thickness required to prevent oil canning.
        2) Location of seams to be approved by Architect with shop drawings.
        3) Seams: As shown or minimum 1-inch flat lock seams.
        4) Cleats: Minimum 2-inches long in seam.
        5) Minimum 2 fasteners per cleat.
        6) Thermal movements perpendicular to seams: Accommodate within seams

7) Thermal movements parallel to seams: Allow sheet metal to slide at attachment cleats.
8) Do not penetrate visible panels with fasteners and do not expose fasteners.
9) Fold seams to shed water.
10) Align all joints and seams.

c. Fasteners for sheet metal flashing: AISI, Types 304 and 316 stainless steel fastener system suitable for substrate.

d. Uncured EPDM Strip: Permitted in exposed or unexposed locations.

e. Uncured Neoprene strip: Permitted only in unexposed locations as alternate flexible flashing.

f. Self-Adhering, High-Temperature Underlayment Sheet for use under sheet metal flashing: Minimum 60 mils (1.5 mm) thick, consisting of slip-resisting polyethylene-film top surface laminated to layer of butyl or SBS-modified asphalt adhesive, with release-paper backing; cold applied. Provide primer when recommended by underlayment manufacturer.
1) Thermal Stability: ASTM D 1970; stable after testing at 240 deg F.
2) Low-Temperature Flexibility: ASTM D 1970; passes after testing at minus 20 deg F.

C. Aluminum “Break Metal” and “Panning Work”

1. Fabricate and install all extruded aluminum and formed sheet aluminum “brake-metal”work in conjunction with the aluminum window and storefront work as detailed and as reasonably required to complete the work including sill extensions, snap trim pieces, jamb and sill trim, closures, coverings, flashings and other miscellaneous extruded and formed “brake-metal” work in conjunction with aluminum windows.
a. Provide extruded shapes wherever possible, reserving formed work for conditions where extrusions are not applicable.
b. Provide sheet metal panning not less than 0.060 inch thick.
c. Fasten trim clips, at not more than 16 inches on center.
2. Protect surfaces from marring when forming work. Provide sufficient material thickness with all necessary concealed reinforcement and anchorage to prevent “oil canning” or deformation of the finished work. Material deemed defective by the architect will be replaced at no cost to the Owner.

2.19 ALUMINUM FINISHES

A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations relative to applying and designating finishes.

B. Appearance: Unless more stringent requirement exist in the “Metal Finishes Manual for Architectural and Metal Products”, when viewing abutting or adjacent pieces, significant visible color variation from a minimum distance of 10 feet, shall not be apparent. Provide samples of color variation for review during submittal process.

C. Material shall not be shipped, delivered, or supplied when the finish of that material:

1. Has not been inspected and tested in the manner and by the means prescribed herein and as approved.
2. Does not meet all specifications for the finishes set forth in the alloy manufacturer's instructions.
3. Does not fall within the color and tonality range approved by the Architect.
4. Has been rejected by the Architect or Owner.
5. Has not otherwise been processed in accordance with these instructions.
6. The Architect shall have final authority to accept or reject any or all material that does not conform to these finishes standards or any of the other requirements of the drawings and specifications.
7. To ensure consistency of color and tonality in the finished work, the Glazing Subcontractor shall implement a quality control program to the approval of the Architect. The quality control program shall be vertically integrated and include controls by the alloy manufacturer and the finisher, as well as the Glazing Subcontractor to provide three independent checks of color and tonality at the point of finishing, during assembly, and during installation.
8. No production finishing shall commence prior to approval of the quality control program by the Architect. Notwithstanding the implementation of an approved quality control program, any installed work with defects in finish or variation in color or tonality in excess of the approved range shall be subject to rejection.
9. A full-time supervisor shall be assigned to each production shift; the inspector shall inspect all production materials and maintain a complete record of all inspections.

D. Superior-Performance Organic Coating Finish for shapes, plates, and sheets exterior and interior side: AA-C12C42R1x cleaned with inhibited chemicals, corrosion coated with an acid-chromate-fluoride-phosphate treatment, and painted with organic coating specified below. Apply finish in strict compliance with paint manufacturer's instructions using a licensed applicator.

1. Fluorocarbon High Performance Organic Coating, Three-Coat Metallic PVDF System: Manufacturer's standard three-coat, thermo-cured pigmented polyvinylidene fluoride resin (PVDF) coating system consisting of specially formulated inhibitive primer and fluoropolymer color topcoat, containing not less than 70 percent of the fluoropolymer resin Kynar 500 or Hylar 5000 by weight; complying with AAMA 2605.
    a. The coating system shall be spray applied under factory conditions to pretreated base metal in a three-coat process in strict accordance with the coating system manufacturers recommendations, and to the minimum standards of AAMA 2605 "Voluntary Specification, Performance Requirements, and Test Procedures for Superior Performing Organic Coatings on Aluminum Extrusions and Panels".
    b. The coating system shall be applied by a licensed applicator approved by the coating system manufacturer. The applicator shall propose a program of records and samples of the entire coating production for

approval by the Architect, and which records and samples shall be made available to the Architect or Owner upon request.

c. Provide and furnish a compatible field touch-up PVDF coating system formulated for air-dying at ambient temperature, based on the Kynar ADS fluoropolymer resin, in color match the factory applied finish. Submit applied coating system, subject to sample approval procedures described herein. Such repairs shall match the original finish for color and glass and shall adhere to the original finish when tested in accordance with AAMA 2605 Dry Adhesion.

d. Warrant that the organic coating shall not peel, check, crack, chalk or change color for a period of twenty (20) years from the Completion Date stipulated in the Certificate of Substantial Completion and that the finish exceeds or meets the standards set out in AAMA 2605-05 which include, but are not limited to the following:

1) Three-coat PVDF finish system thickness shall be a minimum of 1.85 mils DFT.

2. An acceptable organic coating is PPG Industries Duranar XL or equal.

a. Custom metallic color to match Architect's sample.

E. Aluminum finish on structural silicone adhesion surfaces shall be a minimum Alodine conversion coating or other suitable adhesion substrates.

F. Aluminum not exposed to view shall receive, as a minimum, the chromium phosphate chemical conversion coat associated with organic coating.

G. All chemical conversion coatings shall meet the minimum requirements of ASTM D1730, Type B, Method 5 with a minimum coating weight of 40 mg/ft2.

1. Remove die markings on any exposed architectural surfaces prior to finishing operations. Where necessary to remove die markings from any part of the work, all members must be finished by the same process, whether or not die markings exist. Perform this work in addition to the finish specified. Scratches, abrasions, dents and similar defects are unacceptable.
2. All aluminum, whether concealed or exposed shall be finished. No mill finish aluminum shall be permitted.
3. Finishing of all components exposed to view shall be done after the completion of all fabrication processes.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Prior to start of installation, inspect the building and verify as-built conditions and dimensions as being acceptable to receive the Work of this Section. Verify elevations of concrete and structural steel framing, and location of embeds and other anchorages for compliance with the Work of this Section.

B. Should any conditions be found that may prohibit proper execution of the Work, the Glazing subcontractor shall immediately notify the Architect in writing of these conditions. Installation shall not proceed until a recommended course of remedial

action has been submitted and approved in writing by the Architect, prior to execution in the field.

C. Provide a complete site survey of existing conditions to ensure the accuracy of layout and dimensional information.

D. Joint widths as noted in the Contract Documents are the design joint width at the ambient temperature of 75°F. Installation procedures should be adjusted to take into account the ambient temperature at the time of installation.

3.2 PREPARATION

A. Provide connections for temporary shoring, bracing, and supports only where noted on the approved shop drawings. Temporary connections not shown shall be made at locations not exposed to view in the final structure or as approved by the Architect. Handle, lift and align pieces using padded slings and/or other protection required to maintain the appearance of the glazing systems through the process of erection.

B. Clean glazing channels and other framing members receiving glass immediately before glazing. Remove coatings not firmly bonded to substrates.

C. Examine glazing units to locate exterior and interior surfaces. Label or mark units as needed so that exterior and interior surfaces are readily identifiable. Do not use materials that will leave visible marks in the completed work.

3.3 ANCHORS AND CONNECTIONS:

A. Coordinate relationship between brackets and concrete reinforcement.

B. Supply anchorage items to be embedded in or attached to other construction. Provide embed layouts, setting diagrams, templates, instructions and directions as required for installation.

C. After system components are positioned, fix connections to building structure as indicated on approved Shop Drawings. Provide separators and isolators to prevent metal corrosion and electrolytic deterioration.

D. Connections between different materials shall be designed to allow for the differential thermal movement of the respected materials.

E. Self-drilling, self-threading fasteners shall not be permitted for use into concrete or masonry.

F. Avoid excess shimming that may induce additional stress on the fastener. The total thickness (t) of a shim pack shall not exceed a dimension equal to the diameter (d) of the fastener/anchor. Where t>d, the fastener/anchor shall be recalculated to take into account the additional stress from bending on the fastener with the assumption that the shim does not contribute to resistance to fastener bending. Additional stress due to bending shall be added to tension stress and the tension/shear interaction analyzed.

G. Anchorages to Structural Steel shall not induce rotational forces in supporting members.

H. Shim packs that resist compressive forces only may be high-impact plastic, Korolath type, or equal. Shim packs subject to shear shall be stainless steel or HFG steel plates pinned together to form a monolithic shim.

3.4 GLAZED ALUMINUM EXTERIOR WALL SYSTEMS

A. General:

1. Use no materials, equipment, or practices that may adversely affect the functioning, appearance or durability of the completed Storefront Assembly and related construction.
2. The Storefront Assembly shall be accomplished in compliance with the specified criteria without buckling, opening of joints, undue stress on fasteners, sealants, and gaskets, opening of welds, cracking of glass, leakage, noises, or other harmful effects.
3. Conform strictly to the materials, finishes, shapes, profiles, sizes, thickness, and joint locations required by the Drawings and Specifications.
4. Match all materials to produce continuity of line, texture, and color.
5. All work shall be of the highest quality, in accordance with the best trade practices, and performed by skilled workmen. All work shall be accomplished to the satisfaction of the Architect and Owner.
6. To the fullest extent practicable, fabrication and assembly shall be executed in the shop. All Work that is not shop-assembled shall be shop-fitted.
7. To the extent possible, all fabrication shall be done prior to finishing. Any exposed mill finish edges shall be finished to match adjacent construction.
8. All components exposed in the finished work shall be free from warping and oil-canning effects, the telegraphing of welds, studs, and other fasteners, and streaks, tool and die marks.
9. Exposed metal edges shall be finished to match typical finished surfaces.
10. Storefront Assembly design shall typically incorporate an outside weatherseal and an inside air-seal, and provide a pressure-equalized drainage system.
11. Fit joints to produce hairline joints free of burrs and distortion.
12. Rigidly secure non-movement joints.
13. Install anchors with separators and isolators to prevent metal corrosion and electrolytic deterioration and to prevent impeding movement of moving joints.
14. Weld components in concealed locations to minimize distortion or discoloration of finish. Protect glazing surfaces from welding.
15. Seal joints watertight, unless otherwise indicated.

B. Fabrication and Assembly

1. The design of the Storefront Assembly shall endeavor to keep site operations to a minimum. Manufacturing, finishing, and assembly processes shall, wherever possible, be carried out off-site and under controlled environmental conditions.

2. Assembly procedures to be carried out on site shall be simple to execute and capable of execution within the time(s) allowed in the Master Construction Program.

C. Manufacturer's Standards

1. Materials, components, and systems incorporated in the Work shall be mixed, applied, installed and otherwise used in strict accordance with the recommended standards and procedures of the respective manufacturers.

D. Storage and Handling

1. Materials shall be stored in a dry, well ventilated location. Handling of materials shall be kept to a minimum, and all materials shall be carefully protected from soiling and from condensation and other harmful moisture.

E. Jointing and Reinforcing

1. Accurately fit and firmly secure all exposed metal joints with metal to metal hairline contacts.
2. All fastenings shall be installed at an approved spacing. Fasteners shall not penetrate gutters and drainage systems.
3. Exposed fasteners shall occur only where expressly permitted by the Architect. Where exposed in finished surfaces, screw heads shall be Phillips oval-head countersunk type, finish to match adjacent surfaces.
4. All jointing and splicing of members shall be concealed.
5. Accommodation of thermal expansion and contraction shall be resolved within the Storefront Assembly. No loads due to thermal variation may be transferred to the building structure.
6. Conceal all joint sealants except as noted on the drawings.
7. All work shall be properly reinforced to resist all loads imposed upon them by all doors, hardware, anchors, and other attachments.

F. Metal Protection

1. Where dissimilar metals contact, protect against galvanic action by painting contact surfaces with primer or by applying sealant or tape or installing nonconductive spacers as recommended by manufacturer for this purpose.
2. Where aluminum will contact concrete or masonry, protect against corrosion by painting contact surfaces with bituminous paint or with high solids epoxy coating equal to Amerlock 400.

G. Install components to drain water passing joints, condensation occurring within framing members, and moisture migrating within the system to exterior.

H. Erection Tolerances: Install glazed aluminum exterior wall systems plumb, level, square, and true, and to comply with the following maximum tolerances:

1. Plumb: 1/8 inch (3 mm).
2. Level: 1/8 inch (3 mm).
3. Alignment:

a. Where surfaces abut in line or are separated by reveal or protruding element up to 3 inch (76 mm) wide, limit offset from true alignment to 1/32 inch (.8 mm). Otherwise limit offset to 1/16 inch (3.2 mm).

b. Location: Limit variation from plane to 1/8 inch in 12 feet (3 mm in 3.7 m); but no greater than 1/2 inch (12.7 mm) over total length.

3.5 GLAZING

A. General: Comply with combined written instructions of manufacturers of glass, sealants, gaskets, and other glazing materials, unless more stringent requirements are indicated, including those in referenced glazing publications.

1. Glazing channel dimensions as indicated on Drawings provide necessary bite on glass, minimum edge and face clearances, and adequate sealant thicknesses, with reasonable tolerances. Adjust according to requirements in referenced glazing publications, including the “Glass Manual” as issued by GANA.
2. Prior to glazing, all structural silicone glazed glass shall receive a continuous 1 inch wide skim coat of silicone at the perimeter of the lite to conceal sealant and glazing accessories. Color to be determined by Architect.
3. Protect glass edges from damage during handling and installation. Remove damaged glass from Project site and legally dispose of off Project site. Damaged glass is glass with edge damage or other imperfections that, when installed, could weaken glass and impair performance and appearance.
4. Provide temporary marking, if required, with an approved removable marking for visibility during construction, by a method that does not harm the glass, and remove all traces on completion.
5. Setting blocks in sill rabbets, sized and located to comply with referenced glazing publications, unless otherwise required by glass manufacturer. Set blocks in thin course of compatible sealant suitable for heel bead.
6. Do not exceed edge pressures stipulated by glass manufacturers for installing glass lites.
7. Never permit direct glass to frame contact.
8. Provide spacers for glass lites where length plus width is larger than 50 inches.
9. Provide edge blocking where indicated or needed to prevent glass lites from moving sideways in glazing channel, as recommended in writing by glass manufacturer and according to requirements in referenced glazing publications.
10. Install glass and glazing materials under the climate conditions recommended by the fabricator and manufacturer.

B. Sample Section of Sealant:

1. At the beginning of sealant installation work in exterior wall, the manufacturer of sealant shall send his representative to the site, under whose supervision a section of the wall (used as "control section") shall be completed for purposes of determining performance characteristics of sealant in joints. Architect shall be informed of time and place of such installation of control section.

2. Control section shall be installed according to specification given herein and shall not be considered as acceptable until written acceptance is provided by the Architect.
3. Accepted control section shall be standard to which all other sealant work must conform.

C. Supervision: Submit to the Architect written certification from the sealant manufacturer that the applicators have been instructed in the proper application of their materials. Use only skilled and experienced workmen for installation of sealant.

D. Install glass and glazing materials under the climate conditions recommended by the fabricator.

E. The location, type, size and position of all setting blocks shall be inspected for compliance with the approved shop drawings before IGU installation, and again prior to the installation of structural silicone sealant and exterior weatherseals.

F. Install the glass unit in the opening using temporary glass retainers. Care shall be exercised not to set fingerprints on the glass and glazing materials in the structural silicone sealant bond area during installation.

G. Glazing rabbets shall be clean, dry, and free of any materials that might adversely affect the bond and seal of the glazing materials or the drainage of the rabbet.

H. The insulating glass unit shall be fully supported by framing members in the installed position. Inboard and outboard glass lites shall be fully supported by the setting blocks prior to the application of structural silicone sealant.

3.6 GLAZING SEALANTS

A. General: Site glazing shall be carried out and evaluated by approved glaziers in accordance with ASTM C 1394 and ASTM C 1401, and other referenced standards. An approved glazing supervisor shall supervise all work.
1. Comply with the sealant manufacturer's recommendations regarding surface preparation, priming, pot-life, sealant bead application, and the acceptable range in surface temperature and humidity at time of application and for a period at least eight hours following sealant application.
2. Cleaning: Surfaces to receive glazing materials shall be thoroughly cleaned of all dirt, dust, grease, finger-prints and extraneous materials. Where recommended by the glass manufacturer, contact surfaces shall be wiped with Isopropyl Alcohol or equivalent allowed by sealant and glass manufacturer to a dry condition.
    a. Clean joint surfaces immediately before installation of backing rod and again before applying the sealant as recommended by sealant manufacturer.
    b. Remove protective tape or removable films and ensure that no residue remains.
    c. Joint areas to be protected with masking shall be cleaned before application of tape or film.

d. Glass:
   1) Cleaning compounds shall be applied with clean lint-free disposable towels. A two-wipe method of application shall be employed, where one towel is used to wipe the surface dry and clean, and the second is used to apply the cleaning compound. The cleaning compound shall not be allowed to air-dry on the substrate.

e. Porous substrates, concrete, stone:
   1) Clean where necessary by grinding, mechanical abrasion, detergent washing or a combination of methods to ensure a clean sound interface.
   2) Remove laitance mechanically. Remove oils by blast cleaning. Remove loose particles that remain in joints following mechanical surface preparation by blasting with oil free compressed air.
   3) Clean and etch masonry joint surfaces as recommended by sealant manufacturer.

f. Acid washing shall not be used unless approved in writing by the Architect.

3. Priming: Apply primers to joint surfaces where required for adhesion of sealants, as determined by preconstruction sealant-substrate testing.
   a. Do not allow primer/sealer to spill or migrate onto adjoining surfaces. Areas adjacent to joints to be sealed shall be protected where there is likelihood that contamination by cleaning compound, primer, or sealant could occur.
   b. If recommended by the sealant manufacturer, roughen surfaces to remove protective coatings or imperfections that may prohibit provision of clean, sound base surface for sealant adhesion.
4. Application and tooling: Refer to Section 079200 “Joint Sealants”, unless otherwise specified in this section. Install sealants using proven techniques that comply with the following and at the same time backings are installed:
   a. Place sealants so they directly contact and fully wet joint substrates.
   b. Completely fill recesses in each joint configuration.
   c. Produce uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability.
   d. Exposed sealants shall be installed so that the top surfaces of the sealant beads are sloped to drain water away from the glass. Exposed sealant surfaces shall be tooled smooth.
5. Care shall be exercised to prevent three sided adhesion and cohesive failure of joint sealant in all movement joints. Provide bond breakers where necessary.
6. Curing:
   a. Cure sealants in compliance with manufacturer's recommendations, to obtain high early bond strength, internal cohesive strength, and surface durability.
   b. Do not relocate sealed components within the factory or on-site, until the joint has developed sufficient bond strength and cohesive integrity.

c. Do not field test for adhesion or water penetration until joints are fully cured.

7. Exposed sealants shall be installed so that the top surfaces of the sealant beads are sloped to drain water away from the glass. Exposed sealant surfaces shall be tooled smooth. Sealant that has started to set in its container shall not be used and be discarded.
8. Do not use sealant that has exceeded the shelf life published by the manufacturer.
9. Do not install sealant if the ambient temperature is below 40°F. Maintain this temperature during and 48 hours after installation of sealant.
10. Replace sealants that have accumulated debris prior to full cure.
11. Remove any masking material and excess sealant immediately after application of sealant bead is complete and "clean-down" adjacent surfaces as work progresses. All finished work shall be left in a neat and clean condition.

B. Field Applied Weather Sealants: Install continuous spacers, or spacers combined with cylindrical sealant backing, between glass lites and glazing stops to maintain glass face clearances and to prevent sealant from extruding into glass channel and blocking weep systems until sealants cure. Secure spacers or spacers and backings in place and in position to control depth of installed sealant relative to edge clearance for optimum sealant performance.

1. Tool exposed surfaces of sealants to provide a substantial wash away from glass and to eliminate voids and to ensure complete wetting or bond of sealant to glass and channel surfaces.

C. Gasket Glazing (Dry): Fabricate compression gaskets in lengths recommended by gasket manufacturer to fit openings exactly, with allowance for stretch during installation. Comply with gasket requirements in “Glass Manual” as issued by GANA.

1. Insert soft compression gasket between glass and frame or fixed stop so it is securely in place with joints miter cut and bonded together at corners.
2. Center glass lites in openings on setting blocks and press firmly against soft compression gasket. Install dense vulcanized compression gaskets, corner molds, and pressure-glazing stops, applying pressure uniformly to compression gaskets for form continuous weather-stripping. Compress gaskets to produce a weathertight seal without developing bending stresses in glass. Seal gasket joints with sealant recommended by gasket manufacturer.
3. Install gaskets so they protrude past face of glazing stops.

D. Setting blocks shall be the full width of the rabbet, and placed at the glass quarter points. They shall be of a length recommended by the glass manufacturer and be configured in such a way as not to impede water drainage of the glazing rabbet.

E. Anti-walk blocks shall be used to prevent glass from moving out of alignment so that glass bite is maintained.

F. Jamb blocks shall be used for each glass unit supported on four sides.

G. Glass shall be centered in each opening to provide the purchases and clearances recommended by the glass manufacturer and approved by the Architect.

3.7 DOORS

A. Examine doors and installed door frames before hanging doors.

1. Verify that frames comply with indicated requirements for type, size, location, and swing characteristics and have been installed with level heads and plumb jambs.
2. Reject doors with defects.
3. Proceed with installation only after unsatisfactory conditions have been corrected.

B. Hardware: For installation, see Section 087100 – Door Hardware.

C. Install doors to comply with manufacturer's written instructions and the referenced quality standard, and as indicated.

D. Job-Fitted Doors: Align and fit doors in frames with uniform clearances; do not trim stiles and rails.

E. Clearances: Provide 1/8 inch at heads, jambs, and between pairs of doors. Provide 1/8 inch from bottom of door to top of decorative floor finish or covering unless otherwise indicated. Where threshold is shown or scheduled, provide 1/4 inch from bottom of door to top of threshold unless otherwise indicated.

F. Rehang or replace doors that do not operate freely.

G. Install to produce weathertight enclosure and tight fit at weatherstripping.

H. Replace doors that are damaged or that do not comply with requirements. Doors may be repaired or refinished if work complies with requirements and shows no evidence of repair or refinishing.

3.8 CORROSION PROTECTION

A. Ensure by design that no metals, including alloys of the same base metal, are placed together in a manner, combination, or location likely to give rise to damage by electrolytic action or other corrosion. In particular, avoid metal to metal contact between aluminum and metals other than an appropriate grade and composition of stainless steel as per the recommendations of the metal manufacturer and to the approval of the Architect. Ensure that dissimilar aluminum alloys in contact with each other are compatible with each other or isolated. Any other dissimilar materials are to be treated or protected in such a manner as necessary to prevent corrosive action.

B. Isolation of dissimilar metal surfaces to prevent electrolytic action shall be accomplished by materials which are impervious to moisture and non-absorptive.

C. Aluminum surfaces in contact with mortar, concrete, fireproofing, plaster, masonry, or absorptive materials of any kind shall be coated with an anti-galvanic material, impervious to moisture.

3.9 FLASHINGS

A. Elastomeric or metal flashing connecting to work of other Sections shall be provided by the Glazing Subcontractor for the work of this Section, including the attachment to this Work and to other work.

1. Comply with flashing manufacturer's instructions and recommendations.
2. Clean substrates prior to installation of flashings.
3. Make flashings waterproof and air tight.
4. Make flashings continuous.
5. Make flashings collect, control, and direct water to the exterior and to weeps.
6. Shingle seams to best shed water.
7. Inspect all flashings prior to covering or concealing.
8. Ensure flashings are continuous, waterproof, and air tight.

B. Where indicated on the Drawings and where required to accommodate movement, an elastomeric flashing system shall be used.

C. Where elastomeric or metal flashing connects to roofing and waterproofing work provide 8 inches of flashing beyond the point of attachment to the Work of this Section.

D. Elastomeric flashing shall be carefully bonded to the substrates without blistering; joints shall be neat and as infrequent as possible. Adhered flashing shall have a minimum 90 degree peel adhesion of 6 pounds per linear inch when tested in accordance with ASTM D3330 Method F or ASTM D 903.

E. Elastomeric flashing not supported by substrate material shall receive another layer of 60 mil flashing for reinforcement, fully bonded to the finish layer and the substrate, and extending at least 1 inch beyond the unsupported area.

F. Connect air and vapor barrier in glazed exterior wall assembly continuously to the air barrier of the roof, to concrete below-grade structures, walls, exterior doors and other intersection conditions and perform sealing of penetrations, using accessory materials and in accordance with the manufacturer's recommendations.

G. Flashing Slope:

1. Slope all flashings at least 5 percent to drain to the exterior.
2. Ponding on flashings is not acceptable at any location.
3. Grout or shim under flashings to create slope.
4. Do not use any organic material to create slope.

H. Discontinuous Horizontal Flashings - Flashing Pans: Where horizontal flashings are not continuous:

1. Provide flashing pans with three vertical walls.
2. Make pan walls 4 inches high to the greatest extent possible.
3. Never make pan walls less than 1.5 inches high.

4. Make corners permanently waterproof. Sealant sealed corner is not acceptable.
5. Extend flashings the entire width of the obstruction to downward flow of water.
6. Ensure jamb flashings drop into pan flashings.

I. Metal Flashing Installation:

1. Reference Standard: Conform to the requirements of 5th Edition of the Sheet Metal and Air Conditioning Contractors Association (SMACNA) Architectural Sheet Metal Manual.
2. Fabricate and install metal flashing work in accordance with details and specifications of above Reference Standard, with manufacturer's instructions, and as herein specified, to provide a watertight installation. Apply metal flashing to smooth, even, sound, clean, dry surfaces free from defects. Make provisions to allow for expansion and contraction of metal flashing work. Wherever practicable, shop form all metal flashing work and deliver ready for installation. Form metal flashing work accurately to required profiles, with flat surfaces, straight edges, and corners, free from defects. Fold exposed metal edges back not less than 1/2" and form drip.
3. Isolate dissimilar metals.
4. Fully solder seams and joints.
5. Clean metal to bare metal prior to soldering.
6. Use flux when soldering.
7. Do not damage flexible flashing when soldering metal near flexible flashing.
8. Slip Joints: Locate slip joints not more than 24 feet apart and not more than eight (8) feet from corners. Form slip joints as slip-type-joint, or loose lock joint in accordance with SSINA “Standard Practices for Roofing, Flashing, and Copings”.

J. Flexible Flashing Installation:

1. Install flashing using skilled workmen in strict accordance with the recommendations and directions of the manufacturer.
2. Do not install fabric flashing when the temperature is 32 deg. F. and falling.
3. Install, in as long lengths as practical, at concealed locations only, with as few joints as possible, and without wrinkles, buckles or distortions.
4. Set flashing in a full and continuous troweled-on bed of setting cement, with joints lapped a min. of 4". Where flexible flashing meets metal flashing, it shall overlap at least 4" with laps completely buttered and pressure applied for perfect adhesion.
5. Seal holes with a “patch” of flashing.
6. Extend flashing “patch” at least 4 inches onto adjacent undamaged areas on all sides.
7. Where anchors or other materials penetrate the flashing, solidly fill the penetrations with the sealer to insure a fully watertight condition.

8. Provide mechanically fastened non-corrosive metal sheet to span gaps in substrate plane and to make a smooth transition from one plane to the other. Membrane shall be continuously supported by substrate.
9. At through-wall flashings, provide an additional 6 inch wide strip of manufacturer's recommended membrane counterflashing to seal top of through-wall flashing to membrane. Seal exposed top edge of strip with non-corrosive termination bar and sealant.
10. Do not allow materials to come in contact with chemically incompatible materials.
11. Inspect installation prior to enclosing assembly and repair punctures, damaged areas, and inadequately lapped seams with a patch of membrane lapped as recommended by manufacturer.
12. Meet specified installed, in place, peel adhesion performance.
13. Extruded Silicone Flexible Flashing and Transition: Comply with manufacturer's instructions and recommendations.
    a. Clean substrates to remove all contamination and bond breakers.
    b. Confirm substrate moisture and temperature are within manufacturer's recommended limits.
    c. Apply primer to substrates recommended by flashing manufacturer.
    d. For visible locations, mask installation area to control spillage and migration.
    e. Provide continuous adhesive/sealant to bond flashing into place.
    f. Provide bonding area shown or, if not shown, minimum 0.75 inch on each side of joint.
    g. Embed flashing into uncured, fresh adhesive/sealant.
    h. Roll installed flashings into adhesive/sealant with pressure.
    i. Hold flashing in place until adhesive/sealant grabs and holds.
    j. Complete horizontal work before vertical work.
    k. Remove masking and spilled adhesive/sealant.
    l. Provide uniform, straight, flashings free from wrinkles, fish mouths, and distortion.
    m. Provide well adhered flashings which meet manufacturer's adhesion performance.
    n. Provide 100 percent waterproof assemblies including terminations and intersections.
14. Limitations: Use sheet metal flashings and non flexible flashings at the following locations and conditions.
    a. Where flashing is visible.
    b. Where flashing is exposed to sunlight and manufacturer restricts sunlight exposure.
    c. Where sealant is shown adhered to the flashing.
    d. Where metal flashing is shown, indicated, or identified.

e. Where flashing is in contact with materials containing creosote or coal tar, or pressure treated wood.

f. Where flexible flashing cannot be practically installed due to its self-adhesive properties.

g. When environmental conditions during installation are outside flashing manufacturer's limits.

3.10 FIELD QUALITY CONTROL

A. Structural Requirements: The Owner will engage an independent testing and inspecting agency to perform field inspections and tests and to prepare test reports. Refer to Division 1 section "Independent Inspections" or "Special Inspections" for detailed bolt and weld testing requirements and coordination. The P.E. responsible for the design and engineering of the Storefront Assembly of this section shall be responsible for preparing the Statement of Special Inspection required by the building code.

B. Field Air infiltration and Water Penetration Chamber Testing:

1. Owner will engage an independent, fully accredited testing agency to field test the Work of this Section for air leakage and water penetration at 1.0 times the rate specified in "Performance Requirements" Article of this specification, tested according to AAMA 503-08:

a. For storefront systems, air infiltration test shall be ASTM E783 and water penetration test shall be ASTM E1105. The Glazing Subcontractor shall propose the testing scope, location, and schedule for review by the Architect and Owner.

b. Tests shall include:

1) Storefront Fixed Assemblies: Three (3) vertical assemblies during each stage.

2) Storefront Operable Windows: Two (2) vertical assemblies during each stage.

c. Tests shall be performed at the beginning, middle and end stages of installation for each system.

d. Wherever possible, test area shall incorporate interface conditions with adjacent cladding systems.

e. Insect screens shall be removed prior to commencing testing.

f. Interior side of test area shall be left open and unobstructed, permitting the full length of all joints to be examined from the indoor side.

2. Water infiltration criteria shall conform to the requirements of Part 1.

3. In the event of failure, additional field testing in accordance with AAMA 501.2 may be required to isolate the point(s) of entry and leak path(s) so that appropriate corrective action can be developed and implemented by the Glazing Subcontractor.

4. Failure shall be defined as air leakage rate greater than allowable and uncontrolled water penetration as defined in "Performance Requirements" Article of this Specification.

5. In the event of failure, corrective measures shall be made, and additional testing shall be performed until a passing result is achieved.
6. All recommended corrective measures (if required) shall be approved in writing by the Architect and/or the Owner's Designated Representative.
    a. Repair or remove work where test results indicate air/water infiltration of systems.
    b. Perform additional testing to determine air/water infiltration resistance of replaced or additional work.
    c. Corrective work and subsequent retesting shall be performed at no additional cost to the Owner. Glazing Subcontractor shall also pay any additional fees and expenses incurred by the Architect, and their consultants.
    d. Perform an additional test at one new location for each failure, at no cost to the Owner. Glazing Subcontractor shall also pay any additional fees and expenses incurred by the Architect, and their consultants.
    e. All corrective measures required to pass testing shall be implemented throughout the remainder of the project where applicable.

C. Field Water Hose Testing:
1. Owner will engage an independent, fully accredited testing agency to field test the Work of this Section for water penetration resistance in accordance with the following:
    a. Water tests shall be performed at the beginning and end stages of installation for each of the following systems:
        1) Storefront Fixed Assembly: At least three (3) "initially successful" tests at each of the beginning and end stages of installation.
    b. When possible, typical and non-typical areas (such as corners) shall be tested for each wall type.
    c. Wherever possible, test area shall incorporate interface conditions with adjacent cladding systems.
    d. Interior side of test area shall be left open and unobstructed, permitting the full length of all joints to be examined from the indoor side.
    e. Water infiltration criteria shall conform to the requirements of Part 1.
    f. Test installed glazing in accordance with AAMA 501.2. Testing shall include:
        1) At vertical façade, minimum 35 linear feet, including minimum 15 feet horizontal joints and minimum 10 feet vertical joints. Tested joints must include corner joinery.
2. In the event of failure, additional field testing in accordance with AAMA 501.2 may be required to isolate the point(s) of entry and leak path(s) for uncontrolled water penetration observed during initial field testing so that appropriate corrective action can be developed and implemented by the Glazing Subcontractor.
3. Failure shall be defined as uncontrolled water penetration, as defined in "Performance Requirements" Article of this Specification.

4. In the event of failure, corrective measures shall be made, and additional testing shall be performed until a passing result is achieved.
5. All recommended corrective measures (if required) shall be approved in writing by the Architect and/or the Owner's Designated Representative.
    a. Repair or remove work where test results indicate water penetration of systems.
    b. Perform additional testing to determine water penetration resistance of replaced or additional work.
    c. Corrective work and subsequent retesting shall be performed at no additional cost to the Owner. Glazing Subcontractor shall also pay any additional fees and expenses incurred by the Architect, and their consultants.
    d. Perform an additional test at one new location for each failure, at no cost to the Owner. Glazing Subcontractor shall also pay any additional fees and expenses incurred by the Architect, and their consultants.
    e. All corrective measures required to pass testing shall be implemented throughout the remainder of the project where applicable.

D. Field Adhesion Testing for Sealants:
1. Field test joint-sealant adhesion to joint substrates as follows:
    a. Extent of Testing: Test completed and cured sealant joints as follows:
        1) Perform ten tests for the first 1000 feet of joint length for each type of sealant and joint substrate.
        2) Perform one test for each 1000 feet of joint length thereafter.
    b. Tests shall be performed by the sealant manufacturer(s) whose product(s) are being supplied for the sealant joint(s).
    c. Test Method: Test joint sealants according to Method A, Field-Applied Sealant Joint Hand Pull Tab, in ASTM C 1521.
    d. For joints with dissimilar substrates, verify adhesion to each substrate separately; extend cut along one side, verifying adhesion to opposite side. Repeat procedure for opposite side.
    e. Inspect tested joints and report on the following:
        1) Whether sealants filled joint cavities and are free of voids.
        2) Whether sealant dimensions and configurations comply with specified requirements.
        3) Whether sealants in joints connected to pulled-out portion failed to adhere to joint substrates or tore cohesively. Include data on pull distance used to test each kind of product and joint substrate. Compare these results to determine if adhesion passes sealant manufacturer's field-adhesion hand-pull test criteria.
    f. Record test results in a field-adhesion-test log. Include dates when sealants were installed, names of persons who installed sealants, test dates, test locations, whether joints were primed, adhesion results and percent elongations, sealant fill, sealant configuration, and sealant dimensions.

g. Repair sealants pulled from test area by applying new sealants following same procedures used originally to seal joints. Ensure that original sealant surfaces are clean and that new sealant contacts original sealant.

h. Evaluation of Field-Adhesion Test Results: Sealants not evidencing adhesive failure from testing or noncompliance with other indicated requirements will be considered satisfactory. Remove sealants that fail to adhere to joint substrates during testing or to comply with other requirements. Retest failed applications until test results prove sealants comply with indicated requirements.

3.11 ADJUSTING, CLEANING AND PROTECTION

A. Adjusting:

1. Adjust operating sashes, screens, hardware, and accessories for a tight fit at contact points and weather stripping for smooth operation and weather tight closure. Lubricate hardware and moving parts.

B. Protection:

1. Protect exterior glass and exposed aluminum finishes from damage immediately after installation by attaching crossed streamers to framing held away from glass. Do not apply markers to glass surface. Remove nonpermanent labels, and clean surfaces.
2. Protect glass from contact with contaminating substances resulting from construction operations, including weld splatter. If, despite such protection, contaminating substances do come into contact with glass, remove substances immediately as recommended by glass manufacturer.
3. Remove and replace glass that is broken, chipped, cracked, or abraded or that is exposed to weld splatter, permanently etched, damaged from natural causes, accidents, and vandalism, during the construction period.
4. Comply with GANA TD-03-1003 “Construction Site Protection of Architectural Glass” and glass manufacturer’s recommendations.
5. Alkaline including ammonia and trisodium phosphate can etch glass.
   a. Phosphoric and hydrofluoric acids sometimes used to clean concrete can quickly etch glass and should not come in contact with glass, glazing, and frame assemblies.
   b. Touchup Painting: Cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint shall completed to blend with the adjacent surfaces of the Storefront Assembly. Such touch up work shall be done in accordance with manufacturer’s instructions as specified herein.
   c. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing to comply with ASTM A780.

C. Cleaning:

1. Examine glass surfaces adjacent to or below exterior concrete and other masonry surfaces at frequent intervals during construction, but not less than once a month, for buildup of dirt, scum, alkaline deposits, or stains; remove as

recommended in writing by glass manufacturer. Clean the glass according to the glass manufacturer's recommendations.

2. Use only glazing gasket lubricants recommended by gasket manufacturers.
   a. Do not use soap and liquid cleaners, which can etch glass, as lubricants.
3. At completion of installation, clean the work area and the Work of this Section to remove all marks, soiling and the like, according to the glass manufacturer's recommendations.
4. At the completion of all adjacent work by others, including services work, attend the Site, inspect the work areas generally, and repair all damage, complete or make good finishing, trimming and sealing, and replace any damaged or dislodged work
5. Finished work shall be free from defects and mechanical imperfections such as scratches, scrapes, dents, and abrasion.
6. Wash glass on both exposed surfaces in each area of Project not more than four days before date scheduled for inspections that establish date of Substantial Completion. Wash glass as recommended in writing by glass manufacturer.

3.12 PROJECT CLOSE-OUT

A. Repair and Replacement: Repair or remove and replace work that does not conform to specified requirements. Repairs made in one area shall be incorporated into all other similar areas as applicable.

B. Site Modifications: Finished work that contains unauthorized site modifications, or work not in accordance with the approved shop drawings, or submittals specified herein, may require additional modification in the field, or removal and replacement at no additional cost to the Owner. Any additional calculations and testing required for approval by the Architect shall also be provided at no additional cost to the owner.

C. Acceptance of the completed installation of the exterior wall system requires that the installation be structurally sound, weather tight, and free from defects of materials and workmanship.

End of Section

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Section 08 44 13
GLAZED ALUMINUM CURTAIN WALLS

PART 1 - GENERAL

1.1 SUMMARY

A. Design, engineer, furnish and install aluminum framed glazed curtain wall system. Work includes, but is not limited to:

1. Prefinished aluminum curtainwall framing system, including all angles, clips, and other items required to anchor the systems to the building structure.
2. All vision and spandrel glass, and glazing materials.
3. Prefinished aluminum formed brake-metal closures, flashings in conjunction with curtain wall framing.
    a. Brake-metal enclosures of metal columns adjacent to curtainwall.
4. Metal to metal sealing of aluminum assemblies and sealing of assemblies to exterior wall panels.
5. Integral fire stops and air and vapor barrier at floor slabs.
6. Sealant and compressible back-up beads for exterior and interior perimeter joints between framing members furnished hereunder and surrounding dissimilar materials.

B. Build-into place as work progresses, the following products and materials furnished under the indicated Sections:

1. Stainless steel sunshade support brackets furnished under Section 05 50 00 – Metal Fabrications.

C. The work of this Section is performance based, and shall be developed, tested and warranted by the Glazing Subcontractor to comply with design intent indicated on the Project Drawings, specified performance criteria and requirements, and relevant statutory and project requirements. In case of any conflict between Drawings and Specifications, including referenced standards and codes, the more stringent or onerous requirement shall apply. Where multiple standards or requirements apply, the more stringent or onerous shall apply. This specification describes the work in accordance with the current stage of design and does not contain all information required to produce a full working installation. Further design development will be required by the Glazing Subcontractor.

D. Delegated-Design Services:

1. The products and systems addressed by this specification shall be delegated design.
2. Performance and Design Criteria: Where professional design services or certifications by a design professional are specifically required of Glazing Subcontractor by the Contract Documents, provide products and systems complying with specific performance and design criteria indicated.

3. If criteria indicated are insufficient to perform services required, submit a written request for additional information to Architect.

E. System Requirements

1. Vertical mullions shall be structurally reinforced with steel inserts, as required.
2. Movement that will occur in the primary building structure shall not be imposed on the glass, glazing, glazing components and gaskets. The primary building movement shall not impose unintended stresses in the glass.
3. The system shall incorporate two lines of seals (continuous primary air and water seal, secondary water seal), closure, and flashing to perimeter substrates and assemblies. Aluminum framing shall be provided with weeps to collect and drain bulk rainwater and condensation to the exterior.
4. Glazing systems shall be designed, fabricated and installed with the necessary provisions (e.g. continuous built-in gutter system) required to drain accumulated rainwater or condensation inside the system to the building exterior. Provide accessories required to complete the concealed gutter system including but not limited to seals, dams, tubes, sealants and diverters. Provide baffles as required to prevent the ingress of wind driven water as well as insects.
5. Finish of all exposed interior and exterior visible portions of extruded aluminum glazing frame members shall be custom color 3-coat PVDF coating system per AAMA 2605 to match Architect's sample.
    a. Basis of Design: PPG Duranar XL.
6. Finish of all formed exterior aluminum sheet metals shall be custom color 3-coat PVDF coating system per AAMA 2605 to match Architect's sample.
    a. Basis of Design: PPG Duranar XL.
7. Glass lites to be heat treated as required by load, code and or thermal effects.
8. All safety glass lites to be fully tempered (Type FT) or heat strengthened (Type HS) laminated. All fully tempered glass to be heat soak tested.
9. Integration with doors and associated hardware, including requirements for concealed door operators, hinges, and similar and necessary coordination of same with concealed flashing/waterproofing below at door thresholds. Provide all door hardware and associated devices for entrances and terrace doors.
10. Interface, movement joint, and flashing condition between the glazed system and adjacent walls, head of curtain wall and roof waterproofing.
11. All interface flashing conditions between primary exterior wall materials, components and systems.

F. Elements of the Work:

1. Curtain wall and entrances as described above.
2. Backpans and other assemblies occurring in the curtain wall system.

3. All anchors, fixings, miscellaneous steel and attachments to the primary structure and framing reinforcement except those specifically indicated as provided by other trades.
4. Exterior glass and glazing.
5. Thermally broken aluminum glazed entrances including all hardware and accessories required for a complete and operable assembly.
6. All thermal insulation attached to or within the Glazing Assembly inclusive of supports, bracketry, backing and reinforcement.
7. All firesafing insulation and smoke seals attached to the curtain wall and glazed assemblies including supports, backing, and reinforcements and back pans.
8. Mullion wrap fire-rated insulation at all spandrel areas.
9. Sound deadening at all horizontal surfaces.
10. All gaskets, sealants, elastomeric and metal flashing inclusive of sealing at all junctions with ground level waterproofing and building expansion joints and at all interfaces to other new and existing building envelope and waterproofing transitions.
11. End closures at all horizontal and vertical caps and projections and formed metal closures and insulated metal closure panels.
12. Finishes, protective coatings and treatments.
13. Provisions for electrical outlets and cutouts for lighting, conduits, heat tracing cable, and other electrical work.
14. Proposal drawings, data and samples.
15. Design engineering, shop drawings, calculations, engineering data and test reports.
16. Field measurements of adjacent and/or supporting construction and verification of existing conditions where feasible.
17. Scheduling and monitoring of the work.
18. Material samples.
19. On site testing of anchors and field air and water testing.
20. Coordination with the work of other trades.
21. Visual Mock-up as outlined in this section, including prototype drawings, verification of design, components, and total assembly.
22. Storage, handling, protection and cleaning prior to acceptance.
23. Guarantees, warranties and indemnities.
24. All final exterior and interior cleaning of the Glazing System."

1.2 RELATED REQUIREMENTS

A. Section 01 43 39 - MOCKUPS: Requirements for exterior wall mock-up assembly requiring work of this Section.

B. Section 01 45 29 – TESTING LABORATORY SERVICES: General construction test requirements.

C. Section 01 60 00 - PRODUCT REQUIREMENTS: Listing of VOC requirements for adhesives, cleaning/maintenance materials, paints, coatings, and sealants.

D. Section 01 73 00 - EXECUTION: Waste Management and Recycling during Final Cleaning.

E. Section 01 74 19 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL: Procedural and administrative requirements relating to recycling goals, waste management program and reporting.

F. Section 01 81 13 - SUSTAINABLE DESIGN REQUIREMENTS: Procedural and administrative requirements relating to required *Northeast CHPS Verified Program,* (NE-CHPS) Certification.

G. Section 03 30 00 – CAST-IN-PLACE CONCRETE.

H. Section 04 20 00 - UNIT MASONRY: Preparation of adjacent masonry work to receive work of this Section.

I. Section 05 40 00 - COLD-FORMED METAL FRAMING: Structural stud framing at exterior walls.

J. Section 05 50 00 – METAL FABRICATIONS: Furnishing stainless steel sunshade support brackets for installation under this Section.

K. Section 06 10 00 - ROUGH CARPENTRY: Wood blockings, nailers.

L. Section 07 27 13 – SELF-ADHERING SHEET AIR BARRIER.

M. Section 07 92 00 - JOINT SEALANTS: Requirements for sealant and back-up materials.

N. Section 08 43 13 – ALUMINUM-FRAMED STOREFRONTS: Entrance doors, frames, vestibule and storefront framing

O. Section 08 80 00 – GLAZING.

1.3 REFERENCES

A. Referenced Standards: Comply with applicable requirements of the following standards and those others referenced in this Section, under the provisions of Section 01 42 00 - REFERENCES. The Work of this section shall comply with the

requirements of Rhode Island State Building Code – SBC-1 (2018 International Building Code w/ RI Amendments), all referenced standards, and the following additional reference standards. All standards referenced in this Specification shall be the latest editions, including all amendments current at the date of this Document. Criteria specified herein that exceeds reference standards shall take precedence over such standard.

1. The active standards and publications of the American Institute of Steel Construction (AISC), including but not limited to:
    a. AISC 360 “Specification for Structural Steel Buildings”
    b. AISC 303 “Code of Standard Practice for Steel Buildings and Bridges”
2. “Aluminum Design Manual” and “Aluminum Standards and Data” issued by the Aluminum Association (AA).
3. “The Code for Welding in Building Construction” issued by the American Welding Society (AWS), including but not limited to:
    a. AWS D1.1 Structural Welding Code – Steel.
    b. AWS D1.2 Structural Welding Code – Aluminum.
    c. AWS D1.6 Structural Welding Code – Stainless Steel.
4. The specified active standards of the American Society for Testing and Materials (ASTM).
5. The active standards and publications of the American Architectural Manufacturers Association (AAMA), including but not limited to:
    a. The “Voluntary Guide Specifications for Structural Glazing issued by the American Architectural Manufacturers Association (AAMA).
    b. AAMA TIR-A9 Metal Curtain Wall Fasteners
    c. AAMA TIR-A11 Maximum Allowable Deflection of Framing Systems for Building Cladding Components at Design Wind Loads
    d. AAMA TIR-A1, Sound Control for Fenestration Products
6. The European Committee for Standardization (CEN):
    a. EN 14179-1:2005 Glass in building - Heat soaked thermally toughened soda lime silicate safety glass - Part 1: Definition and description.
    b. EN 14179-2:2005 Glass in building - Heat soaked thermally toughened soda lime silicate safety glass - Part 2: Evaluation of conformity/Product standard.
7. French Standard NF P 78-201-1/A1(DTU39) for determination of thermal stress in glass.
8. The active standards and publications of the American National Standards Institute (ANSI), including but not limited to:
    a. ANSI Z97.1 American National Standard For Safety Glazing Materials Used in Buildings - Safety Performance Specifications and Methods of Test.

9. The “Glazing Manual” and the "Laminated Glass Design Guide" as published by the Glass Association of North America Glazing Manual (GANA).
10. The “Sealant, Waterproofing and Restoration Institute: Sealants: The Professional's Guide” issued by the Sealant and Waterproofing Institute (SWRI).
11. The “North American Glazing Guidelines for Sealed Insulating Glass Units for Commercial and Residential Use” issued by the Insulating Glass Manufacturer’s Alliance (IGMA).
    a. IGMA TM-3000 North American Glazing Guidelines for Sealed Insulating Glass for Commercial and Residential Use.
12. The "Metal Finishes Manual for Architectural and Metal Products" as published by the National Association of Architectural Metal Manufacturers (NAAMM).
13. The specified documents of the Consumer Products Safety Commission (CPSC).
14. Guidelines of the Glass Architectural Spray Coaters Association (ASCA).
15. The "Architectural Sheet Metal Manual" published by the Sheet Metal and Air Conditioning Contractor’s National Association (SMACNA).
16. The hardware finish designations of the Building Hardware Manufacturers Association (BHMA).
17. The specified documents of the National Fenestration Registration Council (NFRC):
    a. NFRC 100 Procedure for Determining Fenestration Product U-Factors.
    b. NFRC Simulation Manual.
18. CPSC 16 CFR, Part 1201-03, Safety Standards for Architectural Glazing.
19. American Society of Civil Engineers (ASCE).
    a. ASCE 7: Minimum Design Loads for Buildings and Other Structures
20. International Code Council (ICC)
    a. International Building Code (IBC)

B. Sustainability Requirement Reference: The following sustainability requirements are hereby made a part of this Section by reference thereto:
    1. High Performance Schools Exchange, Northeast Energy Efficiency Partnerships NE-CHPS, (referred to herein as “NE-CHPS”).

1.4 DRAWINGS AND SPECIFICATIONS

A. Information on Drawings and in Specifications establishes requirements for system's aesthetic effects as well as its performance characteristics. Aesthetic effects are indicated by dimensions, arrangements, alignment, and profiles of components and assemblies as they relate to sight lines and relationships to one another and to adjoining construction. Performance characteristics are indicated by

criteria subject to verification by one or more methods including preconstruction testing, field testing, or in-service performance. The drawings are a graphic representation of design intent and do not claim to fully solve movement or structural requirements, pressure equalization, waterproofing, air sealing, thermal requirements, acoustic requirements, glass movement, seismic performance or thermal shock requirements. It is the Glazing Subcontractor's responsibility to provide the final design and meet these requirements.

B. Do not modify intended aesthetic effects, as judged solely by Architect, except with Architect's approval. Where modifications are proposed, submit details to Architect for review.

C. Should the Glazing Subcontractor adopt the details or arrangements indicated on the Design Drawings it shall be deemed that he has checked the materials, their thicknesses, their buildability and performance in terms of this Specification, all relevant Regulations and codes of practice, and manufacturers' recommendations for any products referred to.

D. Where dimensions are not given, the drawings must not be scaled. The matter is to be referred to the Architect, the General Contractor, the Façade Consultant and the Client's Representative.

1.5 PERFORMANCE REQUIREMENTS

A. General: Provide Curtain Wall Assembly, including anchorage, that will meet or exceed the performance requirements specified herein, capable of withstanding, without failure, the effects of the following:

1. Structural loads.
2. Thermal movements.
3. Movements of supporting structure indicated according to the Movement and Tolerance Report by the Structural Engineer of Record including, but not limited to, story drift, twist, column shortening, long-term creep, and deflection from uniformly distributed and concentrated live loads.
4. Curtain Wall assembly shall be weather tight and have weather tight interfaces between other exterior wall system assemblies.
5. Dimensional tolerances of building frame and other adjacent construction.
6. Failure includes, but is not limited to the following:
    a. Material failures.
    b. Deflection exceeding specified limits.
    c. Noise or vibration created by wind and thermal and structural movements.
    d. Loosening or weakening of fasteners, attachments, and other components.

B. Structural Loads:

1. Systems shall be designed to withstand loads indicated according to ASCE 7 and as required by the applicable Building Code, whichever is more stringent.
    a. Wind Loads for components and cladding: Determined according to the applicable Building Code and ASCE 7-10 per the design data and loads determined by Project's Structural Engineer:
        1) Basic Wind Speed (V.ult): 133 mph (three second gust)
        2) Exposure Category: C
        3) Occupancy Category: III
        4) Importance Factor: 1.00
    b. Snow Loads: Determined according to ASCE 7 per the design data and loads determined by Project's Structural Engineer:
        1) Ground Snow Load (Pg) = 30 psf
        2) Flat Roof Snow Load (Pf) = 30 psf
        3) Snow Exposure Factor (Ce) = 1.0
        4) Thermal Factor (Ct) = 1.0
        5) Snow Load Importance Factor (I) = 1.1
    c. Seismic loads: Determined according to ASCE 7 per the design data and loads determined by Project's Structural Engineer.
        1) Seismic Design Category: C, Per Structural
        2) Occupancy Category: III, Per Structural
        3) Site Class: E
        4) Component Importance Factor: Ip
            a) Glazing at egress stair enclosures: 1.5
            b) All other Cladding and Component: 1.25
        5) Component amplification factor, ap: 3.0
        6) Component response modif. factor, Rp: 3.0
2. Design Curtain Wall Assembly to transfer wind loads to building structure.
3. Design frames and connections of curtain wall assemblies to accommodate deflections and other building movements.
4. Dead loads: Self weight of construction.
5. In addition to the minimum design live loads prescribed by the applicable Building Code, glazing systems shall be designed to safely support the following live loads.
    a. A concentrated loading of 250lbs projected over one square foot on all horizontal surfaces including skylights and framing, and projecting features, sills and canopies extending horizontally more than 8”.
        1) A concentrated loading of 300 lbs projected over one square foot or 40psf evenly distributed load on all skylights which may be accessed for maintenance.

b. A line loading of 50lbs per lineal foot acting either downward or outward on all window sills, including on trim components attached at back of sills.

c. At locations where the façade acts as a guard, located at or near the open sides of an elevated walking surface or slab edge, that minimizes the possibility of a fall from the walking surface to a lower level:

1) 50 plf at 42 inch above occupied floor surface.

2) 200 lbf concentrated load applied in the direction and at location of worst effect. When applied to panel surfaces, concentrated load may be distributed over a 4 inch x 4 inch tributary area.

3) These loads need not be superimposed.

d. A uniformly distributed load of 20 psf on all canopies.

e. A concentrated load of 10 lbs at any point, over a 1 inch x 1 inch tributary area, on snap-engaged components.

f. These live loading requirements do not need to be superimposed with each other.

6. Other Loads:

a. Self-straining stresses or forces due to thermal gradients, thermal expansion and contraction, or other effects inherent in the design.

b. Dynamic loading due to operable components.

c. Temporary and construction loads:

1) Design the glazing systems to allow for all handling and installation loads without causing overstress, permanent deflection or warping.

2) No permanent deformation of panels, channel legs and the like during installation to enable panels to fit into place will be allowed on the project.

C. Structural Performance:

1. When tested according to ASTM E 330 at positive and negative wind-load design pressures, systems do not evidence deflection exceeding specified limits

2. When tested at 150 percent of positive and negative wind-load design pressures:

a. Framing member residual deflection after pressure or load is removed shall not exceed 0.002 times distance between supports or cantilever length.

b. Glazing systems, including but not limited to glass, sealants, gaskets, and anchorage, shall not evidence disengagement, material failures, structural distress, or permanent deformation of any component.

D. Deflection of Framing Members: AAMA TIR-A11

1. Deflection Normal to Wall Plane: Limited to L/175 of clear span for spans up to 13 feet 6 inches (4.1 m) and to L/240 of clear span plus 1/4 inch (6.35 mm) for spans greater than 13 feet 6 inches or an amount that restricts edge deflection of individual glazing lites to 3/4 inch, whichever is less.
2. Deflection Parallel to Glazing Plane: Limited to the lesser of L/360 of clear span or 1/8", or amount not exceeding that which reduces glazing bite to less than 75 percent of design dimension, or which reduces edge clearance between framing members and glazing or other fixed components to run or contact block, or which reduces the minimum edge clearance required to accommodate movements.
    a. In-plane deflections of horizontal members supporting operable components shall be limited to less than 1/16 inch (1.5 mm) or L/360 whichever is less.
3. The anticipated movement of the framing members must not exceed the movement capabilities of adjoining sealants.
4. The movement of the framing members must not cause disengagement of applied snap covers or trim.
5. The design of the framing members must accommodate differential movement in adjacent framing members such as might occur at jambs, parapets, unusual geometries and other similar conditions.
6. The framing members must be able to resist any secondary bending moments resulting from axial loads acting through eccentricities caused by large deflections, such as, P-Delta effects.
7. In order to prevent disengagement of the infill material, design of systems incorporating large infill panels must also address the center deflection of the infill panels in conjunction with the framing deflection.

E. Glass Design
1. Comply with 088000 "Glazing".
2. System shall be designed for actual glass thickness, rather than nominal thickness, to ensure proper sealing of compression gaskets.

F. Metal Panel Design (Integral to Glazed Curtain Wall):
1. The deflection of sheet metal backpans shall be limited to 1/4 inch.
    a. If stiffening members are required on backside of metal panel to limit deflection, stiffening members are to be separated from the curtain wall framing system to prevent panel curvature (oil canning) by way of thermal expansion. The stiffeners must be free to expand and contract due to changes in temperature.

G. Resistance to progressive collapse
1. Failure of a single component should not lead to more extensive collapse of a wall or roof. The building envelope should have sufficient redundancy that in

the event of failure of a component the remaining components are able to prevent collapse.

2. The Glazing Subcontractor shall provide a risk assessment and strategy for mitigation of progressive collapse should the bottom panel of a stacked configuration fail.

H. Falling snow and ice mitigation

1. The Glazing Subcontractor shall provide a risk assessment and strategy for mitigation of falling hazard associated with snow and ice accumulation.

I. Air Infiltration:

1. Provide fixed glazing systems with permanent resistance to air leakage through system of not more than 0.06 cfm/sq.ft. of fixed wall area when tested according to ASTM E283 at a minimum uniform static air pressure differential of 6.24 lbf/sq.ft.

2. Provide entrance doors with permanent resistance to air leakage through system of not more than the following air leakage rates when tested according to ASTM E283 at a minimum uniform static air pressure differential of 1.57 lbf/sq.ft:

   a. Double doors: 1.0 cfm per square foot of area

   b. Single doors: 0.5 cfm per square foot of area

3. The glazed systems, including all joints between it and other works shall be designed to prevent air flow, from the exterior surface to the interior surface, through the joints of the curtain wall assembly.

J. Water Penetration Resistance:

1. Curtain Wall Assembly: Provide fixed window glazing that do not evidence water leakage when tested according to the following:

   a. ASTM E 331 at differential pressure of 15 lbf/sq.ft.

   b. AAMA 501.1 under dynamic pressure of 15 lbf/sq.ft.

2. Definition of Uncontrolled Water Penetration and Test Specimen Failure shall be as published by ASTM with the following additions:

   a. There shall be no water penetration inboard of the air barrier plane, nor visible from the interior, and the assembly shall provide rapid drainage resulting in no retained water in cavities outboard of the air barrier. There shall be no uncontrolled water infiltrating system or migration of water into the concealed spaces of any exterior wall cavity not intended to function as a “wet zone” in the design of the above-grade building envelope. Water controlled by flashing and gutters that is drained back to the exterior and cannot damage adjacent materials and finishes is not considered water leakage.

3. Additional Requirements:

a. The glazed assemblies, any incorporated opening lites, including all joints between it and other works shall be designed to prevent leakage of water onto the internal face of the Façade.

b. The glazed assemblies, any incorporated opening lites, including all joints between it and other works, shall be designed to prevent water entry into those parts of the external cladding that would be adversely affected by the presence of water.

c. The glazed assemblies, including any incorporated opening lites components and interfaces, shall be designed to be drained and ventilated or pressure equalized, such that any water which enters the framing system shall be drained to the exterior via an appropriately designed water management system. No traces of water are permitted at any time beyond the air seal line. The discharge of all such water shall avoid producing unsightly staining or deposits. The ventilation and drainage provision shall take into account the sloping nature of the facades without retaining water or compromising the weather performance in any way. Face sealed, barrier systems with only one line of defense against water penetration will not be acceptable.

d. Expansion / Movement joints must be installed to be fully engaged at all times, and is to be permanently watertight and airtight under all conditions and to operate without binding or causing noise or vibration

4. Rainwater disposal:

a. Where necessary, the Glazing Subcontractor will be responsible for verifying the size of the drainage channels and rainwater outlets in accordance with the MEP engineer drawings and specification. The Glazing Subcontractor shall provide calculations to demonstrate that the proposed profiles and outlets can accommodate the anticipated levels of rainfall and that there are sufficient numbers of rainwater outlets for each roof area.

b. The Glazing Subcontractor shall submit his rainwater gutter and outlet design calculations to the Architect for review.

K. Thermal Movements:

1. Provide glazing systems that allow for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures acting on glass framing members and glazing components. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.

a. Temperature Change (Range): 120 deg F (67 deg C), ambient; 180 deg F (100 deg C), material surfaces.

2. Provide for all thermal movement to take place freely in the plane of the exterior wall system without causing harmful buckling, stress on glass, stone, metal, or joint seals, undue stress on structural elements or glass, excess loads on fasteners, reduction of performance or other detrimental effects.

3. Full movement allowances including assembly and installation tolerances shall be incorporated into all junction/components at each expansion joint or assembly.
4. Where necessary carry out checks in respect of the influence of thermal movement on air permeability and water penetration performances of the installation.
5. The dimensions shown on the drawings are to be based on a design temperature of 72ºF. Fabrication, assembly and erection shall therefore take into account the possible thermal movements due to the ambient temperature during fabrication, assembly and installation.
6. Shadow boxes shall be designed for an exposed surface metal temperature (including paint coating system) range of -20 deg. F to +235 deg. F. Design glass seals, gaskets, sealant, etc. to perform under these high temperatures. Seal entire shadow box back pan perimeter. Shadow box should be designed to control condensation that may form in the interstitial space and vent to the exterior. The metal back panel shall exhibit no distress (buckling or distortion) nor shall fastener failure occur as a result of temperature exposure.

L. Energy Performance:

1. Curtain Wall Assembly shall meet or exceed the requirements of the applicable Energy Conservation Code.
2. Provide Curtain Wall Assembly with performance properties specified based on test data or computer simulation and engineering with performance values in accordance with the Project Energy Model, or listed herein, whichever is more stringent.
    a. Maximum assembly thermal transmittance including framing (U-Value):
        1) Curtain Wall Fixed Glazed Assemblies: 0.35 Btu/hr.ft².ºF in winter.
        2) Curtain Wall Opaque Assemblies: 0.11 Btu/hr.ft².ºF in winter
        3) Curtain Wall Glazed Entrance Door Assemblies: 0.60 Btu/hr.ft².ºF in winter
    b. Solar Heat Gain Coefficient: Glazing shall have a solar heat gain coefficient no greater than the basis of design values specified in spec section 088000.
3. Thermal conductance shall be verified by AAMA 1503-09 or NFRC 100 laboratory test or by computer simulation where achievable in accordance with NFRC guidelines. The model shall include glass panels, areas with and without insulated back-pans, typical and atypical mullion and gasket arrangements, thermal bridges, and interface conditions. Where computer simulations are used analysis shall include two dimensional analyses or where appropriate and assemblies have conditions where three-dimensional heat flow exists then three dimensional analyses shall also be performed.

M. Condensation Resistance:

1. Condensation is defined as water, frost, or ice forming on any interior surface of any one component or water that is not collected and positively drained to the exterior through the condensation drainage gutter.
2. The Glazing Subcontractor shall submit a Condensation Resistance Test report according to the AAMA 1503 test method for each Curtain Wall Assembly. Or computer simulation where achievable in accordance with NFRC guidelines. The modelling shall include glass panels, areas with and without insulated back-pans and typical mullion and gasket arrangements, thermal bridges, interface conditions, and atypical details and adjacent constructions. Where required two dimensional or three dimensional heat transfer analysis shall be used.
3. The Glazing Subcontractor shall request confirmation of the boundary conditions below in writing, including but not limited to wind velocity, and exterior and interior temperature and relative humidity from the MEP Engineer.
    a. Exterior Temp: 5ºF (winter)

       89ºF (summer)

       Mean wind speed: 12.3 mph
    b. Interior Temp and Humidity: 72ºF, 30% RH (winter)

       75ºF, 55% RH (summer)
4. The submitted condensation report shall be assessed by the Architect on a case by case basis. Assessment will be based but not limited to best practice principles of moisture management, location of condensation, incidence, and occurrence, and surface area of condensation.
    a. Condensation shall be assessed case by case as specified herein. No condensation on exposed interior surfaces is allowed.
5. Condensation Resistance within glass spandrel cavities and within insulated cavities.
    a. The venting design of spandrel cavities shall ensure that no condensation occurs within the system cavities throughout yearly climatic conditions.
    b. The venting design shall be proposed by Glazing Subcontractor based on the Glazing Subcontractor’s proposed system and the specified requirements.

N. Story Drift: Provide EGA systems that accommodate design displacement of adjacent stories according to the Structural Drawings by The Structural Engineer of Record.
1. Serviceability: When tested in accordance with AAMA 501.4-18 at 1.0x design wind drift, or 1.0x design elastic seismic displacement, whichever is greater:
    a. No visible damage to framing or trim components or assemblies is allowed.

b. No glass breakage or glass fallout is allowed.

c. Full disengagement of gaskets or weatherseals is not allowed at any location.

d. Air infiltration and water penetration resistance shall remain within specified allowable limits without adjustment or repair.

e. No wall components may fall off.

2. Ultimate: When tested in accordance with AAMA 501.4-18 at 1.5x design wind drift, or 1.0x design inelastic seismic displacement, whichever is greater:

a. Glass shall be retained completely in the glazed opening with no glass fallout.

b. No wall components may fall off.

3. Comply with ASCE 7, Section 13.5.9 “Glass in Glazed Curtain Walls, Glazed Storefronts, and Glazed Partitions.”

O. Outdoor-Indoor Transmission Class: Provide the following minimum OITC for glazed system assemblies (frame and glass) when tested for laboratory sound transmission loss according to ASTM E 90 and determined by ASTM E 1332:

1. OITC: To be determined.

P. Acoustical Performance: Curtain Wall Assembly system shall meet and / or exceed requirements of project acoustic report, or code required minimums, whichever is more stringent. Glazing Subcontractor shall provide calculations and glass supplier testing data to verify that acoustic performance targets will be achieved. IN the absence of supplier data, the Glazing Subcontractor shall perform necessary acoustic testing to verify performance targets will be achieved.

Q. Self-Generated Noise:

1. Design and install glazing systems and all component parts to provide for noiseless movement caused by thermal expansion, and when subject to dynamic load caused by external wind pressure and in the operation of operable components. The system shall not generate noise due to creaking, drumming, or rattle.

2. Metal to metal contact between inter-locking members is not permitted unless specifically indicated on the structural drawings.

R. Fire Performance:

1. General:

a. Where required by code, exterior wall systems shall be tested in accordance with, and comply with, the acceptance criteria of NFPA285. Such testing shall be performed on the total wall systems.

2. Surface Burning Characteristics

a. The Curtain Wall Assembly shall not be composed of any materials which readily support combustion, add significantly to the fire load,

and/or give off toxic fumes. Foamed core insulation and metal composite material panels are not permitted.

b. All materials used internally and externally shall have a Class 1 surface burning to ASTM E 84 classification. Façade/Cladding/Roof Glazing system shall have a flame spread index of not more than 25 and a smoke developed index of not more than 450 when tested as an assembly in the maximum thickness intended for use in accordance with ASTM E 84 or UL 723.

3. Fire-Resistance Ratings: Where required comply with ASTM E 119; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

   a. Indicate design designations from UL's "Fire Resistance Directory" or from the listings of another qualified testing agency

4. Fire Stopping between Floors and along Mullions

   a. The junction of the floor and the exterior façade or roofing shall preserve the integrity and insulation of compartmentation, to prevent fire spread from floor to floor.

   b. Where required by the Design Drawings, the junction of the mullion and the partition wall shall preserve the integrity and insulation of compartmentation, to prevent fire spread between rooms or zones.

   c. Spandrel panels must be designed and anchored in a manner that keeps them in place and prevents passage of smoke, flame and hot gasses when exposed to the ASTM E 119 time-temperature curve.

   d. Materials used to complete the junctions shall accommodate movement between slab edge and cladding, and their fire resisting performance shall not be affected by water from sprinkler discharge.

   e. The Glazing Subcontractor is responsible for the provision of all horizontal cavity barriers in the facade system and for fire stopping, as specified, at the junction of the external wall with all other fire-resisting elements of the structure. Continuous smoke seal (sealant) over fire stopping is required.

   f. All fire and smoke stops shall be positively fixed in position in such a manner that they shall not become dislodged in the event of a fire. The fixing shall secure the stop in position for a period at least equal to that required for the compartment wall or floor against which the works abut.

   g. Any insulation in the external wall construction that is exposed in a ventilated cavity shall be of limited combustibility.

   h. Cavity barriers shall be incorporated into the envelope construction so as to prevent the transmission of fire or smoke through voids in the envelope assembly from bypassing any of the fire stops.

1.6 STRUCTURAL REQUIREMENTS

A. General:

1. Except for anchors embedded in concrete and glass design, allowable stress design (ASD) and load and resistance factor design (LRFD) are acceptable.
   a. LRFD shall be used for anchors embedded in concrete.
   b. ASD shall be used for glass design.
2. Loads shall be considered in accordance with the load combinations specified by the applicable Building Code.

B. Building Movements:

1. Provide moveable joints to accommodate the full range of movement requirements including manufacturing tolerances, construction tolerances, thermal movement, lateral movement, floor sag, beam sag, live load deflection, and column settlement.
2. Allowance for movement shall be in addition to allowance for building construction tolerances.
3. Joints shall accommodate the worst possible combination of erection tolerances and anticipated movements to prevent loads of any kind being transferred from the building into the glazing systems, excessive movements of any joints or failure of weather seals.
4. Design movement joint and select sealant products to accommodate all required expansion and contraction within joint tolerances indicated on the approved shop drawings and within the sealant movement limits recommended by the sealant manufacturer under loaded and unloaded conditions.
5. All movement allowances shall be consistent and applied across all junctions and/or components for each expansion joint system or assembly.
6. Basic preliminary criteria for movements including criteria for envelope of vertical deflections of building structure and span ratios for typical deflections of concrete:
   a. Floor slab deflection along perimeter:
      1) Due to Construction Stage: ??” maximum*
      2) Due to Dead Load: 0.8” maximum*
      3) Due to Service Live Load: 0.6” maximum*

      *Special condition at long span roof and floor girders at exterior adjacent to B8 – 2.75” maximum total deflection.
   b. Maximum horizontal inter-story differential movement (lateral drift):
      1) Due to 50-year wind event: H/500
         a) Academic Level 2: 3/16"
         b) Academic Level 3: 3/16"
         c) Academic Level 4: 3/16"
         d) Academic Roof: 3/16"
         e) Performing Arts Level 2: 1/8”

f) Performing Arts Level 3: 1/8”
g) Performing Arts Roof: 1/4"

2) Due to seismic event (service elastic):
a) Academic Level 2: 1/2"
b) Academic Level 3: 1/2"
c) Academic Level 4: 1/2"
d) Academic Roof: 1/2"
e) Performing Arts Level 2: 3/16”
f) Performing Arts Level 3: 3/16”
g) Performing Arts Roof: 1/2"

c. Glazing Subcontractor to confirm that creep assumptions are consistent with the construction schedule.

d. Displacements indicated above are preliminary and provided for reference only. Glazing Subcontractor is responsible for requesting design displacements and tolerances for each slab, and at all necessary locations along each slab edge, from the structural engineer of record (EOR), and ensuring the façade system can accommodate them.

7. Joint widths shall accommodate structural movements and tolerances, in addition to compressibility of joint filler.

8. The use of shoring, pre-loading, or other methods to limit or control building movements during installation is the responsibility of the Glazing Subcontractor. See section 1.9 Action Submittals for requirements for submittal of erection procedure and supporting calculation by Glazing Subcontractor.

C. Long Term Building Movements:

1. Design the glazing system to accommodate the absolute relative vertical deflections and horizontal movements that may occur due to panel rotations due to the following displacements occurring between successive floors:

a. Column and core shortening.

b. Beam or slab edge displacement.

c. Axial Shortening of edge beams.

d. Floor to floor drift of the building due to wind and/or earthquake loads.

D. Primary Structure Tolerance:

1. Minimum +/- 1.5 inch in all directions.

2. Steel: AISC tolerances.

3. Concrete: ACI tolerances.

1.7 ACTION SUBMITTALS

A. General Submittals

1. Comply with Conditions of the Construction Contract and Division 1 Specification Sections.

2. Submissions shall be complete and comprehensive and include all shop drawings, samples, material data submissions, and engineering calculations for each system specified herein, and shall include fully coordinated interface details between each system and the adjacent construction such that air/moisture barrier continuity between the materials, components and systems that comprise the above-grade building envelope can be reasonably evaluated by the Architect-of-Record against the design intent of the contract documents. All work shall be coordinated by the General Contractor prior to submission. Incomplete, non-conforming, or uncoordinated submissions shall be subject to rejection or return without action by the Architect.

3. Analysis: All requirements specified herein shall be analytically and mathematically proven, except for those requirements called for to be proven exclusively by physical testing methods. Calculations and related data and their application in engineering, fabrication, assembly and installation shall be the responsibility of the Glazing Subcontractor’s registered Professional Engineer.

B. Shop Drawings: Shall clearly indicate but not be limited to: Show fabrication and installation of glazed aluminum, steel, and glass exterior wall systems including plans, elevations, sections, details of components, and attachments to other units of Work.

1. Shop Drawings shall clearly illustrate all aspects of the exterior wall system including the relationship of the Work to the structure, waterproofing, roofing, paving, and other adjacent construction and interface conditions; the arrangement of components; and the sequence and details of fabrication, assembly and erection.

2. Shop drawings shall clearly identify locations of steel reinforcing within the curtain wall framing on building elevations.

3. Shop drawings shall include details of all connections to contiguous work as approved by the Glazing Subcontractor for the work adjacent and as coordinated by the General Contractor.

4. Details drawings in the shop drawings shall be full size and not scaled.

5. Coordinate installation of anchors for glazing members that connect to the work of other trades. Furnish setting drawings, templates, and directions for installing anchors, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry or attached to wood.

6. Submit full analysis and complete details of proposed cladding design movement allowances based on the base structure information contained in the Contract Documents. Indicate all cladding design movements and required clearances to adjacent construction on shop drawings.

7. Brackets, anchors, and related components shall be scheduled and described in detail on shop drawings. Show details, including computations, of all related components and connections to areas by others.
8. Submit a schedule of fabrication tolerances for all major glazing system components. Indicate extremes of allowable base-structure tolerances on shop drawings.
9. Exposed fasteners, where approved, shall be indicated on the shop drawings.
10. Clearly indicate all revisions to shop drawings on re-submissions.
11. Shop Drawings shall clearly show internal and concealed sealant joinery. Isometrics to be provided at design team's request.
12. Signed and Sealed Engineering calculations shall be submitted concurrently with the corresponding shop drawings. Shop Drawings will not be reviewed unless this requirement has been met.
13. All shop drawing sheets shall be of one size and shall bear the seal of a Professional Engineer currently licensed in the licensing jurisdiction of the project.

C. Structural Design Calculations:

1. All structural calculation submissions shall bear the seal of a Professional Engineer currently licensed in the licensing jurisdiction of the project.
2. Submit for review by the A/E structural design calculations for all components of the glazing assemblies, including, but not limited to panels, framing, and connections. Indicate direction, location, and magnitude of all connected loads to the building structure coordinated to the building structure as shown in the Contract Documents.
3. Submittal of loads imposed on primary structure shall include location, magnitude and direction of imposed loads, graphically represented in their appropriate locations on a copy of the Contract Document structural framing plans or elevations as appropriate. Detail references indicating the connections applicable at each location shall be noted on the submittal drawings.
    a. Where Glazing Subcontractor loads imposed exceed and/or connection conditions differ from what is shown in the structural drawings, submit for approval to Structural Engineer of Record loads imposed on the primary structural frame due to the dead, live, and wind/seismic loads indicated on the Contract Documents.
4. Calculations shall demonstrate compliance with applicable sections of the applicable Building Code and the appropriate material reference specification for each component considered.
5. Structural Sealant:
    a. Submit certification from the sealant manufacturer that they have reviewed all sealant details and that when exposed to the specified loads the stress in the silicone sealant of dimensions shown does not exceed manufacturer's recommendations.

b. Engineer structural silicone glazing systems specifically for this Project. Stock or standard engineering information is not acceptable.

D. Thermal Performance and Condensation Calculations:

1. Submit calculations and/or test data demonstrating condensation resistance of glazing assemblies.

2. Submit calculations and/or test data demonstrating solar shading and thermal transfer values across exterior wall system assemblies.

E. Engineering Judgement for Perimeter Fire Containment Systems:

1. Submit project-specific engineering judgement prepared by a professional engineer licensed in the Rhode Island that demonstrates the curtain wall assembly satisfies the specified fire resistance requirements and will be capable of providing an ASTM E 2307 compliant perimeter fire containment system.

F. Product Data: Submit manufacturer's product data for each product included in the work, including test data, manufacturer's quality assurance documentation, and preparation and installation recommendations. Also include details of construction relative to materials, dimensions of individual components, profiles, and finishes.

1. Include product data for:

a. Glass and glazing accessories.

b. Sealants, setting blocks, gaskets and glazing accessories, membranes, vapor barriers, including all compatibility test reports.

c. All proprietary accessory hardware and fasteners.

d. Metals and metal alloys, including welding materials.

e. Applied finishes, including preparation and pre-treatment, application, curing, and maintenance procedures.

f. Thermal and Firesafing insulation.

1) For non-UL assemblies used as fire separation between floors, provide engineering judgement from manufacturer.

g. Smoke seals.

h. Grades of all bolts, nuts, washers, screws, pins, and rivets.

i. Submit safety glazing letter from manufacturer. Permanent etched safety label on glass shall not be permitted unless required by code. Removable sticker safety label is permitted.

j. Complete information, as applicable, concerning materials, dimensions, coatings, manufacturing process, and installation procedures.

k. The method of packaging and identifying the Glazing components shall be indicated by manufacturer. Identification shall include the evaluation report number and notice of any product installation limitations.

l. Any products included in the work, but not listed above.

G. Samples: Submit samples for verification of each type of exposed finish required in manufacturer's standard U.S. sizes. Where finishes involve normal color and texture variations, include sample sets showing the full range of variations expected.

1. Samples of production materials shall be of the following sizes:

a. Color samples: 12 inches x 12 inches, each color.

b. Finished extrusions: 12 inches in length.

c. Glass: comply with Section 088000 "Glazing".

d. Finished sheet metal (aluminum): 12 inches x 12 inches, each type.

e. Finish hardware: each type.

f. Fastening devices, each type.

g. Flashing (coated aluminum, stainless steel and non-metallic membranes): 12 inches x 12 inches, each type.

h. Gaskets and joint fillers: 12 inches long, each type, 12 inches x 12 inches, each corner.

i. Sealants: Cured sample-12 inches long, each type, with approved backer rod or similar joint back-up.

j. Range samples shall be provided to define any visual acceptance criteria, including colors, gloss, flatness, presence of die lines, etc. All finishes of extrusions to be from hardened dies. Min 12 inches long.

1) All Aluminum Painted Finishes.

1.8 INFORMATIONAL SUBMITTALS

A. Certificates:

1. Submit product and installer certificates signed by the respective manufacturers certifying that all materials of the glazing systems comply with fabrication, erection, approved shop drawings, structural computations and specified requirements.

2. Submit all shop drawings to the following manufacturers for their review and provide written confirmation from them that the manufacturer's products are appropriate for the proposed use and are being used in accordance with the manufacturer's recommendations.

a. Glass

b. Sealants

3. Separate certifications are not required for glazing materials bearing manufacturer's permanent labels designating type and thickness of glass, provided labels represent a quality control program of a recognized certification agency or independent testing agency acceptable to authorities having jurisdiction.

4. Submit written certification that welded anchors have been designed and tested and will comply with specified performance requirements.
5. Submit welder certificates indicating that welders have satisfactorily passed AWS qualification tests for welding processes involved and who are currently certified for these processes.
6. Submit installer certificates signed by manufacturer certifying that installers comply with requirements in “Quality Assurance” Article.

B. Product Test Reports:

1. For each glazing system, submit test reports from the approved independent testing laboratory showing compliance of the individual components and parts of each glazing system with the performance requirements indicated. Test reports to be within 10 years and without changes to the system specified.
2. Test reports shall be submitted in a timely manner and well before execution of any related component of the curtain wall system.
3. Test Reports shall include:
    a. Glazing.
    b. Fasteners, bolts (each size, length, and type), nuts, washers, and hardware, including manufacturer’s certification of conformance for each and every lot. When requested by Engineer, submit samples to Testing Agency for testing prior to start of any work or delivery of materials to job site or stockyards.
    c. Expansion anchors.
    d. Mechanical fasteners.
    e. Miscellaneous structural clips and accessories.
4. Materials Testing Reports:
    a. Sealants: Comply with Section 079200 “Joint Sealants”.
    b. Staining: Include ASTM C1248 stain response testing for sealant and primers in direct contact with natural stone, concrete, or wood.
    c. Structural silicone: Provide Project specific adhesion testing. Stock or standard testing is not acceptable. Test each material to which structural silicone is adhered.

C. Submit Manufacturers’ Quality Assurance Inspection and Production Testing Programs.

1. Inspection and production testing programs are subject to the Owner’s Representative’s approval.
2. Submit detailed description of inspection and production testing programs and inspection reports for:
    a. Shop fabricated glazed steel and aluminum exterior wall and assemblies.
    b. Insulating glass units fabrication.

c. Structural silicone glazing.

d. Organic coatings.

e. Mill reports for structural steel.

D. Installation Procedures Manual:

1. Submit a comprehensive manual containing all installation procedures, equipment and personnel required for acceptance prior to the commencement of installation works. Comply with requirements in “Quality Assurance” Article.

2. The Glazing Subcontractor shall submit an erection procedure, prepared under the supervision of the Glazing Subcontractor’s Engineer for review. This procedure should consider any shoring, pre-loading, or other temporary means necessary for the sequence of installation of the Curtain Wall Assemblies and related scope of work including compatibility of any loads applied to the primary structure because of these temporary means. The erection procedure and supporting calculations shall be submitted for review and shall bear the seal of a Professional Engineer currently licensed in the licensing jurisdiction of the project.

E. As-Built Record Shop Drawings and Documents:

1. Submit final approved shop drawings and BIM models in electronic format.

2. Prepare as-built drawings, photographs and other records progressively as the work proceeds.

3. Record Shop Drawings: At the completion of the project, submit electronic copies of all final approved shop drawings prepared under the supervision of and signed and sealed by the Professional Engineer currently licensed in the licensing jurisdiction of the project.

F. Operation and Maintenance Manual: At the completion of the project, submit electronic copy of a maintenance manual describing the various materials, equipment and procedures for cleaning and maintaining the work of this Section. Include the manufacturer’s data for all components of each glazing system and type, with supplier/source and contact information included for future reference. Clearly provide replacement procedures, replacement components and methods of replacement of damaged components of glazed steel and aluminum exterior wall systems to ensure full service capability of the work. Include copies of glazing systems guarantees and warranties.

1.9 QUALITY ASSURANCE

A. The work of this section shall be performed by a company which specializes in the type of Curtain Wall work and Design Assist process required for this Project, with a minimum of 10 years of documented successful experience and shall be performed by skilled workmen thoroughly experienced in the necessary crafts.

1. Work shall be performed in compliance with Owner's insurance underwriters' requirements and UL approvals and testing for materials, assemblies, and procedures.

B. Manufacturer shall specialize in manufacturing the type of glazed systems specified in this section, with a minimum of 10 years of documented successful experience, and have the facilities capable of meeting all requirements of Contract Documents as a single-source responsibility and warranty.

C. The Work of this Section shall be the responsibility of one Subcontractor.

D. The Glazing Subcontractor for the Work of this Section shall have proven achievement and experience in similar work and is subject to approval by the Architect.

E. Manufacturers and suppliers of all materials and components of the Work of this Section are subject to approval by the Architect.

F. All products and individual or aggregate components of the Curtain Wall Assembly for which acceptable engineering or test data are not available shall be physically tested.

G. Engineering services are defined as those performed for the design and installation of all exterior glazing systems and types specified herein or otherwise included in the contract documents for this project.

1. Engineering Responsibility: Engage a qualified Professional Engineer currently licensed in the licensing jurisdiction of the project to prepare, or supervise the preparation of, drawings, calculations, and data for the Work of this Section to include a comprehensive engineering analysis that demonstrates full compliance requirements of the contract documents.
2. Installer's responsibilities include providing professional engineering services needed to assume engineering responsibility.

H. Source Limitations: Obtain each type of exterior glazing system from one source, and by a single manufacturer.

I. Source Limitations for Glass: Obtain glass from single source from single manufacturer and single plant for each glass type.

J. Source Limitations for Glazing Accessories: Obtain from single source from single manufacturer for each product and installation method.

K. Pre-Installation Conference: Conduct conference at Project site to comply with requirements of Division 1 Section "Project Meetings”. Meeting shall include General Contractor, Owner, Architect, Glazing Subcontractor, Sealant Subcontractor, as well as any other subcontractors or material technical service representatives whose work, or products, must be coordinated with the curtain wall work. Review methods and procedures related to glazed aluminum exterior wall system including, but not limited to, the following:

1. Review and discuss condition of substrate and other preparatory work performed by other trades.

2. Review erection procedure prepared by Glazing Subcontractor and discuss coordination of procedure with previously installed scope of work.
3. Review structural loading limitations.
4. Review and discuss the sequence of work required to construct a watertight and weather tight exterior building envelope.
5. Review and finalize construction schedule and verify availability of materials, Glazing Subcontractor's personnel, equipment, and facilities needed to make progress and avoid delays.
6. Review required inspecting, testing, and certifying procedures and coordinate with installation schedule and work of individual trades to avoid delays in the Work.
7. Review weather and forecasted weather conditions, and procedures established to mitigate the impact of unfavorable weather conditions on the quality and progress of the Work.

L. Prior to the start of fabrication, the Glazing Subcontractor shall submit a comprehensive Quality Control Program covering all phases of the exterior wall system including, but not necessarily limited to, the following:

1. Procurement of materials including quality control programs of major suppliers.
2. Verification of compliance with International Standards Organization (ISO) or similar agency authorized or otherwise qualified and accredited to provide periodic, independent review and certification of each supplier/manufacturer’s Quality Assurance program.
3. Fabrication of components, to include milestone inspections and written certification that components and finishes meet or exceed the requirements of the contract documents and recognized industry standards specified herein, and that pre-finished components and parts are free of any visible scratches, gouges, dents, blemishes and similar damage considered by the Architect to be unacceptable for the project.
4. Final assembly of components, to include milestone inspections and written certification that internal end-dams, zone-dams, and critical seals have been installed in accordance with the contract documents and recognized industry standards specified herein.
5. Installation and site quality control, to include a sample of the intended Field Report format and intended method to track or otherwise monitor and correct all non-conforming work in a manner that is consistent with the requirements of the contract documents, and available on site for review and independent verification by the Architect and Owner.
6. Periodic, in-house evaluation and performance testing of completed systems and assemblies to verify compliance of glazing systems and assemblies during production, prior to shipment to project site.
7. The QC Programs submitted by each of the Glazing Subcontractors, suppliers, manufacturers shall be included by the GC/CM into a

comprehensive and fully integrated, project-specific Building Envelope Quality Assurance Program.

8. The submittal shall include the identification of a single, qualified Quality Assurance Manager representing the GC/CM who will be in responsible charge of developing and administering the Building Envelope Quality Assurance Program (BEQAP) throughout the duration of the project.
9. The BEQAP shall be subject to review and approval by the Architect, Owner, and Owner's building envelope technical representative.
10. The Architect and Owner shall be allowed access to the Glazing Subcontractor's facilities and those of the major suppliers and subcontractors to monitor QC procedures. The Glazing Subcontractor shall make available to the Owner and the Architect all QC Program records upon request.

M. The Certification Entities shall be accredited as operating in compliance with International Standards Organization (ISO) or similar agency authorized or otherwise qualified and accredited to provide periodic, independent review and certification of each Certification Agency's Quality Assurance program.

N. Production testing programs for coatings and finishes:

1. AAMA 2605 for Coatings.

O. NAAMM /NOMMA 500-06, Metal Finishes Manual for Architectural and Metal Products for fabrication and finishing of stainless steel. Testing Agency Qualifications: Qualified according to ASTM E 699 for testing indicated.

P. Testing Agency Qualifications: Qualified according to ASTM E 699 for testing indicated.

Q. AAMA QAG 1 Quality Assurance Processing Guide or equal for poured, de-bridged, and crimped thermal breaks.

R. Manufacturer Qualifications: A manufacturer capable of fabricating glazed steel and aluminum exterior walls that meet or exceed performance requirements indicated and of documenting this performance by certification, labeling, and inclusion in lists.

S. Manufacturer Qualifications for Insulating-Glass Units with Sputter-Coated, Low-E Coatings: A qualified insulating-glass manufacturer who is approved by coated-glass manufacturer.

T. Installer Qualifications: Manufacturer's authorized representative who is trained and approved for installation of units required for this Project and certified under the National Glass Association's Certified Glass Installer Program.

U. Sealant Testing Agency Qualifications: An independent testing agency qualified according to ASTM C 1021 to conduct the testing indicated.

V. AISC "Code of Standard Practice," latest edition, Section 10 as amended herein.

W. Welding Qualifications: Qualify procedures and personnel according to the following:

1. AWS D1.1/D1.1M, "Structural Welding Code - Steel".
2. AWS D1.2/D1.2M, "Structural Welding Code - Aluminum".
3. AWS D1.6/D1.6M, "Structural Welding Code – Stainless Steel".

X. Independent Inspections: General Contractor shall employ Independent Agent to perform Independent Inspections for, including but not limited to, field welds, shop welds, bolts, and anchors as specified in General Conditions Division 01.

Y. Manufacturer's identification tags or marks are not acceptable on surfaces which will remain exposed to view after installation.

1. Evidence of "patching" after removal of tags or marks is not acceptable.

1.10 MOCK-UP

A. Provide mock-up elements for field panel in accordance with Section 01 43 39 – MOCKUPS at exterior location where directed by Architect. Mock-up will demonstrate quality of work, construction methods, relationship to other work.

1.11 PRE-INSTALLATION CONFERENCE

A. Installer of the Work of this Section is required to attend pre-installation conference specified under Section 04 20 00 - UNIT MASONRY.

1.12 DELIVERY, STORAGE AND HANDLING

A. Comply with General Conditions and Division 1 Section "Product Requirements".

B. Deliver glazing systems and components complete with factory applied protections, removable labeling, and packaging to comply with manufacturer/fabricator's requirements and adequately protected from damage during shipment.

C. Protect glazing systems and components from adverse job conditions before, during, and after installation, including but not limited to:

1. Condensation, temperature changes, direct exposure to sun, or other causes that could otherwise damage the assemblies.
2. The work of other trades before, during, and after installation (e.g. weld slag, concrete spray, run-down staining/etching of aluminum and glass surfaces and similar).
3. Adhere to insulating glass fabricator's recommendations for venting and sealing to avoid hermetic seal ruptures.

D. Storage:

1. Coordinate storage requirements and logistics with the General Contractor before shipping materials.

2. Components shall be stored on elevated platforms, skids, or pallets; covered with tarpaulins or other suitable weather-tight covering. Covering material shall allow for air circulation about the components. Store panel components so that water accumulation drains freely.
3. Neatly stack (in a manner that will not affect the components) system assemblies in locations designated by the General Contractor. Isolate panel assemblies at all contact points; store assemblies to prevent permanent damage, deformation, and similar distress.
4. Do not store system materials in contact with other materials that might cause scratching, gouging, staining, and etching of aluminum and glass surfaces, denting, surface damage, or other deleterious effect.

E. Handling:

1. Take into account the restrictions imposed on the delivery of pre-fabricated elements by the existing building's dimensions and site access.
2. Care shall be exercised to properly brace and reinforce prefabricated assemblies against racking during hoisting and installation.

F. Field Measurements: Verify actual locations of structural supports for glazed systems by field measurements before fabrication and indicate measurements on Shop Drawings.

1. Established Dimensions: Where field measurements cannot be made without delaying the Work, establish dimensions and proceed with fabricating glazed aluminum curtain wall systems without field measurements. Coordinate construction to ensure that actual dimensions correspond to established dimensions.

G. Sequencing: Coordinate the curtain wall fabrication and installation with the General Contractor / Construction Manager and the Air Barrier Subcontractor sequence to ensure that the air barrier tie-in shown on the drawings is achieved. Work with the General Contractor to represent proper sequencing on Construction Schedule.

1. Do not order or deliver any materials until all submittals, required hereunder, have been received and approved by the Architect.
2. Arrange keying, and schedule delivery of keys, with Owner.

1.13 GUARANTEES AND WARRANTIES

A. Comply with Section 01 78 00 - CLOSEOUT SUBMITTALS, and in compliance with Section 01 78 36 – WARRANTIES. The more stringent requirements of the contract documents shall apply.

B. Installer’s Warranty:

1. Provide a warranty for materials and workmanship of the Exterior Glazed Assemblies Contract from Date of Completion for a period of ten (10) years (the "warranty period"). Provide all manufacturer's pass through warranties.

Also provide a warranty to cover all the costs of materials, labor, and equipment to remove any defective components of the glazing systems and replace them.

2. This warranty shall also cover the costs associated with removing and replacing internal finishes trims and services so that remedial works can be carried out. The content of each warranty is to be approved by the Architect.

C. Manufacturer's Warranty: Submit a written warranty executed by the manufacturer agreeing to repair or replace components of a glazed exterior envelope system that fail in materials or workmanship within the specified warranty period, at no cost to the Owner.

1. Failures include, but are not limited to, the following:
   a. Structural failures including, but not limited to, excessive deflection.
   b. Noise or vibration caused by design loads, thermal or other movements.
   c. Thermal stresses transferring to building structure.
   d. Failure of system to meet performance requirements.
   e. Failure of operating components to function normally.
   f. Loosening or weakening of fasteners, attachments, hardware, and other components.
   g. Water leakage.
   h. Failure of glazing due to non-impact breakage including breakage due to Nickel Sulfide, thermal stress, or any other non-impact breakage.
   i. Failure of insulating glass edge seal as evidenced by frost, condensation, water, dust, corrosion, haloing or low-e coating damage within sealed air space.
   j. Insulating glass spacer migration.
   k. De-lamination or discoloration of laminated glass or panels.
   l. Cracking, pitting, or discoloration of glass decorative and low-e coatings.
   m. Deterioration, fading, excessive non-uniformity, pitting, cracking, peeling, crazing or discoloration of finishes and other materials beyond normal weathering.
   n. Loss of effective glass bite due to shifting of glass or loss of effective glass bearing of setting blocks due to shifting of glass and/or blocks.
   o. Adhesive or cohesive sealant failures or crazing/ bulging on surface of sealant.
   p. Gaskets or weather strips hardening, discoloration, or disengagement.
   q. Collapse, slumping or loosening of support of thermal insulation or fire safing insulation.
2. Warranty Period: Ten (10) years from date of Substantial Completion.

D. High Performance Organic Coatings: Submit a warranty for a period as listed below, warranting the integrity of film and permanence of color of the high performance organic coatings for the following:

1. Color fade not to exceed 5 delta E units (Hunter) as calculated in accordance with ASTM D 2244 on exposed surfaces cleaned with clean water and a soft cloth.
2. Degree of chalking not to exceed rating No. 8 when measured in accordance with ASTM D 4214 on exposed unwashed surfaces.
3. Will not crack, check, or peel.
4. Warranty Period for Exterior Coatings systems for Metal: 20 years
5. Warranty Period for Interior Coatings systems for Metal: 5 years

E. Material Manufacturer's Guarantee:

1. Submit written guarantee signed by the respective manufacturer agreeing to furnish replacements for those glass units, finishes, or components that deteriorate from the point of manufacture, during shipping, during storage on site and in the installed condition, within specified period indicated below. Guarantee covers only deterioration due to normal conditions of use and not to handling, installing, and cleaning practices contrary to glass manufacturer's published instructions. Guarantee for Structural Silicone and Weather-Sealant shall include full material costs for failure incurred.
   a. Glass: Comply with 088000 "Glazing"
   b. Weather-Sealant: 20 years
   c. Aluminum Panels: 10 years
2. Warranty does not include damage caused by vandalism, or natural conditions exceeding the performance requirements.

F. Owner's Rights:

1. The Guarantees submitted under this section shall not deprive the Owner of other rights or remedies that the Owner may have under other provisions of the Contract Documents and is in addition to and runs concurrent with other guarantees made by the Glazing Subcontractor under requirements of the Contract Documents.
2. Inspections Upon and After Substantial Completion: Owner's Inspecting Agent (Agent) shall inspect entire system at six months and twelve months after the date of Substantial Completion and provide a written report to the Contractor and Architect. Systems will be evaluated during actual wind-driven rain events at the discretion of the Agent. Glazing Subcontractor shall promptly replace defective work.

1.14 ATTIC STOCK

A. At the completion of the project, provide the following attic stock:

1. A minimum of one percent, but not less than two lites, of each typical size for each glass type. Total amount of required attic stock to be determined by Owner.
2. Attic stock is intended for use in the event of damage after completion of the project and shall not be used to replace materials damaged during construction.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. To establish a standard of quality, design and function desired, Drawings and specifications have been based on EFCO Corporation XTherm 5600 Series with 2-1/2 inch face, specified herein below. System will be both structural glazed and fiberglass “Duracast” pressure plate.

1. Subject to compliance with the requirements specified herein, manufacturers offering products which may be incorporated in the work include the following, or approved equal:
   a. EFCO product “XTherm 5600”.
   b. Kawneer “1600 UT Series System 1”.
   c. Wausau product “HP-Wall”.

B. Glazed aluminum curtain wall manufacturer shall be the same as that providing aluminum storefront systems specified under Section 08 43 13 – ALUMINUM-FRAMED STOREFRONTS.

2.2 DESCRIPTION

A. The Glazing Subcontractor shall engineer, test, fabricate, deliver, install, and warranty all construction necessary to provide all Curtain Wall Assembly systems including all measures that may be required to that end, notwithstanding any omissions or inadequacies of the Contract Documents. The work of this Section shall include all materials, components and systems necessary and incidental to the weather-tight installation.

B. System Descriptions:

1. EWS-01a: Stick Built Curtain Wall
   a. System Type: Stick Built, Thermally Broken, Screw-Spline
   b. Framing Type: Aluminum
   c. Glass Edge Support: 4 Side
   d. Capture Type: Fully Captured
   e. Basis of Design: EFCO “XTherm 5600”
   f. Glass Type: Glass Type A and B. Refer to Section 088000 “Glazing”. See Architectural Drawings for glass type locations.

g. Finish: 3-coat PVDF to meet AAMA 2605, Custom metallic color as selected by Architect.

h. Interior Finish: 1-coat Acrylic to meet AAMA 2603, Custom metallic color as selected by Architect.

i. Provide exterior glazed spandrels as shown on drawings. See Part 2 “Glass Spandrel Constructions”.

1) Glass Type: Glass Type ??[BD1], refer to Section 088000 “Glazing”.

j. Provide exterior glazed entrance doors at ground floor curtain wall. See Part 2 “Exterior Entrance Doors”.

1) Glass Type: Glass Type B, refer to Section 088000 “Glazing”.

2.3 FRAMING SYSTEM

A. Curtain wall framing system: Integrated flush glazed with thermal break and insulated glass. Vertical and horizontal framing members shall have screw spline construction with a nominal face width and total depth as noted on the Drawings.

2.4 MATERIALS

A. Extruded Aluminum: ANSI/ASTM B221; G.S.10A alloy, T-5 temper.

B. Sheet Aluminum: ASTM B209; alloy required for forming and finishing.

C. Sheet Steel: ANSI/ASTM A446; galvanized.

D. Steel Sections: ANSI/ASTM A36; shapes to suit mullion sections.

2.5 GLASS AND GLAZING

A. Glass and Glazing: Comply with Section 088000 "Glazing”.

2.6 ALUMINUM

A. Aluminum Extrusions: ASTM B221, Provide extrusions of the alloy, temper, and thickness recommended by the manufacturer to comply with the following:

1. Alloy 6063-T6, 6063-T5, or 6061-T6, tempered as required by calculations.

a. Extrusions (anodic finish): 6063 T5 or T6, ASTM B221.

b. Extrusions (painted or conversion coat finish): 6063-T5 or T6, 6061-T6, ASTM B221.

2. Dimensional tolerances for all aluminum extrusions regarding thickness, straightness, twisting and flatness shall be held to better than one-half of those published under Sections 11 and 12 of the Aluminum Association’s Publication No. 1 “Aluminum Standards and Data” wherever possible.

3. Minimum Wall Thickness for Primary (Structural) Extrusions: As required to satisfy the performance requirements inclusive of deflections and stress but not less than 0.09 inch.

4. Minimum Wall Thickness for Trim (Non-Structural) Extrusions: As determined relative to die size:
    a. For dies less than 4 inches in diameter; 0.062 inches.
    b. For dies 4 inches to 6 inches in diameter; 0.080 inches.
    c. For dies greater than 6 inches in diameter; 0.093 inches.
5. Extrusion tempers shall be as recommended by the producer and fabricator based on the end-use and requirements for the component part.
6. Welding of aluminum alloys shall be in accordance with the Aluminum Design Manual and AWS D1.2 Structural Welding Code - Aluminum.

B. Aluminum Sheets and Plates: ASTM B209, Alloy 3003-H14 for paint finish, and AA5005-H34 for anodized finish. Sizes and minimum gauges as shown or specified, or as required to provide adequate structural characteristics and suitable for forming and finishing as specified. Dimensional tolerances for aluminum sheet shall be held to better than those published under applicable AA Standards and Data.
    1. Minimum Gauges for Sheet Fabrication of Components:
        a. Exposed Panels, Typical: 0.125” (3mm).
    2. All sheet for exposed or semi-exposed applications is to be provided annealed to relieve work hardening stress prior to fabrication.
    3. Metal panels shall follow the profiles indicated on the Contract Documents.
    4. Panels shall be fabricated to ensure that the grain of all contiguous panels is oriented in the same direction upon installation.
    5. Prior to installation the finished panels shall be laid out and viewed under a uniform daylight source and reviewed for uniformity in color and tonality.
    6. Panel support construction shall result in a panel visual flatness acceptable to the Architect.
    7. Extruded aluminum stiffeners or any alternate panel stiffening devices shall be designed to prevent 'telegraphing' of the stiffening device on the exposed face of the panel.

C. Fasteners: As required by design and calculations with specific torque values identified in the shop drawings where required.

D. Non-conductive spacers: (except at bolted slip-joints): Non-corrosive gaskets shall provide a barrier to prevent galvanic corrosion between dissimilar metals. Gaskets shall contain temperature and moisture properties as required to suit specified performance criteria.

E. Slide Bearings (At slip-joints in exterior wall): Wherever materials are subject by engineering design to movement, provide suitable low friction material(s) such as:
    1. Polytetrafluoroethylene fluoropolymer: ASTM D4894, Teflon as manufactured by Dupont or equal.

2. Acetal homopolymer: ASTM D6100, Delrin as manufactured by Dupont or equal.
3. Nylon: ASTM D4066.
4. Low-friction materials shall be dimensionally-stable, impact-resistant and impervious to moisture.
5. Mating surfaces: PTFE/AHP and PTFE/AHP or PTFE/AHP and mirror finish stainless steel.

2.7 MILD (FERROUS) STEEL

A. General:

1. The Work of this Section shall include the design, supply, fabrication, surface treatment, storage, delivery, and erection of all the exterior wall support steelwork (typically not shown or shown for reference only on the Contract Documents). This also includes the supply and installation of all anchors used to support the steelwork, the grouting of base plates, the provision of cleats and drilling of holes for the attachment of the glazing system, and repairs to damaged surfaces during construction.
2. All visible steel components including but not limited to mullions, anchors, plates, bars, and shapes shall be installed and fabricated to AESS requirements prescribed herein.
    a. Steel framing shall be straight and true with allowable dimensional tolerances one half of those permitted under ASTM A6 for shapes and bars.
    b. Steel framing shall be straight and true with allowable dimensional tolerances one quarter of those permitted under ASTM A6 for plates.
3. Steel Plates, Shapes, and Bars: ASTM A36 or ASTM A992.
4. Cold Formed Hollow Structural Sections: ASTM A500.
5. Steel Pipe: ASTM A53.
6. Hot and cold rolled finished bars: ASTM A108.
7. Steel Sheet, Cold Rolled: ASTM A1008.
8. Steel castings: ASTM A27 or ASTM A148.
9. Coordinate and provide holes in members as required by the Work of other trades or contracts. All holes shall be accurately drilled or punched in the factory. Holes that must be enlarged shall be reamed. Holes for the attachment of work by others shall be coordinated for factory preparation. Holes shall be drilled or punched at right angles to the surface of the metal, in accordance with AISC Specification. Holes shall not be made or enlarged by burning. Holes shall be clean-cut without torn or ragged edges. Outside burrs resulting from drilling operations shall be removed with a suitable tool. The use of manual gas-cutting in the shop may be used only if automatic or semi-automatic methods are not possible. The use of manual gas cutting torch in the field will not be permitted without the specific approval of the Engineer.

10. Members shall be supplied in a single stock length. Splicing of members is not permitted unless it is shown on the Contract Drawings, or it has been approved in writing from the Architect.

B. Structural Steel Hardware and Fittings:

1. Connectors:

a. Nuts and Bolts: ASTM A307 Grade A, A325 Type 1, and shall be the regular hexagon-bolt type. Hex head nuts, ASTM A 563. Round washers shall conform to ASTM F436. Washers in contact with high-strength bolt heads and nuts shall be hardened in accordance with ASTM Standard A325 and AISC requirements. Beveled washers shall be square, smooth and sloped so that contact surfaces with the bolt head and nut are parallel.

b. Carbon steel connectors shall be permitted for use at the interior side of the air seal only and must be plated, hot dip or mechanically galvanized, or polymer coated to provide protection against corrosion.

2. Metal Fittings: ASTM A36, Fabricated of machined and welded materials ground smooth and finished to visual uniformity. Finish as noted on the contract documents.

3. Stainless Steel Fasteners, Bolts, Nuts, and Washers:

a. Stainless steel bolts and nuts shall comply with ASTM F593 and F594, series 300, non-magnetic.

b. Stainless steel washers shall comply with ASTM A276, Grade 316.

c. All fasteners located to the exterior side of the air seal shall be stainless steel, series 300 non-magnetic.

4. Studs: Shear studs shall be Nelson Studs or approved equivalent welded to the structural steel in accordance with manufacturer requirements.

5. Concrete Anchors:

a. Mechanical masonry anchors are to be Hilti HSL or Ramset Trubolts, or Power Wedge Bolts. Chemical anchors are to be Hilti HVA or Ramset Chemset Injection anchors. All anchors are to be installed in accordance with the manufacturer’s requirements. The Glazing Subcontractor is responsible for confirming that all edge distance, spacing, and embedment requirements are satisfied.

b. The Glazing Subcontractor shall be responsible for ensuring that where concrete anchors clash with reinforcement, there is an alternative anchor set out that satisfies the design requirements. Slotting of holes and flame cutting are not permitted. Holes in the concrete are to be repaired by dry packing with a 6000psi cementitious non-shrink grout.

6. Connectors, bolts, and fasteners shall be tested in accordance with ASTM F606.

7. Fasteners subject to vibration, primarily wind induced, can loosen over time. Prevention of loosening shall be achieved through use of lock washers or other locking anchor systems that shall prevent loosening of fasteners.
8. Epoxy or resin bonded anchors: not permitted for use in permanent tension without approval by the Architect. General Contractor shall employ Independent Agent to perform Independent Inspections and tests for all such anchors specified in General Conditions Division 01.

C. Welding:

1. Welding of carbon steel shall be in accordance with AWS D1.1 Structural Welding Code - Steel.
2. Method and Type of welding indicated on the Contract Drawings or the approved shop drawings shall be electric arc welding and shall comply in all respects with the codes and Specifications herein noted covering the Specifications for design, fabrication, and inspection of welded structures and the qualifications of welders and supervisors.
3. The head, input, length of weld, and sequence of weld and cooling process shall be controlled to prevent distortions. For welds comprised of plates in more than one plane, and of configuration that could cause restraint to uniform cooling of the weld, take precautions. Use stress relieving techniques where necessary. Each welder shall mark his identification symbol on his work. Welds found deficient in dimensions but not in quality may be enlarged by additional welding, or removed by chipping or melting and remade if deficient.
4. Tack welds: May only be used with express approval. Tack welds to be minimum 2” long.
5. Butt welds: Shall be full penetration welds between prepared fusion faces, unless otherwise specified. Carry out back chipping, grinding or gouging of the deposited weld as required to obviate imperfections in the root run. Grind butt welds flush without loss of parent metal.
6. Fillet welds: Deposit fillet welds to the required length, throat thickness and with partial or full penetration as specified.
7. Temporary attachment: Do not weld temporary attachments to principle joints. Obtain approval of the position of welds for temporary attachments.

D. Grout for Base Plates: Grout for member base plates shall be proprietary type cementitious non-shrink grout with a minimum compressive strength of 6000 psi. Data sheets, installation procedures and other supporting information for flowing and dry pack grout are to be submitted to the Architect for written acceptance before use.

2.8 BRACKETS AND ANCHORS

A. General:

1. Anchors and connections that are engineered for movement shall include suitable low friction materials specified in this section, as or recommend by the manufacturer.
2. All components are to be designed for the maximum tolerance of the system relative to the base structure, including but not limited to those referenced in Section “Building Movements”, and due consideration shall be given to additional forces from prying action and bolt group effects.
3. Connections between different materials, or different alloys of the same metal, shall be engineered to accommodate the differential thermal movement of the materials to be connected.
4. Design fixing brackets for the worst possible panel eccentricity, packing location, and uneven load sharing. Include prying effects on bolt groups.
5. Use self-locking devices where fasteners are subject to loosening or turning out from thermal and structural movements, wind loads, or vibration.
6. Do not use explosive shot fired devices unless approved in writing before commencing installation.

B. Brackets:

1. There shall be no direct fastening or close contact between any part of the glazing systems and the base structure or interior construction, except through approved bracket connections.
2. Design and install brackets so that all glazing system loads are transmitted through brackets to the base building structure, and prevent transfer of loads to adjacent panels unless specifically designed to do so.
3. Brackets shall be designed to provide three-dimensional adjustment and accurate location of the work, and be rigidly fastened after the work is finally positioned within the specified erection tolerances.

C. Anchors:

1. Provide all required anchors to attach glazing systems to the base structure which:
    a. Are compatible with the bracket assembly and together provide three-way adjustment to accommodate fabrication and construction tolerances.
    b. Secure the glass wall system in its correct position providing for building and glazing system movements.
    c. Are structurally adequate to carry the design loads for the worst possible bracket positioning.
    d. Provide anchor adjustment capability for full range of specified tolerances for building structure, but not less than one inch in all directions.
2. Base Building Substrates: Provide contingency design and installation procedures for all typical substrate conditions and deficiencies including:
    a. Reinforcement clash.

b. Excessive out-of-tolerance concrete and stone.

c. Clash with other structural details.

d. Mislocated, missed and incorrect embeds and epoxy anchors.

2.9 GASKETS/WEATHERSTRIPPING

A. Where gaskets combine to form a continuous seal around all four edges of the lite or panel, all corners and abutted ends of weather stripping gaskets shall be vulcanized, heat-welded, or injection molded to form a positive seal.

B. All material shall be non-staining, UV stabilized and ozone-resistant.

C. All gaskets other than in glazing are to be silicone or silicone compatible EPDM. All gaskets shall have continuous mechanical engagement to framing members; adhesive attachment is not acceptable. All gaskets shall be continuous and contiguous.

1. Silicone or silicone compatible EPDM gaskets shall meet ASTM C509, Option 2, Type 2 for soft gaskets, and ASTM C864 for dense gaskets.
2. Silicone compatible EPDM gaskets shall meet ASTM C864 for dense gaskets.
3. Silicone gaskets shall be profiled to form a positive seal, ASTM C 1115.
4. Silicone Glazing Spacers shall be custom profiled, gray silicone to form a positive seal, ASTM C 1115, Type C (70 ±5 Shore A Durometer). Color to match IGU seals.

2.10 SEALANTS (WEATHERSEAL)

A. Comply with Section 079200 “Joint Sealants”.

B. All joints, which are sealed with sealant as part of the fabrication or erection procedure, shall be sealed with silicone (exposed or concealed) sealant in color to match the adjoining surfaces or as required by the Architect. All perimeter sealant (metal to adjacent construction) shall be low or medium modulus silicone sealant.

C. Seals to air barrier and membrane wall materials medium modulus silicone complying with ASTM C920 as recommended by the sealant and air barrier manufacturer. The sealant shall be designed for adhering to low energy surfaces common in sheet or peel and stick weather resistant barriers. Compatibility and adhesion of sealants with air barrier materials shall be demonstrated by the sealant and membrane manufacturers, based on testing and shall be submitted in writing. Test procedure shall be as indicated below and as specified herein.

1. Adhesion: ASTM C794 Standard Test Method for Adhesion-in-Peel of Elastomeric Joint Sealants
2. Compatibility: ASTM C1087 Standard Test Method for Determining Compatibility of Liquid-Applied Sealants with Accessories Used in Structural Glazing Systems.

D. Sealants shall have a VOC content of 250 g/L or less.

E. Sealant shall comply with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers".

F. Care shall be exercised to insure against "Three Surface Adhesion". Bond breakers shall be provided.

1. Comply with ASTM C 1193 Standard Guide for Use of Joint Sealants.

G. Provide two lines of weather seal:

1. Primary seal shall be both an air and water seal.
2. Secondary seal shall be water seal.

H. Provide non-staining sealant when sealing to porous substrates such as natural stone, wood, or concrete.

I. Provide sealants from one of the following acceptable sealant manufacturers or equal:

1. Dow Corning Corporation.
2. GE / Momentive.
3. Sika.

2.11 ELASTOMERIC SHEET MATERIAL

A. Elastomeric sheet shall be a complete engineered membrane system, consisting primarily of:

1. Low-modulus pre-cured silicone extrusion and sealant for bonding extrusions to substrates:
   a. Hardness: 30 to 70 durometer hardness, Shore A, tested in accordance with ASTM D2240.
   b. Tensile strength: 800 to 1,400 psi, tested in accordance with ASTM D412.
   c. Elongation: Not less than 500 percent, tested in accordance with ASTM D412.
   d. Tear strength, die B: 75 to 130 ppi, tested in accordance with ASTM D624.
   e. Adhesive: Compatible approved silicone recommended by manufacturer.
   f. Thickness: Not less than 65 mils.
   g. Color: Translucent.
   h. Provide elastomeric sheet metal from one of the following manufacturers or equal:

1) General Electric Silicones.
2) Dowsil.

2. Non-corrosive termination bars and fasteners.

B. Bonding, splicing adhesives, and Sealants: Comply with Comply with Section 079200 “Joint Sealants” and ASTM C920.

1. Primers, setting cement, putty, sealants, and all other materials as recommended by the manufacturer of the membrane system.

2.12 EXTERIOR ENTRANCE DOORS

A. General: Supply and install aluminum framed glass doors as required for the Curtain Wall System as specified hereinafter or as indicated on the Drawings and all other finish hardware that will be required to make the Curtain Wall System complete.

B. Entrance doors shall be extruded aluminum, pre-glazed, single acting, hinged doors, heavy duty, wide stile-and-rail type; acceptable products are:

1. EFCO model “D318 DuraStile”.
2. Kawneer mode: “Tuffline 350 Series”.
3. Oldcastle: “Rugged MS 375”.
4. Wausau “Monumental, Medium Stile,” door.”
5. YKK: “40M Monumental Door”.

C. Entrance doors:

1. Wall thickness of stile and rail extrusions: not less than 0.1875 inch.
2. Wall thickness of glazing stops: not less than 0.050 inch.
3. Thickness of door: Nominal 2 inches.
4. Width of door stiles: Nominal 3-3/4 inches, 4-1/16 inches maximum.
5. Width of top rail: Nominal 3-3/4 inches, 4-1/16 inches maximum.
6. Width of bottom rail: 10 inches minimum (in conformance with 2010 ADA).
7. Fabricate doors with hairline joints at corners of stiles and rails; provide heavy concealed reinforcement brackets secured with screws and welded.
8. Weatherstripping: Wool pile type.

D. Door frame: Nominal 2 inch width by 9 inches deep.

1. Wall thickness of frame extrusions: not less than 0.1875 inch.
2. Utilize shear block type construction throughout. No visible raw edges are permitted at joints.
3. Weatherstripping: Bulb polymeric type.

E. Frames and Door Panels: Fabricated from aluminum extrusions complying with AAMA/WDMA/CSA 101/I.S.2/A440

F. Thermally Broken Construction: Fabricate frames and door panels with an integral, concealed, low-conductance thermal barrier located between exterior and interior surfaces in a manner that eliminates direct metal-to-metal contact.

G. Threshold: Provide extruded-aluminum threshold of thickness, dimensions, and profile indicated; designed to comply with performance requirements indicated and to drain to the exterior; with manufacturer's standard finish.

1. Low-Profile Threshold: ADA-ABA compliant.

H. Finish: 3-coat fluoropolymer finish complying with AAMA 2605 and with Section “Aluminum Finishes”. Custom metallic color as selected by Architect

I. Glass and Glazing Materials: Comply with Section 088000 “Glazing”.

J. Hardware: Comply with Section 087100 “Door Hardware”.

K. Fabrication:

1. Fabricate doors in sizes indicated. Include a complete system for assembling components and anchoring doors.
2. Fabricate doors that are reglazable without dismantling panel framing.
3. Weep Holes: Provide weep holes and internal drainage passages to conduct infiltrating water to exterior.
4. Complete fabrication, assembly, finishing, hardware application, and other work in the factory to greatest extent possible. Disassemble components only as necessary for shipment and installation.
5. Factory-Glazed Fabrication: Glaze architectural terrace doors in the factory where practical and possible for applications indicated. Comply with requirements within this specification and with AAMA/WDMA/CSA 101/I.S.2/A440."

2.13 HARDWARE

A. Hardware shall be furnished under Section 08 71 00 - DOOR HARDWARE, and installed by aluminum entrance and storefront framing system manufacturer unless otherwise indicated herein, conforming to governing laws and building codes.

1. Provide aluminum storefront manufacturer’s recommended door bottoms at all exterior doors as part of the work of this Section.
2. Install all reinforcing required and prepare doors for finished hardware specified herein below.

2.14 MISCELLANEOUS MATERIALS

A. General: Provide products of material, size, and shape complying with referenced glazing standard, requirements of manufacturers of glass and other glazing materials for application indicated, and with a proven record of compatibility with surfaces contacted in installation.

B. Thermal break construction:

1. When low conductance thermal barrier is capable of holding glazing assembly in position and provides composite structural performance the thermal break composite shall conform to the following:
    a. Thermal break assemblies shall be tested in conformance with AAMA TIR A8-08 for composite structural performance.
    b. Thermally broken assemblies shall pass AAMA 505 Dry Shrinkage and Composite Performance Thermal Cycling Test Procedure for dry shrinkage thermal cycling.
    c. Thermal breaks shall be mechanically locked in the metal frames to provide composite action and the mechanical locks shall restrain the thermal break material in all directions to resist shear, flexural bending, thermal loads, and other forces that can be imposed on the member.
    d. Manufacturers shall conform to AAMA QAG 1 Quality Assurance Processing Guide.
    e. Minimum 3/8 inch separation of inside and outside by material with conductivity less than 2.2 Btu.in/hr/ft2/oF or air.
    f. The thermal break shall be aligned with the building insulation and insulating glass units.
2. When low conductance thermal barrier is used only as a thermal separation (Thermal break) and does not comply with the Section “Miscellaneous Materials” paragraph “Thermal break construction” , the thermal separation material and framing member shall not be considered as a composite element in the design of the system.
    a. In such case provide connections or mechanical connections between the thermal break and metal framing elements that will accommodate the differential movement between different materials or that are strong enough to resist structural and cyclic thermal loads.
3. Thermal break materials and assemblies shall not degrade under UV and Ozone exposure when tested in accordance with ASTM G155 and G151.
4. Acceptable thermal break materials:
    a. Thermal breaks systems as manufactured by Technoform-Bautec.
    b. Two or more strips of crimped in place, mechanically locked, glass fiber reinforced polyamide nylon thermal barriers.
    c. Insulbar thermal break systems as manufactured by Ensinger.

d. GFRP and CFRP pultruded shapes, plates, and profiles of polyester resin reinforced with glass and carbon fibers.

e. Polyethylene or PVC thermal isolators.

C. Setting blocks: ASTM C1115, Provide setting blocks at the sill quarter points of all glass lites, or as recommended by the glass manufacturer and proven by analysis. Setting blocks shall be dense silicone or heat cured silicone rubber with a hardness of 85 ±5 Shore A Durometer and color to match IGU seals. Minimum length of 4" or length determined in inches by multiplying the glass area in feet by 0.1 per GANA guidelines, and a minimum width which will provide a bearing surface for both the inboard and outboard glass lites without interrupting or otherwise creating a discontinuity in the silicone weather sealant at each IGU perimeter.

D. Edge Blocks: Elastomeric material to limit glass lateral movement (side walking). ASTM C1115, 65-75 Shore A Durometer. Minimum length of 4" and a minimum width which will provide a bearing surface for both the inboard and outboard glass lites without interrupting or otherwise creating a discontinuity in the silicone weather sealant at each IGU perimeter. Color to match IGU seals.

E. All products in contact with IGU secondary sealant shall be demonstrated to be compatible.

F. Cylindrical Glazing Sealant Backing: ASTM C 1330, Type B (Bi-cellular material) or Type C (Closed cell material), jacketed, non-gassing, compatible with sealant and primer, and of a resilient nature, "Sof-Rod" made by Nomaco Inc. or equal, twenty-five (25) percent wider than joint width, of size and density to control glazing sealant depth and otherwise produce optimum glazing sealant performance.

1. Shape: Selected for each joint type; round for common butt type joints or triangular for fillet type sealant joint.

G. Glazing tapes: Back-Bedding Mastic Glazing Tapes: Preformed, butyl-based, 100 percent solids elastomeric tape; non-staining and non-migrating in contact with nonporous surfaces; with or without spacer rod as recommended in writing by tape and glass manufacturers for application indicated; and complying with ASTM C 1281 and AAMA 800.

H. Bond Breaker Tape: Provide bond breakers, where required, of polyethylene tape as recommended by manufacturer of sealant.

I. Weep Hole Baffle: PVC-coated, reticulated open-cell urethane foam, 45 pores per 1 linear inch; filter to be installed compressed to 50 percent of original width.

J. Expanding Foam Sealant: Preformed, expanding, adhesive-backed, closed-cell polyurethane foam impregnated with water repellant material conforming to AAMA 812. The foam sealant shall have a pressure build not more than 0.05psi when tested according to AAMA 812.

1. Minimum thermal resistance of 5.5 degF.ft2.hr/BTU.in, aged values in accordance with ASTM C1303 Part A.

2. Density: Not less than 2.0 pounds per cubic feet when tested according to ASTM D 1622.
3. Closed-Cell Content: 90 percent when tested according to ASTM D 2856.

K. Steel Primer: FS TT-P-31; red; brown; for shop application and field touch-up.

L. Snap covers:

1. Type 1: 2-1/2 inches by ¾ inches deep (equal to EFCO Model No. 7090).
2. Type 2: 2-1/2 inches by 2 inches deep (equal to EFCO Model No. 12G9)

M. Provide straps, plates, and brackets, built-in inserts, as required for support and anchorage of the fabricated items to adjacent surfaces.

N. Provide aluminum brackets, clips, high density plastic shims and reinforcements as required.

O. Flashing required within the system shall be aluminum and of approved design.

P. Flashing required to join the system to adjacent construction shall be aluminum.

Q. Cleaners, Primers, and Sealers: Types compatible and recommended by sealant or gasket manufacturer.

2.15 GLASS SPANDREL CONSTRUCTION

A. Curtain wall spandrels, as indicated on design drawings.

1. Steel back pan: Installed at spandrel panels as indicated on design drawing.
   a. Galvanized sheet shall comply with requirements in Section “Mild (Ferrous) Steel” with a minimum thickness of 0.060” (1.52 mm).
   b. Finish: Galvanized per ASTM A525 (G90).
2. Maintain a minimum clear dimension of two inches from the back surface of the glass.
3. Opaque spandrel glazing shall receive full coat coverage ceramic frit.
4. Provide means of mechanically capturing insulation inside of spandrel cavity.

2.16 INSULATION, FIRESAFING, AND SOUND DEADENING

A. Thermal Insulation: Comply with Section 072100 “Thermal Insulation”.

B. Provide insulation where shown.

C. Utilize foil faced Curtain Wall spandrel insulation and unfaced safing Insulation. For foil faced insulation apply vapor retarder tape over all joints in Curtain Wall Assembly insulation and where Curtain Wall Assembly insulation abuts framing. Seal all joints in Curtain Wall Assembly insulation with vapor retarder tape. Apply vapor retarder tape at intersection of curtain wall insulation with curtain wall

framing, floor slab, and similar intersections to insure a vapor tight seal. Repair all tears in Curtain Wall Assembly insulation foil facing with vapor retarder tape.

D. All fire safing insulation shall comply with ASTM E84, ASTM E2307 (2 hours), ASTM E136.

E. High Density Semi Rigid Mineral Fiber Safing and Thermal Insulation:

1. Faced or unfaced as required, ASTM C 612, maximum flame-spread and smoke- /developed indexes of 15 and 0, respectively; passing ASTM E 136 for combustion characteristics.
2. Nominal density of 8 lb/cu. ft. (128 kg/cu. m), Type III, thermal resistivity of 4.2 deg F x h x sq. ft./Btu x in. at 75 deg F.
3. Passes ASTM C 665 corrosion test.
4. Insulate spandrels with Thermafiber Firespan 90 or equal exterior wall insulation with minimum thickness as shown on Drawings and as required to meet specified thermal performance and foil vapor barrier (permeability not to exceed 0.020 Perms) at interior surface and all edges. Locate foil surface of insulation flush with innermost surface of vertical framing members. Butt joints are acceptable. Each piece of insulation shall be retained at a minimum of two opposite edges.
5. Provide Thermafiber Firespan 90 or equal for firesafing insulation with minimum thickness as required to meeting specified firesafing performance.
6. Insulation shall be retained by steel impaling pin assemblies with bases fastened to frames with screws or adhesive applied.
7. Seal all edges, joints, punctures and tears in vapor barrier with aluminum foil tape to insure continuous vapor barrier.

F. Smoke Seal Compound

1. Caulking compound specifically intended for inhibiting the passage of smoke, Hilti CP, 3M Firebarrier Spray, or Specified Technologies Inc.
2. Sound-deadening: Acoustical board, thickness and density as required by design, non-combustible waterproof type, approved by Architect.

2.17 CURTAIN WALL FABRICATION AND ASSEMBLY

A. General:

1. All work shall be of the highest quality, in accordance with the best trade practices, and performed by skilled workmen. All work shall be accomplished to the satisfaction of the Architect and Owner.
2. To the fullest extent practicable, fabrication and assembly shall be executed in the shop. All Work that is not shop-assembled shall be shop-fitted.
3. The design of the Curtain Wall shall endeavor to keep site operations to a minimum. Manufacturing, finishing, and assembly processes shall, wherever possible, be carried out off-site and under controlled environmental conditions.

4. To the extent possible, all fabrication shall be done prior to finishing. Any exposed mill finish edges shall be finished to match adjacent construction.
5. All components exposed in the finished work shall be free from warping and oil-canning effects, the telegraphing of welds and other fasteners, cut marks, streaks, tool and die marks.
6. Form aluminum shapes before finishing.
7. Glazing Pockets: Provide minimum clearances for thickness and type of glass indicated according to GANA's "Glazing Manual".
8. Fabricate components that, when assembled, have the following characteristics:
    a. Sharp profiles, straight and free of defects or deformations, including but not limited to, warping; oil-canning effects; the telegraphing of welds, studs, and other fasteners; streaks; and tool or die marks.
    b. Accurately fitted joints with ends coped or mitered.
    c. Internal guttering systems or other means to drain water passing joints, condensation occurring within framing members, and moisture migrating within the system to exterior.
    d. Physical and thermal isolation of glazing from framing members.
    e. Accommodations for thermal and mechanical movements of glazing and framing to prevent glazing-to-glazing contact and to maintain required glazing edge clearances.
    f. Provisions for reglazing from exterior.

B. Fabrication Tolerances:
1. Tolerances at joints and junctions shall take precedence over tolerances for components or assemblies.
2. Unless otherwise specified, tolerances shall be:
    a. Joint width: ± 1/16 inch.
    b. Length and width of major components: ± 1/32 inch.
    c. Diagonals of major components: ± 1/16 inch.
    d. Aluminum extrusions: 50% Aluminum Association standards.
    e. Misalignment of mating surfaces: ± 1/16 inch.
3. In addition to special care used to handle and fabricate assemblies, employ the following fabrication techniques.
    a. Welds ground smooth: Fabricator shall grind welds smooth. For groove welds, the weld shall be made flush to the surfaces each side and be within +1/32 inch, minus 0 inch of plate thickness.
    b. Contouring and blending of welds: Where fillet welds are indicated to be ground-contoured, or blended, oversize welds as required and grind to provide a smooth transition and to match profile on approved mock-up.

c. Minimize Weld Show Through: At locations where welding on the far side of an exposed connection occurs, grind distortion and marking of the steel to a smooth profile with adjacent material.

d. Rolled Members: Member specified to be rolled to a final curved shape shall be fully shaped in the shop and tied during shipping to prevent stress relieving. Distortion of the web or stem, and of outstanding flanges or legs of angles shall be visibly acceptable to the Architect from a distance of 10 feet under any lighting condition determined by the Architect.

C. Holes:

1. Provide holes and connections for site assembly and to accommodate work of others as required. Holes shall be drilled, or punched and reamed, perpendicular to the surface. Holes will not be permitted in areas where the completed Work will remain visible.

D. Joinery:

1. Accurately fit and firmly secure all exposed metal joints with metal to metal hairline contracts.
2. All fastenings shall be installed at an approved spacing. Fasteners shall not penetrate gutter and drainage systems.
3. All jointing and splicing of members shall be concealed.
4. Conceal all joint sealants except as noted on the drawings.
5. All work shall be properly reinforced to resist all loads imposed upon them by all doors, hardware, anchors, and other attachments.
6. Exposed Fasteners:
   a. Exposed fasteners shall occur only where expressly permitted by the Architect.
   b. Spacing and location of all fasteners shall be as approved by the Architect.
   c. No self-drilling fasteners shall be allowed outboard of the air-seal line.
   d. Where exposed in finished and visible surfaces, fasteners shall be countersunk or counter bored with allen or pozidrive head unless indicated on the Drawings or as approved by the Architect. Exposed portions of the fastener shall match the adjacent surface.

E. Built-up Members and Reinforcement:

1. Where two or more sections of aluminum are used in built-up members, contact surfaces shall be smooth, true and even, in continuous alignment, and secured so that the joints are tight without the use of filling materials.
2. Steel reinforcement of aluminum members shall be hot-dip galvanized with shop primer and completely enclosed and separated from aluminum as specified herein.

F. Aluminum Welding:

1. General: Weld before finishing components. Weld in concealed locations to greatest extent possible to minimize distortion or discoloration of finish. Remove weld spatter and welding oxides from exposed surfaces by descaling or grinding.
2. Welded joints shall typically be confined to concealed locations. Any exposed joints shall be subject to Architect's approval.
3. Procedures:
    a. Submit details of proposed welding procedures before commencing.
    b. Other than site welds indicated on approved shop drawings, do not weld on site without prior approval. Where practical, locate site welds in positions for down hand welding.
    c. Do not weld:
        1) Finished surfaces.
        2) Adjacent to finished surfaces or glass, unless adequately protected from damage, as recommended by appropriate manufacturers.
4. Finish: Welds shall be de-scaled and free of surface and internal cracks, slag inclusion, and porosity.
5. Welding Dissimilar Metals:
    a. Do not commence until approved in writing. Submit details of welding of dissimilar metals, including:
        1) Type and thickness of materials to be welded.
        2) Proposed joint preparation and welding procedures.
        3) Proposed filler metal.
        4) Expected dilution (proportion of fused parent metal in the weld metal).
    b. After fabrication, clearly mark components to identify their locations in Project according to Shop Drawings. Marking shall be of a type that can be removed with water or solvents after assembly. Marking should be positioned on unexposed surfaces where possible.

2.18 GLAZING SYSTEMS ATTACHMENTS

A. Internal Gutters, diverters, and seals:

1. Provide all required internal weeps, baffles, joint plugs, end dams, zone dams, internal sealant, and similar as required to prevent the air and water penetration through the completed assembly. Where visible, provide matching materials and finishes.
2. Construct weep holes as required to drain water passing joints within the system to the exterior. Provide weep hole baffles.
3. Apply sealants and gaskets under the climatic conditions recommended by the manufacturer(s). Sealant shall not be installed when substrates are wet or

when ambient temperature is below 40°F. All surfaces to receive sealants shall be treated (cleaned, primed or unprimed) in accordance with the recommendations of the sealant manufacturer. Use no sealant that has started to set in its container, or any sealant that has exceeded the shelf life published by the manufacturer.

4. Protect all joining surfaces not to receive sealants against staining by masking and/or other methods. Sealant joints shall be concealed from view to the extent possible.

B. Perimeter Flashing:

1. Comply with the "Architectural Sheet Metal Manual" as issued by SMACNA for flashing recommendations.
2. Install flashing using skilled workmen in strict accordance with the recommendations and directions of the manufacturer.
3. Fabricate and install metal flashing work in accordance with details and specifications of above Reference Standard, with manufacturer's instructions, and as herein specified, to provide a watertight installation. Apply metal flashing to smooth, even, sound, clean, dry surfaces free from defects. Make provisions to allow for expansion and contraction of metal flashing work. Wherever practicable, shop form all metal flashing work and deliver ready for installation. Form metal flashing work accurately to required profiles, with flat surfaces, straight edges, and corners, free from defects.
4. All flashings shall be cut and folded to approved profiles out of non-corrosive materials, with protective coatings as required. Flashing shall be factory fabricated in long lengths where practical, and pre-painted on visible surfaces.
5. Install, in as long lengths as practical, at concealed locations only, with as few joints as possible, and without wrinkles, buckles or distortions.
6. Where anchors or other materials penetrate the flashing, solidly fill the penetrations with the sealer to insure a fully watertight condition.
7. Where flashing is installed to provide air barrier continuity between the glazing system and surrounding construction, flashing shall be painted aluminum or stainless steel as specified herein to provide sufficient rigidity to resist potential fluctuations in air pressure, unless otherwise determined through pre-construction mock-up testing.
8. All flashings shall be continuous and air (where required for air barrier continuity) and water tight, allowing for thermal movement at splices and terminations. Inside and outside corners and end damns shall be prefabricated watertight. Provide mechanically engaged, continuously sealed splice plates at joints in flashing.
9. Flashing of isolated openings shall extend 12" past each jamb of the opening and turn up 3" and then extend from the outer face of the wall to the inside face of the wall where it shall be turned up 3" vertically and be bedded in sealant. Turn up head and sill flashing at sides to form a pan.
10. Where flashings are fitted to pre-formed rebates, coordinate cast-in grooves or reglets as required.

11. Materials:
    a. Unexposed metal flashing: ASTM A240 or A666, Type 304, dead soft fully annealed except where harder temper required for forming or performance; not less than 0.025 in. thick (24ga) unless otherwise shown, finish No. 2D. Provide 60-40 tin/led solder, with acid-chloride type flux, except use rosin flux over tinned surfaces in accordance with ASTM B32. Aluminum sheet, not less than 0.062” gauge (1.02 mm). Provide 80-20 tin/led solder if flashing can be visible in occupied areas.
    b. Exposed metal flashing, fascias, coping attachments, roof curb flashing and covers: Unless otherwise indicated on the Drawings, types and locations shall be stainless steel not less than 0.079” thick (2 mm) with non-directional bead blast satin finish and aluminum sheet not less than 0.125” (3 mm) thick with high performance organic coating.
        1) Provide thickness required to prevent oil canning.
        2) Location of seams to be approved by Architect with shop drawings.
        3) Seams: As shown or minimum 1-inch flat lock seams.
        4) Cleats: Minimum 2-inches long in seam.
        5) Minimum 2 fasteners per cleat.
        6) Thermal movements perpendicular to seams: Accommodate within seams
        7) Thermal movements parallel to seams: Allow sheet metal to slide at attachment cleats.
        8) Do not penetrate visible panels with fasteners and do not expose fasteners.
        9) Fold seams to shed water.
        10) Align all joints and seams.
    c. Fasteners for sheet metal flashing: AISI, Types 304 and 316 stainless steel fastener system suitable for substrate.
    d. Uncured EPDM Strip: Permitted in exposed or unexposed locations.
    e. Uncured Neoprene strip: Permitted only in unexposed locations as alternate flexible flashing.
    f. Self-Adhering, High-Temperature Underlayment Sheet for use under sheet metal flashing: Minimum 60 mils (1.5 mm) thick, consisting of slip-resisting polyethylene-film top surface laminated to layer of butyl or SBS-modified asphalt adhesive, with release-paper backing; cold applied. Provide primer when recommended by underlayment manufacturer.
        1) Thermal Stability: ASTM D 1970; stable after testing at 240 deg F.
        2) Low-Temperature Flexibility: ASTM D 1970; passes after testing at minus 20 deg F.

C. Aluminum “Break Metal” and “Panning Work”
    1. Fabricate and install all extruded aluminum and formed sheet aluminum “brake-metal” work in conjunction with the aluminum window and Curtain Wall

work as detailed and as reasonably required to complete the work including sill extensions, snap trim pieces, jamb and sill trim, closures, coverings, flashings and other miscellaneous extruded and formed “brake-metal” work in conjunction with aluminum windows.

a. Provide extruded shapes wherever possible, reserving formed work for conditions where extrusions are not applicable.

b. Provide sheet metal panning not less than 0.060 inch thick.

c. Fasten trim clips, at no more than 16 inches on center.

2. Protect surfaces from marring when forming work. Provide sufficient material thickness with all necessary concealed reinforcement and anchorage to prevent “oil canning” or deformation of the finished work. Material deemed defective by the architect will be replaced at no cost to the Owner.

2.19 ALUMINUM FINISHES

A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations relative to applying and designating finishes.

B. Appearance: Unless more stringent requirement exist in the “Metal Finishes Manual for Architectural and Metal Products”, when viewing abutting or adjacent pieces, significant visible color variation from a minimum distance of 10 feet, shall not be apparent. Provide samples of color variation for review during submittal process.

C. Material shall not be shipped, delivered, or supplied when the finish of that material:

1. Has not been inspected and tested in the manner and by the means prescribed herein and as approved.

2. Does not meet all specifications for the finishes set forth in the alloy manufacturer’s instructions.

3. Does not fall within the color and tonality range approved by the Architect.

4. Has been rejected by the Architect or Owner.

5. Has not otherwise been processed in accordance with these instructions.

6. The Architect shall have final authority to accept or reject any or all material that does not conform to these finishes standards or any of the other requirements of the drawings and specifications.

7. To ensure consistency of color and tonality in the finished work, the Glazing Subcontractor shall implement a quality control program to the approval of the Architect. The quality control program shall be vertically integrated and include controls by the alloy manufacturer and the finisher, as well as the Glazing Subcontractor to provide three independent checks of color and tonality at the point of finishing, during assembly, and during installation.

8. No production finishing shall commence prior to approval of the quality control program by the Architect. Notwithstanding the implementation of an approved

quality control program, any installed work with defects in finish or variation in color or tonality in excess of the approved range shall be subject to rejection.

9. A full-time supervisor shall be assigned to each production shift; the inspector shall inspect all production materials and maintain a complete record of all inspections.

D. Superior-Performance Organic Coating Finish for shapes, plates, and sheets exterior and interior side: AA-C12C42R1x cleaned with inhibited chemicals, corrosion coated with an acid-chromate-fluoride-phosphate treatment, and painted with organic coating specified below. Apply finish in strict compliance with paint manufacturer's instructions using a licensed applicator.

1. Fluorocarbon High Performance Organic Coating, Three-Coat Metallic PVDF System: Manufacturer's standard three-coat, thermo-cured pigmented polyvinylidene fluoride resin (PVDF) coating system consisting of specially formulated inhibitive primer and fluoropolymer color topcoat, containing not less than 70 percent of the fluoropolymer resin Kynar 500 or Hylar 5000 by weight; complying with AAMA 2605.

   a. The coating system shall be spray applied under factory conditions to pretreated base metal in a three-coat process in strict accordance with the coating system manufacturers recommendations, and to the minimum standards of AAMA 2605 "Voluntary Specification, Performance Requirements, and Test Procedures for Superior Performing Organic Coatings on Aluminum Extrusions and Panels".

   b. The coating system shall be applied by a licensed applicator approved by the coating system manufacturer. The applicator shall propose a program of records and samples of the entire coating production for approval by the Architect, and which records and samples shall be made available to the Architect or Owner upon request.

   c. Provide and furnish a compatible field touch-up PVDF coating system formulated for air-dying at ambient temperature, based on the Kynar ADS fluoropolymer resin, in color match the factory applied finish. Submit applied coating system, subject to sample approval procedures described herein. Such repairs shall match the original finish for color and glass and shall adhere to the original finish when tested in accordance with AAMA 2605 Dry Adhesion.

   d. Warrant that the organic coating shall not peel, check, crack, chalk or change color for a period of twenty (20) years from the Completion Date stipulated in the Certificate of Substantial Completion and that the finish exceeds or meets the standards set out in AAMA 2605-05 which include, but are not limited to the following:

      1) Three-coat PVDF finish system thickness shall be a minimum of 1.85 mils DFT.

2. An acceptable organic coating is PPG Industries Duranar XL or equal.

   a. Custom metallic color to match Architect's sample.

E. Aluminum finish on structural silicone adhesion surfaces shall be a minimum Alodine conversion coating or other suitable adhesion substrates.

F. Aluminum not exposed to view shall receive, as a minimum, the chromium phosphate chemical conversion coat associated with organic coating.

G. All chemical conversion coatings shall meet the minimum requirements of ASTM D1730, Type B, Method 5 with a minimum coating weight of 40 mg/ft2.

1. Remove die markings on any exposed architectural surfaces prior to finishing operations. Where necessary to remove die markings from any part of the work, all members must be finished by the same process, whether or not die markings exist. Perform this work in addition to the finish specified. Scratches, abrasions, dents and similar defects are unacceptable.
2. All aluminum, whether concealed or exposed shall be finished. No mill finish aluminum shall be permitted.
3. Finishing of all components exposed to view shall be done after the completion of all fabrication processes.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Prior to start of installation, inspect the building and verify as-built conditions and dimensions as being acceptable to receive the Work of this Section. Verify elevations of concrete and structural steel framing, and location of embeds and other anchorages for compliance with the Work of this Section.

B. Should any conditions be found that may prohibit proper execution of the Work, the Glazing subcontractor shall immediately notify the Architect in writing of these conditions. Installation shall not proceed until a recommended course of remedial action has been submitted and approved in writing by the Architect, prior to execution in the field.

C. Provide a complete site survey of existing conditions to ensure the accuracy of layout and dimensional information.

D. Joint widths as noted in the Contract Documents are the design joint width at the ambient temperature of 75°F. Installation procedures should be adjusted to take into account the ambient temperature at the time of installation.

3.2 PREPARATION

A. Provide connections for temporary shoring, bracing, and supports only where noted on the approved shop drawings. Temporary connections not shown shall be made at locations not exposed to view in the final structure or as approved by the Architect. Handle, lift and align pieces using padded slings and/or other protection required to maintain the appearance of the glazing systems through the process of erection.

B. Clean glazing channels and other framing members receiving glass immediately before glazing. Remove coatings not firmly bonded to substrates.

C. Examine glazing units to locate exterior and interior surfaces. Label or mark units as needed so that exterior and interior surfaces are readily identifiable. Do not use materials that will leave visible marks in the completed work.

3.3 ANCHORS AND CONNECTIONS:

A. Coordinate relationship between brackets and concrete reinforcement.

B. Supply anchorage items to be embedded in or attached to other construction. Provide embed layouts, setting diagrams, templates, instructions and directions as required for installation.

C. After system components are positioned, fix connections to building structure as indicated on approved Shop Drawings. Provide separators and isolators to prevent metal corrosion and electrolytic deterioration.

D. Connections between different materials shall be designed to allow for the differential thermal movement of the respected materials.

E. Self-drilling, self-threading fasteners shall not be permitted for use into concrete or masonry.

F. Avoid excess shimming that may induce additional stress on the fastener. The total thickness (t) of a shim pack shall not exceed a dimension equal to the diameter (d) of the fastener/anchor. Where t>d, the fastener/anchor shall be recalculated to take into account the additional stress from bending on the fastener with the assumption that the shim does not contribute to resistance to fastener bending. Additional stress due to bending shall be added to tension stress and the tension/shear interaction analyzed.

G. Anchorages to Structural Steel shall not induce rotational forces in supporting members.

H. Shim packs that resist compressive forces only may be high-impact plastic, Korolath type, or equal. Shim packs subject to shear shall be stainless steel or HFG steel plates pinned together to form a monolithic shim.

3.4 GLAZED ALUMINUM EXTERIOR WALL SYSTEMS

A. General:

1. Use no materials, equipment, or practices that may adversely affect the functioning, appearance or durability of the completed Curtain Wall Assembly and related construction.

2. The Curtain Wall Assembly shall be accomplished in compliance with the specified criteria without buckling, opening of joints, undue stress on

fasteners, sealants, and gaskets, opening of welds, cracking of glass, leakage, noises, or other harmful effects.

3. Conform strictly to the materials, finishes, shapes, profiles, sizes, thickness, and joint locations required by the Drawings and Specifications.
4. Match all materials to produce continuity of line, texture, and color.
5. All work shall be of the highest quality, in accordance with the best trade practices, and performed by skilled workmen. All work shall be accomplished to the satisfaction of the Architect and Owner.
6. To the fullest extent practicable, fabrication and assembly shall be executed in the shop. All Work that is not shop-assembled shall be shop-fitted.
7. To the extent possible, all fabrication shall be done prior to finishing. Any exposed mill finish edges shall be finished to match adjacent construction.
8. All components exposed in the finished work shall be free from warping and oil-canning effects, the telegraphing of welds, studs, and other fasteners, and streaks, tool and die marks.
9. Exposed metal edges shall be finished to match typical finished surfaces.
10. Curtain Wall Assembly design shall typically incorporate an outside weatherseal and an inside air-seal, and provide a pressure-equalized drainage system.
11. Fit joints to produce hairline joints free of burrs and distortion.
12. Rigidly secure non-movement joints.
13. Install anchors with separators and isolators to prevent metal corrosion and electrolytic deterioration and to prevent impeding movement of moving joints.
14. Weld components in concealed locations to minimize distortion or discoloration of finish. Protect glazing surfaces from welding.
15. Seal joints watertight, unless otherwise indicated.

B. Fabrication and Assembly

1. The design of the Curtain Wall Assembly shall endeavor to keep site operations to a minimum. Manufacturing, finishing, and assembly processes shall, wherever possible, be carried out off-site and under controlled environmental conditions.
2. Assembly procedures to be carried out on site shall be simple to execute and capable of execution within the time(s) allowed in the Master Construction Program.

C. Manufacturer’s Standards

1. Materials, components, and systems incorporated in the Work shall be mixed, applied, installed and otherwise used in strict accordance with the recommended standards and procedures of the respective manufacturers.

D. Storage and Handling

1. Materials shall be stored in a dry, well-ventilated location. Handling of materials shall be kept to a minimum, and all materials shall be carefully protected from soiling and from condensation and other harmful moisture.

E. Jointing and Reinforcing

1. Accurately fit and firmly secure all exposed metal joints with metal to metal hairline contacts.
2. All fastenings shall be installed at an approved spacing. Fasteners shall not penetrate gutters and drainage systems.
3. Exposed fasteners shall occur only where expressly permitted by the Architect. Where exposed in finished surfaces, screw heads shall be Phillips oval-head countersunk type, finish to match adjacent surfaces.
4. All jointing and splicing of members shall be concealed.
5. Accommodation of thermal expansion and contraction shall be resolved within the Curtain Wall Assembly. No loads due to thermal variation may be transferred to the building structure.
6. Conceal all joint sealants except as noted on the drawings.
7. All work shall be properly reinforced to resist all loads imposed upon them by all doors, hardware, anchors, and other attachments.

F. Metal Protection

1. Where dissimilar metals contact, protect against galvanic action by painting contact surfaces with primer or by applying sealant or tape or installing nonconductive spacers as recommended by manufacturer for this purpose.
2. Where aluminum will contact concrete or masonry, protect against corrosion by painting contact surfaces with bituminous paint or with high solids epoxy coating equal to Amerlock 400.

G. Install components to drain water passing joints, condensation occurring within framing members, and moisture migrating within the system to exterior.

H. Erection Tolerances: Install glazed aluminum exterior wall systems plumb, level, square, and true, and to comply with the following maximum tolerances:

1. Plumb: 1/8 inch (3 mm).
2. Level: 1/8 inch (3 mm).
3. Alignment:
    a. Where surfaces abut in line or are separated by reveal or protruding element up to 3 inch (76 mm) wide, limit offset from true alignment to 1/32 inch (.8 mm). Otherwise limit offset to 1/16 inch (3.2 mm).
    b. Location: Limit variation from plane to 1/8 inch in 12 feet (3 mm in 3.7 m); but no greater than 1/2 inch (12.7 mm) over total length.

3.5 GLAZING

A. General: Comply with combined written instructions of manufacturers of glass, sealants, gaskets, and other glazing materials, unless more stringent requirements are indicated, including those in referenced glazing publications.

1. Glazing channel dimensions as indicated on Drawings provide necessary bite on glass, minimum edge and face clearances, and adequate sealant thicknesses, with reasonable tolerances. Adjust according to requirements in referenced glazing publications, including the “Glass Manual” as issued by GANA.
2. Prior to glazing, all structural silicone glazed glass shall receive a continuous 1 inch wide skim coat of silicone at the perimeter of the lite to conceal sealant and glazing accessories. Color to be determined by Architect.
3. Protect glass edges from damage during handling and installation. Remove damaged glass from Project site and legally dispose of off Project site. Damaged glass is glass with edge damage or other imperfections that, when installed, could weaken glass and impair performance and appearance.
4. Provide temporary marking, if required, with an approved removable marking for visibility during construction, by a method that does not harm the glass, and remove all traces on completion.
5. Setting blocks in sill rabbets, sized and located to comply with referenced glazing publications, unless otherwise required by glass manufacturer. Set blocks in thin course of compatible sealant suitable for heel bead.
6. Do not exceed edge pressures stipulated by glass manufacturers for installing glass lites.
7. Never permit direct glass to frame contact.
8. Provide spacers for glass lites where length plus width is larger than 50 inches.
9. Provide edge blocking where indicated or needed to prevent glass lites from moving sideways in glazing channel, as recommended in writing by glass manufacturer and according to requirements in referenced glazing publications.
10. Install glass and glazing materials under the climate conditions recommended by the fabricator and manufacturer.

B. Sample Section of Sealant:

1. At the beginning of sealant installation work in exterior wall, the manufacturer of sealant shall send his representative to the site, under whose supervision a section of the wall (used as "control section") shall be completed for purposes of determining performance characteristics of sealant in joints. Architect shall be informed of time and place of such installation of control section.
2. Control section shall be installed according to specification given herein and shall not be considered as acceptable until written acceptance is provided by the Architect.

3. Accepted control section shall be standard to which all other sealant work must conform.

C. Supervision: Submit to the Architect written certification from the sealant manufacturer that the applicators have been instructed in the proper application of their materials. Use only skilled and experienced workmen for installation of sealant.

D. Install glass and glazing materials under the climate conditions recommended by the fabricator.

E. The location, type, size and position of all setting blocks shall be inspected for compliance with the approved shop drawings before IGU installation, and again prior to the installation of structural silicone sealant and exterior weatherseals.

F. Install the glass unit in the opening using temporary glass retainers. Care shall be exercised not to set fingerprints on the glass and glazing materials in the structural silicone sealant bond area during installation.

G. Glazing rabbets shall be clean, dry, and free of any materials that might adversely affect the bond and seal of the glazing materials or the drainage of the rabbet.

H. The insulating glass unit shall be fully supported by framing members in the installed position. Inboard and outboard glass lites shall be fully supported by the setting blocks prior to the application of structural silicone sealant.

3.6 GLAZING SEALANTS

A. General: Site glazing shall be carried out and evaluated by approved glaziers in accordance with ASTM C 1394 and ASTM C 1401, and other referenced standards. An approved glazing supervisor shall supervise all work.

1. Comply with the sealant manufacturer's recommendations regarding surface preparation, priming, pot-life, sealant bead application, and the acceptable range in surface temperature and humidity at time of application and for a period at least eight hours following sealant application.
2. Cleaning: Surfaces to receive glazing materials shall be thoroughly cleaned of all dirt, dust, grease, finger-prints and extraneous materials. Where recommended by the glass manufacturer, contact surfaces shall be wiped with Isopropyl Alcohol or equivalent allowed by sealant and glass manufacturer to a dry condition.
    a. Clean joint surfaces immediately before installation of backing rod and again before applying the sealant as recommended by sealant manufacturer.
    b. Remove protective tape or removable films and ensure that no residue remains.
    c. Joint areas to be protected with masking shall be cleaned before application of tape or film.

d. Glass:

1) Cleaning compounds shall be applied with clean lint-free disposable towels. A two-wipe method of application shall be employed, where one towel is used to wipe the surface dry and clean, and the second is used to apply the cleaning compound. The cleaning compound shall not be allowed to air-dry on the substrate.

e. Porous substrates, concrete, stone:

1) Clean where necessary by grinding, mechanical abrasion, detergent washing or a combination of methods to ensure a clean sound interface.

2) Remove laitance mechanically. Remove oils by blast cleaning. Remove loose particles that remain in joints following mechanical surface preparation by blasting with oil free compressed air.

3) Clean and etch masonry joint surfaces as recommended by sealant manufacturer.

f. Acid washing shall not be used unless approved in writing by the Architect.

3. Priming: Apply primers to joint surfaces where required for adhesion of sealants, as determined by preconstruction sealant-substrate testing.

a. Do not allow primer/sealer to spill or migrate onto adjoining surfaces. Areas adjacent to joints to be sealed shall be protected where there is likelihood that contamination by cleaning compound, primer, or sealant could occur.

b. If recommended by the sealant manufacturer, roughen surfaces to remove protective coatings or imperfections that may prohibit provision of clean, sound base surface for sealant adhesion.

4. Application and tooling: Refer to Section 079200 “Joint Sealants”, unless otherwise specified in this section. Install sealants using proven techniques that comply with the following and at the same time backings are installed:

a. Place sealants so they directly contact and fully wet joint substrates.

b. Completely fill recesses in each joint configuration.

c. Produce uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability.

d. Exposed sealants shall be installed so that the top surfaces of the sealant beads are sloped to drain water away from the glass. Exposed sealant surfaces shall be tooled smooth.

5. Care shall be exercised to prevent three sided adhesion and cohesive failure of joint sealant in all movement joints. Provide bond breakers where necessary.

6. Curing:

a. Cure sealants in compliance with manufacturer's recommendations, to obtain high early bond strength, internal cohesive strength, and surface durability.

b. Do not relocate sealed components within the factory or on-site, until the joint has developed sufficient bond strength and cohesive integrity.

c. Do not field test for adhesion or water penetration until joints are fully cured.

7. Exposed sealants shall be installed so that the top surfaces of the sealant beads are sloped to drain water away from the glass. Exposed sealant surfaces shall be tooled smooth. Sealant that has started to set in its container shall not be used and be discarded.

8. Do not use sealant that has exceeded the shelf life published by the manufacturer.

9. Do not install sealant if the ambient temperature is below 40°F. Maintain this temperature during and 48 hours after installation of sealant.

10. Replace sealants that have accumulated debris prior to full cure.

11. Remove any masking material and excess sealant immediately after application of sealant bead is complete and "clean-down" adjacent surfaces as work progresses. All finished work shall be left in a neat and clean condition.

B. Field Applied Weather Sealants: Install continuous spacers, or spacers combined with cylindrical sealant backing, between glass lites and glazing stops to maintain glass face clearances and to prevent sealant from extruding into glass channel and blocking weep systems until sealants cure. Secure spacers or spacers and backings in place and in position to control depth of installed sealant relative to edge clearance for optimum sealant performance.

1. Tool exposed surfaces of sealants to provide a substantial wash away from glass and to eliminate voids and to ensure complete wetting or bond of sealant to glass and channel surfaces.

C. Gasket Glazing (Dry): Fabricate compression gaskets in lengths recommended by gasket manufacturer to fit openings exactly, with allowance for stretch during installation. Comply with gasket requirements in “Glass Manual” as issued by GANA.

1. Insert soft compression gasket between glass and frame or fixed stop so it is securely in place with joints miter cut and bonded together at corners.

2. Center glass lites in openings on setting blocks and press firmly against soft compression gasket. Install dense vulcanized compression gaskets, corner molds, and pressure-glazing stops, applying pressure uniformly to compression gaskets for form continuous weather-stripping. Compress gaskets to produce a weathertight seal without developing bending stresses in glass. Seal gasket joints with sealant recommended by gasket manufacturer.

3. Install gaskets so they protrude past face of glazing stops.

D. Setting blocks shall be the full width of the rabbet, and placed at the glass quarter points. They shall be of a length recommended by the glass manufacturer and be configured in such a way as not to impede water drainage of the glazing rabbet.

E. Anti-walk blocks shall be used to prevent glass from moving out of alignment so that glass bite is maintained.

F. Jamb blocks shall be used for each glass unit supported on four sides.

G. Glass shall be centered in each opening to provide the purchases and clearances recommended by the glass manufacturer and approved by the Architect.

3.7 DOORS

A. Examine doors and installed door frames before hanging doors.

1. Verify that frames comply with indicated requirements for type, size, location, and swing characteristics and have been installed with level heads and plumb jambs.
2. Reject doors with defects.
3. Proceed with installation only after unsatisfactory conditions have been corrected.

B. Hardware: For installation, see Section 087100 – Door Hardware.

C. Install doors to comply with manufacturer's written instructions and the referenced quality standard, and as indicated.

D. Job-Fitted Doors: Align and fit doors in frames with uniform clearances; do not trim stiles and rails.

E. Clearances: Provide 1/8 inch at heads, jambs, and between pairs of doors. Provide 1/8 inch from bottom of door to top of decorative floor finish or covering unless otherwise indicated. Where threshold is shown or scheduled, provide 1/4 inch from bottom of door to top of threshold unless otherwise indicated.

F. Rehang or replace doors that do not operate freely.

G. Install to produce weathertight enclosure and tight fit at weatherstripping.

H. Replace doors that are damaged or that do not comply with requirements. Doors may be repaired or refinished if work complies with requirements and shows no evidence of repair or refinishing.

3.8 CORROSION PROTECTION

A. Ensure by design that no metals, including alloys of the same base metal, are placed together in a manner, combination, or location likely to give rise to damage by electrolytic action or other corrosion. In particular, avoid metal to metal contact between aluminum and metals other than an appropriate grade and composition of

stainless steel as per the recommendations of the metal manufacturer and to the approval of the Architect. Ensure that dissimilar aluminum alloys in contact with each other are compatible with each other or isolated. Any other dissimilar materials are to be treated or protected in such a manner as necessary to prevent corrosive action.

B. Isolation of dissimilar metal surfaces to prevent electrolytic action shall be accomplished by materials which are impervious to moisture and non-absorptive.

C. Aluminum surfaces in contact with mortar, concrete, fireproofing, plaster, masonry, or absorptive materials of any kind shall be coated with an anti-galvanic material, impervious to moisture.

3.9 FLASHINGS

A. Elastomeric or metal flashing connecting to work of other Sections shall be provided by the Glazing Subcontractor for the work of this Section, including the attachment to this Work and to other work.

1. Comply with flashing manufacturer’s instructions and recommendations.
2. Clean substrates prior to installation of flashings.
3. Make flashings waterproof and air tight.
4. Make flashings continuous.
5. Make flashings collect, control, and direct water to the exterior and to weeps.
6. Shingle seams to best shed water.
7. Inspect all flashings prior to covering or concealing.
8. Ensure flashings are continuous, waterproof, and air tight.

B. Where indicated on the Drawings and where required to accommodate movement, an elastomeric flashing system shall be used.

C. Where elastomeric or metal flashing connects to roofing and waterproofing work provide 8 inches of flashing beyond the point of attachment to the Work of this Section.

D. Elastomeric flashing shall be carefully bonded to the substrates without blistering; joints shall be neat and as infrequent as possible. Adhered flashing shall have a minimum 90 degree peel adhesion of 6 pounds per linear inch when tested in accordance with ASTM D3330 Method F or ASTM D 903.

E. Elastomeric flashing not supported by substrate material shall receive another layer of 60 mil flashing for reinforcement, fully bonded to the finish layer and the substrate, and extending at least 1 inch beyond the unsupported area.

F. Connect air and vapor barrier in glazed exterior wall assembly continuously to the air barrier of the roof, to concrete below-grade structures, walls, exterior doors and

other intersection conditions and perform sealing of penetrations, using accessory materials and in accordance with the manufacturer's recommendations.

G. Flashing Slope:

1. Slope all flashings at least 5 percent to drain to the exterior.
2. Ponding on flashings is not acceptable at any location.
3. Grout or shim under flashings to create slope.
4. Do not use any organic material to create slope.

H. Discontinuous Horizontal Flashings - Flashing Pans: Where horizontal flashings are not continuous:

1. Provide flashing pans with three vertical walls.
2. Make pan walls 4 inches high to the greatest extent possible.
3. Never make pan walls less than 1.5 inches high.
4. Make corners permanently waterproof. Sealant sealed corner is not acceptable.
5. Extend flashings the entire width of the obstruction to downward flow of water.
6. Ensure jamb flashings drop into pan flashings.

I. Metal Flashing Installation:

1. Reference Standard: Conform to the requirements of 5th Edition of the Sheet Metal and Air Conditioning Contractors Association (SMACNA) Architectural Sheet Metal Manual.
2. Fabricate and install metal flashing work in accordance with details and specifications of above Reference Standard, with manufacturer's instructions, and as herein specified, to provide a watertight installation. Apply metal flashing to smooth, even, sound, clean, dry surfaces free from defects. Make provisions to allow for expansion and contraction of metal flashing work. Wherever practicable, shop form all metal flashing work and deliver ready for installation. Form metal flashing work accurately to required profiles, with flat surfaces, straight edges, and corners, free from defects. Fold exposed metal edges back not less than 1/2" and form drip.
3. Isolate dissimilar metals.
4. Fully solder seams and joints.
5. Clean metal to bare metal prior to soldering.
6. Use flux when soldering.
7. Do not damage flexible flashing when soldering metal near flexible flashing.
8. Slip Joints: Locate slip joints not more than 24 feet apart and not more than eight (8) feet from corners. Form slip joints as slip-type-joint, or loose lock joint in accordance with SSINA "Standard Practices for Roofing, Flashing, and Copings".

J. Flexible Flashing Installation:

1. Install flashing using skilled workmen in strict accordance with the recommendations and directions of the manufacturer.
2. Do not install fabric flashing when the temperature is 32 deg. F. and falling.
3. Install, in as long lengths as practical, at concealed locations only, with as few joints as possible, and without wrinkles, buckles or distortions.
4. Set flashing in a full and continuous troweled-on bed of setting cement, with joints lapped a min. of 4". Where flexible flashing meets metal flashing, it shall overlap at least 4" with laps completely buttered and pressure applied for perfect adhesion.
5. Seal holes with a “patch” of flashing.
6. Extend flashing “patch” at least 4 inches onto adjacent undamaged areas on all sides.
7. Where anchors or other materials penetrate the flashing, solidly fill the penetrations with the sealer to insure a fully watertight condition.
8. Provide mechanically fastened non-corrosive metal sheet to span gaps in substrate plane and to make a smooth transition from one plane to the other. Membrane shall be continuously supported by substrate.
9. At through-wall flashings, provide an additional 6 inch wide strip of manufacturer’s recommended membrane counterflashing to seal top of through-wall flashing to membrane. Seal exposed top edge of strip with non-corrosive termination bar and sealant.
10. Do not allow materials to come in contact with chemically incompatible materials.
11. Inspect installation prior to enclosing assembly and repair punctures, damaged areas, and inadequately lapped seams with a patch of membrane lapped as recommended by manufacturer.
12. Meet specified installed, in place, peel adhesion performance.
13. Extruded Silicone Flexible Flashing and Transition: Comply with manufacturer’s instructions and recommendations.
    a. Clean substrates to remove all contamination and bond breakers.
    b. Confirm substrate moisture and temperature are within manufacturer’s recommended limits.
    c. Apply primer to substrates recommended by flashing manufacturer.
    d. For visible locations, mask installation area to control spillage and migration.
    e. Provide continuous adhesive/sealant to bond flashing into place.
    f. Provide bonding area shown or, if not shown, minimum 0.75 inch on each side of joint.
    g. Embed flashing into uncured, fresh adhesive/sealant.

h. Roll installed flashings into adhesive/sealant with pressure.

i. Hold flashing in place until adhesive/sealant grabs and holds.

j. Complete horizontal work before vertical work.

k. Remove masking and spilled adhesive/sealant.

l. Provide uniform, straight, flashings free from wrinkles, fish mouths, and distortion.

m. Provide well adhered flashings which meet manufacturer's adhesion performance.

n. Provide 100 percent waterproof assemblies including terminations and intersections.

14. Limitations: Use sheet metal flashings and non-flexible flashings at the following locations and conditions.

a. Where flashing is visible.

b. Where flashing is exposed to sunlight and manufacturer restricts sunlight exposure.

c. Where sealant is shown adhered to the flashing.

d. Where metal flashing is shown, indicated, or identified.

e. Where flashing is in contact with materials containing creosote or coal tar, or pressure treated wood.

f. Where flexible flashing cannot be practically installed due to its self-adhesive properties.

g. When environmental conditions during installation are outside flashing manufacturer's limits.

3.10 FIELD QUALITY CONTROL

A. Structural Requirements: The Owner will engage an independent testing and inspecting agency to perform field inspections and tests and to prepare test reports. Refer to Division 1 section "Independent Inspections" or "Special Inspections" for detailed bolt and weld testing requirements and coordination. The P.E. responsible for the design and engineering of the Curtain Wall Assembly of this section shall be responsible for preparing the Statement of Special Inspection required by the building code.

B. Field Air infiltration and Water Penetration Chamber Testing:

1. Owner will engage an independent, fully accredited testing agency to field test the Work of this Section for air leakage and water penetration at 1.0 times the rate specified in "Performance Requirements" Article of this specification, tested according to AAMA 503-08:

a. For curtain wall systems, air infiltration test shall be ASTM E783 and water penetration test shall be ASTM E1105. The Glazing Subcontractor

shall propose the testing scope, location, and schedule for review by the Architect and Owner.

b. Tests shall include:

1) Curtain Wall Fixed Assemblies: Three (3) vertical assemblies during each stage.

c. Tests shall be performed at the beginning, middle and end stages of installation for each system.

d. Wherever possible, test area shall incorporate interface conditions with adjacent cladding systems.

e. Insect screens shall be removed prior to commencing testing.

f. Interior side of test area shall be left open and unobstructed, permitting the full length of all joints to be examined from the indoor side.

2. Water infiltration criteria shall conform to the requirements of Part 1.

3. In the event of failure, additional field testing in accordance with AAMA 501.2 may be required to isolate the point(s) of entry and leak path(s) so that appropriate corrective action can be developed and implemented by the Glazing Subcontractor.

4. Failure shall be defined as air leakage rate greater than allowable and uncontrolled water penetration as defined in “Performance Requirements” Article of this Specification.

5. In the event of failure, corrective measures shall be made, and additional testing shall be performed until a passing result is achieved.

6. All recommended corrective measures (if required) shall be approved in writing by the Architect and/or the Owner’s Designated Representative.

a. Repair or remove work where test results indicate air/water infiltration of systems.

b. Perform additional testing to determine air/water infiltration resistance of replaced or additional work.

c. Corrective work and subsequent retesting shall be performed at no additional cost to the Owner. Glazing Subcontractor shall also pay any additional fees and expenses incurred by the Architect, and their consultants.

d. Perform an additional test at one new location for each failure, at no cost to the Owner. Glazing Subcontractor shall also pay any additional fees and expenses incurred by the Architect, and their consultants.

e. All corrective measures required to pass testing shall be implemented throughout the remainder of the project where applicable.

C. Field Water Hose Testing:

1. Owner will engage an independent, fully accredited testing agency to field test the Work of this Section for water penetration resistance in accordance with the following:

a. Water tests shall be performed at the beginning and end stages of installation for each of the following systems:
   1) Curtain Wall Fixed Assembly: At least three (3) “initially successful” tests at each of the beginning and end stages of installation.
b. When possible, typical and non-typical areas (such as corners) shall be tested for each wall type.
c. Wherever possible, test area shall incorporate interface conditions with adjacent cladding systems.
d. Interior side of test area shall be left open and unobstructed, permitting the full length of all joints to be examined from the indoor side.
e. Water infiltration criteria shall conform to the requirements of Part 1.
f. Test installed glazing in accordance with AAMA 501.2. Testing shall include:
   1) At vertical façade, minimum 35 linear feet, including minimum 15 feet horizontal joints and minimum 10 feet vertical joints. Tested joints must include corner joinery.

2. In the event of failure, additional field testing in accordance with AAMA 501.2 may be required to isolate the point(s) of entry and leak path(s) for uncontrolled water penetration observed during initial field testing so that appropriate corrective action can be developed and implemented by the Glazing Subcontractor.
3. Failure shall be defined as uncontrolled water penetration, as defined in “Performance Requirements” Article of this Specification.
4. In the event of failure, corrective measures shall be made, and additional testing shall be performed until a passing result is achieved.
5. All recommended corrective measures (if required) shall be approved in writing by the Architect and/or the Owner’s Designated Representative.
   a. Repair or remove work where test results indicate water penetration of systems.
   b. Perform additional testing to determine water penetration resistance of replaced or additional work.
   c. Corrective work and subsequent retesting shall be performed at no additional cost to the Owner. Glazing Subcontractor shall also pay any additional fees and expenses incurred by the Architect, and their consultants.
   d. Perform an additional test at one new location for each failure, at no cost to the Owner. Glazing Subcontractor shall also pay any additional fees and expenses incurred by the Architect, and their consultants.
   e. All corrective measures required to pass testing shall be implemented throughout the remainder of the project where applicable.

D. Field Adhesion Testing for Sealants:

1. Field test joint-sealant adhesion to joint substrates as follows:
    a. Extent of Testing: Test completed and cured sealant joints as follows:
        1) Perform ten tests for the first 1000 feet of joint length for each type of sealant and joint substrate.
        2) Perform one test for each 1000 feet of joint length thereafter.
    b. Tests shall be performed by the sealant manufacturer(s) whose product(s) are being supplied for the sealant joint(s).
    c. Test Method: Test joint sealants according to Method A, Field-Applied Sealant Joint Hand Pull Tab, in ASTM C 1521.
    d. For joints with dissimilar substrates, verify adhesion to each substrate separately; extend cut along one side, verifying adhesion to opposite side. Repeat procedure for opposite side.
    e. Inspect tested joints and report on the following:
        1) Whether sealants filled joint cavities and are free of voids.
        2) Whether sealant dimensions and configurations comply with specified requirements.
        3) Whether sealants in joints connected to pulled-out portion failed to adhere to joint substrates or tore cohesively. Include data on pull distance used to test each kind of product and joint substrate. Compare these results to determine if adhesion passes sealant manufacturer's field-adhesion hand-pull test criteria.
    f. Record test results in a field-adhesion-test log. Include dates when sealants were installed, names of persons who installed sealants, test dates, test locations, whether joints were primed, adhesion results and percent elongations, sealant fill, sealant configuration, and sealant dimensions.
    g. Repair sealants pulled from test area by applying new sealants following same procedures used originally to seal joints. Ensure that original sealant surfaces are clean and that new sealant contacts original sealant.
    h. Evaluation of Field-Adhesion Test Results: Sealants not evidencing adhesive failure from testing or noncompliance with other indicated requirements will be considered satisfactory. Remove sealants that fail to adhere to joint substrates during testing or to comply with other requirements. Retest failed applications until test results prove sealants comply with indicated requirements.

3.11 ADJUSTING, CLEANING AND PROTECTION

A. Adjusting:

1. Adjust operating sashes, screens, hardware, and accessories for a tight fit at contact points and weather stripping for smooth operation and weather tight closure. Lubricate hardware and moving parts.

B. Protection:

1. Protect exterior glass and exposed aluminum finishes from damage immediately after installation by attaching crossed streamers to framing held away from glass. Do not apply markers to glass surface. Remove nonpermanent labels, and clean surfaces.
2. Protect glass from contact with contaminating substances resulting from construction operations, including weld splatter. If, despite such protection, contaminating substances do come into contact with glass, remove substances immediately as recommended by glass manufacturer.
3. Remove and replace glass that is broken, chipped, cracked, or abraded or that is exposed to weld splatter, permanently etched, damaged from natural causes, accidents, and vandalism, during the construction period.
4. Comply with GANA TD-03-1003 “Construction Site Protection of Architectural Glass” and glass manufacturer’s recommendations.
5. Alkaline including ammonia and trisodium phosphate can etch glass.
    a. Phosphoric and hydrofluoric acids sometimes used to clean concrete can quickly etch glass and should not come in contact with glass, glazing, and frame assemblies.
    b. Touchup Painting: Cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint shall be completed to blend with the adjacent surfaces of the Curtain Wall Assembly. Such touch up work shall be done in accordance with manufacturer’s instructions as specified herein.
    c. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing to comply with ASTM A780.

C. Cleaning:

1. Examine glass surfaces adjacent to or below exterior concrete and other masonry surfaces at frequent intervals during construction, but not less than once a month, for buildup of dirt, scum, alkaline deposits, or stains; remove as recommended in writing by glass manufacturer. Clean the glass according to the glass manufacturer’s recommendations.
2. Use only glazing gasket lubricants recommended by gasket manufacturers.
    a. Do not use soap and liquid cleaners, which can etch glass, as lubricants.
3. At completion of installation, clean the work area and the Work of this Section to remove all marks, soiling and the like, according to the glass manufacturer’s recommendations.
4. At the completion of all adjacent work by others, including services work, attend the Site, inspect the work areas generally, and repair all damage, complete or make good finishing, trimming and sealing, and replace any damaged or dislodged work
5. Finished work shall be free from defects and mechanical imperfections such as scratches, scrapes, dents, and abrasion.

6. Wash glass on both exposed surfaces in each area of Project not more than four days before date scheduled for inspections that establish date of Substantial Completion. Wash glass as recommended in writing by glass manufacturer.

3.12 PROJECT CLOSE-OUT

A. Repair and Replacement: Repair or remove and replace work that does not conform to specified requirements. Repairs made in one area shall be incorporated into all other similar areas as applicable.

B. Site Modifications: Finished work that contains unauthorized site modifications, or work not in accordance with the approved shop drawings, or submittals specified herein, may require additional modification in the field, or removal and replacement at no additional cost to the Owner. Any additional calculations and testing required for approval by the Architect shall also be provided at no additional cost to the owner.

C. Acceptance of the completed installation of the exterior wall system requires that the installation be structurally sound, weather tight, and free from defects of materials and workmanship.

End of Section

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SECTION 08 71 00
DOOR HARDWARE

PART 1- GENERAL

1.1 SUMMARY

A. Section Includes: Door hardware for wood doors, steel doors, aluminum framed entrance doors, all glass entrance doors, and miscellaneous hardware items.

B. Provide hardware not described herein but otherwise required for proper completion of the project, conforming to size, function, quality, and finish of other specified hardware.

1.2 REFERENCED STANDARDS

A. American National Standards Institute (ANSI):
1. ANSI A117.1 Accessible and Usable Buildings and Facilities

B. Builders Hardware Manufacturers Association (BHMA):
1. ANSI/BHMA A156.1 Butts and Hinges.
2. ANSI/BHMA A156.2 Bored and Preassembled Locks and Latches.
3. ANSI/BHMA A156.3 Exit Devices.
4. ANSI/BHMA A156.4 Door Controls - Closers.
5. ANSI/BHMA A156.5 Auxiliary Locks and Associated Products.
6. ANSI/BHMA A156.6 Architectural Door Trim.
7. ANSI/BHMA A156.7 Template Hinge Dimensions.
8. ANSI/BHMA A156.8 Door Controls - Overhead Stops and Holders.
9. ANSI/BHMA A156.10 Power Operated Pedestrian Doors.
10. ANSI/BHMA A156.13 Mortise Locks and Latches.
11. ANSI/BHMA A156.14 Sliding and Folding Door Hardware.
12. ANSI/BHMA A156.15 Release Devices: Closer Holders, Electromagnetic and Electromechanical.
13. ANSI/BHMA A156.16 Auxiliary Hardware.
14. ANSI/BHMA A156.17 Self-Closing Hinges and Pivots.
15. ANSI/BHMA A156.18 Materials and Finishes.
16. ANSI/BHMA A156.19 Power Assist and Low Energy Power Operated Doors.
17. ANSI/BHMA A156.21 Thresholds.
18. ANSI/BHMA A156.22 Door Gasketing and Edge Seal Systems.
19. ANSI/BHMA A156.23 Electromagnetic Locks.
20. ANSI/BHMA A156.24 Delayed Egress Locks.
21. ANSI/BHMA A156.25 Electrified Locking Devices.
22. ANSI/BHMA A156.26 Continuous Hinges.
23. ANSI/BHMA A156.28 Recommended Practices for Mechanical Keying Systems.
24. ANSI/BHMA A156.29 Exit Locks, Exit Locks with Exit Alarms, Exit Alarms, Alarms for Exit.
25. ANSI/BHMA A156.30 High Security Cylinders.

26. ANSI/BHMA A156.31 Electrified Strikes and Frame Mounted Activators.
27. ANSI/BHMA A156.115 Hardware Preparation in Steel Doors with Steel Frames.
28. ANSI/BHMA A156.115W Hardware Preparation in Wood Doors with Wood or Steel Frames.

C. Door and Hardware Institute (DHI):
1. ANSI/DHI A115.IG Installation Guide for Doors and Hardware
2. DHI Keying Systems and Nomenclature
3. DHI Sequence and Format for the Hardware Schedule

D. International Building Code (IBC)

E. National Fire Protection Association (NFPA):
1. NFPA 80 Fire Doors and Other Opening Protectives
2. NFPA 252 Fire Tests of Door Assemblies

F. Underwriters Laboratories Inc. (UL):
1. UL 10C Positive Pressure Fire Tests Of Door Assemblies
2. UL 305 Panic Hardware
3. UL 437 Drill and Pick Resistant Key Cylinders
4. UL 1034 Burglary-Resistant Electric Locking Mechanisms

1.3 SUBMITTALS

A. Products other than those designated herein must be approved as substitutions prior to submittal of Door Hardware.

B. Door Hardware Schedule: Vertical format conforming to DHI “Sequence and Format for the Hardware Schedule.” Horizontal format schedules will be rejected without review. Format shall be 8-1/2 by 11 inch page size. Organize Schedule into headings, grouping doors to receive same hardware items, indicating quantity and complete designations of every item required for each door opening. The schedule shall include:
1. Cover sheet indicating name and location of Project; name of Architect; name of Contractor; name, address and phone of hardware supplier, name of hardware consultant preparing the schedule; date of submittal or revised submittal.
2. A list of abbreviations used in schedule.
3. An index of door openings, listed in numerical order, with hardware heading identification cross-referenced to Architect’s set identification.
4. Hardware headings shall be listed in numerical order corresponding, as closely as possible, with numerical order of Architect's set numbers.
5. Each hardware heading shall have each door listed in numerical order according to door numbers in the Architect's door schedule, and denoting: location, configuration (single, pair, etc.), type (elevation, etc.), door and frame size(s), door and frame material(s), handing, fire rating, and key set identification.
6. Type, complete model number, style, function, size, hand, and finish of each door hardware item.
7. Manufacturer of each item.
8. Fastenings and other pertinent information.
9. System Description of Operation. Include description of component functions including, but not limited to, the following situations: normal

secured/unsecured state of door; authorized access; authorized egress; unauthorized access; unauthorized egress; fire alarm and loss of power conditions, and interfaces with other building control systems.

C. Manufacturer's Technical Product Data / Catalog Cut Sheets: Clearly marked for each hardware item, including installation details, material descriptions, dimensions of individual components and profiles, and finishes. Format shall be 8-1/2 by 11 inch page size.

D. Wiring Diagrams: No later than 14 days after receipt of reviewed hardware schedule submittal, submit detailed wiring diagrams for power, signaling, monitoring, and control of the access control system electrified hardware; identified by door number(s), and detailed specifically for each type and function of electrified door opening. Format shall be 8-1/2 by 11 inch page size. Include the following:
   1. System Description of Operation. Include description of component functions including, but not limited to, the following situations: normal secured/unsecured state of door; authorized access; authorized egress; unauthorized access; unauthorized egress; fire alarm and loss of power conditions, and interfaces with other building control systems.
   2. Elevation single-line diagram, showing interface between electrified door hardware and fire alarm, power, access control, and security systems as applicable.
   3. Point-to-point wiring diagram for field-installed wiring.

E. Keying Schedule: In accordance with Owner's final keying instructions for locks. Conform to DHI “Keying Systems and Nomenclature.” Format shall be 8-1/2 by 11 inch page size.

F. Operation and Maintenance Data: Provide complete operating and maintenance instructions listing routine maintenance procedures, possible breakdowns and repairs, and troubleshooting guides.

G. Qualification Data: For firms and persons specified in "Quality Assurance" Article.

H. Warranties: Special warranties specified in this Section.

1.4 QUALITY ASSURANCE

A. Obtain each type and variety of door hardware from a single manufacturer, unless otherwise indicated.

B. Manufacturers, Hardware Supplier, and Installer shall have no less than five years experience in the provision of Door Hardware for projects similar in size, complexity and type to this Project.

C. Hardware Schedule and Keying Schedule submittals shall be prepared by a Hardware Consultant holding the credentials of Architectural Hardware Consultant (AHC) issued by the Door and Hardware Institute. Hardware Consultant shall have no less than five years experience in the scheduling of Door Hardware for projects similar in size, complexity and type to this Project; and shall be available, at no additional cost, during the course of the Work to

consult with Contractor, Architect, and Owner regarding door hardware and keying.

D. Pre-Submittal Conference: Conduct coordination conference in compliance with requirements in Division 01 Section "Project Meetings" with attendance by representatives of Supplier(s), Installer(s), and Contractor(s) to review proper methods and the procedures for receiving, handling, and installing door hardware.
   1. Prior to installation of door hardware, conduct a project specific training meeting to instruct the installing contractors' personnel on the proper installation and adjustment of their respective products. Product training to be attended by installers of door hardware (including electromechanical hardware) for aluminum, hollow metal and wood doors. Training will include the use of installation manuals, hardware schedules, templates and physical product samples as required.
   2. Inspect and discuss electrical roughing-in, power supply connections, and other preparatory work performed by other trades.
   3. Review sequence of operation narratives for each unique access controlled opening.
   4. Review and finalize construction schedule and verify availability of materials.
   5. Review the required inspecting, testing, commissioning, and demonstration procedures

1.5 REGULATORY REQUIREMENTS

A. Fire-Rated Door Assemblies: Provide door hardware for assemblies complying with all applicable regulations, listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction.
   1. At rated doors with panic exit devices, provide devices labeled as “Fire Exit Device.”

B. Comply with all applicable accessibility regulations as set forth in Americans with Disabilities Act (ADA) -- Accessibility Guidelines for Buildings and Facilities (ADAAG) and ANSI A117.1 as applicable.

C. Latching and locking doors that are hand-activated and that are in a path of travel shall be operable with a single effort by lever-type hardware, panic bars, push-pull activating bars, or other hardware designed to be easy to grasp with one hand, not requiring tight grasping, tight pinching or twisting of the wrist; from egress side shall not require the use of a key, tool, or special knowledge for operation.
   1. All hand-activated hardware shall be mounted between 34 inches and 48 inches above finished floor.

D. At sliding doors, when fully open, operating hardware shall be exposed and usable from both sides.

E. Door closing devices shall comply with the following maximum opening-force requirements:
   1. Interior Hinged Doors: 5 lbf applied perpendicular to door at latch.
   2. Exterior Hinged Doors: 5 lbf applied perpendicular to door at latch.

3. Sliding or Folding Doors: 5 lbf applied parallel to door at latch.
4. Fire Rated Doors: 5 lbf applied perpendicular to door at latch. To insure latching, may be increased to the minimum force allowable by the appropriate administrative authority, not to exceed 15 lbf.

F. Where door closers are provided, adjust sweep speed so that from an open position of 90 degrees, the time required to move the door to a position of 12 degrees from the latch is 5 seconds minimum.

G. Thresholds shall be maximum 1/2 inch in height above floor and landing on both sides of openings. Bevel raised thresholds with a slope of not more than 1:2.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Each article of hardware shall be delivered individually packaged in the manufacturer's standard commercial carton or container, and shall be properly marked or labeled to be readily identifiable with the approved hardware schedule.

B. Manufacturer's printed installation instructions, fasteners, and special tools shall be included in each package.

C. Hardware shall be stored in a dry, secure locked area, complete with shelving for unpacking and sorting of the door hardware.

D. Deliver all master keys by restricted, receipted delivery directly from the manufacturer to the Owner.

1.7 COORDINATION

A. Provide hardware templates to the parties involved for doors, frames, and other work specified to be factory prepared for door hardware. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing door hardware to comply with indicated requirements.

B. When required by door or frame fabricator, furnish physical samples of each mortised and recessed hardware item required.

C. Coordinate layout and installation of recessed pivots and closers with floor construction.

D. Electrical System Rough-in: Coordinate layout and installation of electrified door hardware with connections to power supplies, fire alarm system and detection devices, access control system, and security system as applicable.

E. Pre-Installation Conference: Arrange conference at job site to coordinate door, frame, hardware and electronic security hardware installation; to be attended by the Architect, Owner, Contractor and representative personnel of firms involved in the provision and installation of said items.

F. Keying Conference: Arrange conference with Owner, or designated representative, and Manufacturer’s/ Hardware Supplier’s Architectural Hardware Consultant to establish keying requirements. Incorporate keying conference decisions into Keying Schedule.

1.8 WARRANTY

A. In addition to, and not precluding, other warranty requirements in the Contract Documents, the following hardware items shall carry extended minimum warranties as indicated:
1. Hinges: Ten years from date of Substantial Completion.
2. Locks: Five years from date of Substantial Completion.
3. Exit Devices: Three years from date of Substantial Completion.
4. Door Closers: Ten years from date of Substantial Completion.

1.9 MAINTENANCE

A. Furnish a complete set of specialized tools and maintenance instructions as needed for Owner's continued adjustment, maintenance, and removal and replacement of door hardware.

PART 2- PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A. Subject to compliance with requirements herein, provide products by one of the following manufacturers for each type of hardware:
1. Butt Hinges: Ives, McKinney, Stanley.
2. Continuous Pinned Hinges: Architectural Builders Hardware, Hager, Ives, Markar, Select.
3. Continuous Geared Hinges: Architectural Builders Hardware, Hager, Ives, National Guard Products, Pemko, Select.
4. Cylinders and Keying: Schlage E key system Primus by AA Lock.
5. Locksets and Latchsets: Corbin Russwin, Sargent, Schlage.
6. Exit Devices: Corbin Russwin, Sargent, Von Duprin.
7. Exterior Weatherized Exit Devices: Detex
8. Electric Strikes: Hanchett Entry Systems (HES), SDC, Von Duprin.
9. Electrical Power Transfers: Architectural Builders Hardware, Securitron, Von Duprin.
10. Power Supplies for Electrified Hardware: Securitron, Security Door Controls, Von Duprin.
11. Flush Bolts and Door Coordinators: Architectural Builders Hardware, Ives, Rockwood.
12. Surface Door Closers: Dorma 8900 Series, LCN 4000 Series, Norton 7500 Series.
13. Overhead Holders and Stops: Architectural Builders Hardware, Glynn-Johnson, Rixson.
14. Electromagnetic Holder / Releases: Architectural Builders Hardware, LCN, Rixson.
15. Architectural Door Trim: Architectural Builders Hardware, Ives, Rockwood.
16. Auxiliary Hardware: ABH, Ives, Rockwood.
17. Door Bottoms, Metal Thresholds, Weatherstripping and Gaskets: National Guard Products, Pemko, Reese, Zero.
18. Key Storage System: Lund, MMF Industries, Telkee.

2.2 MATERIALS AND FABRICATION

A. Requirements for grade, materials, size, and other distinctive qualities of each type of door hardware are indicated herein. Furnish items in types, sizes or

weight, in accordance with manufacturer's standards, appropriate for the conditions of installation and service, unless otherwise indicated.

B. Products named or identified by make or model number, or other designation and described herein are base products. Base products establish the standards of type, in-service performance, physical properties, appearance, warranty, cost, and other characteristics required by the Project.

2.3 FASTENERS

A. Provide concealed fasteners for hardware items on exterior doors which are exposed when door is closed.

B. Combination machine screws and expansion shields shall be used for attaching hardware to concrete or masonry.

C. Fasteners exposed to the weather in the finished work shall be of brass, bronze, or stainless steel.

2.4 BUTT HINGES

A. Butt hinges shall meet ANSI/BHMA A156.1 requirements.

B. Hinge dimensions shall conform to ANSI/BHMA A156.7.

C. Base Metal shall be steel plated for fire-rated doors; bronze or stainless steel for exterior outswinging doors; bronze or plated steel elsewhere as scheduled.

D. Provide hinges with antifriction bearings for doors with closers.

E. Unless otherwise indicated, provide hinges in heights as follows:
1. Doors to 36 inches wide up to 1-3/4” thick: 4-1/2 inches standard weight.
2. Doors to 36 inches wide more than 1-3/4” thick: 5 inches heavy weight.
3. Doors over 36 inches to 48 inches wide: 5 inches heavy weight.
4. Doors over 48 inches wide or more than 1-3/4” thick: 6 inches heavy.
5. Doors over 1-3/4 inch thick shall be per hinge manufacturers published listings or recommendations.

F. Provide in minimum width sufficient to clear trim when door swings 180 degrees, whether or not shown on Drawings to swing 180 degrees.

G. Number of hinges per leaf shall be as follows:
1. Doors to 60 inches in height: 2 hinges.
2. Doors over 60 to 90 inches in height: 3 hinges.
3. Doors over 90 to 120 inches in height: 4 hinges.
4. For doors over 120 inches in height: 4 hinges plus 1 hinge for every 30 inches, or fraction thereof, door height greater than 120 inches.

H. Screws: Flat head wood screws not less than 1-1/2 inches long for hinges for wood doors; flat head machine screws elsewhere.

I. Hinges for reverse bevel doors with locks shall have pins that are made non-removable when the door is in the closed position by means of a set screw in the hinge pin barrel.

J. Electrified hinges:
1. Coordinate number and size of wires for electrified hardware served.
2. Provide junction box/ mortar shield for each electrified hinge.

2.5 CONTINUOUS PINNED HINGES

A. Continuous hinges shall meet ANSI/BHMA A156.26 requirements.

B. Type: Pin and barrel construction; 1/4 inch diameter stainless steel pin; split nylon or stainless steel bearings. Fabricated from 14 gauge cold-rolled steel or 304 stainless steel as indicated.

C. Provide in minimum width sufficient to clear trim when door swings 180 degrees, whether or not shown on Drawings to swing 180 degrees.

D. Hole pattern for fasteners shall be symmetrical and located to template dimensions.

2.6 CONTINUOUS GEARED HINGES

A. Continuous hinges shall meet ANSI/BHMA A156.26 requirements.

B. Type: Heavy duty assembly of 3 interlocking aluminum extrusions. Door leaf and jamb leaf shall be continuously geared together the full hinge length; secured together with full length cover channel permitting 180 degree operation. Vertical door loads carried on integrated thrust bearings spaced no more than 3 inches apart.

C. Hinges shall have non-removable cap at hinge top to prevent foreign material from becoming lodged in hinge gear mechanism.

D. Unless otherwise noted, provide factory finished to match door and frame finish.

E. Hole pattern for fasteners shall be symmetrical and located to template dimensions.

2.7 PIVOT HINGES

A. Pivot hinges shall meet ANSI/BHMA A156.4 Grade 1 requirements.

B. Pivots shall be constructed of steel, cast or forged bronze, or stainless steel as indicated by BHMA finish specified.

C. Where offset pivots are used, provide intermediate pivots as follows:
1. Doors over 60 to 90 inches in height provide one intermediate pivot.
2. For doors over 90 inches in height provide one additional intermediate pivot for every 30 inches, or fraction thereof.

D. Electrified pivots:
1. Coordinate number and size of wires for electrified hardware served.
2. Provide junction box/ mortar shield for each electrified pivot.

2.8 CYLINDERS, KEYING AND KEY STORAGE

A. Lock cylinders shall meet ANSI/BHMA A156.5 requirements.

B. Keying system shall meet ANSI/BHMA A156.28 requirements.

C. All cylinders shall be interchangeable core type.

D. Cylinders at exit devices shall be interchangeable core type. Provide mortise or rim type cylinders as required by device for all exit devices having key locking function.

E. Cylinders shall be High-Security type, listed and labeled as complying with drill and pick-resistant testing requirements of UL 437.

F. A new great grand master keying system shall be provided.

G. Keying shall be provided to integrate with existing system as directed.

H. Cylinders shall be keyed according to approved Keying Schedule.

I. Provide a temporary keying system for interim use during construction.

J. Provide change keys in individual envelopes for each cylinder delivered. Envelopes shall be marked with respective door identification numbers.

K. Key set symbol, and inscription "Do Not Duplicate" shall be stamped on all keys.

L. Keys shall be supplied as follows:
1. Locks: 3 change keys each lock.
2. Master keyed sets: 2 keys each set.
3. Grand master keys: 5 total.
4. Great Grand master keys: 5 total.
5. Interchangeable Core control keys: 2 total.
6. Construction keys: 10 total.
7. Blank keys: 100 total.

M. Provide Key Storage / Control System conforming to ANSI/BHMA A156.5, including key-holding hooks, labels, two sets of key tags with self-locking key holders, key-gathering envelopes, and temporary and permanent markers. Contain system in metal cabinet with baked-enamel finish and key locking door.
1. Key tags and holders shall be inscribed with key-change number and key-control to conform with approved hardware schedule for identification.
2. Key Storage System shall be large enough to accommodate 150 percent of the facility.

N. Subject to compliance with requirements, provide emergency entrance key vault(s); Knox Company 3200 Series, or equal.
1. Finish Color - Black, Dark Bronze or Aluminum as selected by Architect.
2. Where indicated provide security key override switches for electrically activated openings.
3. Coordinate and provide keying and type per fire/ police department, and other jurisdictional agency requirements.

2.9 LOCKSETS AND LATCHSETS

A. Mortise Locks and Latches shall meet ANSI/BHMA A156.13 Grade 1 requirements.

B. Cylindrical Locks and Latches shall meet ANSI/BHMA A156.2 Series 4000 Grade 1 requirements.

C. Interconnected Locks and Latches shall meet ANSI/BHMA A156.12 requirements.

D. Auxiliary Locks shall meet ANSI/BHMA A156.5 requirements.

E. Electrified Locks shall also meet ANSI/BHMA A156.25 requirements.

F. Operating trim shall be lever type: Refer to hardware sets.

G. Lock functions which include thumb turn trim shall be provided with thumb turns compliant with accessibility code requirements.

H. Lock Throw: Comply with requirements for length of latch bolts to comply with labeled fire door requirements.

I. Lock backset shall be 2-3/4 inches unless otherwise indicated.

J. Where thumb turns are used, thumb turns to meet ANSI 117.1 requirements and be listed as meeting Accessibility requirements. Corbin Russwin Ergonomic or Schlage L583-363 EZ-Turn to be used.

K. Provide curved-lip strike with dust box for each latch or lock bolt, with lip extended to protect frame, finished to match door hardware set, unless otherwise indicated.

L. Electromechanical locksets utilized at fire rated openings shall be listed and labeled by a testing agency acceptable to authorities having jurisdiction, and shall maintain door in positive latched position when power is off.

2.10 STRIKES AND HINGE FILLER PLATES

A. At existing frames, provide new strike prep where required. Provide strike cover plate where locking device is changed.

B. Provide hinge filler plates as required.

2.11 EXIT DEVICES

A. All exterior doors to be less dogging.

B. All exterior doors to have latchbolt monitoring.

C. Interior doors to have latchbolt monitoring where indicated in sets.

D. Exit devices and exit device accessories shall meet ANSI/BHMA A156.3, Grade 1 requirements.

E. Electromechanical exit devices shall also meet ANSI/BHMA A156.25 requirements.

F. Panic Exit Devices: Listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for panic protection, based on testing according to UL 305.

G. Fire Exit Devices: Complying with NFPA 80 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire and panic protection, based on testing according to UL 305 and NFPA 252.

H. Outside Trim: Design, material and finish to match locksets, unless otherwise indicated.

I. Adjustable strikes shall be provided for rim type and vertical rod devices.

J. Fire Exit Removable Mullions: Where indicated, provide removable mullions for use with fire exit devices complying with NFPA 80 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire and panic protection, based on testing according to UL 305 and NFPA 252. Mullions shall be used only with exit devices for which they have been tested.

K. Electromechanical exit devices utilized at fire rated openings shall be listed and labeled by a testing agency acceptable to authorities having jurisdiction, and shall maintain door(s) in positive latched position when power is off.

2.12 ELECTRIC STRIKES

A. Electric strikes shall meet ANSI/BHMA A156.31 Grade 1 requirements, and be listed and labeled under UL 1034 Burglary Resistant Electric Locking Equipment.

B. Electric strikes for fire rated openings shall be listed and labeled for such use by a testing agency acceptable to authorities having jurisdiction. Fail Secure (fail locked) strikes shall be used at all fire rated openings.

2.13 ELECTROMAGNETIC LOCK ASSEMBLIES

A. Electromagnetic lock assemblies shall meet ANSI/BHMA A156.23 Grade 1 requirements.

B. Locks shall be field-selectable for 12 or 24 VDC operation, and provide 1,500 lbf minimum holding force for direct pull applications and 2,000 lbf holding force for shear type applications.

C. Wiring connections shall be via on-board screw terminal connections. Lock shall have built-in circuit/ surge and voltage kickback suppression protection.

D. Where indicated, locks shall be equipped with concealed sensors to monitor magnetic bond status and door position status.

E. Locks used on fire rated doors shall be listed and labeled for such use by a testing agency acceptable to authorities having jurisdiction.

2.14 ELECTRICAL POWER TRANSFERS

A. Electrical power transfers shall be capable of transferring sufficient electrical current to properly operate electrified hardware in door.

B. Electrical power transfers used on fire rated doors shall be listed and labeled by a testing agency acceptable to authorities having jurisdiction.

2.15 POWER SUPPLIES FOR ELECTRIFIED HARDWARE

A. Power supplies shall be UL listed for applicable use; shall be housed in an approved enclosure; and provide both Class 1 and Class 2 outputs. Power Supplies to be Securitron AQD6-8F8R.

B. Output shall be filtered and regulated. Relay, timer, and logic modules shall be provided as required for interface to related security components; and shall be assembled, connected, and fully contained within the power supply enclosure. A fire alarm emergency release input terminal shall be provided for connection to fire / life safety system.

C. Power supplies shall provide sufficient power capacity for the worst-case condition that could occur in the operating environment without any loss or degradation of operation.

2.16 FLUSH BOLTS

A. Automatic flush bolts shall meet ANSI/BHMA A156.3

B. Manual flush bolts shall meet BHMA A156.16 requirements.
1. Bottom bolt shall have 12 inch long operating rod. Top bolt operating rod shall be determined by door height, assuring the operator is located less than 72 inches above the floor.
2. Manual Flush Bolts are not to be utilized except where a pair of non-rated doors serving a room not normally occupied is needed for the movement of equipment.

C. Provide dust proof strikes for bottom bolts. Dust proof strikes shall meet BHMA A156.16.

2.17 DOOR COORDINATORS

A. Door coordinators shall meet ANSI/BHMA A156.3 requirements.

B. Door coordinators shall be flat bar type; stop mounted with all necessary filler bars and mounting brackets to accommodate required hardware.

C. Provide carry bar at each pair of doors equipped with an overlapping astragal, except when automatic or self-latching bolts are used.

2.18 SURFACE DOOR CLOSERS

A. Door closing devices shall meet ANSI/BHMA A156.4, Grade 1 requirements.

B. Surface closers shall be fully adjustable with sweep speed, latch speed and back check position valves.

C. Provide closers size adjusted in accordance with ANSI/BHMA A156.4; sized as required to insure closing and latching of doors.

D. Arm selection shall follow the requirements of the manufacturer's recommendations with brackets, drop plates and miscellaneous accessories provided as necessary.

E. Provide closers with arms designed to permit openings of doors as far as job conditions will permit; unless otherwise indicated closers with arms restricting opening of door will not be acceptable.

F. Electrified closers where indicated in hardware sets shall be tied into building fire alarm system to release upon fire-alarm activation or loss of power.

2.19 OVERHEAD CONCEALED DOOR CLOSERS

A. Overhead Concealed Door Closers shall meet ANSI/BHMA A156.4 requirements.

B. Closers shall be fully adjustable with sweep speed, latch speed and back check position valves.

C. Provide closers size adjusted in accordance with ANSI/BHMA A156.4; sized as required to insure closing and latching of doors.

2.20 OVERHEAD HOLDERS AND STOPS

A. Overhead holders and stops shall meet ANSI/BHMA A156.8 requirements.

B. Overhead door holders and stops shall be adjustable from 90 to 110 degrees dead stop or hold open position, as applicable.

C. Overhead door stops shall have shock absorbers providing 5 to 7 degrees compression before dead stop.

D. Overhead stops shall not be provided with hold open function when used at fire rated doors.

2.21 ELECTROMAGNETIC HOLDER / RELEASES

A. Electromagnetic holders shall meet ANSI/BHMA A156.15 requirements.

B. Size and configuration shall provide degree of swing and hold open position as indicated on the drawings.

2.22 ARCHITECTURAL DOOR TRIM

A. Architectural door trim shall meet ANSI/BHMA A156.6 requirements.

B. Door Protection Plates: Kick, mop, and armor plates shall be 0.050 inch thick brass, bronze, or stainless steel depending on finish indicated. Plates shall have beveled edges, and shall be provided with countersunk mounting holes and No. 6 oval head screw fasteners. Width of kick and armor plates shall be 2 inches less than door width for single doors and 1 inch less for pairs of doors. Width of

mop plates shall be 1 inch less than door width. Unless otherwise indicated, height shall be 10 inches for kick and mop plates, and 34 inches for armor plates.

1. At fire rated doors, provide UL labeled protection plates in sizes, types, fasteners and materials only in accordance with door manufacturer's listings for respective ratings.

C. Door Edging and Astragals: Fabricated from 18 gauge cold-rolled steel or 304 stainless steel as indicated; factory prepared for all mortise hardware; countersunk screw mounting.

1. At fire rated doors, provide UL labeled edge protection in sizes, types, fasteners and materials only in accordance with door manufacturer's listings for respective ratings.

D. Push and pull plates shall be 0.050 inch thick brass, bronze, or stainless steel depending on finish indicated. Plates shall have beveled edges, and shall be furnished with countersunk mounting holes and No. 6 oval head screw fasteners. Pull plates shall also be furnished with flat-head through bolts for pull grip.

E. Push and pull bars and grip handles shall be brass, bronze, or stainless steel depending on BHMA finish indicated.

2.23 AUXILIARY HARDWARE

A. Auxiliary hardware shall meet ANSI/BHMA A156.16 requirements.

B. Door Stops: Stops shall be of heavy duty construction, provided in finish indicated. Wall bumpers shall have no visible fasteners. Floor stops shall be of height required by floor conditions.

C. Silencers: Gray rubber, non-marring configured for metal or wood frames as scheduled. Provide 3 per single door and 2 per pair of doors. Silencers shall be tamper resistant once installed in door frame.

2.24 DOOR BOTTOMS

A. Door bottoms shall be of aluminum or extruded bronze of the type and finish indicated and shall provide proper clearance and an effective seal with specified thresholds.

B. Door bottom shall have a vinyl, neoprene, silicone rubber, polyurethane or brush seal as indicated.

C. The door bottom shall exclude light when the door is in the closed position and shall inhibit the flow of air through the unit.

2.25 ELECTRONIC ACCESSORIES

A. Request-to-Exit Motion Sensor shall be SDC, Securitron XMS or Schlage Scan II as indicated in hardware sets specifically designed for detecting exiting through a door from the secure area to a non-secure area. Include built-in timers (up to 60 second adjustable timing), door monitor with sounder alert, internal vertical pointability coverage, 12VDC or 24VDC power and selectable relay trigger with fail safe/fail secure modes.

B. Push-Button Switches shall be Securitron, SDC or Schlage as indicated in hardware sets. Industrial grade momentary or alternate contact, back-lighted push buttons with stainless-steel switch enclosures. 12/24 VDC bi-color illumination suitable for either flush or surface mounting.

C. Key Switches shall be Securitron, SDC, or Schlage as indicated in hardware sets. furnished standard with stainless steel single gang face plate with a 12/24VDC bi-color LED indicator. Integral backing bracket permits integration with any 1 1/4" or 1 1/2" mortise type cylinder. Key switches available as momentary or maintained action and in narrow face plate options.

2.26 METAL THRESHOLDS

A. Thresholds shall meet ANSI/BHMA A156.21 requirements.

B. Thresholds shall be heavy-gauge aluminum or bronze of the configuration and finish indicated, and shall provide an effective seal with door bottom.

C. Where required, thresholds shall be prepared to accommodate floor closers, pivots, and projecting bolts of latching hardware.

D. Thresholds at floor closers shall have mitered returns and removable access portion for floor closer maintenance.

E. Provide thresholds at doors where indicated. Refer to Door Schedule and Drawing details for type and configuration required. Additionally, where combustible flooring passes under doors, provide fire door thresholds in accordance with applicable regulatory requirements.

2.27 METAL HOUSED TYPE WEATHERSTRIP

A. Metal Housed Type Weatherstrip shall meet ANSI/BHMA A156.22 requirements.

B. Metal Housed Type Weatherstrip shall be aluminum or bronze of the type and finish indicated, comprised of metal retainers with vinyl, neoprene, silicone rubber, polyurethane or brush inserts as indicated.

2.28 GASKETING

A. Gasketing shall meet ANSI/BHMA A156.22 requirements.

B. Shall be a compression type product for use with wood or steel doors; labeled for use on smoke-control and fire-rated doors where required.

2.29 FINISHES

A. Provide hardware in finishes as indicated.

B. Unless otherwise indicated, finishes shall conform to those identified in ANSI/BHMA A156.18.

PART 3- EXECUTION

3.1 EXAMINATION

A. Examine doors and frames for compliance with requirements for installation tolerances, labeled fire door assembly construction, wall and floor construction, and other conditions affecting performance.

B. Examine rough-in for electrical power systems to verify actual locations of wiring connections before electrified door hardware installation.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Steel doors shall be factory prepared for hardware per ANSI/BHMA A156.115.

A. Wood doors shall be factory prepared for hardware per ANSI/BHMA A156.115W.

B. Installation shall be in accordance with DHI A115.IG.

C. Hardware for fire door assemblies shall be installed conforming with NFPA 80, and all other applicable building codes and regulations.

D. Hardware for smoke door assemblies shall be installed conforming with NFPA 105, and all other applicable building codes and regulations.

E. Install each door hardware item according to manufacturer's printed instructions, utilizing templates and proper fasteners provided by manufacturer.

F. Set units level, plumb, and true to line and location. Adjust and reinforce attachment substrates for proper installation and operation.

G. Where cutting and fitting are required to install door hardware onto or into surfaces that are later to be painted or finished in another way, coordinate removal, storage, and reinstallation of surface protective trim units with finishing work specified in other Sections. Do not install surface-mounted items until finishes have been completed on substrates involved.

H. Install each door hardware item to comply with manufacturer's written instructions. Install overhead surface closers for maximum degree of opening obtainable. Place on room side of corridor doors, stair side of stair doors, secondary corridor side of doors between corridors. Where cutting and fitting are required to install door hardware onto or into surfaces that are later to be finished, coordinate removal, storage, and reinstallation of surface protective trim units with finishing work specified in Division 09 Sections. Do not install surface-mounted items until finishes have been completed on substrates involved.

I. All wall stops shall be installed with reinforced blocking in wallboard construction. Drywall anchors are not an acceptable means of reinforcement/blocking. Provide intermediate steel plates or channel reinforcement backing at wall stops mounted in wallboard construction.

J. Do not install permanent key cylinders in locks until the time of preliminary acceptance by the Owner. At the time of preliminary acceptance, and in the presence of the Owner's representative, permanent key all lock cylinders. Record and file all keys in the key control system specified, and turn system over to Owner for sole possession and control.

K. Key control storage system shall be installed where directed by the Owner.

L. Thresholds: Thresholds shall be secured with a minimum of 3 fasteners per single door width and 6 fasteners per double door width with a maximum spacing of 12 inches (305 mm). Minimum screw size shall be No. 10 length, dependent on job conditions, with a minimum of 3/4 inch (19 mm) thread engagement into the floor or anchoring device used. Screw heads to be countersunk and flush with face of threshold. Set thresholds for exterior and acoustical doors in full bed of sealant complying with requirements specified in Section 07 92 00 "Joint Sealants." Once installed thresholds shall not rock or cause noise when walked on.

3.3 DOOR CLOSING DEVICES

A. Surface closers on doors opening to or from halls and corridors shall be mounted on the room side of the door.

B. Surface closers on doors opening into stairs or stair vestibules shall be mounted on the stair or stair vestibule side of the door.

C. Surface closers on exterior doors shall be mounted on the interior side of building utilizing regular arm, or parallel arm mounting as required.

D. Door closing devices with adjustable spring power shall be adjusted for proper door operation, and compliance with all applicable codes and regulations.

E. Cutting of gasketing or weatherstripping to accommodate closer installation is not acceptable.

3.4 KEY CONTROL STORAGE SYSTEMS

A. Key control storage system shall be installed where directed by the Architect.

B. Place keys on markers and hooks in key control system cabinet, as determined by final keying schedule.

3.5 THRESHOLDS

A. Thresholds shall be secured with a minimum of 3 fasteners per single door width and 6 fasteners per double door width with a maximum spacing of 12 inches; with a minimum of 1 inch thread engagement into the floor or anchoring device used. Thresholds over 6 inches in width shall be secured with a double row of fasteners.

B. Exterior thresholds shall be installed in a bed of sealant with combination expansion anchors and stainless steel machine screws, except that bronze or anodized bronze thresholds shall be installed with expansion anchors with brass screws.

3.6 ASTRAGALS

A. Unless otherwise indicated install overlapping astragals as follows:
   1. At out-swing pairs of doors, mount astragal on active leaf.
   2. At in-swing pairs of doors, mount astragal on inactive leaf.

3.7 HARDWARE LOCATIONS

A. Unless otherwise indicated install hardware as follows:
   1. Bottom Hinge: 10 inches from door bottom to bottom of hinge.
   2. Top Hinge: 5 inches from door top to top of hinge.
   3. Center Hinge(s) or Pivot(s): Spaced equidistantly between top and bottom hinges/ pivots.
   4. Lockset / Latchset: 38 inches from finished floor to center of lever.
   5. Exit Device: 38 inches from finished floor to device centerline.
   6. Deadlock: 42 inches from finished floor to center key cylinder / thumb turn.
   7. Push Plate/ Pull Plate: 42 inches from finished floor to center of pull.
   8. Wall Bumper: Centered at point on wall where lever, or other operating trim, first makes contact with wall.
   9. Floor Stop: Adjacent to wall; not to exceed 4 inches from face of wall; located 3 inches from latch edge of door; in any case never more than 50 percent of door width from latch edge of door.

3.8 ADJUSTING

A. Adjust and check each operating item of door hardware and each door to ensure proper operation or function of every unit. Replace units that cannot be adjusted to operate as intended.

B. Engage a factory-authorized service representative to adjust door closing devices, compensating for final operation of heating and ventilating equipment, and to comply with referenced accessibility requirements.

C. Follow-up Adjustment: Approximately 6 months after date of Substantial Completion, Installer shall perform the following:
   1. Examine and readjust each item of door hardware as necessary to ensure function of door hardware.
   2. Consult with and instruct Owner's personnel on recommended maintenance procedures.
   3. Replace door hardware items that have deteriorated or failed due to faulty design, materials, or installation of door hardware units.

3.9 FIELD QUALITY CONTROL

A. Independent Architectural Hardware Consultant:
   1. Engage a qualified independent Architectural Hardware Consultant to perform inspections and to prepare inspection reports.
   2. Independent Architectural Hardware Consultant shall inspect door hardware and prepare written report whether installed work complies with or deviates from requirements, whether door hardware is properly installed and adjusted, and prepare a specific list of any deficiencies, a copy of which shall be provided to Architect.
   3. Contractor shall correct all deficiencies noted in above report.

4. Independent Architectural Hardware Consultant shall re-inspect door hardware and prepare a report certifying correction of deficiencies and compliance with requirements.

3.10 COMPLETION

A. When complete all hardware shall be properly secured in place and all exposed surfaces shall be clean and free from scratches, paint, and other defects and damages.

B. Contractor shall demonstrate that all keys properly operate the locks as identified in the approved Keying Schedule.

3.11 DOOR HARDWARE SETS

A. The following is a general listing of hardware requirements. Provide hardware items required by established standards and practices to meet state and local codes, whether or not specifically indicated in the following sets.

B. Silencers and gasketing, where listed in Hardware Sets, may be omitted at openings where door frames are provided with integral seals if integral seals satisfy all applicable Codes and Regulations.

C. Refer to Door Schedule and/ or Drawings for door opening information, hardware set assignment, and related requirements.

D. Provide knurled hardware at electrical, mechanical rooms.

E. Provide access control readers where indicated on Technology Drawings.

Hardware Sets

Set: 2.0

Description: Paired Opening - Access Controlled, Trash

1	Continuous Hinge	CFM_SLF-HD1		Pemko
1	Continuous Hinge	CFM_HD1 SER12		Pemko
1	Dust Proof Strike	570	US26D	Rockwood
1	Self Latch Flush Bolt Set	2845 / 2945 (as required)	US26D	Rockwood
1	Electrified Mortise Lock, RX, LX	64 LX RX 8271 LNJ	US32D	Sargent
1	Lever Protection			
2	Armor Plates	K1050 30”		
2	Surface Closer (stop)	351 CPS	EN	Sargent
1	Threshold	252 x _AFG		Pemko
1	Gasketing	290APK x 2891APK		Pemko
1	Rain Guard	346C x Width of Frame Head		Pemko
1	Gasketing	S88BL Head and Jambs		Pemko
2	Sweep	315CN		Pemko
2	Astragal	303AS		Pemko
1	Frame Wiring Harness	QC-C1500P		McKinney
1	Door Wiring Harness	QC-C300		McKinney
1	Access Control Reader	By Security Supplier		
2	Position Switch	By Security		
1	Power Supply	AQL4-R8E1 x Relays as Required		Securitron

Notes: Operation:
*Door normally closed and secured.
*Upon use of mechanical key or presentation of authorized credentials door to unlock allowing authorized entry.
*Built in request to exit switch to signal access control of authorized exit
*Upon loss of power door to remain locked from key side.
*Always free egress.
*Access Control reader by security
*Coordinate Power with Electrical/LV Contractor
* Provide Door/Frame Harnesses
* Door Position switch, where indicated by security, to monitor status of door.

Set: 3.0

Description: Paired Opening - Access Controlled, Aluminum

2	Continuous Hinge	CFM_SLF-HD1 SER12		Pemko
1	Removable Mullion	L980S / L980A (As Required) x Length Required		Sargent
1	Rim Exit Device, Storeroom, RX, ELR, Pull, LX	[12] 43 53 55 56 64 8504 862	US32D	Sargent
1	Rim Exit Device, ELR RX, Pull, LX	[12] 43 53 55 56 8510 862	US32D	Sargent
2	Conc Overhead Stop	1-ADJ Series	689	Rixson
2	Surface Closer	351 O / P10	EN	Sargent
1	Threshold	252 x _AFG		Pemko
1	Mullion Gasket	5110		Pemko
2	Frame Wiring Harness	QC-C1500P		McKinney
2	Door Wiring Harness	QC-C300		McKinney
2	Position Switch	MC-4-2		SDC
1	Power Supply where indicated on door schedule.	AQL4-R8E1 x Relays as Required		Securitron

Notes: Gasketing, Sweep, Astragal by opening manufacturer

Notes: Operation:
*Door normally closed and secured.
*Upon use of mechanical key or presentation of authorized credentials door to unlock allowing authorized entry.
*Built in request to exit switch to signal access control of authorized exit
*Upon loss of power door to remain locked from key side.
*Always free egress.
*Access Control reader by security where indicated on door schedule
*Coordinate Power with Electrical/LV Contractor
* Provide Door/Frame Harnesses
* Door Position switch, where indicated by security, to monitor status of door.

Set: 3.1

Description: Paired Opening – Stairwell Discharge, Aluminum, Reader at interior to shunt alarm

2	Continuous Hinge	CFM_SLF-HD1 SER12		Pemko
1	Removable Mullion	L980S / L980A (As Required) x Length Required		Sargent
1	Rim Exit Device, LX, RX	[12] 43 53 55 8510	US32D	Sargent
1	Rim Exit Device, Storeroom, Pull, RX, LX	[12] 43 53 55 64 8504 862	US32D	Sargent
2	Conc Overhead Stop	1-ADJ Series	689	Rixson
2	Surface Closer	351 O / P10	EN	Sargent
1	Threshold	252 x _AFG		Pemko
1	Mullion Gasket	5110		Pemko
2	Frame Wiring Harness	QC-C1500P		McKinney
2	Door Wiring Harness	QC-C300		McKinney
2	Position Switch	MC-4-2		SDC

Notes: Gasketing, Sweep, Astragal by opening manufacturer

Notes: Operation:
*Door normally closed and secured.
*Upon use of mechanical key or presentation of authorized credentials door to unlock allowing authorized entry.
*Built in request to exit switch to signal access control of authorized exit
*Upon loss of power door to remain locked from key side.
*Always free egress.
*Access Control reader by security where indicated on door schedule
*Coordinate Power with Electrical/LV Contractor
* Provide Door/Frame Harnesses
* Door Position switch, where indicated by security, to monitor status of door.

Set: 3.2				
Description: Paired Opening - Access Controlled, Hollow Metal				
2	Continuous Hinge	CFM_SLF-HD1 SER12		Pemko
1	Removable Mullion	L980S / L980A (As Required) x Length Required		Sargent
1	Rim Exit Device, LX, RX, ELR	[12] 43 53 55,56 8510 862	US32D	Sargent
1	Rim Exit Device, Storeroom, ELR, Pull, RX, LX	[12] 43 53 55 56 64 8504 862	US32D	Sargent
2	Conc Overhead Stop	1-ADJ Series	689	Rixson
2	Surface Closer	351 O / P10	EN	Sargent
1	Gasketing	S88BL Head and Jambs		Pemko
1	Perimeter Gasketing	290APK x 2891APK		Pemko
2	Sweep	315CN		Pemko
2	Astragal	303AS		Pemko
1	Threshold	252 x _AFG		Pemko
1	Mullion Gasket	5110		Pemko
2	Frame Wiring Harness	QC-C1500P		McKinney
2	Door Wiring Harness	QC-C300		McKinney
2	Position Switch	MC-4-2		SDC
1	Power Supply where indicated on door schedule.	AQL4-R8E1 x Relays as Required		Securitron
Notes: Operation: *Door normally closed and secured. *Upon use of mechanical key or presentation of authorized credentials door to unlock allowing authorized entry. *Built in request to exit switch to signal access control of authorized exit *Upon loss of power door to remain locked from key side. *Always free egress. *Access Control reader by security where indicated on door schedule *Coordinate Power with Electrical/LV Contractor * Provide Door/Frame Harnesses * Door Position switch, where indicated by security, to monitor status of door.				

Set: 5.0				
Description: Paired Opening - Exterior Aluminum, RX, LX				
2	Continuous Hinge	CFM_SLF-HD1 SER12		Pemko
1	Removable Mullion	L980S / L980A (As Required) x Length Required	PC	Sargent
2	Rim Exit Device, Exit Only, RX, LX	[12] 43 53 55 8510 EO	US32D	Sargent
2	Conc Overhead Stop	1-ADJ Series	689	Rixson
2	Surface Closer	351 O / P10	EN	Sargent
1	Threshold	252 x _AFG		Pemko
1	Mullion Gasket	5110		Pemko
2	Frame Wiring Harness	QC-C1500P		McKinney
2	Door Wiring Harness	QC-C300		McKinney
2	Position Switch	MC-4-2		SDC
Notes: Gasketing, Sweep, Astragal by opening manufacturer				

Set: 7.0

Description: Single Opening - Exterior Access Controlled, HM, Concessions

1	Continuous Hinge	CFM_HD1 SER12		Pemko
1	Electrified Mortise Lock	64 LX RX NAC-82271 LNJ	US32D	Sargent
1	Surface Closer (stop)	351 CPS	EN	Sargent
1	Threshold	252 x _AFG		Pemko
1	Gasketing	290APK x 2891APK		Pemko
1	Rain Guard	346C x Width of Frame Head		Pemko
1	Gasketing	S88BL Head and Jambs		Pemko
1	Sweep	315CN		Pemko
1	Frame Wiring Harness	QC-C1500P		McKinney
1	Door Wiring Harness	QC-C300		McKinney
1	Position Switch	MC-4-2		SDC
1	Power Supply	AQL4-R8E1 x Relays as Required		Securitron

Notes: Operation:
*Door normally closed and secured.
*Upon use of mechanical key or presentation of authorized credentials door to unlock allowing authorized entry.
*Built in request to exit switch to signal access control of authorized exit
*Upon loss of power door to remain locked from key side.
*Always free egress.
*Access Control reader by security
*Coordinate Power with Electrical/LV Contractor
* Provide Door/Frame Harnesses
* Door Position switch, where indicated by security, to monitor status of door.
*Actuator at interior side only

Set: 8.0

Description: Paired Opening - Exterior Stair to Roof

1	Continuous Hinge	CFM_SLF-HD1		Pemko
1	Continuous Hinge	CFM_SLF-HD1 SER12		Pemko
1	Flush Bolt	557 / 555	US26D	Rockwood
1	Dust Proof Strike	570	US26D	Rockwood
1	Fail Secure Lock, RX, LX	64 LX RX 82271 LNJ	US32D	Sargent
2	Surface Closer	351 O	EN	Sargent
2	Overhead Stops	9-336		Rixson
1	Threshold	252 x _AFG		Pemko
1	Gasketing	290APK x 2891APK		Pemko
1	Rain Guard	346C x Width of Frame Head		Pemko
1	Gasketing	S88BL Head and Jambs		Pemko
2	Sweep	315CN		Pemko
2	Astragal	303AS		Pemko
1	Frame Wiring Harness	QC-C1500P		McKinney
1	Door Wiring Harness	QC-C300		McKinney
2	Position Switch	MC-4-2		SDC
1	Power Supply	AQL4-R8E1 x Relays as Required		Securitron

Notes: Operation:
*Door normally closed and secured.
*Upon use of mechanical key or presentation of authorized credentials door to unlock allowing authorized entry.
*Built in request to exit switch to signal access control of authorized exit
*Upon loss of power door to remain locked from key side.
*Always free egress.
*Access Control reader by security
*Coordinate Power with Electrical/LV Contractor
* Provide Door/Frame Harnesses
* Door Position switch, where indicated by security, to monitor status of door.
*Actuator at interior side only

Set: 11.0				
Description: Single Opening – Fire Pump				
1	Continuous Hinge	CFM_HD1 SER12		Pemko
1	Storeroom/Closet Lock, RX, LX	LX, RX 64 8204 LNJ	US32D	Sargent
1	Surface Closer (stop)	351 CPS	EN	Sargent
1	Threshold	252 x _AFG		Pemko
1	Perimeter Gasket / Silencers	S88		Pemko
1	Gasketing	290APK x 2891APK		Pemko
1	Rain Guard	346C x Width of Frame Head		Pemko
1	Sweep	315CN		Pemko
1	Frame Wiring Harness	QC-C1500P		McKinney
1	Door Wiring Harness	QC-C300		McKinney
1	Position Switch	MC-4-2		SDC

Set: 12.0

Description: Single Opening - Exterior Toilet, RX, LX

1	Continuous Hinge	CFM_HD1 SER12		Pemko
1	Dormitory/Exit Lock, RX, LX	RX LX 64 8225 LNJ	US32D	Sargent
1	Surface Closer (stop)	351 CPS	EN	Sargent
1	Threshold	252 x _AFG		Pemko
1	Perimeter Gasket	S88		Pemko
1	Gasketing	290APK x 2891APK		Pemko
1	Rain Guard	346C x Width of Frame Head		Pemko
1	Door Bottom	420ASL / 434ARL		Pemko
1	Sweep	315CN		Pemko
1	Frame Wiring Harness	QC-C1500P		McKinney
1	Door Wiring Harness	QC-C300		McKinney
1	Position Switch	MC-4-2		SDC

Set: 12.1

Single Opening - Exterior Mechanical, RX, LX

1	Continuous Hinge	CFM_HD1 SER12		Pemko
1	Storeroom Lock, RX, LX	RX LX 64 8204 LNJ	US32D	Sargent
1	Surface Closer (stop)	351 CPS	EN	Sargent
1	Threshold	252 x _AFG		Pemko
1	Perimeter Gasket	S88		Pemko
1	Gasketing	290APK x 2891APK		Pemko
1	Rain Guard	346C x Width of Frame Head		Pemko
1	Door Bottom	420ASL / 434ARL		Pemko
1	Sweep	315CN		Pemko
1	Frame Wiring Harness	QC-C1500P		McKinney
1	Door Wiring Harness	QC-C300		McKinney
1	Position Switch	MC-4-2		SDC

Set: 12.2				
Single Opening - Exterior Toilets, RX, LX				
1	Continuous Hinge	CFM_HD1 SER12		Pemko
1	Classroom Lock, RX, LX	RX LX 64 8237 LNJ	US32D	Sargent
1	Surface Closer (stop)	351 CPS	EN	Sargent
1	Threshold	252 x _AFG		Pemko
1	Perimeter Gasket	S88		Pemko
1	Gasketing	290APK x 2891APK		Pemko
1	Rain Guard	346C x Width of Frame Head		Pemko
1	Door Bottom	420ASL / 434ARL		Pemko
1	Sweep	315CN		Pemko
1	Frame Wiring Harness	QC-C1500P		McKinney
1	Door Wiring Harness	QC-C300		McKinney
1	Position Switch	MC-4-2		SDC

Set: 13.0

Description: Paired Opening - Stairwell

	Transfer Hinge	T4A3786 QC	US26D	McKinney
	Hinge, Full Mortise	T4A3786	US26D	McKinney
1	Removable Mullion	L980S / L980A (As Required) x Length Required	PC	Sargent
1	Fail Secure Exit Device, RX, LX	[12] 43 53 55 64 8876 ETJ	US32D	Sargent
1	Rim Exit Device, Exit Only, RX, LX	[12] 43 53 55 8810 EO	US32D	Sargent
2	Surface Closer	351 CPS	EN	Sargent
2	Kick Plate	K1050 10" high CSK BEV	US32D	Rockwood
1	Mullion Gasket	5110		Pemko
1	Gasketing	S88BL Head and Jambs		Pemko
2	Frame Wiring Harness	QC-C1500P		McKinney
2	Door Wiring Harness	QC-C300		McKinney
2	Position Switch	MC-4-2		SDC
1	Power Supply	AQL4-R8E1 x Relays as Required		Securitron

Provide fire hold open closer at RHR leaf at door ST4-3-01

Notes: Operation:
*Door normally closed and secured.
*Upon use of mechanical key or presentation of authorized credentials door to unlock allowing authorized entry.
*Built in request to exit switch to signal access control of authorized exit
*Upon loss of power door to remain locked from key side.
*Always free egress.
*Access Control reader by security
*Coordinate Power with Electrical/LV Contractor
* Provide Door/Frame Harnesses
* Door Position switch, where indicated by security, to monitor status of door.

Set: 13.1

Description: Single Opening – Stairwell, Access Controlled

	Transfer Hinge	T4A3786 QC	US26D	McKinney
	Hinge, Full Mortise	T4A3786	US26D	McKinney
1	Fail Secure Exit Device, RX, LX	[12] 43 53 55 64 8876 ETJ	US32D	Sargent
1	Surface Closer	351 CPS	EN	Sargent
1	Kick Plate	K1050 10" high CSK BEV	US32D	Rockwood
1	Gasketing	S88BL Head and Jambs		Pemko
1	Frame Wiring Harness	QC-C1500P		McKinney
1	Door Wiring Harness	QC-C300		McKinney
1	Position Switch	MC-4-2		SDC
1	Power Supply	AQL4-R8E1 x Relays as Required		Securitron

Notes: Operation:
*Door normally closed and secured.
*Upon use of mechanical key or presentation of authorized credentials door to unlock allowing authorized entry.
*Built in request to exit switch to signal access control of authorized exit
*Upon loss of power door to remain locked from key side.
*Always free egress.
*Access Control reader by security
*Coordinate Power with Electrical/LV Contractor
* Provide Door/Frame Harnesses
* Door Position switch, where indicated by security, to monitor status of door.

Set: 15.0

Description: Paired Opening - Gym, Fitness Center

2	Continuous Hinge	CFM_SLF-HD1		Pemko
1	Removable Mullion	L980S / L980A (As Required) x Length Required	PC	Sargent
2	Rim Exit Device, Classroom, Indicator	[12] 43 49 64 8816 ETJ	US32D	Sargent
2	Surface Closer	351 CPS	EN	Sargent
2	Door Bottom	420ASL / 434		Pemko
1	Threshold	See Arch Details or 151A		Pemko
1	Gasketing	S88BL Head and Jambs		Pemko
	Astragal	303AS		Pemko

Set: 16.0

Description: Paired Opening - Vestibule - Push/Pull

2	Continuous Hinge	CFM_SLF-HD1		Pemko
2	Dummy Push Bar	8893	US32D	Sargent
2	Door Pull	862	US32D	Sargent
2	Surface Closer (stop)	351 CPS	EN	Sargent

Notes: Gasketing, Sweep, Astragal by opening manufacturer

Set: 16.2				
Description: Paired Opening - Vestibule - Push/Pull, Auditorium				
2	Continuous Hinge	CFM_SLF-HD1		Pemko
2	Dummy Push Bar	8893	US32D	Sargent
2	Door Pull	862	US32D	Sargent
2	Surface Closer (stop)	351 CPS	EN	Sargent
1	Gasketing	S88BL Head and Jambs		Pemko
2	Door Bottom	420ASL / 434		Pemko
2	Astragal	303AS		Pemko

Set: 17.0

Description: Paired Opening - Access Controlled

	Transfer Hinge	T4A3786 QC	US26D	McKinney
	Hinge, Full Mortise	T4A3786	US26D	McKinney
1	Removable Mullion	L980S / L980A (As Required) x Length Required	PC	Sargent
1	Rim Exit Device, Classroom, RX, ELR	[12] 43 55 56 8813 ETJ	US32D	Sargent
1	Rim Exit Device, Exit Only, RX	[12] 43 55 8810 EO	US32D	Sargent
2	Electromagnetic Holder	996M	689	Rixson
2	Surface Closer	351 O	EN	Sargent
2	Kick Plate	K1050 10" high CSK BEV	US32D	Rockwood
1	Perimeter Gasket	S88		Pemko
2	Astragals	303AS		Pemko
2	Frame Wiring Harness	QC-C1500P		McKinney
2	Door Wiring Harness	QC-C300		McKinney
2	Position Switch	MC-4-2		SDC
1	Power Supply	AQL4-R8E1 x Relays as Required		Securitron

Notes: Operation:
*Door normally closed and secured.
*Upon use of mechanical key or presentation of authorized credentials door to unlock allowing authorized entry.
*Built in request to exit switch to signal access control of authorized exit
*Upon loss of power door to remain locked from key side.
*Always free egress.
*Access Control reader at door 181-01 only
*Coordinate Power with Electrical/LV Contractor
* Provide Door/Frame Harnesses
* Door Position switch, where indicated by security, to monitor status of door.

Set: 17.1				
Description: Paired Opening - Access Controlled, STC				
1	Surface Vert Rod Exit, RX, ELR	[12] 43 55 56 NB8706 ETJ	US32D	Sargent
1	Fail Secure Exit Device, RX, ELR	[12] 43 55 56 NB8774 ETJ	US32D	Sargent
2	Surface Closer	351 O / P10	EN	Sargent
2	Kick Plate	K1050 10" high CSK BEV	US32D	Rockwood
2	Frame Wiring Harness	QC-C1500P		McKinney
2	Door Wiring Harness	QC-C300		McKinney
2	Position Switch	MC-4-2		SDC
1	Power Supply	AQL4-R8E1 x Relays as Required		Securitron
Gasketing, hinges by STC Door Manufacturer				
Notes: Operation: *Door normally closed and secured. *Upon use of mechanical key or presentation of authorized credentials door to unlock allowing authorized entry. *Built in request to exit switch to signal access control of authorized exit *Upon loss of power door to remain locked from key side. *Always free egress. *Access Control reader by security *Coordinate Power with Electrical/LV Contractor * Provide Door/Frame Harnesses * Door Position switch, where indicated by security, to monitor status of door.				

Set: 18.0

Description: Paired Opening - Access Controlled

	Transfer Hinge	T4A3786 QC	US26D	McKinney
	Hinge, Full Mortise	T4A3786	US26D	McKinney
1	Electrified Mortise Lock	64 RX NAC-82271 LNJ Provide LX where indicated in door schedule	US32D	Sargent
1	Auto Flush Bolt	2849	US26D	Rockwood
1	Coodinator	1700		Rockwood
2	Electromagnetic Holder	996M	689	Rixson
2	Surface Closer	351 O	EN	Sargent
2	Kick Plate	K1050 10" high CSK BEV	US32D	Rockwood
1	Perimeter Gasket	S88		Pemko
2	Astragals	303AS		Pemko
1	Frame Wiring Harness	QC-C1500P		McKinney
1	Door Wiring Harness	QC-C300		McKinney
2	Position Switch	MC-4-2		SDC
1	Power Supply	AQL4-R8E1 x Relays as Required		Securitron

Notes: Operation:
*Door normally closed and secured.
*Upon use of mechanical key or presentation of authorized credentials door to unlock allowing authorized entry.
*Built in request to exit switch to signal access control of authorized exit
*Upon loss of power door to remain locked from key side.
*Always free egress.
*Access Control reader at door 181-01 only
*Coordinate Power with Electrical/LV Contractor
* Provide Door/Frame Harnesses
* Door Position switch, where indicated by security, to monitor status of door.

Set: 19.0				
Description: Paired Opening – CTE, Media Commons				
	Hinge, Full Mortise	T4A3786	US26D	McKinney
1	Removable Mullion	L980S / L980A (As Required) x Length Required	PC	Sargent
1	Rim Exit Device, Classroom, Indicator	[12] 43 49 64 8816 ETJ	US32D	Sargent
1	Rim Exit Device, Exit Only	[12] 43 8810	US32D	Sargent
2	Surface Closer	351 CPS	EN	Sargent
2	Kick Plate	K1050 10" high CSK BEV	US32D	Rockwood
1	Perimeter Gasket	S88		Pemko
2	Astragals	303AS		Pemko
2	Door Bottom	420ASL/434		Pemko
1	Threshold	See Arch Details or 151A		Pemko

Set: 22.0				
Description: Paired Opening – Gymnasium, Aluminum				
	Hinge, Full Mortise	T4A3786	US26D	McKinney
1	Removable Mullion	L980S / L980A (As Required) x Length Required		Sargent
2	Rim Exit Device, Classroom, Indicator	[12] 43 49 64 8816 ETJ	US32D	Sargent
2	Surface Closer	351 CPS	EN	Sargent
1	Mullion Gasket	5110		Pemko
Gasketing by aluminum door manufacturer				
Set: 23.0				
Description: Single Opening - Access Controlled				
	Transfer Hinge	TA2714 QC	US26D	McKinney
	Hinge, Full Mortise	TA2714	US26D	McKinney
1	Electrified Mortise Lock	64 RX NAC-82271 LNJ Provide LX where indicated in door schedule	US32D	Sargent
1	Surface Closer	351 O / P10	EN	Sargent
1	Kick Plate	K1050 10" high CSK BEV	US32D	Rockwood
1	Stop	401 (441CU per conditions)	US26D	Rockwood
1	Perimeter Gasket / Silencers	S88 (At fire rated Openings) / Silencers(608) at Non Rated		Pemko
1	Frame Wiring Harness	QC-C1500P		McKinney
1	Door Wiring Harness	QC-C300		McKinney
1	Position Switch	MC-4-2		SDC
1	Power Supply	AQL4-R8E1 x Relays as Required		Securitron
Provide selective hold open at door closer at guidance Provide perimeter gasket, door bottom, and threshold at door 112B-01				
Notes: Operation: *Door normally closed and secured. *Upon use of mechanical key or presentation of authorized credentials door to unlock allowing authorized entry. *Built in request to exit switch to signal access control of authorized exit				

*Upon loss of power door to remain locked from key side.
*Always free egress.
*Access Control reader by security
*Coordinate Power with Electrical/LV Contractor
* Provide Door/Frame Harnesses
* Door Position switch, where indicated by security, to monitor status of door.

Set: 23.1

Description: Single Opening - Access Controlled, Both Sides

	Transfer Hinge	TA2714 QC [NRP]	US26D	McKinney
	Hinge, Full Mortise	TA2714	US26D	McKinney
1	Fail Secure Lock, Both sides	64 8273 LNJ	US32D	Sargent
1	Surface Closer	351 O / P10	EN	Sargent
1	Kick Plate	K1050 10" high CSK BEV	US32D	Rockwood
1	Stop	401 (441CU per conditions)	US26D	Rockwood
1	Perimeter Gasket / Silencers	S88 (At fire rated Openings) / Silencers(608) at Non Rated		Pemko
1	Frame Wiring Harness	QC-C1500P		McKinney
1	Door Wiring Harness	QC-C300		McKinney
1	Position Switch	MC-4-2		SDC
1	Power Supply	AQL4-R8E1 x Relays as Required		Securitron

Notes: Operation:
*Door normally closed and secured.
*Upon use of mechanical key or presentation of authorized credentials (both sides of door) door to unlock allowing authorized entry.
**Upon loss of power door to remain locked.
*Access Control reader by security
*Coordinate Power with Electrical/LV Contractor
* Provide Door/Frame Harnesses
* Door Position switch, where indicated by security, to monitor status of door.

Set: 23.2

Description: Single Opening - Access Controlled, Aluminum

	Transfer Hinge	TA2714 QC	US26D	McKinney
	Hinge, Full Mortise	TA2714	US26D	McKinney
1	Electrified Mortise Lock	64 RX LX 82271 LNJ	US32D	Sargent
1	Surface Closer	351 O / P10 x Drop plate/Blade stop spacer as required	EN	Sargent
1	Stop	401 (441CU per conditions)	US26D	Rockwood
1	Perimeter Gasket / Silencers	By aluminum door/frame manufacturer		
1	Frame Wiring Harness	QC-C1500P		McKinney
1	Door Wiring Harness	QC-C300		McKinney
1	Position Switch	MC-4-2		SDC
1	Power Supply	AQL4-R8E1 x Relays as Required		Securitron

Notes: Operation:
*Door normally closed and secured.
*Upon use of mechanical key or presentation of authorized credentials door to unlock allowing authorized entry.
*Built in request to exit switch to signal access control of authorized exit
*Upon loss of power door to remain locked from key side.
*Always free egress.
*Access Control reader by security
*Coordinate Power with Electrical/LV Contractor
* Provide Door/Frame Harnesses
* Door Position switch, where indicated by security, to monitor status of door.

Set: 25.0				
Description: Paired Opening - Gym Storage, Sound Closet				
	Hinge, Full Mortise	TA2714 / [T4A3786 at doors with panic hardware] [NRP]	US26D	McKinney
2	Flush Bolt	557 / 555	US26D	Rockwood
1	Dust Proof Strike	570	US26D	Rockwood
1	Classroom Deadlock	64 4877	US32D	Sargent
2	Roller Latch	594	US26D	Rockwood
1	Flush Pull	BF97	US32D	Rockwood
2	Surf Overhead Stop	9-ADJ Series	689	Rixson
2	Kick Plate	K1050 10" high CSK BEV	US32D	Rockwood
Set: 26.0				
Description: Single Opening - Locker Room, Multi-Stall Toilet				
	Hinge, Full Mortise	TA2714	US26D	McKinney
1	Continuous Hinge @ locker room doors	FM100		Markar
1	Classroom Deadlock	64 4877	US32D	Sargent
1	Push Pull	111x73C/73CL CFC CFTT	US32D	Rockwood
1	Surface Closer	351 O / P10	EN	Sargent
2	Kick Plate	K1050 10" high CSK BEV	US32D	Rockwood
1	Stop	401 (441CU per conditions)	US26D	Rockwood

Set: 27.0				
Description: Paired Opening - Storage				
	Hinge, Full Mortise	TA2714	US26D	McKinney
2	Flush Bolt	557 / 555	US26D	Rockwood
1	Dust Proof Strike	570	US26D	Rockwood
1	Storeroom/Closet Lock	64 8204 LNJ	US32D	Sargent
2	Surf Overhead Stop	9-ADJ Series	689	Rixson
2	Kick Plate	K1050 10" high CSK BEV	US32D	Rockwood
1	Perimeter Gasket / Silencers	S88 (At fire rated Openings) / Silencers(608) at Non Rated		Pemko

Set: 27.1				
Description: Paired Opening - Mechanical				
	Hinge, Full Mortise	TA2714 /	US26D	McKinney
2	Flush Bolt	557 / 555	US26D	Rockwood
1	Dust Proof Strike	570	US26D	Rockwood
1	Storeroom/Closet Lock	64 8204 LNJ	US32D	Sargent
1	Closer	351 UO	EN	Sargent
2	Surf Overhead Stop	9-ADJ Series	689	Rixson
2	Kick Plate	K1050 10" high CSK BEV	US32D	Rockwood
	Silencers	608		

Set: 28.0				
Description: Paired Opening – Music Storage				
	Hinge, Full Mortise	TA2714	US26D	McKinney
1	Dust Proof Strike	570	US26D	Rockwood
2	Flush Bolt	557 / 555	US26D	Rockwood
1	Classroom Lock	64 8237 LNJ	US32D	Sargent
2	Surf Overhead Stop	9-ADJ Series	689	Rixson
2	Kick Plate	K1050 10" high CSK BEV	US32D	Rockwood
	Silencers	608		
Set: 29.0				
Description: Single Opening - IDF				
	Hinge, Full Mortise	TA2714	US26D	McKinney
1	Storeroom/Closet Lock	64 76 8204 LNJ	US32D	Sargent
1	Surface Closer	351 CPS	EN	Sargent
1	Perimeter Gasket / Silencers	S88 (At fire rated Openings) / Silencers(608) at Non Rated		Pemko
Set: 30.0				
Description: Single Opening - Storeroom				
	Hinge, Full Mortise	TA2714	US26D	McKinney
1	Storeroom/Closet Lock	64 8204 LNJ	US32D	Sargent
1	Surface Closer	351 O / P10	EN	Sargent
1	Kick Plate	K1050 10" high CSK BEV	US32D	Rockwood
1	Stop	401 (441CU per conditions)	US26D	Rockwood
1	Perimeter Gasket / Silencers	S88 (At fire rated Openings) / Silencers(608) at Non Rated		Pemko
Notes: Provide knurled lever at IDF, Elevator Control Room, and Electrical rooms				

Set: 30.1				
Description: Single Opening - Electrical				
	Hinge, Full Mortise	T4A3786 [NRP]	US26D	McKinney
1	Rim Exit Device, Storeroom	[12] 43 76 8804 ETJ	US32D	Sargent
1	Surface Closer	351 CPS	EN	Sargent
1	Perimeter Gasket / Silencers	S88 (At fire rated Openings) / Silencers(608) at Non Rated		Pemko
Set: 30.2				
Description: Pair Opening - Electrical				
	Hinge, Full Mortise	TA2714 / [T4A3786 at doors with panic hardware] [NRP]	US26D	McKinney
	Spring Hinge Set	1552	US26D	McKinney
1	Mortise Exit Device, Storeroom	[12] 43 64 8904 ETJ	US32D	Sargent
1	Auto Flush Bolt Set	2945	US26D	Rockwood
1	Surface Closer	351 CPS	EN	Sargent
1	Coordinator	1700	Black	Rockwood
1	Perimeter Gasket	S88		Pemko
2	Astragal Set	303AS		Pemko

Set: 30.3				
Description: Single Opening – Classroom lock (Storage)				
	Hinge, Full Mortise	TA2714 / [T4A3786 at doors with panic hardware] [NRP]	US26D	McKinney
1	Classroom Lock	64 8237 LNJ	US32D	Sargent
1	Stop	401 (441CU per conditions)	US26D	Rockwood
	Silencers	608		Rockwood

Set: 31.0				
Description: Single Opening - Kiln				
	Hinge, Full Mortise	TA2714 / [T4A3786 at doors with panic hardware] [NRP]	US26D	McKinney
1	Classroom Lock	64 8237 LNJ	US32D	Sargent
1	Surface Closer	351 O / P10	EN	Sargent
1	Kick Plate	K1050 10" high CSK BEV	US32D	Rockwood
1	Stop	401 (441CU per conditions)	US26D	Rockwood
	Silencers	608		Rockwood
Set: 32.0				
Description: Single Opening - Custodial				
	Hinge, Full Mortise	TA2714	US26D	McKinney
1	Storeroom/Closet Lock	64 8204 LNJ	US32D	Sargent
1	Surface Closer	351 H	EN	Sargent
1	Kick Plate	K1050 10" high CSK BEV	US32D	Rockwood
1	Stop	401 (441CU per conditions)	US26D	Rockwood
1	Perimeter Gasket / Silencers	encers(608) at Non Rated		Pemko
Set: 34.0				
Description: Single Opening - Prep Room				
	Hinge, Full Mortise	TA2714	US26D	McKinney
1	Classroom Lock	64 8237 LNJ	US32D	Sargent
1	Kick Plate	K1050 10" high CSK BEV	US32D	Rockwood
1	Stop	401 (441CU per conditions)	US26D	Rockwood
1	Threshold	151A		Pemko
1	Perimeter Sound Gasket	S773		Pemko
1	Door Bottom	420ASL / 434ARL		Pemko

Set: 35.0				
Description: Single Opening - Kitchen Storage				
	Hinge, Full Mortise	TA2714	US26D	McKinney
1	Classroom Lock	64 8237 LNJ	US32D	Sargent
1	Kick Plate	K1050 10" high CSK BEV	US32D	Rockwood
1	Stop	401 (441CU per conditions)	US26D	Rockwood
1	Threshold	151A		Pemko
1	Sweep	315CN		Pemko
Set: 36.0				
Description: Single Opening – Office, Teacher Planning				
	Hinge, Full Mortise	TA2714	US26D	McKinney
1	Office/Entry Lock	64 8205 LNJ	US32D	Sargent
1	Stop	401 (441CU per conditions)	US26D	Rockwood
1	Silencers	608		Rockwood
Provide 1 perimeter gasket, Pemko S88BL at head and jambs, and 1 door bottom, 434 x Pemko where note 1 is indicated in door schedule.				
Notes: Provide overhead stop per conditions				
Set: 37.0				
Description: Single Opening - Kitchen				
1	Continuous Hinge	CFM-HD1		Pemko
1	Rim Exit Device, Classroom, Indicator	[12] 43 49 64 8816 ETJ	US32D	Sargent
1	Surface Closer (stop)	351 CPS	EN	Sargent
1	Kick Plate	K1050 10" high CSK BEV	US32D	Rockwood
1	Threshold	See Arch Details or 151A		Pemko
1	Perimeter Gasket / Silencers	S88		Pemko
1	Sweep	315CN		Pemko

Set: 38.0				
Description: Single Opening - Classroom				
	Hinge, Full Mortise	TA2714 / [T4A3786 at doors with panic hardware] [NRP]	US26D	McKinney
1	Storeroom/Closet Lock	64 8204 LNJ	US32D	Sargent
1	Surf Overhead Stop	9-ADJ Series	689	Rixson
1	Kick Plate	K1050 10" high CSK BEV	US32D	Rockwood
1	Stop	401 (441CU per conditions)	US26D	Rockwood
1	Threshold	151A		Pemko
1	Perimeter Sound Gasket	S773		Pemko
1	Door Bottom	420ASL / 434ARL		Pemko
Notes: Provide wall/floor/overhead stop per conditions.				

Set: 38.3				
Description: Single Opening - Classroom, STC				
1	Mortise Exit Device, Classroom, Indicator	[12] 43 49 64 8916 ETJ	US32D	Sargent
1	Kick Plate	K1050 10" high CSK BEV	US32D	Rockwood
1	Stop	401 (441CU per conditions)	US26D	Rockwood
Notes: Hinges, Gasketing, threshold, drop seal - by door manufacturer				

Set: 39.0				
Description: Single Opening - Privacy				
	Hinge, Full Mortise	TA2714	US26D	McKinney
1	Privacy Lock, Indicator	V21 8265 LNJ	US32D	Sargent
1	Kick Plate	K1050 10" high CSK BEV	US32D	Rockwood
1	Stop	401 (441CU per conditions)	US26D	Rockwood
1	Perimeter Gasket / Silencers	S88		Pemko
Set: 40.0				
Description: Single Opening – Toilet, Staff				
	Hinge, Full Mortise	TA2714	US26D	McKinney
1	Institutional Privacy Lock	V21 64 8267 LNJ	US32D	Sargent
1	Surface Closer	351 O / P10	EN	Sargent
1	Kick Plate	K1050 10" high CSK BEV	US32D	Rockwood
1	Stop	401 (441CU per conditions)	US26D	Rockwood
1	Perimeter Gasket / Silencers	S88		Pemko
Set: 40.1				
Description: Single Opening - Toilet, Privacy				
	Hinge, Full Mortise	TA2714	US26D	McKinney
1	Privacy Lock, Indicator	V21 8265 LNJ	US32D	Sargent
1	Surface Closer	351 O / P10	EN	Sargent
1	Kick Plate	K1050 10" high CSK BEV	US32D	Rockwood
1	Stop	401 (441CU per conditions)	US26D	Rockwood
1	Perimeter Gasket	S88		Pemko

Set: 41.0

Description: Single Opening - Conference , Exam, Room

	Hinge, Full Mortise	TA2714	US26D	McKinney
1	Mortise Lock (passage)	8215 LNJ	US32D	Sargent
1	Surf Overhead Stop per conditions	9-ADJ Series	689	Rixson
1	Kick Plate	K1050 10" high CSK BEV	US32D	Rockwood
1	Stop	401 (441CU per conditions)	US26D	Rockwood
1	Perimeter Gasket	S88		Pemko
1	Door Bottom	420/434		Pemko

Notes: Provide overhead stop per conditions only

Set: 42.0

Description: Single Opening - Ensemble, STC Rated

1	Mortise Lock (passage)	8215 LNJ	US32D	Sargent
1	Door Stop	441CU	US26D	Rockwood

Notes: Hinges, Gasketing, threshold, drop seal - by door manufacturer

Set: 44.0

Description: Small Group Room

	Hinge, Full Mortise	TA2714 / [T4A3786 at doors with panic hardware] [NRP]	US26D	McKinney
1	Office/Entry Lock	64 8205 LNJ	US32D	Sargent
1	Surf Overhead Stop	9-ADJ Series	689	Rixson
1	Kick Plate	K1050 10" high CSK BEV	US32D	Rockwood
1	Threshold	151A		Pemko
1	Perimeter Sound Gasket	S773		Pemko
1	Door Bottom	420ASL / 434ARL		Pemko

Notes: Provide wall stop per conditions.

Set: 46.0				
Description: Specialty Opening				
1	Mortise Cylinder	as required	US15	
1	Balance of Hardware	Furnished by Door Supplier		
Notes: Provide door position switch where indicated on door schedule				
Set: 48.0				
Description: Paired Opening - Tech Engineering				
	Hinge, Full Mortise	TA2714	US26D	McKinney
1	Flush Bolt	557 / 555	US26D	Rockwood
1	School Security Lock	8259 LNJ	US32D	Sargent
2	Surf Overhead Stop	9-ADJ Series	689	Rixson
2	Kick Plate	K1050 10" high CSK BEV	US32D	Rockwood
1	Threshold	151A		Pemko
1	Perimeter Sound Gasket	S773		Pemko
1	Gasketing	290APK x 2891APK		Pemko
2	Door Bottom	420ASL / 434ARL		Pemko
1	Astragal	303AS		Pemko

Set: 49.0				
Single Opening – Conference Room, RX, LX				
	Hinge, Full Mortise	TA2714	US26D	McKinney
1	Storeroom Lock, RX, LX	RX LX 64 8204 LNJ	US32D	Sargent
1	Surface Closer (stop)	351 O	EN	Sargent
1	Perimeter Gasket	S88		Pemko
1	Frame Wiring Harness	QC-C1500P		McKinney
1	Door Wiring Harness	QC-C300		McKinney
1	Position Switch	MC-4-2		SDC

Set: 50.0				
Description: Paired Opening - Trash				
	Hinge, Full Mortise	TA2714 /	US26D	McKinney
2	Flush Bolt	557 / 555	US26D	Rockwood
1	Dust Proof Strike	570	US26D	Rockwood
1	Storeroom/Closet Lock	64 8237 LNJ	US32D	Sargent
1	Closer	351 UO	EN	Sargent
2	Surf Overhead Stop	9-ADJ Series	689	Rixson
2	Kick Plate	K1050 10" high CSK BEV	US32D	Rockwood
	Silencers	608		

Set: 51.0				
Description: Single Opening – Classroom to Classroom				
	Hinge, Full Mortise	TA2714 / [T4A3786 at doors with panic hardware] [NRP]	US26D	McKinney
1	Store Lock	8259 LNJ	US32D	Sargent
1	Surf Overhead Stop	9-ADJ Series	689	Rixson
1	Kick Plate	K1050 10" high CSK BEV	US32D	Rockwood
1	Threshold	151A		Pemko
1	Perimeter Sound Gasket	S773		Pemko
1	Door Bottom	420ASL / 434ARL		Pemko
Notes: Provide wall/floor/overhead stop per conditions.				

END OF SECTION

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Section 08 80 00

GLAZING

PART 1 – GENERAL

1.1 SUMMARY

A. The work of this Section consists of glass and glazing work where shown on the Drawings, as specified herein, and as required for a complete and proper installation.

B. General requirements and definition of glass types for glazing work specified under other individual specifications.

1. Insulated glass in aluminum entrance and storefront.
2. Insulated glass in aluminum curtainwall systems.
3. Bullet resistant glass in bullet resistant aluminum storefront framing system.

C. Furnish and install the following:

1. Tempered glass in wood and hollow metal doors and frames.
2. Tempered glass in interior aluminum storefront doors and frames.
3. Intruder resistant glass at designated locations.
4. Insulated glass in hollow metal window frames.
5. Fire protective glazing in designated rated doors and frames.
6. Low-iron glass at locations indicated and scheduled.
7. All materials required to properly install glass furnished hereunder, including sealant, tapes, setting blocks, and spacers.

D. Work of this section includes installation of glazing beads furnished under related sections.

1.2 RELATED REQUIREMENTS

A. Section 01 74 19 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL: Procedural and administrative requirements relating to recycling goals, waste management program and reporting.

B. Section 01 81 13 - SUSTAINABLE DESIGN REQUIREMENTS: Procedural and administrative requirements relating to required *Northeast CHPS Verified Program,* (NE-CHPS) Certification.

C. Section 07 92 00 - JOINT SEALANTS: Requirements for sealants and backing materials.

D. Section 08 11 13 - HOLLOW METAL DOORS AND FRAMES: Steel doors, door and window frames, and related glazing stops, for both fire-resistance rated (labeled) and non-rated (labeled) conditions.

E. Section 08 14 16 - FLUSH WOOD DOORS: Wood doors, and related glazing stops.

F. Section 08 43 13 - ALUMINUM-FRAMED STOREFRONTS: Storefront framing and doors to receive glazing from this Section 08 80 00.

G. Section 08 43 15 - BULLET RESISTANT ALUMINUM STOREFRONT FRAMING SYSTEM.

H. Section 08 44 13 - GLAZED ALUMINUM CURTAIN WALLS.

I. Section 08 86 00 - FIRE-RATED GLAZING AND FRAMING SYSTEMS: Specialized fire-rated framing and doors systems with fire-resistant glazing.

J. Section 08 87 00 - GLAZING SURFACE FILMS.

K. Section 10 28 13 - TOILET ACCESSORIES: Framed mirrors.

1.3 REFERENCES

A. Referenced Standards: Comply with applicable requirements of the following standards and those others referenced in this Section, under the provisions of Section 01 42 00 - REFERENCES. The standards referenced herein are included to establish recognized minimum quality only. Where these standards conflict with other specified requirements, the most restrictive requirements shall govern. Equivalent quality and testing standards will be acceptable, subject to their timely submission, review and acceptance by the Architect.

1. AAMA 804.1 - Ductile Back-Bedding Compound.
2. ANSI Z97.1 - Safety Performance Specifications and Methods of Test for Safety Glazing Used in Buildings.
3. ANSI/NFRC 100 – Procedure for Determining Fenestration Product U-Factors.
4. ANSI/NFRC 200 – Procedure for Determining Fenestration Product Solar Heat Gain Coefficient and Visible Transmittance at Normal Incidence.
5. ANSI/NFRC 300 – Procedure for Determining Solar Optical Properties of Glazing Materials and Systems.
6. ASTM C794 – Standard Test Method for Adhesion-in-Peel of Elastomeric Joint Sealants.
7. ASTM C920 - Standard Specification for Elastomeric Joint Sealants.
8. ASTM C1036 - Standard Specification for Flat Glass.
9. ASTM C1048 - Standard Specification for Heat-Strengthened and Fully Tempered Flat Glass.
10. ASTM C1503 - Standard Specification for Silvered Flat Glass Mirror.
11. ASTM D638 - Standard Test Method for Tensile Properties of Plastics.
12. ASTM D714 - Standard Test Method for Evaluating Degree of Blistering of Paints.
13. ASTM D790 - Standard Test Methods for Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials.
14. ASTM D1003 - Standard Test Method for Haze and Luminous Transmittance of Transparent Plastics.

15. ASTM D1044 - Standard Test Method for Resistance of Transparent Plastics to Surface Abrasion by the Taber Abraser.
16. ASTM D1308 - Standard Test Method for Effect of Household Chemicals on Clear and Pigmented Coating Systems.
17. ASTM D3359 - Standard Test Methods for Rating Adhesion by Tape Test.
18. ASTM D3363 - Standard Test Method for Film Hardness by Pencil Test.
19. ASTM D4541 - Standard Test Method for Pull-Off Strength of Coatings Using Portable Adhesion Testers.
20. ASTM D4585/D4585M - Standard Practice for Testing Water Resistance of Coatings Using Controlled Condensation.
21. ASTM D4977/D4977M - Standard Test Method for Granule Adhesion to Mineral-Surfaced Roofing by Abrasion.
22. ASTM E119 – Standard Test Methods for Fire Tests of Building Construction and Materials.
23. ASTM E546 – Standard Test Method For Frost/Dew Point of Sealed Insulating Glass Units.
24. ASTM E576 – Standard Test Method for Frost/Dew Point of Sealed Insulating Glass Units in the Vertical Position.
25. ASTM E695 - Standard Test Method of Measuring Relative Resistance of Wall, Floor, and Roof Construction to Impact Loading.
26. ASTM E1300 – Standard Practice for Determining Load Resistance of Glass in Buildings.
27. ASTM E1886 - Standard Test Method for Performance of Exterior Windows, Curtain Walls, Doors, and Impact Protective Systems Impacted by Missile(s) and Exposed to Cyclic Pressure Differentials.
28. ASTM E1996 - Standard Specification for Performance of Exterior Windows, Curtain Walls, Doors, and Impact Protective Systems Impacted by Windborne Debris in Hurricanes.
29. ASTM E2010 – Standard Test Method for Positive Pressure Fire Tests of Window Assemblies.
30. ASTM E2074 - Standard Test Method for Fire Tests of Door Assemblies, Including Positive Pressure Testing of Side-Hinged and Pivoted Swinging Door Assemblies.
31. ASTM E2188 - Standard Test Method for Insulating Glass Unit Performance.
32. ASTM E2189 - Standard Test Method for Testing Resistance to Fogging in Insulating Glass Units.
33. ASTM E2190 - Standard Specification for Insulating Glass Unit Performance and Evaluation.
34. ASTM F1233 - Standard Test Method for Security Glazing Materials and Systems.
35. Federal Safety Standards for Architectural Glazing Materials 16CFR1201.
36. FS TT-S-001543A - Sealing Compound, Silicone Rubber Base.
37. GANA Sealant Manual (2008 edition).

38. IGCC: Certified Products Directory, and Certification Guidelines.
39. NFPA Publication 80 - Fire Doors and Windows.
40. NFPA 252 – Standard Methods of Fire Tests of Door Assemblies.
41. NFPA 257 – Standard on Fire Test for Window and Glass Block Assemblies
42. SGCC: Certified Products Directory, and Certification Guidelines.
43. UL publication 752 - Test Requirements for Bullet Resistant Equipment
44. UL publication 9 – Standard for Fire Tests of Window Assemblies.
45. UL publication 10B – Standard for Fire Tests of Door Assemblies.
46. UL publication 10C – Standard for Positive Pressure Fire Tests of Door Assemblies.
47. UL publication 263 – Standard for Fire Tests of Building Construction Materials

B. Inclusionary References: The following reference materials are hereby made a part of this Section by reference thereto:
   1. GANA Laminated Glazing Reference Manual (2019 edition).
   2. GANA - Glazing Manual (50th Anniversary edition).
   3. SIGMA - Vertical Glazing Guidelines, Number A3000-87.
   4. Consumer Product Safety Commission (CPSC) 16CFR 1201 Code of Federal Regulations for Architectural Glazing Materials.

C. Sustainability Requirement Reference: The following sustainability requirements are hereby made a part of this Section by reference thereto:
   1. High Performance Schools Exchange, Northeast Energy Efficiency Partnerships NE-CHPS, (referred to herein as “NE-CHPS”).

1.4 ADMINISTRATIVE REQUIREMENTS

A. Coordination:
   1. General: Coordinate the work of this Section with the respective trades responsible for installing interfacing and adjoining work for proper sequence of installation, and ensure that the work performed hereunder is acceptable to such trades for the installation of their work.

B. Sequencing:
   1. Field Measurements
      a. Take field measurements before preparation of shop drawings and fabrication, where possible, to ensure proper fitting of Work.
      b. Allow for adjustments within specified tolerances wherever taking of field measurements before fabrication might delay Work.
   2. Do not order or deliver any materials until all submittals, required in the listed Specification Sections included as part of this Subcontract, have been received and approved by the Architect.
   3. Before proceeding with installation work, inspect all project conditions and all work of other trades to assure that all such conditions and work are suitable to

satisfactorily receive the work of this Section and notify the Architect in writing of any which are not. Do not proceed further until corrective work has been completed or waived.

1.5 PERFORMANCE REQUIREMENTS

A. Delegated Design: Glass shall be design by a qualified Professional Engineer, currently licensed in the licensing jurisdiction.

B. General: Installed glazing systems shall withstand normal thermal movement and wind and impact loads (where applicable) without failure, including loss or glass breakage attributable to the following: defective manufacture, fabrication, or installation; failure of sealants or gaskets to remain watertight and airtight; deterioration of glazing materials; or other defects in construction.

1. Structural loads.
2. Thermal movements.
3. Movements of supporting structure indicated on Drawings including, but not limited to, story drift, twist, column shortening, long-term creep, and deflection from uniformly distributed and concentrated live loads.
4. Glazing systems shall be weather tight and have weather tight interfaces between other exterior wall system assemblies.
5. Dimensional tolerances of building frame and other adjacent construction.
6. Failure includes the following:
    a. Material failures.
    b. Deflection exceeding specified limits.
    c. Thermal stresses transferred to building structure.
    d. Framing members transferring stresses, including those caused by thermal and structural movements, to glazing.
    e. Noise or vibration created by wind and thermal and structural movements.
    f. De-lamination.
    g. Sealant failure.
    h. IG fogging.
    i. PIB migration.
    j. Other visual obstructions.

C. Structural Performance

1. Refer to 084313 Aluminum-Framed Storefronts and 084413 Glazed Aluminum Curtain Walls for structural loading requirements.
2. Applicable loads shall be considered in accordance with the load combinations specified by the applicable Building Code. Generally, glass design shall be conducted using ASD load combinations.

3. Insulated glass units (IGU) shall be designed to safely resist any loads due to internal air pressure, altitude, temperature, during production or other related sources creating differential pressures between the cavity and ambient.
4. Unless otherwise defined by Contract Documents, overall thickness of each glass type, and component thicknesses of multiple layer glass types, shall be determined by analysis of project loads and in-service conditions, and consistent within adjacent window systems. Glass strength and thickness for vertical and sloped glazing shall conform to the applicable Building Code and ASTM E1300.
    a. When subject to specified loading, minimum glass thicknesses of lites, whether composed of annealed or heat-treated glass, are selected so the worst case Probability of Breakage (POB) does not exceed the following:
        1) Lites up to 15deg from Vertical: 8/1000
        2) Sloped Lites 15deg or more from Vertical: 1/1000
5. When ASTM E1300 does not apply, provide additional project specific engineering for structural glass applications.
6. Effects of interlayers shall be taken into account for analysis of laminated glass. Unless demonstrated otherwise interlayer properties shall be taken at:
    a. 50°C.
    b. The appropriate load duration for the loads under consideration.
    c. Effects of ceramic frit shall be taken into account using a reduction factor, confirmed by the fabricator, on allowable glass stress for affected areas. Where glass is point supported, ceramic frit pattern design shall be coordinated to prevent strength reduction at areas of high stress concentration.
7. Where differential shading within individual glass lites is present, design glass to resist associated thermal gradients and stresses.
8. Provide safety glass where required by load, code, and/or thermal effect.
9. Allowable Glass Deflections:
    a. Glass load duration factors shall not be applied for determining deflections.
    b. Wind loads for glass center deflection may be reduced to 10-yr reoccurrence values if permitted by glass manufacturer. Wind loads may not be reduced for glass edge deflections.
    c. Center Deflection of 4 side supported Vertical Glass Lites:
        1) Glass center deflection relative to glass edges at 100 percent of specified design pressures shall not exceed L/60 of its clear span, or 1-inch maximum, where L is the shortest edge length.
    d. IGU Pillowing: Deflection of exterior lite due to changes in cavity temperature and pressure shall be limited to the lesser of D/1000 or 5mm, where D is the diagonal dimension of the panel.

10. Where heat treatment is required, fully tempered glass shall only be used where increased material capacity is required as demonstrated by calculation. Heat strengthened preferred when possible.
11. IGU Secondary Seal Design:
    a. Comply with 079200 Joint Sealants, 084313 Aluminum-Framed Storefronts and 084413 Glazed Aluminum Curtain Walls.
    b. Where insulating glass is structurally silicone glazed, tensile stress at narrowest point of secondary seal shall not exceed 20 PSI (0.138 MPa) at outward design wind pressure.
    c. Provide IGU secondary seals with structural bite adequate to restrain the glass at 100% of the design loads without exceeding sealant allowable stress. Silicone shall not fail when tested to 1.5 times design pressures and loads according to ASTM E330.
    d. Structural silicone of IGU secondary seals shall not fail when subjected to a racking test (AAMA 501.4).
    e. Verify that frit extended to glass edge to obscure visibility of spacer bars will not interfere with bond, long-term durability and performance of IGU seals.

D. Thermal movements:
1. Comply with Section 084313 Aluminum-Framed Storefronts and 084413 Glazed Aluminum Curtain Walls

1.6 SUBMITTALS

A. Submit the following according to Conditions of the Construction Contract and Division 1 Specification Sections.
1. Submissions shall be complete and comprehensive and include all shop drawings, samples, material data submissions, and engineering calculations for each glazing system specified herein, and shall include fully coordinated interface details between each glazing system and the adjacent construction such that air/moisture barrier continuity between the materials, components and systems that comprise the above-grade building envelope can be reasonably evaluated by the Architect-of-Record against the design intent of the contract documents. All work shall be coordinated by the General Contractor prior to submission. Incomplete, non-conforming, or uncoordinated submissions shall be subject to rejection or return without action by the Architect.
2. Each submittal shall be dated, signed, and certified by the Glazing Subcontractor, as being correct and in strict conformance with the Contract Documents. In the case of Shop Drawings, each sheet shall be dated, signed, and certified. No consideration for review by the Architect of any Glazing Subcontractor submittal will be made for any items which have not been so certified by the Glazing Subcontractor. All non-certified submittals will be returned to the Glazing Subcontractor without action taken by the Architect, and any delays caused by thereby shall be the total responsibility of the Glazing Subcontractor.

3. Analysis: All requirements specified herein shall be analytically and mathematically proven, except for those requirements called for to be proven exclusively by physical testing methods. Calculations and related data and their application in engineering, fabrication, assembly, and installation shall be the responsibility of the Glazing Subcontractor's registered Professional Engineer.
4. In addition to the performance requirements herein, the Glazing Subcontractor shall provide, for Architect's approval, physical samples for the review of the materials' visual appearance. If approved, materials shall be permitted to be used for the Work of this section.

B. Product Data: For each glass product and glazing material indicated, including test data, manufacturer's quality assurance documentation, and preparation and installation recommendations. Also include details of construction relative to materials, dimensions of individual components, profiles, and finishes.
   1. Include product data for:
      a. Each glass type, including optical data as necessary to demonstrate compliance with performance requirements herein.
      b. All proprietary accessories.
      c. Applied finishes, including preparation and pre-treatment, application, curing, and maintenance procedures.
      d. Submit safety glazing letter from manufacturer. Permanent etched safety label on glass shall not be permitted unless required by code.
         1) The method of packaging and identifying the BIPV roof panels shall be specified. Identification shall include the evaluation report number and notice of any product installation limitations.

C. Glass Samples: For each type of glass product and the following products; 12 inches (600 mm) square.
   1. Glazing Schedule: List glass types and thicknesses for each size opening and location. Use same designations indicated on Drawings.

D. Glass / Glazing Analysis and Engineering Calculations
   1. Comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified Professional Engineer responsible for their preparation.
   2. The glass analysis shall clearly demonstrate the following:
      a. The statistical POB for each glass type at the design loads and combinations will not exceed the specified statistical POB.
      b. For the specified service temperature range, the effects of partial and full shading on the glass and thermal stress gradients have been accounted for. Append to the thermal stress analysis a statement from the glass manufacturer that based upon this analysis the resulting thermal stresses will not reduce the specified statistical POB for other load combinations.
      c. Glass deflections are at or below allowable for each load combination.

3. Submit certification from the glass manufacturer that the glass manufacturer has reviewed all glazing details and thicknesses and finds same suitable for the purpose intended in accordance with these specifications.
4. For structural silicone glazing, submit stress analysis for structural sealant used for IGU secondary seals. Append to the silicone analysis a certification from the sealant manufacturer stating that they have reviewed all sealant details and that when exposed to the specified loads the stress in the silicone sealant of dimensions shown does not exceed manufacturer's recommendations.
5. All calculation sheets shall be of one size and submission shall bear the seal of a Professional Engineer currently licensed in the licensing jurisdiction.

E. Thermal Performance Calculations
1. Submit calculations and/or test data demonstrating solar shading and thermal transfer values across glass assemblies.

F. Qualification Data: For Glazing Subcontractor, manufacturers of insulating-glass units with sputter-coated, low-e coatings, glass testing agency, and sealant testing agency.

G. Product Certificates: For glass and glazing products, from manufacturer.

H. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for insulating glass, glazing sealants, and glazing gaskets.

I. Preconstruction adhesion and compatibility test report.

J. Materials testing reports
1. Insulating Glass sealant: Submit compatibility test report from manufacturer of insulating glass edge sealant and coated glass manufacturer indicating that glass edge sealants and coated glass were tested for compatibility with other glazing materials including sealants, glazing tape, gaskets, setting blocks, and edge blocks.
2. Fully tempered glass: Submit EN 14179 test report for fully tempered glass.
3. Laminated Glass interlayer: Submit compatibility test report from manufacturer of interlayer indicating that interlayer was tested for compatibility with glazing sealants.

K. Submit Manufacturers' Quality Assurance Inspection and Production Testing Programs
1. Inspection and production testing programs are subject to the Owner's Representative's approval.
2. Submit detailed description of inspection and production testing programs and inspection reports for:
   a. Float Glass
   b. Laminated Glass
   c. Insulating Glass Units Fabrication

d. IGU Secondary Seal

L. Installation procedures manual:

1. Submit a comprehensive manual containing all installation procedures, equipment and personnel required for acceptance prior to the commencement of installation works. Comply with requirements in “Quality Assurance” Article.

M. Warranties: Sample of special warranties.

N. Hazardous Materials Notification: In the event no product or material is available that does not contain asbestos, PCB or other hazardous materials as determined by the Owner, a "Material Safety Data Sheet" (MSDS) equivalent to OSHA Form 20 shall be submitted for that proposed product or material prior to installation.

O. Asbestos and PCB Certification: After completion of installation, but prior to Substantial Completion, Glazing Subcontractor shall certify in writing that products and materials installed, and processes used, do not contain asbestos or polychlorinated biphenyls (PCB), using format in Division 1 Section “Closeout Procedures”.

1.7 QUALITY ASSURANCE

A. The work of this section shall be performed by a company which specializes in the type of glass and glazing work required for this Project, with a minimum of 10 years of documented successful experience and shall be performed by skilled workmen thoroughly experienced in the necessary crafts.

1. Work shall be performed in compliance with Owner's insurance underwriters' requirements and UL approvals and testing for materials, assemblies, and procedures.

B. Manufacturer shall have the facilities capable of meeting all requirements of Contract Documents as a single-source responsibility and warranty.

C. Manufacturer Qualifications for Insulating-Glass Units with Sputter-Coated, Low-E Coatings: A qualified insulating-glass manufacturer who is approved and certified by coated-glass manufacturer.

D. Glazing Subcontractor Qualifications: A qualified Glazing Subcontractor who employs glass subcontractors for this Project who are certified under the National Glass Association's Certified Glass Installer Program.

E. Manufacturers and suppliers of all materials and components of the Work of this Section are subject to approval by the Architect.

F. All products and individual or aggregate components of the Exterior Wall Systems for which acceptable engineering or test data are not available shall be physically tested.

G. Glass Testing Agency Qualifications: A qualified independent testing agency accredited according to the NFRC CAP 1 Certification Agency Program.

H. Sealant Testing Agency Qualifications: An independent testing agency qualified according to ASTM C 1021 to conduct the testing indicated.

I. Source Limitations for Glass: Obtain glass from single source, from single manufacturer, from a single facility for each glass type.

J. Source Limitations for Glazing Accessories: Obtain from single source from single manufacturer for each product and installation method.

K. Fire-Protection-Rated Glazing Labeling: Permanently mark fire-protection-rated glazing with certification label of a testing agency acceptable to authorities having jurisdiction. Label shall indicate manufacturer's name, test standard, whether glazing is for use in fire doors or other openings, whether or not glazing passes hose-stream test, whether or not glazing has a temperature rise rating of 450 °F, and the fire-resistance rating in minutes.

L. The Certification Entities shall be accredited as operating in compliance with International Standards Organization (ISO) or similar agency authorized or otherwise qualified and accredited to provide periodic, independent review and certification of each Certification Agency’s Quality Assurance program.

M. Glazing Publications: Comply with published recommendations of glass product manufacturers and organizations below, unless more stringent requirements are indicated. Refer to these publications for glazing terms not otherwise defined in this Section or in referenced standards.

1. GANA Publications: GANA's "Laminated Glazing Reference Manual" and GANA's "Glazing Manual”.
2. AAMA Publications: AAMA GDSG-1, "Glass Design for Sloped Glazing," and AAMA TIR-A7, "Sloped Glazing Guidelines”.
3. IGMA Publication for Sloped Glazing: IGMA TB-3001, "Guidelines for Sloped Glazing”.
4. IGMA Publication for Insulating Glass: SIGMA TM-3000, "North American Glazing Guidelines for Sealed Insulating Glass Units for Commercial and Residential Use”.

N. Production testing programs for insulating glass:

1. IGMA TM-3000 North American Glazing Guidelines for Sealed Insulating Glass for Commercial and Residential Use.
2. IGMA TM-4000 insulating glass manufacturing quality procedures technical manual.
3. The IG Certification Program shall require mandatory IG testing by its program participants at least once every 2 years utilizing independent testing laboratories that are accredited to ISO 17025 for the applicable IG testing procedures.
4. The IGC Entity shall perform at least two (2) audits of it’s certification program participant’s IG fabrication facilities per year.

5. Minimum Requirements for Certified IG Products. The IGC Program shall require IG Products submitted for certification to meet the following requirements:
6. Comply with the requirements of ASTM E2190.
7. Comply with ASTM C1249 and ASTM C1369 for IGU secondary edge seals.
8. Establish proof of gas content to a minimum initial 90% insulating gas fill content and a minimum of 80% insulating gas fill content following completion of respective IG durability testing. Demonstration of gas content for argon shall qualify other gases provided the same gas filling method is used.

O. Safety Glazing Labeling: Where safety glazing labeling is indicated, permanently mark glazing with certification label of the SGCC or another certification agency acceptable to authorities having jurisdiction. Label shall indicate manufacturer's name, type of glass, thickness, and safety glazing standard with which glass complies.

P. Insulating-Glass Certification Program: Permanently marked either on spacers or on at least one component lite of units with appropriate certification label of IGCC.

Q. Mockups: Build mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.

1. Provide full sized glass samples for each exterior glass types. Glass samples to be reviewed at glass fabrication facility.
2. Install glazing in mockups as specified in Section 084400 “Curtain Wall and Glazed Assemblies" to match glazing systems required for Project, including glazing methods.
3. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

R. Pre-installation Conference: Conduct conference at Project site to comply with requirements of Division 1 Section "Project Meetings”. Review methods and procedures related to glazed steel and aluminum exterior wall system including, but not limited to, the following:

1. Review and finalize construction schedule and verify availability of materials, Glazing Subcontractor's personnel, equipment, and facilities needed to make progress and avoid delays.
2. Review temporary protection requirements for glazing during and after installation.
3. Review and discuss condition of substrate and other preparatory work performed by other trades.
4. Review structural loading limitations.
5. Review and finalize construction schedule and verify availability of materials, Glazing Subcontractor's personnel, equipment, and facilities needed to make progress and avoid delays.

6. Review required inspecting, testing, and certifying procedures and coordinate with installation schedule and work of individual trades to avoid delays in the Work.
7. Review weather and forecasted weather conditions, and procedures established to mitigate the impact of unfavorable weather conditions on the quality and progress of the Work.

S. Quality control measurements (pre-construction):

1. Bow and Warp Distortion (Flatness) Tolerance:
   a. Prior to the visual observation by the Architect and Owner of the preconstruction glass mockups, measure each mockup lite for bow and warp in accordance with ASTM C 1048. Measure the lites on a vertical plane with an aluminum straight edge or fishing line.
      1) Measure the mockup glass lites for compliance with the bow and warp tolerances under Article "Heat-Treated Float Glass".
   b. Document and record results for each glass lite. Tag each glass lite that falls outside of the maximum bow and warp limits and certify that these non-conforming glass lites will not be incorporated into the Work.
      1) Provide written documentation of the bow and warp readings in fractions of an inch or millimeters for each mockup glass lite to the Owner and Architect at the preconstruction glass mockup meeting. Provide additional written documentation as requested by the Owner and Architect.
2. Roll Ripple Distortion (Flatness) Tolerance:
   a. Prior to the visual observation by the Architect and Owner of the preconstruction glass mockups, measure each monolithic ply in the mockup containing heat-treated glass using a LiteSentry Osprey Series or similar optical scanning measurement device complying with ASTM C 1652.
      1) Measure the monolithic mockup glass lites for compliance with the flatness tolerances under Article "Heat-Treated Float Glass".
   b. Document and record results for each glass lite. Tag each glass lite that falls outside of the maximum flatness limits and certify that these non-conforming glass lites will not be incorporated into the Work.
      1) Provide written documentation of the flatness readings in fractions of an inch, in millimeters, and in millidiopters, for each mockup glass lite to the Owner and Architect at the preconstruction glass mockup meeting. Provide additional written documentation as requested by the Owner and Architect.
3. Color Tolerance:
   a. Prior to the visual observation by the Architect and Owner of the preconstruction glass mockups, measure each monolithic mockup glass unit using a spectrophotometer. Color measurement shall be taken from the uncoated side.
      1) Tolerance limits for the color variation shall be as accepted on the visual mockup.

2) Color variation of glass lites shall not exceed 1 .5 ΔE00 (CIEDE2000) as defined by ASTM D2244.
3) Transmitted and reflected color for all coated glass shall be consistent and fall on the same side of the neutral axis of the color spectrum as defined in ASTM D 2244.

b. Document and record results for each glass unit. Tag each unit of glass that falls outside of the color variation limits and certify that these non-conforming glass units will not be incorporated into the Work.

T. Quality Control Measurements (Production): As a minimum, provide the following quality control measurements for the exterior glass units:

1. Bow and Warp Distortion (Flatness) Tolerance:
   a. During the production of the heat-treated glass lites, measure for bow and warp in accordance with ASTM C 1048. Measure the lites on a vertical plane with an aluminum straight edge or fishing line.
      1) Measure the monolithic glass lites for compliance with the bow and warp tolerances under Article "Heat-Treated Float Glass", unless otherwise accepted by the Owner and Architect at the preconstruction glass mockup.
   b. During glass production, and once an hour, randomly select a single heat-treated glass lite and measure it. Document and record results. Tag each glass lite that falls outside of the maximum bow and warp limits and certify that these non-conforming glass lites were not incorporated into the Work.
   c. Provide written documentation of the bow and warp readings in fractions of an inch or millimeters for each tested glass lite to the Owner and Architect, if requested. Provide additional written documentation as requested by the Owner and Architect.
2. Roll Ripple Distortion (Flatness) Tolerance:
   a. During the production of the heat-treated glass lites, measure each low monolithic glass lite using a LiteSentry Osprey Series or similar optical scanning measurement device complying with ASTM C 1652.
      1) Measure the monolithic glass lites for compliance with the flatness tolerances under Article "Heat-Treated Float Glass", unless otherwise accepted by the Owner and Architect at the preconstruction glass mockup.
   b. Document and record results for each glass lite. Tag each glass lite that falls outside of the maximum flatness limits and certify that these non-conforming glass lites were not incorporated into the Work.
      1) Provide written documentation of the flatness readings in fractions of an inch, in millimeters, and in millidiopters, for each glass lite to the Owner and Architect, if requested. Provide additional written documentation as requested by the Owner and Architect.
3. Color Tolerance: During production, test monolithic coated and coated insulating glass units for color compliance as follows:

a. Establish a color target selected from the accepted pre-construction glass mockup unit(s) and perform quality control color control checks using a spectrophotometer. Examples of acceptable off-line devices include Minolta 2500d/2600d; examples of acceptable on-line devices include Benchmodel Spectrophotometers. Color measurement shall be taken from the uncoated side.

b. Frequency: Test a minimum of one unit every hour.

c. Document and record results for each glass unit. Tag each unit of glass that falls outside of the color variation limits and certify that these non-conforming glass units will not be incorporated into the Work.

4. Insulating Glass Unit Requirements: During production, test insulating glass units as follows:

a. Butterfly Unit Adhesion Pull Testing:

1) Adhesion Criteria: Comply with the pass/fail requirements of the sealant manufacturer's published guidelines and/or sealant manufacturer's certification audit requirements/recommendations. Minimum pull back to 30° from horizontal with no adhesive failure.

2) Frequency: Test one minimum 24-by-36-inch (600 x 900-mm) size unit each eight-hour shift and after each sealant drum change.

3) Test units shall be fabricated on the same production line and processing equipment and with the same spacers and sealant used in the production of the insulating glass units fabricated for the Project.

b. Desiccant Temperature Rise Testing:

1) Test Criteria: Comply with the desiccant manufacturer's written recommendations.

2) Frequency: Test a minimum of once every eight-hour shift and after each drum change.

c. Air Space Measurement Concave/Convex:

1) At time of fabrication, measure center cavity dimension on all units. Dimension shall be within +/- 1/16” of nominal. Document and record results for each glass lite. Visually check each unit. Tag each glass lite that falls outside of the limits and certify that these non-conforming glass lites were not incorporated into the Work.

2) Provide written documentation of the air space measurement readings in fractions of an inch or millimeters for each tested glass lite to the Owner and Architect, if requested.

d. Skips and voids in the primary or secondary seals are not acceptable and maximum gap at primary/secondary seal interface shall be 1 inch (25.4 mm) in length and 1/16 inch (1.59 mm) in width.

e. Document and record results. Provide additional documentation upon request by the Owner or Architect.

U. Manufacturer’s identification tags or marks are not acceptable on surfaces which will remain exposed to view after installation.

1. Evidence of “patching” after removal of tags or marks is not acceptable.

1.8 MOCK-UPS

A. Provide glazing for mock-ups under provisions of Section 01 43 39 – MOCK-UPS.

1.9 DELIVERY, STORAGE AND HANDLING

A. Delivery and Acceptance Requirements:
   1. Do not deliver items to the site, until all specified submittals have been submitted to, and approved by, the Architect.
   2. Deliver materials in labeled, protective packages, when and as required.

B. Storage and Handling Requirements:
   1. Store and handle in strict compliance with manufacturer's instructions and recommendations of GANA Glazing Manual. Use clean gloves and tools when handling materials, avoid contamination. Use rolling blocks and suction cups to move glass units not in shipping crates.
      a. Carefully store materials to avoid overloading any building component or structure.
      b. Do not unpack material until it is to be set, unless un-packing is required for inspection by the Architect.
      c. Comply with insulating-glass manufacturer's written recommendations for venting units to avoid hermetic seal ruptures due to temperature and pressure changes within airspace.
   2. Store mirrors and coated glass in a dry place with acid-free paper between glass sheets.
   3. Protect factory finished materials from damage due to moisture, direct sunlight, excessive temperatures, surface contamination, corrosion and damage from construction operations and other causes.

1.10 SITE CONDITIONS

A. Do not install glazing when ambient temperature is less than 50 degrees Fahrenheit.

B. Maintain minimum ambient temperature before, during and 24 hours after installation of glazing compounds.

1.11 WARRANTY

A. General: Submit the following warranties under provisions of Section 01 78 00 - CLOSEOUT SUBMITTALS, and in compliance with Section 01 78 36 – WARRANTIES.
   1. Warranties shall be effective starting from Date of Project Substantial Completion and are effective for specified term lengths.

B. Manufacturer Warranty/Guarantee: All shall include replacement of defective glass and mirrors, and delivery of replacement glass products furnished f.o.b. from point of manufacturer to project site.

1. Laminated glass: Manufacturer's 10 year written guarantee covering against defects in materials and workmanship of laminated glass and replacement of the same. Warranty shall be effective from date of original factory shipment to site.
    a. Provide coverage in Guarantee for manufacturing defects, including failure of laminated glass units as evidenced by edge separation, delamination, or discoloration of inner layer.
2. Insulating Glass: Manufacturer's 10 year written guarantee covering insulating glass against defects in materials and workmanship, including failure of seals effective on date of original factory shipment to site.
    a. Provide coverage in Guarantee for manufacturing defects, including failure of hermetic seal of air space (except by glass breakage) as evidenced by intrusion of dirt or moisture, internal condensation or fogging, deterioration of protected internal glass coating or other visual indications of seal failure or performance.
3. Manufacturer's Special Warranty for Coated and Fritted Glass Products: Manufacturer's standard form in which coated or fritted glass manufacturer agrees to replace coated-glass units that deteriorate within specified warranty period. Deterioration of coated or fritted glass is defined as defects developed from normal use that are not attributed to glass breakage or to maintaining and cleaning the glass contrary to manufacturer's written instructions. Defects include peeling, cracking, fading, and other indications of deterioration in coating or frit.
    a. Warranty Period: 10 years from date of Substantial Completion."

PART 2 - PRODUCTS

2.1 GLASS PRODUCTS

A. General

1. In order to reduce the possibility of glass color range rejection, the supplier of float (primary) glass products shall provide glass for the entire Project from a single facility using stockpiled batch run materials from a single source for the entire Project.
2. All glass shall be prefabricated and delivered in the required sizes. No field modifications shall be allowed.
3. All exposed edges shall be arrissed and polished unless specifically indicated otherwise on the Drawings.
4. Thickness: Where glass thickness is indicated, it is a nominal thickness. Provide glass lites in thicknesses as needed to comply with requirements indicated.
5. Strength: Where float glass is indicated, provide annealed float glass, Kind HS heat-treated float glass, or Kind FT heat-treated float glass as needed to comply with "Performance Requirements" Article. Where heat-strengthened glass is indicated, provide Kind HS heat-treated float glass or Kind FT heat-treated float glass as needed to comply with "Performance Requirements"

Article. Where fully tempered glass is indicated, provide Kind FT heat-treated float glass.

6. Thermal and Optical Performance Properties: Provide glass with performance properties specified, as indicated in manufacturer's published test data, based on procedures indicated below:
    a. For insulating-glass units, properties are based on units of thickness indicated for overall unit and for each lite.
    b. U-Factors: Center-of-glazing values, according to NFRC 100 and based on current version of LBNL WINDOW computer program, expressed as Btu/sq. ft. x h x °F.
    c. Solar Heat-Gain Coefficient and Visible Transmittance: Center-of-glazing values, according to NFRC 200 and based on current version of LBNL WINDOW computer program.
    d. Optical Properties: Center-of-glazing values, according to NFRC 300.

B. Annealed float glass: ASTM C1036, Type I (transparent flat glass), Quality-Q3; of Class I amended as follows: Except for skylights, glass surfaces with detectable linear blemishes that exceeds “Light Intensity” according to Table 4 in ASTM C1036 will not be accepted.
    1. Glass dimensional tolerances shall be 50% of those specified by ASTM C1036.
    2. In addition to the limitations included under ASTM C 1036, all glass shall be supplied meeting the following quality standards:
        a. A maximum of 3 acceptable scratches/rubs are allowed.
        b. Water blow-off stains, tag residue, and handprints will not be permitted.
    3. Ultra-Clear (Low-Iron) Float Glass: Minimum 91 percent visible light transmission.

C. Heat treated float glass: ASTM C 1048, Type I (transparent flat glass), Quality-Q3; of class indicated, of kind and condition indicated. All heat strengthening and tempering shall be by the horizontal process, with IG units fabricated in such a manner as to have all roller distortion in a horizontal direction as installed in the building.
    1. The minimum surface and edge compression shall comply with requirements of ASTM C 1048.
    2. Requirements of ASTM C 1048 listed for 6mm HS glass shall also apply for greater thicknesses.
    3. Fully Tempered glass shall conform to ANSI Z97.1.
    4. Fully tempered glass shall be 100% heat soak tested per EN 14179-2016 in calibrated oven.
        a. Unless otherwise specified, all fully tempered glass shall be heat soaked to minimize the occurrence of nickel sulfide (NiS) crystals. This process shall be strictly controlled and carried out to EN 14179 paying particular attention to the temperature and duration of treatment.

b. Records must be kept of heat soaking for each batch for QA/QC purposes and made available to the Architect on request. Such records shall include, as a minimum, the following:
   1) Traceability of glass, i.e. source of supply and evidence of batching.
   2) Dates of tempering/heat soaking.
   3) Certification that the glass will meet the performance requirements of this Specification.
   4) Records to include details of all units that failed during the heat soak test.

c. Responsibility for NiS Inclusions:
   1) Where glass is heat soak tested, failure due to NiS at a rate greater than 5 broken plies per 1000 represents a bad batch of glass, and Glazing Subcontractor shall replace, at no cost to the owner, all panels broken as a result of NiS.
   2) A ply is a single sheet of un-laminated glass.

5. Glass flatness tolerances shall conform to the following:
   a. Maximum Overall Bow: 0.2% of smallest edge length, or 50% of ASTM limits whichever is more stringent.
   b. Localized bow in any direction, and corner/edge lift/dip/curl:
      1) Heat strengthened glass: 0.012” (0.3mm) over a length of 12” (300mm), or 50% of ASTM limits whichever is more stringent.
      2) Fully tempered glass: 0.02” (0.5mm) over a length of 12” (300mm), or 50% of ASTM limits whichever is more stringent.
   c. Roller Wave: The Glazing Subcontractor shall state in his Submission his proposals to control the extent of roller wave, if any. The Glazing Subcontractor shall provide full size samples of all specified heat strengthened and toughened glass to signify the range of bowing and roller wave throughout the works, prior to commencing production of the glass.
      1) Peak to valley deviation shall not exceed: 0.003” (0.08mm) at non-edge locations.
      2) Maximum of 0.008” (0.2mm) within 10.5” of the leading or trailing edge.
      3) The average roller wave distortion shall be certified not to exceed 0.002” (0.05mm).
      4) Must be coordinated so that the orientation of the roller waves is horizontal throughout the Contract Works.
   d. Millidiopter Criteria:
      1) 1/4”, 5/16”, and 3/8” Thicknesses: 95% of all measurements for a single lite shall be less than 100 millidiopters.
      2) Other Thicknesses: 95% of all measurements for a single lite shall be less than 125 millidiopters.
      3) In no case shall the millidiopter reading for a single lite exceed the 95% fractile measurements of the approved visual mockup glass.
   e. Fabricator Quality Control: Test all heat treated glass for distortion.

1) Test Method: GANA “TD 04-03-26 Standard Test Method for In Plant Measurement of Roll Wave in Heat Treated Architectural Glass”, or ASTM C 1651 and C 1652.

6. Assessment of visual quality appearance for anisotropy (Visual Quality Glass Samples):
   a. Appearance against anisotropy will be assessed by one full size glass samples (typical size) for primary coating and glass type configuration and thicknesses to be supplied by the Glazing Subcontractor. These samples are offered for review to the Architect, the Façade Consultant, General Contractor and Client’s Representative.
      1) Light conditions: normal daylight (not direct sunlight), and exposed to sky so anisotropy can be considered. Viewing in boxes with artificial or overcast lights is not permitted.
      2) Viewing position: room side for transmission, outside for reflection. The glass sample shall be placed on a movable platform able to rotate 360°to assess the conditions under different light conditions and orientations.
      3) Viewing distance for light transmission, reflection and any defects: 1 meter at eye level for any monolithic, laminated, double glazed and coated glass.
      4) Viewing angle: any angle.
      5) Time limit for assessment: 1 week.
   b. Once the samples will be approved, then they are to be marked (signed) by the Architect, the Façade Consultant, the General Contractor and the Client’s Representative and photographed, with copies of the photographs to be retained by all parties. The accepted samples shall be kept on site as a control sample. Records of the production equipment and process parameters used to produce the visual quality samples shall be retained by the glass processor for reference throughout the project.
   c. The Glazing Subcontractor shall select the glass suppliers for this project to obtain improved quality standards and minimize the effect of anisotropy. Excessive anisotropy may not be permitted following a review of the above Visual Quality Glass Samples by the Architect, the Façade Consultant, and Client’s Representative.
   d. Should the Architect or the Client’s Representative not approve the proposed visual quality glass samples due to optical phenomena, then the Glazing Subcontractor has to propose an alternative solution to satisfy the Architect’s aesthetic aspirations (ie. switching to thicker annealed glass instead of heat treated glass): any cost or time implications will be at the Glazing Subcontractor’s expenses.
7. Orange peel or Heat speckle: Surface defects on the upper face of heat treated glass that appears in reflection as a scattering of irregular dimples of similar size which causes a general blurring of the image when looking through the glass, are not permitted.
8. Longitudinal Fine Waves (LFW): Defects in the region of 1 micron amplitude and around 20 mm in wavelength, are not permitted.

9. Dish: Any oval or elliptical dish as an effect of overheating the glass and in the quench or other manufacturing causes is not permitted.
10. White Haze: Fine mechanical scratching or contamination of small particles caused by some faults from the tempering line (dust in the rollers, non flatness of the rollers, etc…) are not permitted.
11. Roller Pick-up or Roller Marks: Surface defects on the lower face that appear as elongated dimples (that can often be seen at regular intervals equal to the roller circumference) are not permitted.
12. Kind: Kind CV (coated vision glass), except that Kind CO coated overhead glass may be used where the lower edge of the glass is more than 6 feet above the adjacent floor level or cannot be approached closer than 10 feet.

D. Low-e and Reflective Coatings

1. Low-Emissivity coating(s) shall be neutral in transmitted and reflected color and otherwise exhibit the visual and performance characteristics of the products specified herein as well as in accordance with ASTM C 1376.
2. Low-E coatings shall typically be applied through the MSVD (magnetic sputter vacuum deposition) process.
3. Visual quality control acceptance criteria of the low-E coating shall be consistent with industry guidelines, subject to approval of the Architect.
    a. Pinholes with diameters in excess of 1/16 inch are not acceptable. Acceptable pinholes shall be separated by 12 inches minimum.
    b. Scratches no longer than 3 inches in length are acceptable provided that they occur within 3 inches of an edge. Acceptable scratches shall be limited to 3 inches maximum in length separated by 36 inches minimum. Concentrated scratches or abraded areas are not allowed.
4. Provide edge deletion of low-e coating to ensure proper seal in insulating unit.
5. Color variation of glass lites shall not exceed 1 .5 ∆E00 (CIEDE2000) as defined by ASTM D2244.
6. All coated glass on entire project to be manufactured in a single production line to ensure uniform coating.
7. Low-e coating uniformity to be maintained for all glass in each type of application. When viewing adjacent coated glass units, significant visible color variation from a minimum distance of 10 feet, shall not be apparent. Provide samples that establish range of color variation for review during submittal process.
8. Transmitted and reflected color for all coated glass shall be consistent and fall on the same side of the neutral axis of the color spectrum as defined in ASTM D 2244.
9. The coating shall be as approved by the Architect.
10. Edge deletion of reflective and low-e coatings shall be provided at all insulating glass and structural silicone glazing unless manufacturer submits test data acceptable to the Architect indicating that edge deletion is not required. Width of edge deleted zone of reflective and low-e coatings shall be

to the centerline of PIB primary seal and sufficient to prevent corrosion due to vapor migration through secondary edge seal.

11. Low-e coating uniformity to be maintained for all glass in each type of application. When viewing adjacent coated glass units, significant visible color variation from a minimum distance of 10 feet, shall not be apparent. Provide samples that establish range of color variation for review during submittal process.

E. Ceramic Frit Coating on Glass

1. All ceramic frit coated glass shall be heat-strengthened (Kind HS) and meet the requirements specified herein, but in no case less than the minimum requirements of ASTM C 1048.
    a. Glazing Subcontractor to confirm adequacy of strength design of glass for ceramic frit coated glass.
2. Ceramic frit color is subject to approval by the Architect.
3. Visual Quality Control acceptance criteria of the ceramic fritted surface shall be consistent with industry guidelines, subject to approval by the Architect.
4. Patterns shall be located not more than 1/16 inch [1.5 mm] off parallel from the locating glass edge.
    a. Frit shall be evenly applied and consistent in tone. Where indicated provide custom ceramic frit on interior surfaces of glass lites.
5. For dual image frits, the stacking tolerance is 0.002” maximum.

F. Glass edges

1. Structurally glazed glass edges shall be seamed.
2. Butt glass edges shall be seamed and ground (matte finish).
3. Exposed edges, such as at corners, shall be arissed and polished.
4. Hidden edges shall be seamed.
5. All edges of structural glass shall be arissed and polished.
6. Acute corners to receive treatment in accordance with glass manufacturer’s recommendations.
7. All glass edges shall conform to the following requirements:
    a. Shark teeth shall not penetrate more than 25% the glass thickness.
    b. Serration hackle shall not penetrate more than 10% of the glass thickness.
    c. Flare shall not exceed 1/16” as measured perpendicular to the glass surface at the edge.
    d. Bevel shall not exceed 1/16”.
    e. Flake chips shall not exceed 1/32” in length or 1/4” in diameter.
    f. Rough chips exceeding the dimensions listed for flake chips above shall not be permitted.
8. Cutting:
    a. Edges may be wheel cut or sawed and seamed at manufacturer's option.

b. Do not cut, seam, nip, grind, or abrade heat-treated glass.

9. Laminated Glass Edges
   a. All interlayers at exposed laminated glass edges to be hot-knife trimmed for a clean consistent appearance. No interlayer fragments shall be permitted on the exposed glass edges.
   b. Glass to be stacked racked or otherwise supported during lamination process to ensure no dust or other debris contaminates the interlayer.
   c. No delamination shall be permitted.
   d. Allowable edge offset:
      1) Edge length less than 80” (1000mm): ±0.04” (1.0mm).
      2) Edge length greater than 80” (2000mm): ±0.08” (2mm).
      3) When edge of glass is visible the edges of the laminated glass plies shall be flush and level ±0.04” (1.0mm).
      4) Interlayer snap-back to be less than 0.08” (2mm).

G. Insulating Glass

1. Insulating glass: Factory-assembled units consisting of sealed lites of glass separated by a dehydrated interspace, qualified according to ASTM E 2190, and complying with other requirements specified. Units shall be fabricated using the dual-seal system, consisting of two lites of glass with a primary seal of extruded polyisobutylene, and a secondary seal of structural silicone, color to be approved by Architect.
2. Insulating glass units shall be certified by IGMA and shall comply with ASTM E 2188 and E 2189.
3. Insulating glass shall not experience fogging, wetting or staining within the sealed space, spacer corrosion, spacer migration, adhesive or cohesive failure of primary or secondary edge seal.
4. Insulating glass shall not experience decrease in the air space dimension due to chemical reaction of desiccant with entrapped air. Size of insulating glass spacer shall be calculated according to the pressure differential of the inboard and outboard glass sheets in opposite directions of each unit to prevent contact between the glass sheets in the center of the large insulated glazing units.
5. The insulating glass dimensional tolerances shall conform to the following:
   a. Edge length: +0.12” (3mm), -0.08” (-2mm).
   b. Thickness (with tempered glass): +0.08” (2mm), -0.06” (-1.5mm).
   c. Thickness (with laminated glass): ±0.06” (1.5mm).
6. Primary sealant contact width between spacer and glass shall be as tested per ASTM E 2188, +/- 1mm, with a 2mm minimum dimension, and continuously applied on four sides, including corners.
7. The lites comprising insulating glass units shall be heat treated or laminated where required to meet loading or safety glazing requirements, or as recommended by the specified glass fabricator to insure against breakage

due to thermal stress and to assure adequate glass performance at the specified design pressures specified under the performance criteria herein.

8. IGU Spacers
    a. The spacer shall be made of stainless steel ‘warm edge’ spacers and shall be finished black or natural silver to meet the Performance Requirements article indicated herein and Section 084400. Color to be confirmed by Architect. Glazing Subcontractor shall demonstrate compliance to BS EN 1279 part 2 and 3 for moisture penetration and gas leakage prior to assembling the units: this compliance must be proven by testing the exact project glazing and framing conditions.
    b. Aluminium spacers, butyl spacers (ie TPS), silicone spacers or structural foam spacers (such as “superspacers”) are not to be used.
    c. The spacers shall be continuous, with bent corners and welded joints to ensure integrity of the seal. Where composite spacers are required due to thermal requirements, the use of corner joints fabricated in accordance with suppliers recommendations are acceptable.
    d. The spacer shall contain desiccants to minimize any risk of condensation. Any spillage of the desiccant into the cavity during unit manufacturing, transportation or installation is not permitted. The Glazing Subcontractor shall assess any desiccant spillage issues prior to erection and replace the glass panes.
    e. The spacer shall be:
        1) Height up to 10 feet: within +/- 1mm of nominal position.
        2) Height up to 20 feet: within +/- 2mm of nominal position.
        3) Height up to 30 feet: within +/- 3mm of nominal position.
    f. For IGUs with an edge length of less than 20 feet, there will be one butt joint in the spacer. For IGUs from 20 to 40 feet, there will be a maximum of 2 joints. Joint layout in warm edge spacers to be submitted for approval.
9. The silicone edge seal of the IGU shall be selected from manufacturer’s standard color options as approved by Architect.
10. Desiccant: Molecular sieve or silica gel, or blend of both.

H. Low-Iron Glass: Low-iron soda-lime float glass, fully tempered safety glass, in 1/4 inch thickness, except as otherwise indicated.
1. Performance criteria for 1/4-inch (6mm) thickness glass:
    a. Visible Light Transmittance: minimum 90 percent.
    b. Reflectance Visible Light: 8 percent.
    c. U-V transmission: minimum 85 percent.
    d. Solar Heat Gain Coefficient (SHGC): 0.90.
2. Acceptable Products: Subject to compliance with requirements, provide one of the following, or approved equal:
    a. AGC Industries, product “Krystal Klear”.
    b. Guardian Industries, product “Guardian Ultra White”.

c. UltraGlas Inc., product “Low-Iron Glass”, formerly “Starphire”.

d. Pilkington North America, product “Optiwhite”.

e. Vitro Architectural Glass, product “Starphire Ultra-Clear”.

3. Sole Source: All low-iron glass incorporated into the work shall be from single source and same product.

2.2 LOW-E COATINGS

A. Low-Emissivity Coatings (Low-E): Magnetron Sputter Vacuum Deposition (MSVD) thin film “Sputter coatings” in compliance with specified performance requirements.

1. Acceptable Manufacturers: Subject to compliance with the requirements specified herein, manufacturers offering MSVD Low-E coatings include the following, or approved equal:

a. AGC Glass Company North America, Alpharetta GA.

b. Cardinal Glass Industries, Inc., Eden Prairie MN.

c. Guardian Glass LLC, Auburn Hills, MI.

d. Oldcastle Building Envelope, Santa Monica, CA.

e. Vitro Architectural Glass (formerly PPG Glass), Cheswick, PA.

f. Viracon Inc., Owatonna, MN.

B. Pyrolytic Low-Emissivity Coatings (Low-E) will not be considered as equivalent to MSVD coatings.

2.3 EXTERIOR GLASS TYPES

A. Acceptable Manufacturers: Subject to compliance with the requirements specified herein, manufacturers offering similar products include the following, or approved equal:

1. Cardinal IG, Minneapolis MN.

2. Guardian Industries Corporation, Lewiston PA.

3. Oldcastle Glass, Atlanta, GA.

4. PPG Industries Inc, Glass Group, Pittsburgh PA.

5. Viracon, Owatonna MN.

6. Rochester Insulated Glass Inc., Manchester NY.

B. General: For locations of glass types, comply with the following descriptions and refer to Door Schedule, Interior Elevations and Exterior Elevations for additional locations, and as additionally noted on Drawings.

1. Glass Type A - Insulated “Low-E” glass units:

a. Typical all locations except where type B is required.

2. Glass Type B - Insulated “Low-E” tempered glass units:

a. Provide at all sidelights within 36 inches of a door opening, and all locations where bottom of glass is less than 18 inches to either finished floor or grade (whichever is less).

3. Glass Type C – 1/4-inch tempered safety glass

C. Glass Type A: Insulated “Low-E,” clear glass 1 inch thick units:
   1. Components
      a. Outer layer: 1/4 inch (6 mm) thick heat-strengthened glass with Low-E sputter coating on number 2 surface.
      b. Inner layer: 1/4 inch (6 mm) thick clear heat-strengthened glass.
      c. Air space: 1/2 inch (13 mm) thick.
         1) Gas fill: 90% Argon/10% Air.
   2. Performance Requirements: Insulated glass units shall meet the following performance characteristics.
      a. Visible Transmittance: 72 percent
      b. Solar Heat Gain Coefficient: 0.40
      c. Solar Blockage: 59%
      d. Reflectance (interior): 12 percent
      e. Reflectance (exterior): 11 percent
      f. U Value (Winter): 0.30
      g. Fading Transmission UV: 0.16
      h. Fading Transmission TDW-K: 0.33
      i. Fading Transmission TDW: 0.55

D. Glass Type B: Insulated “Low-E,” glass 1 inch thick units with tempered glass:
   1. Components
      a. Outer layer: 1/4 inch (6 mm) thick clear tempered glass with Low-E sputter coating on number 2 surface.
      b. Air space: 1/2 inch (13 mm) thick.
         1) Gas fill: 90% Argon/10% Air.
      c. Inner layer: 1/4 inch (6 mm) thick full tempered clear glass.
   2. Performance Requirements: Same as Glass type A.

E. Glass Type C –Tempered glass, 1/4 inch (6 mm) thick clear full tempered glass.
   1. Provide at interior aluminum entrance doors and frames.

F. Glass Type D: Insulated “Low-E” glass 1 inch thick units in spandrel units:
   1. Components:
      a. Outer layer: 1/4 inch (6mm) thick clear heat-strengthened glass with Low-E neutral sputtered triple silver softcoat on number 2 surface.
      b. Air space: 1/2" inch (13mm) thick.
         1) Gas fill: 90% Argon/10% Air.
         2) Warm Edge Spacer.
      c. Inner layer: 1/4 inch (6mm) thick clear heat-strengthened glass.
      d. Ceramic Frit:

1) Basis of Design: OPACI-COAT-300 by ICD Coatings
2) Full coat frit on #4 surface.
a) Color: #3-8222LI Signal Gray (LI)

2. Performance:
a. Solar Heat Gain Coefficient: 0.40
b. U Value (Winter): 0.30

G. Glass Type F – Bullet Resistant Glass: Refer to Section 08 43 15.

2.4 INTERIOR GLASS TYPES

A. Glass Type 1 - Tempered safety glass: 1/4 inch thick.
1. Locate heat-tempered safety glass for all of the following:
a. Typical all locations except where Type 3 or 4 is required or unless noted otherwise on the drawings.
b. Within 18 inches of walking surfaces and elsewhere as indicated.
c. Within 36 inches of a door jambs.
d. At all non-rated door and frame assemblies.

B. Glass Type 2: Nominal 1/4 inch thick laminated glass.
1. Outer face: 1/8 inch (3 mm) thick heat strengthened clear glass
2. Interlayer: 0.030 inch thick translucent clear polyvinyl butyl innerlayer
3. Inner face: 1/8 inch (3 mm) thick heat strengthened clear glass.

C. Glass Type 3: 8mm-9 mm thick (5/16 inch-3/8 inch) transparent wire-less fire rated ceramic glazing material with polished finish.
1. Acceptable Manufacturers: Subject to compliance with the requirements specified herein, manufacturers offering products which may be incorporated in the work include the following, or approved equal:
a. Nippon Electric Glass Co., Ltd., “Firelite Plus”.
b. Vetrotech Saint-Gobain, “SSG Keralite FR-L”.
c. SAFTI First, “Pyran Platinum L”.
2. For fire rated door assemblies, conform with latest edition of ASTM E152, ASTM E163, NFPA-80, NFPA 252, NFPA 257.
3. Conforms to ANSI Z97.1 - Safety Performance Specifications and Methods of Test for Safety Glazing Used in Buildings.
4. Permanently identify each individual glazing unit with a listing mark visible after installation.
5. In accordance with manufacturer's specifications, glass must be glazed into frames with a similar rating, using silicone glazing compound which shall be supplied with the glazing material.

D. Glass Type 4: Interior glazing at acoustical walls and sidelights, transoms, and windows at corridors to classrooms. Insulated glass units comprised of:

1. Classroom Side: 1/4 inch thick fully tempered safety glass (Glass type 1).
2. Air space: 1/2 inch (13 mm) thick.
   a. Gas fill: 100% Air
3. Outer Side: Nominal 1/4 inch thick laminated glass (Glass Type 2).

E. Glass Type 5: Not Used.

F. Glass Type 6 - Frameless mirror glass, 1/4 inch thick:

1. Size: Provide sizes shown. If not shown, provide continuous one piece mirrors from top of back splash to the underside of ceiling and extending in one piece the full length of the countertop. Extend mirrors wall to wall where countertop is in an alcove.

G. Intruder Resistant Glass: Laminated glass units with security strengthened core, 3/8 inch thick or as otherwise scheduled on Drawings equal to LTI Smart Glass, Inc., product “School Guard Glass SG4” or approved equal.

1. Locate where indicated.

2.5 FABRICATION

A. General: Do not fabricate materials until all specified submittals have been submitted to, and approved by, the Architect.

B. Fabricate glass as required to openings with edge clearances and bite on glass as recommended by the manufacturer with clean-cut edges where concealed, and smooth-ground, polished and seamed edges where exposed to view. Do not cut, seam, nip or abrade glass after heat-tempering.

1. For non-tempered to be cut at site, provide glass larger than required so as to obtain clean cut edges without seaming or nipping.

C. Fabricate glass with the following edge treatments.

1. Exposed edges: Polished-finished radiused (penciled).
2. Concealed edges: Cut edges with minimum edge work.
3. Butt-joint edges: Flat round and finished with edges eased.

D. Shop Fabrication:

1. All vision panels and baffles shall be cut to size by manufacturer or by fabricator prior to delivery to site. All glass edges shall be ground smooth, polished and eased. Provide all necessary holes wherever required by the approved Shop Drawings, drilled and tapped to suite project requirements. Do all cutting and drilling prior to tempering.

2.6 ACCESSORIES

A. Joint Sealer for silicone butt-joint glazing: One-part low modulus, moisture curing, synthetic rubber sealant, having a useful life expectancy of at least 20 years, conforming to ASTM C 920, Type S, NS, Class 50, in black or clear color, as selected by Architect:

1. Dow Corning, product “999-A”.
2. GE Silicones, product “SilPruf SCS2000”.
3. Tremco, product “Spectrem 2”.

B. Glazing tape: Preformed butyl-polyisobutylene rubber with 100 percent solids contained in extruded tape roll form and complying with AAMA 804.1; coiled on release paper; of sizes required for proper glazing. equal to one of the following:
1. Protective treatments 3030 or 606.
2. Tremco Preshimmed 440.
3. Woodmont Chem-Tape 40.

C. Setting blocks: Neoprene, 80-90 shore A durometer hardness, certified to be “silicone compatible”; sized as follows:
1. Length: 0.1 inch per square foot of glass, but not less than 4 inches.
2. Width: equal to glazing rabbet space minus 1/16 inch.
3. Height to suit glazing method and pane weight and area.

D. Spacers: Neoprene, 60-80 shore A durometer hardness; sized as required.

E. Mirror mastic: Asphalt-based adhesive mirror mastic compatible with mirror backing for adhesive application to wall substrate. Provided mastic wall-board sealer as recommended by adhesive manufacturer.
1. Palmer Products Corporation, Louisville, KY., product: “Palmer Mirror Mastic”.
2. Pecora Corporation, Harleysville PA, product “7hr4 Mirror-Tac”.
3. Royal Adhesives and Sealants, South Bend, IL, “Gunther Brand” product “Ultra/Bond Mirror Mastic”

F. Mirror mounting clips: Chrome plated brass, nickel plated brass, ‘Anachrome’ brass, or stainless steel J-shape mirror clips designed for 1/4 inch mirrors, minimum 1 inch support width, equal to C.R. Laurence Co., Inc., Los Angeles CA., “Dallas Mirror Clip”, model Nº. 778B.

G. Cleaners, Primers, and Sealers: Type recommended by manufacturer of glass and gaskets.

2.7 ACCESSORIES FOR FIRE-RESISTANT GLAZING

A. Glazing Tape: Closed cell polyvinyl chloride (PVC) foam, coiled on release paper over adhesive on two sides, maximum water absorption by volume of 2.5 percent.

B. Silicone Sealant: One-part neutral curing silicone, medium modulus sealant, Type S; Grade NS; Class 25 with additional movement capability of 50 percent in both extension and compression (total 100 percent); Use (Exposure) NT; Uses (Substrates) G, A, and O as applicable. Available Products:
1. Dow Corning Corporation, Midland MI.; product, “795”.
2. General Electric Company (GE Silicones) Waterford NY.; product “Silglaze-II 2800”

3. Tremco, Beachwood OH.; product, “Spectrem 2”.

C. Setting Blocks: Neoprene, EPDM, or silicone; tested for compatibility with glazing compound; of 70 to 90 Shore A hardness.

PART 3 - EXECUTION

3.1 EXAMINATION AND PREPARATION

A. Inspect receiving surfaces and ensure that they are dry and free from dust, or other foreign materials before glazing. Clean all surfaces with cloth saturated with mineral spirits of high-flash naphtha as recommended by glazing tape manufacturer, before glazing.

B. Field Measurements: Verify that field measurements are as indicated on approved Shop Drawings.

1. Check all openings, prior to glazing, to make certain that the opening is square, plumb and secure in order that uniform face and edge clearances are maintained.
2. Determine the actual sizes required by measuring the receiving openings. Size glass and mirrors to permit required clearance and bite around full perimeter of glass, as set forth in the referenced GANA standards, or as recommended by the glass manufacturer. Do not nip edges, to remove flares or to reduce oversize dimensions, under any circumstance.

C. Beginning of installation means acceptance of existing conditions.

3.2 GENERAL INSTALLATION OF GLASS HAVING PERMANENT LABELS

A. Install glass units so that appropriate manufacturer’s permanent label for safety glass, and permanent label for fire-rated glass are visible.

3.3 INSTALLATION - DRY GLAZING

A. Utilize dry glazing methods for field installation of glass in interior doors and frames.

1. Install in vision panels in fire-rated doors and frames to requirements of NFPA 80.

B. Cut glazing tape to length and set against permanent stops, projecting 1/16 inch (2 mm) above sight line.

C. Place setting blocks at 1/4 points with edge block no more than 6 inches from corners.

D. Rest glazing on setting blocks and push against tape for full contact at perimeter of pane.

E. Place glazing tape on free perimeter of glazing in manner as described above.

F. Install removable stop without displacement of tape. Exert pressure on tape for full continuous contact.

G. Knife trim protruding tape.

3.4 INSTALLATION - WET GLAZING

A. Utilize wet glazing methods for field installation of glass in exterior curtainwall, storefront and window systems.

B. Place setting blocks at quarter points on web of sill receiving member. Set glass unit in place with equal spaces on all sides.

C. Install spacers at a spacing not exceeding 24 inches apart uniformly around perimeter, between interior face of glass unit and the fixed glazing rabbet.

D. Apply a continuous heel bead of specified sealant between the outer edges if the glass unit and the web of the receiving member, in sufficient quantity to engage the leg of the applied glazing stop, when installed.

E. As the glazing stop is being applied, install spacers between the outer face of the glass unit and the stop, locating the spacers directly opposite the previously installed interior spacers. Install the glazing stops, ensuring that all clearances around the perimeter of the glass unit conform to the requirements of the respective standards referenced herein.

F. Apply a continuous bead of sealant around the exterior and interior perimeters, between the glass unit and the fixed rabbet, and between the glass unit and the applied glazing stop, extending the sealant material slightly above the sight line to permit proper tooling thereof.

G. Tool all exposed sealant at a 45 degree angle away from the glass surface, leaving the sealant surface uniformly dense and smooth.

H. Immediately remove all excess sealant from surfaces of metal and glass.

3.5 PROTECTION

A. Protect glass from breakage immediately upon installation. Use streamers or ribbons suitably attached to framing and held free of the glass. Do not apply warning markings directly to the glass.

B. Protect mirrors from breakage immediately upon installation. Cover mirrors to protect it from activities that might abrade the glass surface.

C. Cover glass To protect it from activities that might abrade the glass surface.

D. Protect glass from contact with contaminating substances resulting from construction operations, including weld splatter. If, despite such protection, contaminating substances do come into contact with glass, remove substances immediately as recommended in writing by glass manufacturer.

E. Comply with GANA TD-03-1003 “Construction Site Protection of Architectural Glass” and glass manufacturer’s recommendations.

F. Alkaline including ammonia and trisodium phosphate can etch glass.

1. Phosphoric and hydrofluoric acids sometimes used to clean concrete can quickly etch glass and should not come in contact with glass and glazing.

G. Use only glazing gasket lubricants recommended by gasket manufacturers.
   1. Do not use soap and liquid cleaners, which can etch glass, as lubricants.

H. Examine glass surfaces adjacent to or below exterior concrete and other masonry surfaces at frequent intervals during construction, but not less than once a month, for buildup of dirt, scum, alkaline deposits, or stains; remove as recommended in writing by glass manufacturer.

I. Remove and replace glass that is broken, chipped, cracked, or abraded or that is exposed to weld splatter, permanently etched, damaged from natural causes, accidents, and vandalism, during the construction period."

3.6 CLEANING

A. Clean glass surfaces promptly after installation, exercising care to avoid damage to the same. Remove excess glazing tape, labels, dirt, and other contaminants.

B. Wash glass on both exposed surfaces in each area of Project not more than four days before date scheduled for inspections that establish date of Substantial Completion. Wash glass as recommended in writing by glass manufacturer.

3.7 SCHEDULE

A. Safety Glass (fully tempered glass or laminated) glass is required at conditions identified by applicable codes, which include, but are not limited to the following:
   1. Glazing in swinging doors except jalousies.
   2. Glazing in fixed and sliding panels of sliding patio door assemblies and panels in other doors, including walk-in closets and wardrobes.
   3. Glazing in storm doors.
   4. Glazing in unframed swinging doors.
   5. Glazing in doors and enclosures for hot tubs, whirlpools, saunas, steam rooms, bathtubs and showers.
   6. Glazing in any portion of a building wall enclosing these above compartments where the exposed edge of the glazing is less than 60 inches above a standing surface.
   7. Glazing in an individual fixed or operable panel adjacent to a door where the nearest exposed edge of the glazing is within a 24-inch arc of either vertical edge of the door in a closed position and where the bottom exposed edge of the glazing is less than 60 inches above a walking surface. (panels where there is an intervening wall or other permanent barrier between the door and the glazing are exempt.)
   8. Glazing in an individual fixed or operable panel where the exposed area of an individual pane is greater than 9 square feet and the exposed bottom edge is less than 18 inches above the floor, the exposed top edge is greater than 36 inches above the floor, and one or more walking surface(s) are within 36

inches horizontally of the plane of the glazing. Exceptions include a panel with a protective bar (1-1/2 inches or more in height and capable of withstanding a horizontal load of 50 pounds per linear foot without contacting the glass installed on the accessible sides of the glazing 34 inches to 38 inches above the floor), and an outboard pane in insulating glass units or multiple glazing where the bottom exposed edge of the glass is 25 feet or more above any grade, roof, walking surface of other horizontal or sloped surface adjacent to the glass interior.

9. Glazing in guards and railings, including structural baluster panels and nonstructural in-fill panels, regardless of height above a walking surface.
10. Glazing in walls and fences enclosing indoor and outdoor swimming pools and spas when the bottom edge of the glazing on the pool side is less than 60 inches above a walking surface on the pool side of the glazing and the glazing is within 60 inches horizontally of a water's edge.
11. Glazing adjacent to stairways, landings and ramps when it is within 36 inches horizontally of a walking surface, within 60 inches horizontally of a bottom tread of a stairway in any direction, and the bottom edge is less than 60 inches above the plane of the adjacent walking surface (or stairway, measured from the nose of the tread).

3.8 PROJECT CLOSE-OUT

A. Repair and Replacement: Repair or remove and replace work that does not conform to specified requirements. Repairs made in one area shall be incorporated into all other similar areas as applicable.

B. Site Modifications: Finished work that contains unauthorized site modifications, or work not in accordance with the approved shop drawings, or submittals specified herein, may require additional modification in the field, or removal and replacement at no additional cost to the Owner. Any additional calculations and testing required for approval by the Architect shall also be provided at no additional cost to the owner.

C. Acceptance of the completed installation of the exterior wall system requires that the installation be structurally sound, weather tight, and free from defects of materials and workmanship."

End of Section

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Section 08 87 00

GLAZING SURFACE FILMS

PART 1 – GENERAL

1.1 SUMMARY

A. The work of this Section consists of field-applied glazing films where shown on the Drawings, as specified herein, and required for a complete and proper installation. Work includes, but is not limited to the following scope.

B. Furnish and install the following:

1. Decorative glazing films (two patterns required).

1.2 RELATED REQUIREMENTS

A. Section 01 74 19 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL: Procedural and administrative requirements relating to recycling goals, waste management program and reporting.

B. Section 01 81 13 - SUSTAINABLE DESIGN REQUIREMENTS: Procedural and administrative requirements relating to required *Northeast CHPS Verified Program,* (NE-CHPS) Certification.

C. Section 08 80 00 - GLAZING: Glazing applications to receive decorative glazing film.

1.3 REFERENCES

A. Referenced Standards: Comply with applicable requirements of the following standards and those others referenced in this Section, under the provisions of Section 01 42 00 - REFERENCES. The standards referenced herein are included to establish recognized minimum quality only. Where these standards conflict with other specified requirements, the most restrictive requirements shall govern. Equivalent quality and testing standards will be acceptable, subject to their timely submission, review and acceptance by the Architect.

1. ASHRAE - American Society for Heating, Refrigeration, and Air Conditioning Engineers; Handbook of Fundamentals.
2. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.
3. ASTM E308 - Standard Practice for Computing the Colors of Objects by Using the CIE System.
4. ASTM E903 - Standard Test Method for Test for Solar Absorbance, Reflectance and Transmittance of Materials Using Integrating Spheres.
5. ASTM G155 - Standard Practice for Operating Xenon Arc Light Apparatus for Exposure of Non-Metallic Materials.
6. All Applicable federal, state and municipal codes, laws, and regulations for exits.

B. Sustainability Requirement Reference: The following sustainability requirements are hereby made a part of this Section by reference thereto:

1. High Performance Schools Exchange, Northeast Energy Efficiency Partnerships NE-CHPS, (referred to herein as “NE-CHPS”).

1.4 SUBMITTALS

A. Information and Review Submittals: Submit the following under provisions of Section 01 33 00 - SUBMITTAL PROCEDURES:

1. Product Data:
   a. Product data sheets on glazing products: Provide chemical, functional, and environmental characteristics, size limitations, special application requirements. Identify available colors.
   b. Sample Warranty: Provide copies of manufacturers' actual warranties for all materials to be furnished under this Section, clearly defining all terms, conditions, and time periods for the coverage thereof.
2. Shop Drawings: For custom patterns (as appropriate).
3. Selection Samples: Sets of color chips representing manufacturer's full range of available colors and patterns.
4. Verification Samples: Minimum 12 x 12 inch Samples representing actual product color and opacity.
5. Test and Evaluation Reports: Provide a Glass Stress Analysis of the existing glass and proposed glass/film combination as recommended by the film manufacturer.
6. Manufacturer’s Instructions:
   a. Preparation instructions and recommendations.
   b. Installation methods.
7. Sustainable Design Submittals: As required by NE CHPS.

B. Closeout Submittals: Submit the following under provisions of Section 01 78 00 - CLOSEOUT SUBMITTALS.

1. Bonds and Warranty Documentation:
   a. Manufacturer’s Warranties and Guarantees as specified elsewhere herein this Section.

1.5 QUALITY ASSURANCE

A. General: Notify the Architect where conflicts apply between referenced standards and existing materials, and existing methods of construction.

B. Qualifications:

1. Installer/Applicator: Installer Qualifications: All products listed in this section are to be installed by a single installer with a minimum of five (5) years demonstrated experience in installing products of the same type and scope as specified.

1.6 FIELD-SAMPLE / MOCK-UP

A. Provide field sample / mock-up(s) under provisions of Section 01 45 00 - QUALITY CONTROL.

B. Provide mock-up using selected film types, minimum 16 square feet, illustrating color, texture and finish, and demonstrating the minimum standard for the Work.

C. Locate mock-ups where directed.

D. Do not proceed with remaining work until mock-up is approved by Architect.

E. Accepted mock-ups may not remain as part of the work; the number of mock-ups shall not be restricted.

1.7 DELIVERY, STORAGE AND HANDLING

A. Delivery and Acceptance Requirements:

1. Do not deliver items to the site, until all specified submittals have been submitted to, and approved by, the Architect.
2. Deliver materials in original unopened packages, containers or bundles bearing brand name, and identification of manufacturer, with labels and package seals intact and legible.

B. Storage and Handling Requirements:

1. Store and handle materials following manufacturer's recommended procedures, and in accordance with material safety data sheets.
2. Protect materials from damage due to moisture, direct sunlight, excessive temperatures, surface contamination, corrosion and damage from construction operations and other causes.

C. Packaging Waste Management: Comply with packaging requirements specified under Section 01 60 00 - PRODUCT REQUIREMENTS.

1. Shipping materials: Manufacturer shall utilize to the greatest extent possible packaging materials which are biodegradable and recyclable.
2. Jobsite packaging waste management: Recycle packaging materials coordinated with general construction waste management specified under Section 01 74 19 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL

1.8 SITE CONDITIONS

A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's limits.

1.9 WARRANTY

A. General: Submit the following warranties under provisions of Section 01 78 00 - CLOSEOUT SUBMITTALS, and in compliance with Section 01 78 36 – WARRANTIES.

B. Manufacturer Warranty: In addition to the specific guarantee requirements of the GENERAL CONDITIONS and SUPPLEMENTAL GENERAL CONDITIONS, the Contractor shall obtain in the Owner's name the standard written manufacturer's guarantee of all materials furnished under this Section where such guarantees are offered in the manufacturer's published product data. All these guarantees shall be in addition to, and not in lieu of, other liabilities which the Contractor may have by law or other provisions of the Contract Documents.

PART 2 - PRODUCTS

2.1 GLAZING FILMS

A. Basis of Design (Specified Manufacturer): To establish a standard of quality, design and function desired, Drawings and specifications have been based on 3M Window Film, St. Paul, MN.

1. Acceptable Manufacturers: Subject to compliance with the requirements specified herein, manufacturers offering products which may be incorporated in the work include the following, or approved equal:
    a. CPFilms, Inc., Martinsville, VA.
    b. Decorative Films, LLC, Frederick, MD.
    c. 3M Window Film, St. Paul, MN.

B. Glazing Films: Pressure sensitive, permanent polyester film, 3.3 mils thick with silicone-coated polyester release film.

1. Glazing Film Type 1: 3M Window Film, St. Paul, MN., product: "Fasara – Glass Finishes Stripe SH2PTST, String" Decorative / Privacy Glazing Film (ASTM E903, ASTM E308):
    a. Ultraviolet Transmittance: 0 percent.
    b. Visible Light Transmittance: 74 percent.
    c. Visible Light Reflectance: 22 percent.
    d. Solar Heat Transmittance: 74 percent.
    e. Solar Heat Reflectance: 17 percent.
    f. Shading Coefficient at 90 Degrees (Normal Incidence): 0.88 percent.
2. Glazing Film Type 2: 3M Window Film, St. Paul, MN., product: "Fasara – Glass Finishes Stripe SH2PTSTS, Fine String" Decorative / Privacy Glazing Film (ASTM E903, ASTM E308):
    a. Ultraviolet Transmittance: 0 percent.
    b. Visible Light Transmittance: 69 percent.
    c. Visible Light Reflectance: 16 percent.
    d. Solar Heat Transmittance: 69 percent.
    e. Solar Heat Reflectance: 13 percent.
    f. Shading Coefficient at 90 Degrees (Normal Incidence): 0.86 percent.

2.2 PERFORMANCE/DESIGN CRITERIA

A. Fire Performance: Surface burning characteristics when tested in accordance ASTM E84:

1. Flame Spread: 25, maximum.
2. Smoke Developed: 450, maximum.

2.3 ACCESSORIES

A. Slip solution: Composed of one capful of baby shampoo or dishwashing liquid to 1 gallon of water, or as otherwise recommended by glazing film manufacturer.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verification of Conditions: Inspect all surfaces and verify that they are in proper condition to receive the work of this Section.

1. Beginning of installation means acceptance of existing substrate and project conditions.

3.2 PREPARATION

A. Surface Preparation: Clean surfaces thoroughly prior to installation.

1. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

3.3 APPLICATION

A. Install in accordance with manufacturer's instructions.

B. Cut film edges neatly and square at a uniform distance of 1/8 inch to 1/16 inch of window sealant. Use new blade tips after 3 to 4 cuts.

C. Spray slip solution on window glass and adhesive to facilitate proper positioning of film.

D. Apply film to glass and lightly spray film with slip solution.

E. Squeegee from top to bottom of window. Spray slip solution to film and squeegee a second time.

F. Bump film edge with lint-free towel wrapped around edge of a 5-way tool.

G. Upon completion of film application, allow 30 days for moisture from film installation to dry thoroughly, and to allow film to dry flat with no moisture dimples when viewed under normal viewing conditions.

3.4 CLEANING

A. Touch-up, repair or replace damaged products before Substantial Completion.

B. After application of film, wash film using common window cleaning solutions, including ammonia solutions, not sooner than 30 days after application. Do not use abrasive type cleaning agents and bristle brushes to avoid scratching film. Use synthetic sponges or soft cloths.

End of Section

Section 08 88 60

FIRE-RATED GLAZING AND FRAMING SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

A. Furnish and install the following:

1. Prefinished specialized interior fire-rated glazed framing systems, of the types specified herein, all required integral reinforcing, bracing members and related accessories for the framing systems, and all angles, clips, and other items required to anchor the systems to the building structure, and as required for specified fire resistance ratings.
2. Prefinished interior fire resistance framing for vision lites, with fire rated glazing.
3. Prefinished fire resistance rated glazed doors with blocking for hardware.
4. Prefinished "brake-metal" mullion covers, closures, flashings, in conjunction with fire rated glazed framing systems.
5. Shimming and fasteners required for installation.
6. All wireless fire resistance rated glazing for fire rated framing systems and vision lites which are provided under this Section 08 88 60

1.2 RELATED REQUIREMENTS

A. Section 01 60 00 - PRODUCT REQUIREMENTS: Listing of VOC requirements for adhesives, cleaning/maintenance materials, paints, coatings, and sealants.

A. Section 01 74 19 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL: Procedural and administrative requirements relating to recycling goals, waste management program and reporting.

B. Section 01 81 13 - SUSTAINABLE DESIGN REQUIREMENTS: Procedural and administrative requirements relating to required *Northeast CHPS Verified Program,* (NE-CHPS) Certification.

C. Section 08 71 00 - DOOR HARDWARE: Furnishing door hardware for installation under this Section

1.3 SYSTEM DESCRIPTION

A. Performance Requirements:

1. Duration of Fire Rating -- Doors: Capable of providing a fire rating for 60 minutes.
2. Duration of Fire Rating – Window/Walls: Capable of providing a fire rating for, 60 minutes.
3. Fire Resistive Rating: Glaze applications in occupancy or area separation walls and corridors where glazing exceeds 25% of the wall area, or as otherwise specified with a fire resistive assembly meeting the radiant heat requirements of ASTM E119. Per ASTM E119 and UL 263 requirements temperature on the non-fire side of glazing and framing at conclusion of fire test exposure shall be below 250∞F above ambient room temperature.

1.4 REFERENCES

A. Referenced Standards: Comply with applicable requirements of the following standards and those others referenced in this Section, under the provisions of Section 01 42 00 - REFERENCES. The standards referenced herein are included to establish recognized minimum quality only. Where these standards conflict with other specified requirements, the most restrictive requirements shall govern. Equivalent quality and testing standards will be acceptable, subject to their timely submission, review and acceptance by the Architect.

1. ASTM E119: Methods for Fire Tests of Building Construction and Materials.
2. ASTM E152: Methods for Fire Tests of Door Assemblies.
3. ASTM E163: Methods for Fire Tests of Window Assemblies.
4. NFPA 80: Fire Doors and Windows.
5. NFPA 251: Fire Tests of Building Construction & Materials
6. NFPA 252: Fire Tests of Door Assemblies
7. NFPA 257: Fire Test of Window Assemblies
8. UL 9: Fire Tests of Door Assemblies
9. UL 10 B: Fire Tests of Window Assemblies
10. UL 263: Fire tests of Building Construction and Materials
11. UL 10 C: Positive Pressure Fire Tests of Window & Door Assemblies
12. ANSI Z97.1: Standard for Safety Glazing Materials Used in Buildings
13. CPSC 16 CFR 1201: Safety Standard for Architectural Glazing Materials

B. Sustainability Requirement Reference: The following sustainability requirements are hereby made a part of this Section by reference thereto:

1. High Performance Schools Exchange, Northeast Energy Efficiency Partnerships NE-CHPS, (referred to herein as “NE-CHPS”).

1.5 SUBMITTALS

A. Information and Review Submittals: Submit the following under provisions of Section 01 33 00 - SUBMITTAL PROCEDURES:

1. Literature: Manufacturer's product data sheets, specifications, performance data, physical properties and installation instructions for each item furnished hereunder.
2. Shop Drawings: Show doors, frames, hardware and steel frame components as shown on shop drawings and schedules
3. Obtain Architect’s approval before fabrication.
4. Samples for Initial Powder Coating Color Selection: For steel frames with factory-applied powder coat color finishes.
5. Verification Samples: 12-inch square samples of glass
6. Glazing Schedule: Use same designations indicated on Drawings for glazed openings in preparing a schedule listing glass types and thicknesses for each size opening and location.
7. Qualification Data: For firms and persons specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.

8. Sustainable Design Submittals: As required by NE CHPS.

1.6 QUALITY ASSURANCE

A. Installer Qualifications: An experienced installer who has completed glazing similar in material, design, and extent to that indicated for this Project; whose work has resulted in glass installations with a record of successful in-service performance; and who employs glass installers for this Project who are certified under the National Glass Association Glazier Certification Program as Level 2 (Senior Glaziers) or Level 3 (Master Glaziers).

B. Installer Qualifications: An experienced installer who has completed glazing similar in material, design, and extent to that indicated for Project and whose work has resulted in construction with a record of successful in-service performance.

C. Source Limitations for Glazing Accessories: Obtain glazing accessories from one source for each product and installation method indicated.

D. Fire-Rated Door Assemblies: Assemblies complying with NFPA 80 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire ratings indicated, based on testing according to NFPA 252.

E. Fire-Rated Window Assemblies: Assemblies complying with NFPA 80 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire ratings indicated, based on testing according to NFPA 257.

F. Certification: Signed by manufacturers of glass and glazing products certifying that products furnished comply with requirements.

1. Door assemblies shall be tested to the acceptance criteria of ASTM E152, NFPA 252, UL 9, UL 10C Standard Methods of Fire Tests of Door Assemblies.
2. Wall assemblies shall be tested to the acceptance criteria of ASTM E119, NFPA 251, UL 263 Standard Test Methods for Fire Tests of Building Construction and Materials.
3. An approved independent testing laboratory equal to UL shall conduct fire test.

G. Listings and Labels - Fire Rated Assemblies: Under current follow-up service by an approved independent agency maintaining a current listing or certification. Label assemblies accordance with limits of manufacturer’s listing.

H. Regulatory Requirements: Comply with provisions of the following:

1. Americans with Disabilities Act (ADA), "Accessibility Guidelines for Buildings and Facilities (ADAAG).
2. NFPA 101: Comply with the following for means of egress doors:
    a. Latches, Locks, and Exit Devices: Not more than 15 lbf (67 N) to release the latch. Locks shall not require the use of a key, tool, or special knowledge for operation.
    b. Door Closers: Not more than 30 lbf (133 N) to set door in motion and not more than 15 lbf (67 N) to open door to minimum required width.

1.7 DELIVERY, STORAGE AND HANDLING

A. Deliver, store and handle under provisions specified by manufacturer. For details on storage and product handling, please contact Technical Glass Products and request information on storage and product handling.

B. Deliver materials to specified destination in manufacturer or distributor's packaging undamaged, complete with installation instructions.

C. Store off ground, under cover, protected from weather and construction activities.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Specified Manufacturer: To establish a standard of quality, design and function desired, Drawings and specifications have been based on Technical Glass Products (TGP), Snoqualmie, WA, product: "Fireframes® Heat Barrier Series" frames with "Pilkington Pyrostop" glazing.

B. Acceptable Manufacturers: Subject to compliance with the requirements specified herein, manufacturers offering products which may be incorporated in the work include the following, or approved equal:

1. Technical Glass Products (TGP), Snoqualmie, WA, product, "Fireframes® Heat Barrier Series" with Pilkington "Pyrostop" glazing.
2. Vetrotech Saint-Gobain, Auburn, WA, product, "VDS" with "Contraflam" glazing.
3. SAFTI First (a division of O'Keefe's Inc.), San Francisco, CA, product "GPX" with "SuperLite II-XL" glazing.

2.2 FIRE-RESISTANCE RATED FRAMING AND GLAZING SYSTEMS

A. General requirements:

1. Labeling: Each piece of fire-rated glazing material shall be labeled with a permanent logo including name of product, manufacturer, testing laboratory (Warnock Hersey or Underwriters Laboratory), fire rating period and safety glazing standards.
2. Glazing shall be installed in a rated framing system meeting ASTM E119.

B. Steel Framing System: 60 minute rated:

1. Steel Frame: Profiled steel tubing permanently joined with steel bolts.
2. Insulation: Insulate framing system against effects of fire, smoke, and heat transfer from either side. Insulate profiled steel tubing using a shell construction that incorporates Promatect-H intermediate interlayer. Firmly pack perimeter of framing system to rough opening with mineral wool fire stop insulation or appropriately rated intumescent sealant.
3. Steel Glazing Beads: Extruded steel beads with dimensions recommended by manufacturer to securely hold glazing material in place.
4. Fasteners: Type recommended by manufacturer.

C. Fire rated glazing: Laminated glass with intumescent interlayers as required to match the required fire rating indicated for the framing system herein.

1. Acceptable Manufacturers: Subject to compliance with the requirements specified herein, manufacturers offering products which may be incorporated in the work include the following, or approved equal:
   a. Vetrotech Saint-Gobain, “Contraflam”.
   b. Pilkington Group, “Pyrostop”.
   c. SAFTI First, “SuperLite II-XL”.
2. For fire rated door assemblies, conform with latest edition of ASTM E152, ASTM E163, NFPA-80, NFPA 252, NFPA 257.
3. Conforms to ANSI Z97.1 - Safety Performance Specifications and Methods of Test for Safety Glazing Used in Buildings.
4. Permanently identify each individual glazing unit with a listing mark visible after installation.
5. In accordance with manufacturer's specifications, glazing must be installed into frames with a similar rating, using silicone glazing compound which shall be supplied with the glazing material.

2.3 ACCESSORIES

A. Door Hardware: door hardware scheduled and specified under Section 08 71 00 - DOOR HARDWARE to be installed under this Section 08 88 60.

B. Glazing Accessories: Manufacturer recommended fire rated glazing accessory as follows:
   1. Glazing Tape: Closed cell polyvinyl chloride (PVC) foam, coiled on release paper over adhesive on two sides, maximum water absorption by volume of 2 percent. Glass panels that exceed 1,393 sq. inches for 90-minute ratings must be glazed with fire-rated glazing tape supplied by manufacturer.
   2. Silicone Sealant: One-part neutral curing silicone, medium modulus sealant, Type S; Grade NS; Class 25 with additional movement capability of 50 percent in both extension and compression (total 100 percent); Use (Exposure) NT; Uses (Substrates) G, A, and O as applicable. Available Products:
      a. Dow Corning 795 - Dow Corning Corp.
      b. Silglaze-II 2800 - General Electric Co.
      c. Spectrem 2 - Tremco Inc.
   3. Setting Blocks: Neoprene, EPDM, or silicone; tested for compatibility with glazing compound; of 70 to 90 Shore A hardness.
   4. Cleaners, Primers, and Sealers: Type recommended by manufacturer of glass and gaskets.

2.4 FABRICATION

A. Framing:
   1. Steel framing: Furnish frame assemblies pre-welded when possible. Slice frames too large for shop fabrication or shipping. Fit with suitable fasteners.

B. For certain design criteria or where job conditions require; knocked-down construction will be permitted. Furnish knock-down frames with suitable fasteners for final fabrication

C. Field glaze door and frame assemblies.

D. Factory prepare door assemblies field mounting of hardware.

E. Fabrication Dimensions: Fabricate fire rated assembly to approved dimensions. Guarantee dimensions where practicable within required tolerance.

F. Obtain approved Shop Drawings prior to fabrication.

G. Fabrication Dimensions: Fabricate to approved dimensions. The General Contractor shall guarantee dimensions within required tolerance (plus or minus 1/8 inch).

2.5 FACTORY FINISHES

A. Color Coated Finish: Apply manufacturer's standard powder coating finish system applied to factory-assembled frames before shipping, complying with manufacturer's written instructions for surface preparation including pretreatment, application, and minimum dry film thickness.
   1. Color and Gloss: As selected by Architect from manufacturer's full range.

2.6 SOURCE QUALITY CONTROL

A. Source Quality: Obtain fire rated glazing products from a single manufacturer.
   1. Fabrications Dimensions: Fabricated to approved dimensions. The General Contractor shall guarantee dimensions where practicable within required tolerances.

PART 3 EXECUTION

3.1 EXAMINATION

A. Site Verification of Conditions: Verify substrate conditions, have been previously installed under other sections, and are acceptable for product installation in accordance with manufacturer’s instructions.

3.2 INSTALLATION - GENERAL

A. Installation shall be in strict accordance with the fire-rated framing and glazing material manufacturer’s specifications. Field cutting or tampering of fire-resistance rated glass is strictly prohibited.

3.3 INSTALLATION - GLAZING

A. Comply with referenced FGMA standards and instructions of manufacturers of glass, glazing sealants, and glazing compounds.

B. Protect glass from edge damage during handling and installation. Inspect glass during installation and discard pieces with edge damage that could affect glass performance.

C. Set units of glass in each series with uniformity of pattern, draw, bow, and similar characteristics.

D. Cut glazing tape to length and set against permanent stops, flush with sight lines to fit openings exactly, with stretch allowance during installation.

E. Place setting blocks located at quarter points of glass with edge block no more than 6 inches from corners.

F. Glaze vertically into labeled fire-rated metal frames or partition walls with same fire rating as glass and push against tape for full contact at perimeter of pane or unit.

G. Place glazing tape on free perimeter of glazing in same manner described above.

H. Install removable stop and secure without displacement of tape.

I. Use specified glazing compound, without adulteration; bed glazing material in glazing compound; entirely fill all recess and spaces. Provide visible glazing compound with smooth and straight edges.

J. Install in vision panels in fire-rated doors to requirements of NFPA 80.

K. Install so that appropriate markings remain permanently visible.

3.4 CLEANING

A. Comply with requirements of Section 01 74 19 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL for handling and disposition of all construction and demolition waste.

B. Cleaning: Remove temporary coverings and protection of adjacent work areas. Clean installed products in accordance with manufacturer's instructions prior to owner's acceptance. Remove construction debris from project site and legally dispose of debris.

End of Section

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Section 08 90 00

LOUVERS AND VENTS

PART 1 - GENERAL

1.1 SUMMARY

A. Furnish and install the following under the Work of Section 23 00 00 – HEATING, VENTILATION AND AIR CONDITIONING:

1. Prefinished aluminum exterior fixed storm louvers, complete with aluminum wire mesh bird screens and related items, for indicated locations.
2. Prefinished aluminum flashing matching louver frame color.

B. Place, install and build-in, under the Work of Section 23 00 00 – HEATING, VENTILATION AND AIR CONDITIONING as work progresses, the following products and materials furnished under the indicated Sections:

1. Hollow metal frames furnished by Section 08 11 13 – HOLLOW METAL DOORS AND FRAMES.

1.2 RELATED REQUIREMENTS

A. Section 01 60 00 - PRODUCT REQUIREMENTS: Listing of VOC requirements for adhesives, cleaning/maintenance materials, paints, coatings, and sealants.

B. Section 01 73 00 - EXECUTION: Waste Management and Recycling during Final Cleaning.

C. Section 01 74 19 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL: Procedural and administrative requirements relating to recycling goals, waste management program and reporting.

D. Section 01 81 13 - SUSTAINABLE DESIGN REQUIREMENTS: Procedural and administrative requirements relating to required *Northeast CHPS Verified Program,* (NE-CHPS) Certification.

E. Section 07 92 00 - JOINT SEALANTS: Providing perimeter sealant and backing materials.

F. Section 08 11 13 – HOLLOW METAL DOORS AND FRAMES: Furnishing hollow metal frames for louver installation.

G. Division 23 - HEATING, VENTILATING AND AIR CONDITIONING:

1. Furnishing and installing motorized dampers.
2. Blank-off plates on back side of louvers.

H. Division 26 – ELECTRICAL;

1. Power supply to motorized louvers.
2. Connections to control terminals for smoke detection devices and fire alarm system activation of louver.

1.3 REFERENCES

A. Referenced Standards: Comply with applicable requirements of the following standards and those others referenced in this Section, under the provisions of Section 01 42 00 - REFERENCES. The standards referenced herein are included to establish recognized minimum quality only. Where these standards conflict with other specified requirements, the most restrictive requirements shall govern. Equivalent quality and testing standards will be acceptable, subject to their timely submission, review and acceptance by the Architect. Where these standards conflict with other specified requirements, the most restrictive requirements shall govern.

1. AAMA 2605 - Specification for High Performance Organic Coatings on Architectural Extrusions and Panels.
2. ASCA 96 - Voluntary Specification for Performance of Organic Coatings on Architectural Aluminum Curtainwall, Extrusions and Miscellaneous Aluminum Components.
3. ASTM A240/A240M – Standard Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications.
4. ASTM A480/A480M - Standard Specification for General Requirements for Flat-Rolled Stainless and Heat-Resisting Steel Plate, Sheet, and Strip.
5. ASTM B209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate.
6. ASTM B221 – Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.

B. Inclusionary References: The following reference materials are hereby made a part of this Section by reference thereto:

1. ANSI/AMCA Standard 500-L - Laboratory Methods of Testing Louvers for Rating.
2. ANSI/AMCA Standard 540 - Test Method for Louvers Impacted by Wind Borne Debris
3. ANSI/AMCA Standard 550 - Test Method for High Velocity Wind Driven Rain Resistant Louvers
4. ANSI/AMCA Publication 501 - Application Manual for Air Louvers.

C. Sustainability Requirement Reference: The following sustainability requirements are hereby made a part of this Section by reference thereto:

1. High Performance Schools Exchange, Northeast Energy Efficiency Partnerships NE-CHPS, (referred to herein as “NE-CHPS”).

1.4 SUBMITTALS

A. Information and Review Submittals: Submit the following under provisions of Section 01 33 00 - SUBMITTAL PROCEDURES:

1. Literature: Manufacturer's product data sheets, specifications, performance data, physical properties for each type of louver and related components furnished hereunder.
2. Certifications: Provide AMCA and BSRIA test data to confirm that the louvers have the specified air and water performance characteristics.
3. Manufacturer's sample warranties for louvers and finishes.
4. Schedule: Schedule of all louvers to be furnished hereunder, indicating locations for each size and type of louver, and locations and sizes of blank off panels.
5. Shop drawings:
    a. Large scale details of louver and blank off panel construction, indicating all sizes, gages, and thickness; large scale details of bird screens and accessory items; and complete installation details, coordinated to the specific receiving conditions. All details bearing dimensions of actual measurements taken at the project.
6. Samples:
    a. Sample card indicating Manufacturer's full range of colors available for selection by Architect.
    b. 12 inch long finish samples of louver frame showing each type material finish and color selected.
7. Sustainable Design Submittals: As required by NE CHPS.

1.5 QUALITY ASSURANCE

A. Perform work in accordance with AMCA Certification for louvers. Mark units with AMCA Certified Ratings Seal.

1.6 DELIVERY, STORAGE AND HANDLING

A. Store all materials in an elevated dry location, protected by waterproof coverings.

1.7 WARRANTY

A. Provide the following warranties under provisions of Section 01 78 00 - CLOSEOUT SUBMITTALS:

1. Louver manufacturer’s standard warranty.
2. 10 year warranty on louver finish which shall include covering the applied finish against defects, including color fading, chipping, crazing, pitting, and delamination.

3. 10 year warranty on polyvinylidene fluoride enamel finish which shall include covering the applied finish against defects, including color fading, chipping, crazing, pitting, and delamination.

PART 2 - PRODUCTS

2.1 ARCHITECTURAL LOUVERS

A. Acceptable Manufacturers: Subject to compliance with the requirements specified herein, manufacturers offering products which may be incorporated in the work include the following, or approved equal:

1. Construction Specialties, Inc., Cranford, NJ.
2. Airolite Company, Marietta, OH.
3. Industrial Louvers, Inc., Delano, MN.
4. Ruskin Company, Grandview, MO.

B. Louvers: Nominal 8-inch deep drainable architectural louvers in the arrangements and dimensions shown on the Drawings. Louvers shall be stationary, continuous blade, horizontal fixed, drainable storm louvers; equal to Construction Specialties Model RS-8400.

1. Minimum Free Area: 47 percent (As determined in accordance with AMACA Standard 500).
2. Framing: Heads, sills, jambs and mullions to be one-piece structural members of 6063-T5 alloy minimum 0.081 thick (2.06 mm) with integral caulking slot and retaining beads.
    a. Mullions shall be sliding interlock type.
3. Sill flashing: 4 inch high by full depth pan fabricated from 0.050 inch (1.27 mm) thick aluminum with welded side panels, finished to match louver.
4. Blades: Double chevron design, minimum 0.063 inch (1.52 mm) thick.
    a. Fabricate louver with close-fitting, field made splice joints in blades designed to permit expansion and contraction without deforming blades or framework and with mullions recessed from front edges of blades so blades have continuous appearance.
5. Structural Requirements: Design all materials to withstand wind and snow loads required by the Rhode Island State Building Code. Maximum allowable deflection for the louver structural members to be l/180 or 3/4 inch, whichever is less. Maximum allowable deflection for the louver blades shall be l/120 or 0.50 inch across the weak axis, whichever is less.
6. Screen: 5/8 inch mesh by 0.063 inch (1.6 mm) diameter bird screen secured within a extruded aluminum frame.

2.2 ACCESSORIES

A. Fasteners and Anchors: Stainless steel type.

B. Primer: Zinc chromate, alkyd type.

C. Perimeter sealant, Joint Sealer Type SX (Silicone, Exterior construction): Medium modulus, neutral curing, low to no bleed silicone passing ASTM C1248, having a useful life expectancy of at least 20 years, conforming to ASTM C920, Type S, Grade NS, Class 50, with a minimum movement capability of +50 percent and -50 percent, equal to the following:

1. Dow Corning, product, “795”.
2. GE Silicones, product, “SCS9000 SilPruf NB”.
3. Sika, product “Sikasil-WS-295”.
4. Tremco, product “Spectrem 4-TS”.

D. Sealant used within system: As recommended by louver manufacturer.

2.3 FACTORY FINISHING

A. Shop-applied Polyvinylidene Fluoride (PVDF) resin based, high performance thermoplastic organic coating conforming to AAMA 2605, NAAMM - Metal Finishes Manual, and the following:

1. Resin base of 70 percent PVDF by weight, Atochem North America, Inc., product “Kynar 500” or Ausimont USA. product “Hylar 5000“.
2. Finish Coating shall be manufactured as one of the following products:
   a. Morton International; product “Fluoroceram”.
   b. P.P.G. Industries Inc.; product “Duranar”.
   c. Valspar Corp., product: “Fluropon”.
3. Surface Preparation: Properly clean aluminum with inhibited chemical cleaner and pretreat with acid chromate-fluoride-phosphate conversion coating, in accordance with Aluminum Association method AA-C12C42.
4. Shop-prime all surfaces with a corrosion resistant, epoxy-based primer compatible with finish coating, averaging 0.2 to 0.4 mils dry film thickness, fully oven-cured.
5. Shop finish with one color coat, of polyvinylidene fluoride enamel minimum 1.0 to 0.80 mil dry film thickness on all exposed surfaces, including all exposed screws and fastenings.
6. Total system dry film thickness: 1.2 mils.
7. Color and Appearance: Color shall be from paint manufacturer's available library of non-exotic colors and shall match color sample furnished by Architect.

B. Concealed Steel Items: Galvanized in accordance with ASTM A386 to 2.0 ounces per square foot.

C. Apply one coat of bituminous paint to concealed aluminum surfaces in contact with cementitious or dissimilar materials.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Inspect all surfaces and verify that they are in proper condition to receive the work of this Section. Verify that prepared openings and flashings are ready to receive the work of this Section and opening dimensions are as indicated on the shop drawings. Verify that all blocking and nailers are set in place and secure.

B. Beginning of installation means acceptance of existing project conditions.

3.2 INSTALLATION

A. Install louver assembly in accordance with manufacturer's instructions. Erect louvers plumb and level, free of warp or twist. Maintain dimensional tolerances, aligning with adjacent work.

1. Install flashings and align louver assembly to ensure moisture shed from flashings and diversion of moisture to exterior.
2. Secure louvers in opening framing with concealed fasteners.
3. Install bird screen and frame to interior of louver. Hinge screens for access.

B. No permanent exposed to view labels of any kind will be permitted to remain on the louvers or frames.

3.3 TOLERANCES

A. Maximum Variation from Level or Plumb: 0.06 inches every 3 feet non-cumulative or 0.5 inches per 100 feet, whichever is less.

3.4 CLEANING AND TOUCH UP

A. Upon completion of the work of this Section in any given area, remove tools, equipment and all rubbish and debris from the work area; leave area in broom-clean condition.

B. Remove excess sealant by solvent acceptable to sealant manufacturer. All exposed edges of sealant and gaskets shall be left smooth, uniform in line, and with edges neatly struck.

C. Remove protective material from prefinished aluminum surfaces. Wash down exposed surfaces free of dirt, handling marks, packing tapes, and foreign matter, using a solution of mild detergent in warm water, applied with soft, clean wiping cloths. Take care to remove dirt from corners. Wipe surfaces clean.

D. Touch-up all scratches, abrasions, and other defects in the prefinished metal surfaces with shop-coat finish material, supplied with the various items to be furnished hereunder.

End of Section

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Section 09 05 60

COMMON WORK RESULTS FOR FLOORING

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes general requirements for flooring preparation, installation and temporary protection.

1. Provide independent testing laboratory services to perform relative humidity, moisture vapor emission, and pH tests on in situ concrete slabs, which shall be in addition to testing as may be performed by Owner.
2. Prepare substrates to receive flooring systems as required to ensure specified tolerance level for finish surface of floor. Preparation work includes patching, smoothing and leveling substrate, including:
   a. Grinding down high spots of substrate.
   b. Providing Portland cement-based latex underlayment (filler).
3. Provide transition and edge strips between flooring types, and abutting conditions as detailed on Drawings.

1.2 RELATED REQUIREMENTS

A. Section 01 74 19 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL: Procedural and administrative requirements relating to recycling goals, waste management program and reporting.

B. Section 01 81 13 - SUSTAINABLE DESIGN REQUIREMENTS: Procedural and administrative requirements relating to required *Northeast CHPS Verified Program,* (NE-CHPS) Certification.

C. Section 03 05 13 – CONCRETE SEALERS.

D. Section 03 30 00 – CAST-IN-PLACE CONCRETE: Concrete floor slab substrate.

E. Section 09 64 29 - WOOD STRIP AND PLANK FLOORING.

F. Section 09 64 66 - WOOD ATHLETIC FLOORING.

G. Section 09 65 19 - RESILIENT TILE FLOORING: Resilient tile and plank flooring.

H. Section 09 65 23 - RUBBER FLOORING: Rubber tile and sheet flooring, rubber stair treads and risers.

I. Section 09 65 36 - STATIC-CONTROL RESILIENT FLOORING.

J. Section 09 67 23 - RESINOUS FLOORING.

K. Section 09 68 00 - CARPETING: Carpet and transition strips.

L. Section 09 68 13 – TILE CARPETING: Carpet tile and transition strips.

M. Section 12 48 13 – FLOOR MATS.

1.3 REFERENCES

A. Referenced Standards: Comply with applicable requirements of the following standards and those others referenced in this Section, under the provisions of Section 01 42 00 - REFERENCES. The standards referenced herein are included to establish recognized minimum quality only. Where these standards conflict with other specified requirements, the most restrictive requirements shall govern. Equivalent quality and testing standards will be acceptable, subject to their timely submission, review and acceptance by the Architect.

1. ASTM D4259 - Standard Practice for Abrading Concrete.
2. ASTM E329 - Standard Specification for Agencies Engaged in the Testing and/or Inspection of Materials Used in Construction.
3. ASTM E1907 - Standard Guide to Methods of Evaluating Moisture Conditions of Concrete Floors to Receive Resilient Floor Coverings
4. ASTM F710 - Preparing Concrete Floors to Receive Resilient Flooring.
5. ASTM F1869 – Standard Test Method for Measuring Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride.
6. ASTM F2170 – Standard Test Method for Determining Relative Humidity in Concrete Floor Slabs Using In-Situ Probes
7. ASTM F3010 - Standard Practice for Two-Component Resin Based Membrane-Forming Moisture Mitigation Systems for Use Under Resilient Floor Coverings.
8. All applicable federal, state and municipal codes, laws and regulations regarding flammability and smoke generation of interior finishes.

B. Sustainability Requirement Reference: The following sustainability requirements are hereby made a part of this Section by reference thereto:

1. High Performance Schools Exchange, Northeast Energy Efficiency Partnerships NE-CHPS, (referred to herein as “NE-CHPS”).

1.4 ADMINISTRATIVE REQUIREMENTS

A. Coordination:

1. General: Coordinate flooring work with the respective trades responsible for installing interfacing and adjoining work for proper sequence of installation, and ensure that the work performed hereunder is acceptable to such trades for the installation of their work.

B. Pre-Installation Meetings: At least 30 calendar days prior to commencing any flooring work, conduct a pre-installation conference at the Project site. Comply with requirements of Section 01 31 00 - PROJECT MANAGEMENT AND COORDINATION. Coordinate time of meeting to occur prior to installation of work under the related sections named below.

1. Required attendees:
   a. Owner.

b. Architect.

c. General Contractor.

d. Project Superintendents representing each floor system installer.

e. Manufacturer's technical representative(s) for flooring products as designated by Architect or Contractor.

f. Representatives of related trades as directed by the Architect or Contractor, and representatives for installers of related work specified under the following Sections:

1) Section 03 01 36 - Resurfacing and Patching of Concrete Slabs.
2) Section 09 65 23 - Rubber Flooring.
3) Section 09 65 36 – Static Control Resilient Flooring.
4) Section 09 67 23 - Resinous Flooring.
5) Section 09 68 00 - Carpeting.
6) Section 09 68 13 – Tile Carpeting.
7) Section 12 48 43 – Floor Mats.

2. Agenda:

a. Scheduling of preparation and flooring operations.

b. Procedures for testing of relative humidity and moisture content of in situ substrates.

c. Water vapor emission control methods.

d. Review of staging and material storage locations.

e. Coordination of work by other trades.

f. Protection of completed Work.

g. Establish humidity and temperature limitations for performing the work, to which Architect and Contractor must agree.

h. Discuss process for inspection and acceptance of completed Work of this Section.

C. Sequencing:

1. Sequence work to ensure flooring is not installed until building is enclosed, sufficient heat is provided, dust generating activities have terminated, wet work is dry and cured, and work overhead is completed.

2. Field Measurements

a. Take field measurements before preparation of shop drawings and fabrication, where possible, to ensure proper fitting of Work.

b. Allow for adjustments within specified tolerances wherever taking of field measurements before fabrication might delay Work.

3. Ensure that installation of flooring and accessories occurs after other finishing operations, including painting.

1.5 SUBMITTALS

A. Information and Review Submittals: Submit the following under provisions of Section 01 33 00 - SUBMITTAL PROCEDURES:

1. Test and Evaluation Reports: Include the following:
    a. Report the test deployment parameters at start of testing and finishing of testing:
        1) Start and finish dates and times of testing.
        2) Ambient temperature.
        3) Ambient relative humidity and dew point temperature.
        4) Minimum and maximum ambient temperature and relative humidity reached during testing.
    b. Report the "factor" used to calculate the actual test area of the calcium chloride test site.
    c. Report the concrete slab thickness (in inches).
    d. Report all test results in chart form listing the following:
        1) Test locations (also mark test locations on floor plan).
        2) Surface temperature of concrete.
        3) pH paper/ pencil reading (ASTM F 710).
        4) Visual appearance of concrete.
        5) Concrete slab age.
        6) Relative humidity in concrete, % (ASTM F 2170):
            a) Depth of hole from top of slab, inches.
            b) RH in concrete, %.
            c) Temperature in concrete, °F.
        7) Surface moisture meter test (ASTM E 1907):
            a) Electrical impedance test values.
            b) Electrical resistance test values.
        8) Moisture vapor emission (MVER) - CaC12 test (ASTM F 1869):
            a) Weight gain in grams.
            b) Exposure time/hours.
            c) MVER pounds/1000 sq. ft./24 hours.
    e. Report all unacceptable substrate and field conditions observed during testing.
2. Sustainable Design Submittals: As required by NE CHPS.

B. Submit 1 copy of test data to the installers of all flooring materials or floor surface coating materials scheduled to be installed.

1.6 QUALITY ASSURANCE

A. General: perform relative humidity, moisture vapor emission (MVER) and acidity/alkalinity (pH)Testing for concrete slabs and floors.
    1. General Contractor shall employ and pay for services of an independent testing laboratory to perform relative humidity, moisture vapor emission, and pH tests on concrete slabs as follows. The test shall be witnessed by the General Contractor , flooring subcontractors and Owner’s Project Representative.

a. Relative Humidity, Moisture Vapor Emission and pH Testing on all concrete slabs over-which a finished floor is to be installed. This includes, but is not limited to:
   1) Resilient sheet flooring, including (but not limited to) linoleum, and vinyl flooring.
   2) Resilient tile and plank flooring, including (but not limited to) linoleum, solid vinyl and composite flooring.
   3) Static dissipative flooring.
   4) Resinous flooring and seamless flooring of all types.
   5) Painted floors and concrete sealers.
   6) Carpet.
   7) Wood flooring of all types.
   8) Terrazzo (excluding sand-bed terrazzo systems).

b. Perform moisture and pH tests on all concrete floors over-which stone flooring is to be applied.

2. Testing Requirements: As specified under Part 3 of this Section.
   a. Provide additional testing in the event test results indicate higher moisture content than recommended by the flooring material and coating material manufacturers for the installation of their products.
      1) Perform additional testing after procedures have been performed by the General Contractor to reduce moisture content to ratings acceptable to the various flooring and floor-coating manufacturers. General Contractor's procedures to reduce moisture content may consist of project dehumidification and temporary heating, environmental controls, or moisture mitigation treatment to concrete.

PART 2 - PRODUCTS

2.1 GENERAL FLOORING ACCESSORIES

A. Rubber Transition strips, carpet reducers, edgings and accessories: Composition nitrile rubber alloy, in colors as selected by the Architect.
   1. Acceptable manufacturers:
      a. American Billtrite (Canada) Ltd., Sherbrooke, Quebec.
      b. Burke Industries, San Jose, CA.
      c. Roppe Corporation, Fostoria OH.
      d. Freudenberg Building Systems Inc., Lawrence MA.
   2. Profiles as indicated, submit shop drawings for all conditions not indicated and obtain Architect's approval for each transition/reducer.

B. Metal Transition strips, reducers, edgings and accessories: extruded aluminum transition strips with a perforated anchoring leg, as appropriate to transition condition, in height(s) as required for flooring thickness.
   1. Profiles as indicated on Drawings. Submit shop drawings for all conditions not indicated and obtain Architect's approval for each transition/reducer.

2. Acceptable Manufacturers: Subject to compliance with the requirements specified herein, manufacturers offering products which may be incorporated in the work include the following, or approved equal:
    a. Schlüter Systems L.P., Plattsburgh NY. (Basis of Design).
    b. Powerhold, Inc., Middlefield, CT.
    c. Genotek, Court Murrieta CA.
    d. Custom Building Products, Inc., Seal Beach, CA.
    e. Ceramic Tool Company Inc., Waukesha WI.
3. Finish: As selected by Architect.

C. Filler for patching, smoothing and leveling subfloors and underlayments: Portland cement-based latex underlayment acceptable to flooring manufacturer, equal to the following:
1. Ardex Americas, Aliquippa, PA., products “Feather Flash” and “Ardex SD-P Rapid”.
2. Henry Company, El Sequndo, CA., product: “547 UniPro" or “549 Feather Finish”.
3. Kingdom Products, Throop, PA., product “Fast Feather”
4. Nox-Crete Inc., Omaha, NE., “Feather Patch”.
5. Sakrete, Cincinnati OH. Products: “Flo Coat Concrete Resurfacer” or, Sakrete “Fast Setting Self-Leveling Resurfacer.”
6. Sika, Lyndhurst, products “Level SkimCoat” or “SikaQuick Concrete Resurfacer”.
7. Silpro Corp., Ayer MA., product “Raeco Feather Spread RPS”.

D. Non-structural Crack filler: Filler for existing cracks, shrinkage cracks, saw-cuts, and ‘dormant’ (non-movement) control joints in concrete substrate:
1. Ardex Americas, Aliquippa, PA., product “Addifix”.
2. Emecole Metro LLC., Romeoville, IL/, product: “555”.
3. The Quikrete Companies, Atlanta, GA., product: “Fastset Concrete Crack Repair”.
4. SpecChem, Kansas City, MO., product “Poly Fix”.

E. Adhered flooring systems general requirements for adhesives (except as otherwise specified in individual Specification Sections):
1. General Flooring Adhesives: High moisture resistant and alkali resistant adhesive: Synthetic Polymer, non-flammable in wet state, with NFPA, Class A rated, VOC compliant, capable of withstanding the following in continuous service:
    a. Up to 95% RELATIVE HUMIDITY when measured in accordance with ASTM F2170 – Standard Test Method for Determining Relative Humidity in Concrete Floor Slabs Using in-situ Probes.

b. Up to 8 lbs./1000 sq. ft./ 24 hours MVER when measured in accordance with ASTM F1869 - Standard Test Method for Measuring Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride.

c. VOC content: Less than 50 g/L.

2. Acceptable adhesives, include the following, or approved equal, (subject to acceptance of flooring manufacturer for performance and compliance with warranty requirements, for each type of floor system specified):

a. Advanced Adhesive Technology Inc., Dalton GA. Adhesive: “AAT-Go2 Adhesiver” (maximum 95% RH / 8pounds MVER).

b. Armstrong World Industries, Inc., Flooring Division, Lancaster PA., adhesive: “S-515” (maximum 95% RH / 5 pounds MVER).

c. DriTac Corp., Clifton NJ., adhesive: “5900 Mega Bond” (maximum 99% RH / 8 pounds MVER).

d. W.W. Henry Company (Ardex), Aliquippa PA. adhesive: “695 High RH Vinyl Flooring Adhesive” (maximum 95% RH / 3 pounds MVER).

e. Mapei Corporation, Elk Grove IL Adhesive: “Ultrabond ECO 711” (maximum 95% RH / 8 pounds MVER).

f. Mohawk Group, Dalton, GA.

1) Adhesive: “Aquaflex M100Plus” (maximum 100% RH)

2) Adhesive: “Aquaflex M99” (maximum 95% RH)

F. Temporary Floor Protection: Flame retardant treated in conformance with NFPA 701. Acceptable Products include the following, or approved equal:

1. Holland Manufacturing, Succasunna NJ., product: “Blue Shield Flame StopR.”

2. Pro Tect Associates, Northbrook, IL, product “Traffic Guard.”

3. Protection from the Ground Up, Escondido, CA., product “Deck Cover FR.”

4. Surface Shields, Orland Park, IL, product “Cover Shield.”

2.2 TESTING EQUIPMENT

A. For relative humidity testing: Digital Meter and Calibrated Humidity and Temperature probe kit in Compliance with ASTM F 2170.

1. Minimum 2 point probe calibration.

B. For calcium chloride testing: Anhydrous calcium chloride testing in accordance with Rubber Manufacturer's Association (RMA) Test requirements and in compliance with ASTM F 1869.

C. For pH testing: In compliance with ASTM F710.

1. pH test paper.

2. Distilled or de ionized water.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that spaces to receive flooring finishes are suitable for installation. Do not proceed with work until unsatisfactory conditions are corrected. Comply with manufacturer's recommendations including the following:

1. Substrates shall be dry and clean.
2. Substrates shall be free of depressions, raised areas, or other defects which would telegraph through installed flooring.
3. Verify concrete substrates have a flat tolerance of 3/16" in 10 linear feet, or more restrictive tolerances as specified under individual flooring Specification Sections.
4. Temperature of flooring and substrate shall be within specified tolerances as required by flooring and adhesive manufacturers.
5. Moisture condition and adhesive bond tests shall be performed as specified herein.

B. For applications on concrete:

1. Verify concrete substrate has been cured and is sufficiently dry to achieve a bond with the adhesive, in accordance with the manufacturer's recommended bond and moisture test
2. Verify curing, hardening, or breaking compounds have not been used. If there are any, do not proceed until compounds have been removed as specified.
3. For applications on concrete slab on grade or below grade, verify vapor barrier below slab was installed. If no vapor barrier was installed, do not proceed with work unless written acceptance of such conditions is received and submitted.
4. Perform testing of in situ concrete, relative humidity and surface pH testing to all concrete slabs specified to be covered with floor coverings or resinous coatings as specified herein. Do not proceed with work until results of moisture condition tests are acceptable.

3.2 SURFACE PREPARATION FOR TESTING

A. General: Substrates shall be dry and clean. Remove all dirt, debris, sealers, coatings, finishes, film-forming curing compounds, and other substances which may affect the rate of moisture dissipation. Remove all dust by vacuum or other methods. Do not use chemicals of any kind to clean concrete.

1. Non- chemical methods for removal, such as abrasive grinding or bead-blasting, including methods described in ASTM D 4259 may be used on existing slabs with deleterious residues to achieve an appropriate state for testing.

B. To test for pH at the surface of a concrete slab, use care not to over abrade the surface of the concrete which can result in overstated pH readings.

3.3 TESTING IN SITU CONCRETE SUBSTRATES

A. Scope:

1. Provide in situ concrete relative humidity and surface pH testing to all concrete slabs specified to be covered with floor coverings or resinous coatings. Includes concrete placed as part of this Work which occurs below grade, above grade (suspended slabs), and slabs on grade.

B. Scheduling:

1. Testing shall take place after allowing concrete to dry for a minimum of 90 days. Testing to be scheduled no less than one, nor more than three weeks prior to scheduled flooring installation.
    a. DO NOT conduct testing unless the slab environment is identical to that In which the finished flooring Is to be installed.

C. Test result submittals:

1. Report all test results in chart form listing test dates, time, depth of test well, in situ temperature, relative humidity, moisture vapor and pH levels.
2. List test locations on chart and show same on marked up Floor Plan Drawings.
3. Submit results In duplicate. Deliver copies directly to Architect, Owner's Project Representative and General Contractor .

D. Testing Procedures, quantification of Relative Humidity

1. The test site should be maintained at the same temperature and humidity conditions as those anticipated during normal occupancy. These temperature and humidity levels should be maintained for 48 hours prior and during test period. If meeting this criteria is not possible, then minimum conditions should be 75 degrees F (plus or minus 10 degrees F), and 50 percent (plus or minus 10 percent) relative humidity. When a building is not under HVAC control, a recording hygrometer or data logger shall be in place recording conditions during the test period. A transcript of this information must be Included with the test report.
2. The number of In situ relative humidity test sites is determined by the square footage of the facility. The minimum number of tests to be placed is equal to 3 in the first 1,000 square feet and 1 per each additional 1,000 square feet.
3. Drill test holes utilizing a roto hammer drill. Hole diameter shall not exceed outside diameter of the insertable test sleeve by more than 0.04 inch (1mm). Drilling operation must be dry. Do not use water for cooling or lubrication; do not wet-core test hole. Determine the thickness of the concrete slab from Construction Documents. Depths of test holes shall be as follows:
    a. For elevated slabs (not poured in pans): Drill test holes to a depth equal to 20 percent of the concrete thickness.
    b. For slabs on grade and elevated slabs in pans: Drill test holes to a depth equal to 40 percent of the concrete thickness.
4. Vacuum all concrete dust from test hole.

5. Insert a hole liner, or sleeve, to the full depth of test hole, assuring that the liner is capped or plugged at the end protruding from the concrete surface.
6. Permit the test site to acclimate, or equilibrate, for 72 hours prior to taking relative humidity readings.
7. Remove the sleeve plug and place a probe into the sleeve assuring that it reaches the bottom of the test hole.
8. Allow the probe to sit in the test sleeve for 30 minutes before taking readings.
9. Read and record temperature and relative humidity at the test site.

E. Testing Procedures, quantification of concrete moisture vapor emission through Calcium Chloride Testing:

1. The test site should be maintained at the same temperature and humidity conditions as those anticipated during normal occupancy. These temperature and humidity levels should be maintained for 48 hours prior and during test period. If meeting this criteria is not possible, then minimum conditions should be 75 degrees F (plus or minus 10 degrees F) and 50 percent relative humidity (plus or minus 10 percent). When a building is not under HVAC control, a recording hygrometer or data logger shall be in place recording conditions during the test period. A transcript of this information must be included with the test report.
2. The number of vapor emission test sites is determined by the square footage of the facility. The minimum number of tests to be placed is equal to 3 In the first 1.000 square feet and I per each additional 1,000 square feet.
3. Tests sites are to be cleaned of all adhesive residue, curing compounds, paints, sealers, floor coverings, and similar materials. 24 hours prior to the placement of test kits.
4. Weigh test dish on site prior to start of test. Scale must report weight to 0.1 grams. Record weight and start time.
5. Expose Calcium Chloride and set dish on concrete surface.
6. Install test containment dome and allow test to proceed for 60 to 72 hours.
7. Retrieve test dish by carefully cutting through containment dome. Close and reseal test dish.
8. Weigh test dish on site recording weight and stop time.
9. Calculate and report results as pounds of emission per 1,000 square feet per 24 hours."

F. Testing Procedures, quantification of Acidity/Alkalinity (pH) Level:

1. At or near the relative humidity test site and each vapor emission (calcium chloride) test site, perform pH test.
    a. At each testing site, lay down a loose 2 foot by 2 foot sheet of non perforated sheet backed by plywood. Leave in place for 48 hours.
    b. Remove sheet and place several drops of distilled or de ionized water onto the concrete surface to form a puddle approximately 1 inches in diameter.
    c. Allow the water to set for approximately 60 seconds.

d. Dip the pH paper into the water and remove immediately, compare color to chart provided by paper supplier to determine pH reading

2. Record and report results.

G. Testing Procedures:

1. Initial testing: Provide 3 tests for the first 1,000 square feet.
2. Add one test for each additional 1,000 square feet.
3. Concrete surface area to be tested shall be completely clean as specified herein under Preparation.
4. Perform moisture tests in strict accordance with the kit manufacturer's Instructions. Moisture tests shall remain undisturbed for 60 to 72 hours.
5. Immediately after moisture test has been removed from test area, conduct pH test in area previously covered by plastic dome of moisture test kit.
6. After completion of tests submit 2 copies of test data to the Architect. Submit a copy of the test data to all installers of flooring materials and resinous flooring materials scheduled to be installed.
7. Provide additional testing in the event test results indicate higher moisture content than recommended by the flooring material and coating material manufacturers for the installation of their products. Perform such additional testing, at no additional cost to the Owner, after procedures have been performed to reduce moisture content to ratings acceptable to the various flooring and coating manufacturers.

3.4 FLOORING PREPARATION – GENERAL REQUIREMENTS

A. Close spaces to pedestrian and worker traffic during the installation of the flooring.

B. General: Comply with ASTM F 710 and manufacturer's recommendations for surface preparation. Remove substances incompatible with resilient flooring adhesive by method acceptable to manufacturer.

1. Fill voids, cracks, and depressions with trowel-applied leveling compounds acceptable to manufacturer. Remove projections and repair other defects to tolerances acceptable to manufacturer.
2. Remove, by light sanding and grinding, all protruding edges, high spots.
3. Ensure substrate is flat to a plus or minus 1/8 inch in 10 feet tolerance. Fill minor or local low spots, cracks, joints, holes, and other defects with subfloor filler to achieve smooth, flat, hard surface. Prohibit traffic until filler is cured.
4. Ensure that substrate is free from paint, varnish, wax, oil, or other foreign matter.
5. For concrete substrates:
   a. Concrete floors with steel troweled (slick) finish shall be properly roughened up (sanded) to ensure suitable adhesion.
   b. Concrete floors with curing, hardening, and breaking compounds shall be abraded with mechanical methods only to remove compounds. Use blastrac or similar equipment.

C. Protection of In-situ Conditions: During the operation of flooring work, protect surrounding materials and finishes against undue soilage and damage by the exercise of reasonable care and precautions. Clean, or repair all surfaces which are soiled or otherwise damaged by Work, to match indicated profiles and specified finishes. Materials and finishes which cannot be cleaned, or repaired shall be removed and replaced with new work in conformance with the Contract Documents.

D. Use HEPA Vacuum to clean substrate, and ensure that substrate is dry, clean and smooth prior to application of flooring. Perform vacuuming immediately prior to installation.

E. Apply primers as recommended by adhesive manufacturer's written instructions.

F. Condition flooring materials, accessories and adhesives to room temperatures for a period of 48 hours minimum, and as additionally required under individual Specification Sections.

3.5 CRACK FILLING IN CONCRETE SUBSTRATES

A. Fill existing cracks, shrinkage cracks, saw-cuts, and ‘dormant’ (non-movement) control joints. Do not fill movement joints, dynamic control joints.

B. Prepare joints and cracks prior to filling. Mix and apply filler as directed by manufacturer. Dispense material using continuous smooth motion and allow material to gravity feed into crack.

C. Apply crack filler where no-leveling or surfacing is indicated or required prior to installation of finish flooring. Install crack filler to full depth of repair and after partial setting, shave excess material smooth with top of slab.

D. Apply crack filler scheduled or required to receive a topping as directed by manufacturer. Install crack filler to full depth of repair creating a recess of an 1/8 inch. Broadcast clean sand into freshy applied fill material. Do not sweep. Vacuum remaining loose sand.

3.6 FLOORING INSTALLATION GENERAL

A. Install all products in strict accordance with each manufacturer's written installation procedures and other provisions specified herein.

1. Apply primers as recommended by adhesive manufacturer's written instructions.

3.7 FIELD QUALITY CONTROL

A. Adhesive Bond Testing: Use the specified flooring and recommended adhesive, install approximately 36 by 36 inch sized flooring as specified under individual flooring specification sections. Install test samples approximately 50 feet apart throughout the area, but not less than 1 test per 1000 square feet. Areas next to walls or other light traffic areas should be selected for the bond test. Tape down the perimeter of the flooring to prevent drying of the adhesive at the edges. After a minimum period of 72 hours the flooring should be pulled from the subfloor. If an

unusual amount of force is required, the bond could be considered sufficient. Floors demonstrating unsuitable bond to substrate require modifications to flooring installation and may require application of moisture mitigation products. Review all conditions with Architect.

3.8 PROTECTION

A. Immediate post-installation protection required:

1. Prohibit traffic on finished floor areas until flooring adhesives have fully set.
2. For all types of adhesive applied resilient Flooring: Prohibit washing, scrubbing or other similar ‘wet’ operations to occur on finished floor areas for a minimum period of 5 calendar days after installation.
3. Vacuum floor surfaces after adhesives have fully set.

B. Provide protection of completed flooring areas from construction traffic until Substantial Completion of the General Contract. Cover all floor surfaces with specified protective coverings. Reapply temporary coverings as required to maintain floor protection.

End of Section

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Section 09 21 16

GYPSUM BOARD SHAFT WALL ASSEMBLIES

PART 1 - GENERAL

1.1 SUMMARY

A. The work of this Section consists of vertical and horizontal shaft wall assemblies where shown on the Drawings, as specified herein, and required for a complete and proper installation. Work includes, but is not limited to the following scope.

B. Furnish and install shaft wall systems including framing, liner and board finish components.

1. Gypsum board taping and finishing are specified under Section 09 29 00 – GYPSUM BOARD.

C. Install access panels occurring in shaft walls, furnished by Section 08 31 00 - ACCESS DOORS AND PANELS, and by trades requiring the same.

1.2 RELATED REQUIREMENTS

A. Section 01 60 00 - PRODUCT REQUIREMENTS: Listing of VOC requirements for adhesives, cleaning/maintenance materials, paints, coatings, and sealants.

B. Section 01 74 19 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL: Procedural and administrative requirements relating to recycling goals, waste management program and reporting.

C. Section 01 81 13 - SUSTAINABLE DESIGN REQUIREMENTS: Procedural and administrative requirements relating to required *Northeast CHPS Verified Program,* (NE-CHPS) Certification.

D. Section 05 40 00 - COLD-FORMED METAL FRAMING: Load bearing framing.

E. Section 06 10 00 - ROUGH CARPENTRY:

1. Supplemental wood blocking.
2. Installation of metal door frames in shaft wall systems.

F. Section 08 31 00 - ACCESS DOORS AND PANELS: Shop primed access panels, occurring in partitions and walls.

G. Section 09 22 16 - NON-STRUCTURAL METAL FRAMING: Non-load bearing partition and ceiling framing and furring.

H. Section 09 29 00 - GYPSUM BOARD: Gypsum board finishes, applied over work of this Section 09 21 16, including: joint treatment, joint compound finishing and related trim components.

I. Section 09 91 00 - PAINTING: Applied finish coatings.

1.3 REFERENCES

A. Referenced Standards: Comply with applicable requirements of the following standards and those others referenced in this Section, under the provisions of Section 01 42 00 - REFERENCES. The standards referenced herein are included to establish recognized minimum quality only. Where these standards conflict with other specified requirements, the most restrictive requirements shall govern. Equivalent quality and testing standards will be acceptable, subject to their timely submission, review and acceptance by the Architect.

1. ASTM A653 – Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
2. ASTM A1003 – Standard Specification for Steel Sheet, Carbon, Metallic- and Nonmetallic-Coated for Cold-Formed Framing Members.
3. ASTM C475 - Standard Specification for Joint Compound and Joint Tape for Finishing Gypsum Board.
4. ASTM C645 – Standard Specification for Nonstructural Steel Framing Members.
5. ASTM C754 - Standard Specification for Installation of Steel Framing Members to Receive Screw-Attached Gypsum Panel Products.
6. ASTM C919 – Standard Practice for Use of Sealants in Acoustical Applications.
7. ASTM C1002 - Standard Specification for Steel Self-Piercing Tapping Screws for Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Steel Studs.
8. ASTM C1047 - Standard Specification for Accessories for Gypsum Wallboard and Gypsum Veneer Base.
9. ASTM C1177 – Standard Specification for Glass Mat Gypsum Substrate for Use as Sheathing.
10. ASTM C1396 - Standard Specification for Gypsum Board.
11. ASTM C1658 - Standard Specification for Glass Mat Gypsum Panels.
12. ASTM D3273 – Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber.
13. ASTM E90 – Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions.
14. ASTM E119 - Standard Test Methods for Fire Tests of Building Construction and Materials.
15. GA 201 - Gypsum Board for Walls and Ceilings.
16. GA 214 - Recommended Specifications for Levels of Gypsum Board Finish, Glass Mat and Fiber-Reinforced Gypsum Panels.
17. GA 216 - Recommended Specifications for the Application and Finishing of Gypsum Board.
18. All applicable federal, state and municipal codes, laws and regulations for fire rated assemblies.

B. Sustainability Requirement Reference: The following sustainability requirements are hereby made a part of this Section by reference thereto:

1. High Performance Schools Exchange, Northeast Energy Efficiency Partnerships NE-CHPS, (referred to herein as “NE-CHPS”).

1.4 ADMINISTRATIVE REQUIREMENTS

A. Coordination:

1. Coordinate the work of this Section with the respective trades responsible for installing interfacing work, and ensure that the work performed hereunder is acceptable to such trades for the installation of their work.
2. Work of this Section shall be closely coordinated with the work of Section 09 29 00 - GYPSUM BOARD, to assure the steady progress of the Contract.

B. Sequencing: Do not install shaft wall until all pipes, ducts, conduits, and other such items which are to be enclosed thereby, have been permanently installed, inspected and approved.

1.5 SUBMITTALS

A. Information and Review Submittals: Submit the following under provisions of Section 01 33 00 - SUBMITTAL PROCEDURES:

1. Product Data: Manufacturer's product data sheets, specifications, performance data, physical properties for each item furnished hereunder.
2. Shop Drawings:
   a. Details of any special conditions associated with fireproofing.
   b. Mark-up a set of blackline interior elevations indicate corrections to grid layout and provide dimensioning showing locations of all proposed control joints and expansion joints.
      1) Provide interior elevation drawings for interior elevations which are not included as part of the Contract Drawing set.
3. Sustainable Design Submittals: As required by NE CHPS.

1.6 DELIVERY, STORAGE AND HANDLING

A. Delivery and Acceptance Requirements:

1. Do not deliver items to the site, until all specified submittals have been submitted to, and approved by, the Architect.
2. Deliver materials in original packages, containers or bundles bearing brand name, identification of manufacturer or supplier.

B. Storage and Handling Requirements:

1. Store materials inside under cover and in manner to keep them dry, protected from weather, direct sunlight, surface contamination, corrosion and damage from construction traffic and other causes.
   a. Neatly stack board materials flat to prevent sagging.
2. Handle board materials so to prevent damage to edges, ends and surfaces.

3. Protect metal trim accessories and corner beads from being bent or damaged.

C. Damaged material: Remove any damaged or contaminated materials from job site immediately, including plaster materials in packages containing water marks, or show other evidence of damage, unless Architect specifically authorizes correction thereof and usage on project.

1.7 SITE CONDITIONS

A. In accordance with GA 216, maintain minimum ambient temperature of 50 degrees Fahrenheit 48 hours before, during taping and compounding, and until completely dry thereafter.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Acceptable Manufacturers: Subject to compliance with the requirements specified herein, manufacturers offering products which may be incorporated in the work include the following, or approved equal:

1. Metal components and related items:
   a. Clarkwestern Dietrich Building Systems, LLC, Schiller Park, IL.
   b. Marino\Ware, Division of Ware Industries, South Plainfield, NJ.
   c. Cemco Steel Framing and Metal Lath, City of Industry, CA.
   d. Telling Industries, Mentor, OH.
   e. United States Gypsum Company (USG), Chicago, IL.
2. Gypsum liner panels and board materials:
   a. United States Gypsum Company (USG), Chicago, IL.
   b. National Gypsum Company, Charlotte, NC.
   c. Georgia-Pacific Gypsum, LLC, Atlanta, GA.
   d. Lafarge Corporation, Herndon, VA.

B. The design and details as shown on the drawings and the model numbers specified herein are to establish the standards of design and quality and not to limit competition.

2.2 DESCRIPTION

A. Regulatory Requirements:

1. Obtain certificate of compliance from authority having jurisdiction indicating approval of specified products.
2. Fire resistance ratings: Provide materials and assemblies of the rating required, tested per ASTM E 119, which are identical to those indicated by reference to Gypsum Association file numbers in "Fire Resistance Design Manual" or to design designation in the Underwriters Laboratories "Fire Resistance Directory" or in listing of other testing agencies acceptable to authorities having jurisdiction and to the Owners' insurance underwriters

3. Seismic Compliance: Nonstructural components that are permanently attached to structures and their support attachments, shall be designed and constructed to resist the effects of earthquake motions in accordance to local jurisdiction.

B. Sustainability Requirements:

1. Gypsum Board Recycled Content: Use maximum available percentage of recycled materials but not less than that required to meet LEED Credit MR 5.2. Gypsum board products incorporated into the work shall contain not less than 50 percent of recycled materials.

2.3 MATERIALS

A. Studs for shaft wall assemblies: 20 gage (0.0329 inch [0.84 mm] minimum thickness), galvanized and complying with ASTM C 645, 2-1/2 inch size, or as indicated otherwise in the drawings.

1. Framing members shall have a G-40 (hot-dipped galvanized) minimum protective coating conforming to ASTM A653 and ASTM A1003 (table 1). Equivalent coatings (G40e) will not be considered equal.
2. Acceptable products include the following, or approved equal:
   a. Clarkwestern Dietrich Building Systems, LLC, West Chester, OH, product, “C-T Stud”.
   b. Marino\Ware, Division of Ware Industries, South Plainfield, NJ, product: “CT-Stud”.
   c. Cemco Steel Framing and Metal Lath, City of Industry, CA, product; “C-H Studs”.
   d. Telling Industries, Mentor, OH, product; “C-T Stud”.
   e. United States Gypsum Company (USG), Chicago, IL, product, “C-H Studs”.

B. Runners for studs in shaft wall assemblies: J-track, galvanized and complying with ASTM C 645, with 2-1/4 inch leg, in size, gage and manufacturer to match shaft wall studs.

C. Struts for jamb framing of door openings in shaft wall assemblies: J-type strut, galvanized and complying with ASTM C 645, 20 gage (0.0329 inch [0.84 mm] minimum thickness), with minimum 3 inch return.

D. Shaftwall liner: UL fire resistance rated, ASTM C 442 - Type X board with beveled edges, 1 inch thick, 24 inches wide, of lengths to minimize end joints.

1. Acceptable products include the following, or approved equal:
   a. United States Gypsum Company (USG) Sheetrock Brand product; “Gypsum Liner Panels”.
   b. National Gypsum Company, Gold Bond Brand product; “Fire-Shield Shaftliner”.
   c. Georgia-Pacific Gypsum, LLC, product; “DensGlass Shaftliner”.
   d. Lafarge Corporation, product: “Shaftliner Type X”

E. Gypsum board types: Specified under Section 09 29 00 – GYPSUM BOARD.

2.4 ACCESSORIES

A. Finishing trim, joint tapes, compound and accessories: Specified under Section 09 29 00 – GYPSUM BOARD.

B. Break away clips: As recommended by the manufacturer of the shaft wall framing system.

C. Fasteners:

1. Shaft wall framing:
   a. Expansion-type fasteners for securing vertical concrete and masonry surfaces.
   b. Concrete stub nails for securing runners to concrete.
   c. Nº.7 by 7/16 inch Pan head self-drilling screw to attach metal framing components.
2. Board fasteners: In compliance with ASTM C954 or ASTM C1002, of head type, thread, point and finish as recommended by the shaft wall system manufacturer.

D. Joint Sealers (Acoustical Sealant): One component acrylic latex, permanently elastic, non-staining, non-shrinking, non-migrating and paintable. Acceptable products include the following, or approved equal.

1. Tremco, Beachwood, OH. product, “Acoustical Sealant”.
2. United States Gypsum Company, Chicago, IL. product, “USG Acoustical Sealant”.
3. Pecora Corporation, Harleysville PA, product, “ AC-20 FTR”.

2.5 SOURCE QUALITY CONTROL

A. Obtain shaft wall products from a single manufacturer, or from manufacturers recommended by the prime manufacturer of shaft wall system.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that all items which are to be enclosed by Work of this Section, have been permanently installed, inspected and approved.

B. Beginning of installation means acceptance of existing substrate and site conditions.

3.2 INSTALLATION - GENERAL

A. Erect shaft wall systems in strict accordance with the manufacturers' UL listed test construction for the required fire rating and in strict accordance with manufacturer's instructions, ASTM C 754 for Metal Framing, together with the additional requirements specified herein and as indicated on the Drawings.

B. Install supplementary framing in shaft-wall assemblies around openings and required for blocking, bracing, and support of gravity and pullout loads of fixtures, equipment, services, heavy trim, furnishings, and similar items that cannot be supported directly by shaft-wall assembly framing.

1. Where handrails directly attach to shaft-wall assemblies, provide galvanized steel reinforcing strip with 0.0312-inch minimum thickness of base (uncoated) metal, accurately positioned and secured behind at least 1 face-layer panel.
2. Integrate stair hanger rods with shaft-wall assemblies by locating cavity of assemblies where required to enclose rods.

3.3 INSTALLATION OF SHAFT WALL

A. Install J runners or E studs at floor and ceiling structural elements with suitable fasteners located 2 inches from each end and intermediate fasteners spaced no greater than 24 inches.

1. Install runners and studs prior to fireproofing.
2. Do not splice studs, all studs shall extend from the floor to the underside of the structure above in one single length.

B. Install studs in direct contact with all door and window frame jambs, abutting partitions, partition corners and construction elements; screw fasten with one screw per flange.

1. Where studs are installed directly to exterior masonry walls, install 15 pound asphalt felt between stud and wall.

C. Install studs 3/8 inch to not more than 1/2 inch less than opening height and install between liner panels with liner inserted in the groove. Install full-length steel “E” studs over shaft wall liner at T-intersections, corners, columns and both sides of closure panels. Frame openings cut within a liner panel with “E” studs around perimeter. For openings, frame with vertical “E” studs at edges, horizontal J-strut at head and sill, and reinforcing as recommended by the shaft wall manufacturer. Suitably frame all openings to maintain structural support for wall.

D. Furnish and install additional cross bracing and other framing elements to assure a completely rigid assembly on metal stud partitions and furred areas, whether or not such bracing has been indicated on the Drawings, and for proper receipt of items which will be attached to partition surfaces.

1. At penetrations in shaft wall, maintain fire-resistance rating of shaft-wall assembly by installing supplementary steel framing around perimeter of penetration and fire protection behind boxes containing wiring devices and similar items.

E. Cut liner board panels 1 inch less than opening height and erect vertically between J-runners. Where shaft walls exceed 14 feet in height, position liner panel end joints within upper and lower third points of wall. Stagger joints top and bottom in adjacent panels.

1. Isolate gypsum finish panels from building structure to prevent cracking of finish panels while maintaining continuity of fire-rated construction.

F. Erect fire rated gypsum panel base layer horizontally on one side of studs with end joints staggered. Fasten base layer to studs with 1 inch, Type S-12 screws. Caulk perimeter of base layer panels.

G. Apply fire rated gypsum panels face layer vertically over base layer with joints staggered and attach with 1-5/8 inch Type S-12 screws staggered from those in base, spaced 12 inches on center and driven into studs.

H. Finish boards, trim and joint compound finishing as specified under Section 09 29 00 – GYPSUM BOARD.

3.4 APPLICATION OF ACOUSTICAL SEALANT

A. General: Install sealant and backing in accordance with the recommendations of ASTM C-919 and sealant manufacturer's recommendations.

1. Perform preparation in accordance with C-790. Thoroughly clean all joints, removing all loose mortar, oil, grease, dust, frost, and other foreign materials that will prevent proper adhesion of primers and sealant materials.
2. If so recommended and furnished by the specific sealant manufacturer, apply primer to all joint surfaces, taking care not to stain adjacent surfaces.

B. Seal all partition perimeters prior to taping or compounding. Where perimeters are edged with metal trim, apply sealant and backing material between trim and dissimilar material.

C. Seal all penetrations in partition types designated for "acoustical" insulation. Penetrations to receive sealant include electrical boxes, plumbing, heating and air conditioning ducts, telephone, intercom hookups and similar items.

1. Install joint bead back-up in all joints in excess of 5/8-inch depth, and joints that have no back-up therein, placing the joint bead in the joint in a manner that will assure a constant depth 1/8 inch greater than the sealant and caulking material depth tolerances.
    a. Set beads into joints continuously, by slightly stretching during placement, to permit compression against sides of joint, without surface wrinkles or buckles.
    b. Do not stretch back-up material into joints.
    c. Install bond breaker wherever recommended by the sealant manufacturer to prevent bond of the sealant to surfaces where such bond might impair the Work.
2. Apply sealant in continuous beads without open joints, voids or air pockets
    a. The depth of sealant and caulking materials shall be in accordance with manufacturer's recommendations for the specific joint function, but in no case exceed 1/2-inch in depth, nor less than 1/4-inch, regardless of the joint width.
3. Remove the temporary masking tape immediately after tooling, and before the sealant or caulking material has taken initial set.

3.5 APPLICATION OF JOINT TREATMENT

A. Application of joint tape and compound finishing is specified under Section 09 29 00 – GYPSUM BOARD.

3.6 TOLERANCES

A. Install shaft wall partitions with a maximum variation from true flatness of 1/8 inch per 10 feet, noncumulative.

3.7 CLEANING

A. Daily clean work areas by sweeping and disposing of debris, scraps, and deposits of compound and gypsum fill.

B. After completion of the work of this Section, remove equipment, and clean all wall, partition, and floor areas free from deposits of gypsum fill, and other materials installed under this Section.

End of Section

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Section 09 22 16

NON-STRUCTURAL METAL FRAMING

PART 1 - GENERAL

1.1 SUMMARY

A. Furnish and install:

1. Metal furring and framing where indicated on the Drawings, including cross bracing and knee bracing.
2. Metal ceiling and soffit framing, including hanger attachments, wire hangers, and screwable metal tee grid system.
3. Reinforcing plate blocking.
4. Deflection track assemblies at tops of metal stud partitions.
5. Metal furring clips at structural steel components.
6. Sound isolation 'resilient' hangers at Gymnasium, and where elsewhere indicated on Drawings.
7. Universal grid system for support of overhead work required as part of this Section 09 22 16.

1.2 RELATED REQUIREMENTS

A. Section 01 74 19 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL: Procedural and administrative requirements relating to recycling goals, waste management program and reporting.

B. Section 01 81 13 - SUSTAINABLE DESIGN REQUIREMENTS: Procedural and administrative requirements relating to required *Northeast CHPS Verified Program,* (NE-CHPS) Certification.

C. Section 02 41 19 - SELECTIVE DEMOLITION: Removal of existing finishes, partitions and walls as indicated in the Drawings.

D. Section 05 40 00 - COLD-FORMED METAL FRAMING: Load bearing framing.

E. Section 06 10 00 - ROUGH CARPENTRY: Wood blocking and framing, where indicated.

F. Section 07 21 00 - THERMAL INSULATION.

G. Section 08 11 13 - HOLLOW METAL DOORS AND FRAMES: Providing steel door frames.

H. Section 08 31 00 - ACCESS DOORS AND PANELS: Shop primed access panels, occurring in partitions and walls.

I. Section 09 21 16 – GYPSUM BOARD SHAFT WALL ASSEMBLIES: Framing supporting shaft wall assemblies, and fire-resistant liner panels.

J. Section 09 29 00 - GYPSUM BOARD: Gypsum board, applied over metal framing installed by this Section 09 22 16 including: gypsum board, and related trim components.

K. Section 09 51 00 - ACOUSTICAL CEILINGS: Suspended acoustical tile ceiling, including related metal suspension system.

L. Section 09 81 00 – ACOUSTICAL INSULATION: acoustical batt insulation between framing.

M. Division 23 - HEATING, VENTILATING AND AIR CONDITIONING: Supply and return air registers.

N. Division 26 - ELECTRICAL: Independent hangers for suspended lighting fixtures.

1.3 REFERENCES

A. Referenced Standards: Comply with applicable requirements of the following standards and those others referenced in this Section, under the provisions of Section 01 42 00 - REFERENCES. The standards referenced herein are included to establish recognized minimum quality only. Where these standards conflict with other specified requirements, the most restrictive requirements shall govern. Equivalent quality and testing standards will be acceptable, subject to their timely submission, review and acceptance by the Architect.

1. ASTM A568 – Standard Specification for Steel, Sheet, Carbon, Structural, and High-Strength, Low-Alloy, Hot-Rolled and Cold-Rolled, General Requirements for.
2. ASTM A653 - Standard Specification for Steel Sheet, Carbon, Metallic- and Nonmetallic-Coated for Cold-Formed Framing Members.
3. ASTM A641 - Standard Specification for Zinc–Coated (Galvanized) Carbon Steel Wire.
4. ASTM A1003 - Standard Specification for Steel Sheet, Carbon, Metallic- and Nonmetallic-Coated for Cold-Formed Framing Members.
5. ASTM A1011/A1011M - Standard Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength.
6. ASTM C636 – Standard Practice for Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-In Panels.
7. ASTM C645 - Standard Specification for Nonstructural Steel Framing Members.
8. ASTM C1002 - Standard Specification for Steel Self-Piercing Tapping Screws for Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Steel Studs.
9. ASTM C754 - Standard Specification for Installation of Steel Framing Members to Receive Screw-Attached Gypsum Panel Products.
10. ASTM D226 – Standard Specification for Asphalt-Saturated Organic Felt Used in Roofing and Waterproofing.

11. ASTM D412 – Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers—Tension.
12. ASTM D573 - Standard Test Method for Rubber—Deterioration in an Air Oven.
13. ASTM D2000 - Standard Classification System for Rubber Products in Automotive Applications.
14. ASTM D2240 - Standard Test Method for Rubber Property—Durometer Hardness.
15. ASTM E90 – Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements.
16. ASTM E119 - Standard Test Methods for Fire Tests of Building Construction and Materials.
17. ASTM F1267- Standard Specification for Metal, Expanded, Steel.
18. GA 203 - Installation of Screw-Type Steel Framing Members to Receive Gypsum board.

B. Sustainability Requirement Reference: The following sustainability requirements are hereby made a part of this Section by reference thereto:
   1. High Performance Schools Exchange, Northeast Energy Efficiency Partnerships NE-CHPS, (referred to herein as “NE-CHPS”).

1.4 SUBMITTALS

A. Information and Review Submittals: Submit the following under provisions of Section 01 33 00 - SUBMITTAL PROCEDURES:
   1. Literature: Manufacturer's product data sheets, specifications, performance data, physical properties for each item furnished hereunder.
   2. Sustainable Design Submittals: As required by NE CHPS.

1.5 QUALITY ASSURANCE

A. General: Notify the Architect where conflicts apply between referenced standards, specified materials, and methods of construction.

B. Sole Source: Obtain products required for the Work of this Section from a single manufacturer.

1.6 DELIVERY, STORAGE AND HANDLING

A. Delivery and Acceptance Requirements:
   1. Do not deliver items to the site, until all specified submittals have been submitted to, and approved by, the Architect.

B. Storage and Handling Requirements:
   1. Store and handle materials following manufacturer's recommended procedures, and in accordance with material safety data sheets.
   2. Protect materials from damage due to moisture, surface contamination, corrosion and damage from construction operations and other causes.

1.7 SEQUENCING AND SCHEDULING

A. Work of this Section shall be closely coordinated with the work of Section 09 20 00 - GYPSUM BOARD to assure the steady progress of the Contract.

B. Coordinate the work of this Section with the respective trades responsible for installing interfacing work, and ensure that the work performed hereunder is acceptable to such trades for the installation of their work.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Acceptable Manufacturers: Subject to compliance with the requirements specified herein, manufacturers offering products which may be incorporated in the work include the following, or approved equal:

1. Metal components and related items:
    a. Clarkwestern Dietrich Building Systems, LLC, Schiller Park, IL.
    b. Marino\Ware, Division of Ware Industries, South Plainfield NJ.
    c. Cemco Steel Framing and Metal Lath, City of Industry, CA.
    d. Telling Industries, Mentor, OH.
    e. Super Stud Building Products, Inc., Edison NJ.
2. Deflection track assemblies:
    a. Clarkwestern Dietrich Building Systems, LLC, Schiller Park, IL.
    b. Cemco Steel Framing and Metal Lath, City of Industry, CA.
    c. The Steel Network, Inc., Durham, NC.
    d. Fire Trak Inc., Watkins, MN.
3. Suspended furring system for ceilings and soffits:
    a. Armstrong World Industries, Inc., Lancaster, PA.
    b. Chicago Metallic Corporation, Chicago IL.
    c. Donn Corporation, Westlake OH.
4. Sound isolation hangers:
    a. LD Peters & Sons, Inc., New Rochelle NY.
    b. Mason Industries, Inc., Hauppauge NY.
    c. Kinetics Noise Control, Inc., Dublin, OH.

B. The design and details as shown on the drawings and the model numbers specified herein are to establish the standards of design and quality and not to limit competition.

2.2 DESCRIPTION

A. Regulatory Requirements

1. Obtain certificate of compliance from authority having jurisdiction indicating approval of specified products.

2. Fire resistance ratings: Where veneer plaster systems with fire-resistance ratings are indicated, provide materials and assemblies of the rating required, tested per ASTM E 119, which are identical to those indicated by reference to Gypsum Association file numbers in "Fire Resistance Design Manual" or to design designation in the Underwriters Laboratories "Fire Resistance Directory" or in listing of other testing agencies acceptable to authorities having jurisdiction and to the Owners' insurance underwriters.
    a. Fire-Test-Response Characteristics: Provide components that comply with rating requirements specified for fire-rated assemblies under UL 2079 for non-load bearing wall systems.
        1) Deflection Clips and Firestop Track: Connections and/or top runner provided in fire-resistance-rated assemblies shall be certified by UL 2079 for cyclic movement requirements.

2.3 STEEL

A. Sustainability Requirements:
    1. Recycled content of Steel: Use maximum available percentage of recycled steel. Steel framing products incorporated into the work shall contain not less than 30 percent of recycled steel.

2.4 FRAMING MATERIALS

A. “Hat shaped” Furring channels: 7/8 x 2-3/4 inch, roll-formed, hat-shaped, furring channel 25 gage hot-dip galvanized steel galvanized steel conforming to ASTM C 645.

B. Resilient furring channels: Roll-formed, hat-shaped, 1/2 x 2-5/8 inch, 26 gage hot-dip galvanized steel conforming to ASTM C 645, with pre-punched holes, equal to Unimast Metal Channel “RC1”.

C. Furring channels: ‘Z-shaped’ 1-1/2 inch depth, roll-formed, 25 gage (0.179 inch [0.45 mm] minimum thickness), hot-dip galvanized steel.

D. Studs: ‘C-shaped’ screw studs, hot-dip galvanized steel complying to ASTM C 645, 20 gage-equivalent (nominal 0.02 inches [0.75 mm] factory ribbed and/or embossed for performance equivalent to 20 gage (0.0329 inch [0.84 mm] minimum thickness studs), of widths indicated on the Drawings.
    1. Acceptable products include the following or approved equal:
        a. Clarkwestern Dietrich Building Systems, LLC, product “UltraSTEEL, USTE series”.
        b. Marino\Ware, Division of Ware Industries, product: “ViperStud Viper20”.
        c. Cemco Steel Framing and Metal Lath, product; “ViperStud Viper20”.
        d. Telling Industries, product; “ViperStud”.
        e. Super Stud Building Products Inc., product: “Edge EQ, EDS20P”.
    2. Provide full 20 gage (0.0329 inch [0.84 mm] minimum thickness studs where required under the indicated UL assemblies to meet fire resistance ratings.

E. Runners for metal studs: 'U-shaped' hemmed, hot-dip galvanized steel track conforming to ASTM C645, of gage and width to match respective stud sizes, or heavier gage per design requirements, having 1-1/4 inch or 2 inch leg as indicated, provided at tops and bottoms of all studs and at heads of all openings in stud partitions.

F. Internal reinforcement for various stud conditions, and bracing: 10 gage, minimum, galvanized steel.

G. Furnish cross bracing and knee bracing, to assure a completely rigid assembly on metal stud partitions and furred areas.

2.5 DEFLECTION TRACK ASSEMBLIES:

A. Non Fire-Rated Assemblies

1. Deflection Track: Manufacturer's standard top runner with extended flanges designed to prevent cracking of gypsum board applied to interior partitions resulting from deflection of the structure above fabricated from steel sheet complying with ASTM A 653 or ASTM A 568. Thickness as indicated for studs, and width to accommodate depth of studs, and the following configuration.
    a. Top runner with extended deep flanges that have one of the following: V-shaped offsets that compress, slots 1 inch on center that allow fasteners for stud attachment; 16 gage sliding clip assemblies attached to top track and clipped to stud, or double track systems required to meet anticipated vertical movement.
2. Acceptable Manufacturers: Subject to compliance with the requirements specified herein, manufacturers offering products which may be incorporated in the work include the following, or approved equal:
    a. Clarkwestern Dietrich Building Systems, LLC, product; "Deep Leg Deflection Track System", "Fast Top Clip", or "DoubleTrack System".
    b. Marino\Ware, Division of Ware Industries, product: "Slotted Track".
    c. Cemco Steel Framing and Metal Lath, product; "Slotted Track CST".
    d. Telling Industries, product; "ViperTrack Deep Leg Deflection Track".
    e. Super Stud Building Products Inc., product: "ITTC 450 Top Track Deflection Clip".
    f. The Steel Network, Inc., product; "VertiTrack VT", "VertiTrack VTD", or "VertiClip SLD".

B. Fire-Rated Assemblies: Head of wall dynamic fire rated joint systems for assemblies in compliance with UL 2079 HW-D. Provide clips or deep leg track system including step bushings complying with ASTM C 645 fabricated from steel sheet complying with ASTM A 653 or ASTM A 568. Thickness as indicated for studs, and width to accommodate depth of studs.

1. Acceptable Manufacturers: Subject to compliance with the requirements specified herein, manufacturers offering products which may be incorporated in the work include the following, or approved equal:
    a. Clarkwestern Dietrich Building Systems, LLC, product; "SLP-TRK Slotted Deflection Track".

b. Cemco Steel Framing and Metal Lath, product; “FAS Track UL Assemblies”.

c. The Steel Network, Inc., Durham, NC. product; “VertiClip SLD”.

d. Fire Trak Inc., Watkins, MN, product “Fire Trak”, or “Posi Clips”

C. Coordination: Verify with partition schedule on the Drawings to ensure proper depth of flange offsets at various partitions types.

2.6 CEILING AND SOFFIT SUSPENSION MATERIALS

A. Hanger attachments: Galvanized steel hanger eyes, of size and capacity to safely sustain a live load of at least 150 pounds per hanger attachment.

B. Hangers: Soft temper, pre-stretched galvanized carbon steel wire, conforming with ASTM A641, with a yield stress load of at least three times design load, but not less than 12 gage.

C. Sound isolation hangers: precompressed neoprene rubber and spring isolation hanger; designed for high frequency sound waves and low frequency vibrations. Size hangers as recommended by manufacturer for anticipated ceiling load.

1. LD Peters & Sons, Inc., New Rochelle NY, type W30N
2. Mason Industries, Inc., Hauppauge NY, W30N series
3. Kinetics Noise Control, Inc., Dublin, OH, type SRH series.

D. Grid system for direct attachment of plaster base and veneer plaster finish: Comprised of double web main furring tees, 1 1/2 inches high by 1-3/8 inches flange face by 0.020 inch thick; double web cross tees, 1 1/2 inches high by 15/16 inch flange face by 0.020 inch thick; 0.020 inch thick wall channels, with 1 1/2 inches interior web height; and all splices, clips, and related items. Provide Underwriters Laboratories Label fire-rated assemblies for locations requiring fire-rated ceilings and soffits

1. Chicago Metallic product “system 640 Furring System”.
2. Armstrong Word Industries product “Drywall Furring System”.
3. Donn (USG) Corporation, Chicago IL., product “USG Drywall Furring System” with DGLW tees.

2.7 CEILING AND SOFFIT FRAMING MATERIALS

A. Carrying channels, 2 inches deep, 16 gage cold-rolled channels, galvanized.

B. Support channels: 3/4 inches deep, 16 gage cold-rolled channels, galvanized.

C. Furring Channels: 7/8 x 2-3/4 inch, roll-formed, hat-shaped, furring channel 25 gage hot-dip galvanized steel galvanized steel conforming to ASTM C 645.

D. Metal Studs used in ceiling framing: ‘C-shaped’ screw studs, hot-dip galvanized steel complying to ASTM C 645, 25 gage, of widths indicated on the Drawings, or other gages under the specified standards to meet fire resistance ratings.

2.8 ACCESSORIES

A. Universal Grid System:

1. Specified Manufacturer: To establish a standard of quality, design and function desired, Drawings and specifications have been based on Unistrut Corporation, Itasca IL.
    a. Acceptable Manufacturers and products: Subject to compliance with the requirements specified herein, manufacturers offering products which may be incorporated in the work include the following.
        1) Unistrut Corporation, Itasca IL., product “Unistrut”
        2) Cooper US, Inc., Houston TX., product “Cooper B-Line”.
        3) Gleason Partners, LLC., Grand Rapids, MI., product “Strut Channel Systems”.
        4) Thomas & Betts Corporation, Memphis TN, product “Kindorf Superstrut”.
    b. There are no other manufacturers of this product type available in the United States, fabricators may choose to fabricate grid system components using structural steel shapes, with submittal and approval of complete engineering Drawings and calculations as a substitution.
    c. Finish:
        1) Rust inhibiting acrylic enamel paint applied by electro-deposition, after cleaning and phosphating, and thoroughly baked. Color is per Federal Standard 595a color number 14109 (dark limit V-). Finish to withstand minimum 400 hours salt spray when tested in accordance with ASTM B 117.
2. All channel members shall be fabricated from structural grade steel confirming to the following ASTM specifications:
    a. ASTM A 653 Grade A
3. All fittings shall be fabricated from steel conforming to one of the following ASTM specifications:
    a. ASTM A 36, A 575, or A 576.
4. All materials shall be stamped and identifiable by manufacturer and part number (where appropriate). Materials that appear damaged, distressed, unidentifiable or rusted shall not be used and will not be accepted.

B. Metal sheet plate blocking and bracing, where indicated: galvanized sheet 0.0312 inch thickness (20 gage).

C. Metal clips for wall framing, where indicated: Galvanized steel sheet 0.0625 inch thickness (16 gage).

D. Fasteners:

1. Expansion-type fasteners for securing vertical concrete and masonry surfaces.
2. Concrete stub nails for securing runners to concrete.

3. Nº.7 by 7/16 inch Pan head self-drilling screw to attach metal framing components.

E. Asphalt felt moisture barrier: ASTM D226, No. 15 asphalt saturated roofing felt.

PART 3 – EXECUTION

3.1 INSTALLATION, QUALITY STANDARDS

A. General: Perform erection procedures for the various veneer plaster system conditions, except as otherwise specified, as set forth in GA 201, GA 206, the written instructions of veneer plaster manufacturer, together with the additional requirements specified herein and as indicated on the Drawings.

3.2 INSTALLATION OF FURRING

A. Install metal furring channel horizontally, with channels spaced not more than 16-inch on centers, and attaching the channels to the masonry or concrete substrates with expansion type fasteners spaced not more than 8 inches on centers. Shim beneath channels as needed to ensure that a uniform receiving plane is maintained throughout.

3.3 INSTALLATION OF PARTITION FRAMING, GENERAL

A. Install metal runners at floor and ceiling to structural elements with suitable fasteners located 2 inches from each end and intermediate fasteners spaced no greater than 24 inches.

B. Install metal stud framing with open side facing in same direction, engaging floor and ceiling runners.

1. Stud spacing:
    a. Typical: 16 inches on-center, unless otherwise indicated on the Drawings.
    b. For partitions supporting wall cabinets and other wall mounted equipment: 12 inches on-center.
2. When necessary to splice studs, nest stud with 8 inch overlap and screw studs together with screws on both flanges.
3. Where studs are installed directly to exterior masonry walls, install asphalt felt between stud and wall.

C. Install studs in direct contact with all door and window frame jambs, abutting partitions, partition corners and construction elements; screw fasten with screw through both flanges of studs and track, top and bottom.

D. Securely anchor studs to jamb and head anchors of steel door frames. Over head of frames and openings in partitions, install a horizontal section of runner with a web flange bent at each end, horizontally and secure to strut studs with two screws in each bent web. Provide cripple studs over wall openings. Where indicated provide boxed headers fabricated from steel studs.

E. Where horizontal studs are used for wall reinforcing or framing, cut pieces of stud and install horizontally between vertical studs. Cope horizontal studs to fit between flanges of vertical studs. Bend ends of horizontal studs or install clip angles in order to secure by screwing to vertical studs.

F. Furnish and install additional cross bracing and knee bracing and other framing elements, required to assure a completely rigid assembly on metal stud partitions and furred areas, whether or not such bracing has been indicated on the Drawings, and for proper receipt of items which will be attached to partition surfaces.

3.4 INSTALLATION OF DEFLECTION TRACK

A. Isolate interior metal stud framing and shaft wall framing from building structure to prevent transfer of loading imposed by structural movement due to deflection.

1. Install deflection track top runner in accordance with manufacturer’s instructions and required to attain lateral support and avoid axial loading.
2. Install fire-rated deflection track top runner in accordance with manufacturer’s instructions at top of fire-rated, corridor and smoke partitions.

3.5 INSTALLATION OF REINFORCING PLATE BLOCKING

A. Install steel reinforcing plates in partitions and furred walls for the support of wall mounted objects as follows:

1. Wherever such reinforcing plates are indicated on the drawings.
2. All wall mounted casework locations.
3. All markerboard and tackboard locations.
4. All wall mounted acoustical room components.

B. Secure gage sheet metal reinforcing plates to steel studs with 1-1/4", Type "S" bugle head screws.

3.6 INSTALLATION - CEILING SUSPENSION SYSTEM

A. Coordinate layout and installation of suspension system components for suspended ceilings with other work supported by, or penetrating work of this section. Re-adjust ceiling suspension system, prior to the installation of plaster base and after installation of mechanical and electrical equipment and fixtures by the respective trades.

B. Install all components of concealed grid system in accordance with the manufacturer's instructions, with current ASTM C 636 requirements, with design and installation of suspended grid system safely sustaining a membrane loading of at least 7.9 pounds per square foot.

C. Install hangers not more than 24 inches on centers over locations of main tee members. Install hanger wires to hanger attachment with triple twists. Install additional wires required to provide support for main tees, at intervals not exceeding four feet, wherever main tees must be interrupted in order to install other work and at all other locations as may be directed by the Architect.

D. Install main tees parallel to long dimension of the area, at spacing not to exceed 48 inches on-center. Secure with hanger wire as the work progresses. Install cross tees as recommended by the system manufacturer, except spacing shall not exceed16 inches on-center.

3.7 INSTALLATION OF CEILING AND SOFFIT FRAMING

A. Install framing to height indicated, independent of walls, columns, and above ceiling work. Erect after Work above ceiling is complete. Coordinate the location of hangers with other work.

B. Securely anchor hangers to structural members or embed in structural slab. Space hangers to achieve deflection limits indicated.

C. Space main carrying channels at maximum 48 inch centers; not more than 4 inches from wall surfaces. Lap splice securely.

D. Securely fix furring channels or metal studs to hangers to prevent turning or twisting and to transmitted full load to hangers.

1. Place furring channels perpendicular to carrying channels at 16 inches on center, not more 1 inch from perimeter walls and rigidly secure. Lap splice securely.
2. Screw fasten metal studs perpendicular to carrying channels at 16 inches on center, not more 1 inch from perimeter walls. Lap splice securely.

E. Reinforce openings in suspension system which interrupt main carrying channels or furring channels with lateral channel bracing. Extend bracing minimum 24 inches past each opening.

3.8 TOLERANCES

A. Install partition and ceiling framing and furring with a maximum variation from true flatness of 1/8 inch per 10 feet, non-cumulative.

End of Section

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Section 09 29 00

GYPSUM BOARD

PART 1 - GENERAL

1.1 SUMMARY

A. The work of this Section consists of gypsum board (drywall) and trim finishes for partitions, ceilings, and soffits, where shown on the Drawings, as specified herein, and required for a complete and proper installation.

B. Furnish and install:

1. Taped, compounded and sanded gypsum board finishes.
2. Abuse resistant gypsum board.
3. All trim and accessory components related to gypsum board work.
4. Reveal trim in gypsum board work.
5. Impact resistant gypsum board at Gymnasium.
6. Grommets with brush gasket at Gymnasium ceiling.

C. Install access panels occurring in gypsum board work furnished by Section 08 31 00 - ACCESS DOORS AND PANELS, and by trades requiring the same.

1.2 RELATED REQUIREMENTS

A. Section 01 60 00 - PRODUCT REQUIREMENTS: Listing of VOC requirements for adhesives, cleaning/maintenance materials, paints, coatings, and sealants.

B. Section 01 74 19 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL: Procedural and administrative requirements relating to recycling goals, waste management program and reporting.

C. Section 01 81 13 - SUSTAINABLE DESIGN REQUIREMENTS: Procedural and administrative requirements relating to required *Northeast CHPS Verified Program,* (NE-CHPS) Certification.

D. Section 06 10 00 - ROUGH CARPENTRY:

1. Supplemental wood blocking supporting gypsum board.
2. Installation of metal door frames in gypsum board work.

E. Section 07 21 00 - THERMAL INSULATION.

F. Section 07 92 00 – JOINT SEALANTS: Furnishing and installing perimeter sealant and backing at gypsum drywall partitions.

G. Section 08 11 13 - HOLLOW METAL DOORS AND FRAMES: Furnishing steel door frames.

H. Section 08 31 00 - ACCESS DOORS AND PANELS, and by trades requiring the same: Shop primed access panels, occurring in partitions and walls.

I. Section 09 21 16 –SHAFT WALL ASSEMBLIES: Pre-engineered fire-resistant assemblies including framing and liner boards. Interior Finishing work performed under this Section 09 29 00.

J. Section 09 22 16 - NON-STRUCTURAL METAL FRAMING: Non-load bearing partition and ceiling framing and furring.

K. Section 09 51 00 - ACOUSTICAL CEILINGS: Suspended acoustical tile ceilings.

L. Section 09 91 00 - PAINTING: Applied finish coatings.

M. Section 10 14 00 – SIGNAGE: Finished wall surface coordination.

N. Division 21 - FIRE SUPPRESSION: Sprinkler heads in ceiling system.

O. Division 23 - HEATING, VENTILATING AND AIR CONDITIONING: Supply and return air registers.

P. Division 26 - ELECTRICAL: Independent hangers for suspended lighting fixtures.

1.3 REFERENCES

A. Referenced Standards: Comply with applicable requirements of the following standards and those others referenced in this Section, under the provisions of Section 01 42 00 - REFERENCES. The standards referenced herein are included to establish recognized minimum quality only. Where these standards conflict with other specified requirements, the most restrictive requirements shall govern. Equivalent quality and testing standards will be acceptable, subject to their timely submission, review and acceptance by the Architect.

1. ASTM C475/C475M - Standard Specification for Joint Compound and Joint Tape for Finishing Gypsum Board.
2. ASTM C557 - Standard Specification for Adhesives for Fastening Gypsum Wallboard to Wood Framing.
3. ASTM C645 – Standard Specification for Nonstructural Steel Framing Members.
4. ASTM C754 - Standard Specification for Installation of Steel Framing Members to Receive Screw-Attached Gypsum Panel Products.
5. ASTM C919 - Standard Practice for Use of Sealants in Acoustical Applications.

6. ASTM C1002 - Standard Specification for Steel Self-Piercing Tapping Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Steel Studs.
7. ASTM C1047 - Standard Specification for Accessories for Gypsum Wallboard and Gypsum Veneer Base.
8. ASTM C1177/C1177M – Standard Specification for Glass Mat Gypsum Substrate for Use as Sheathing.
9. ASTM C1278/C1278M - Standard Specification for Fiber-Reinforced Gypsum Panel.
10. ASTM C1396/C1396M - Standard Specification for Gypsum Board.
11. ASTM C1629/C1629M - Standard Classification for Abuse-Resistant Nondecorated Interior Gypsum Panel Products and Fiber-Reinforced Cement Panels.
12. ASTM C1658/C1658M - Standard Specification for Glass Mat Gypsum Panels.
13. ASTM C1766 - Standard Specification for Factory-Laminated Gypsum Panel Products.
14. ASTM D1784 - Standard Classification System and Basis for Specification for Rigid Poly (Vinyl Chloride) (PVC) Compounds and Chlorinated Poly(Vinyl Chloride) (CPVC) Compounds.
15. ASTM D3273 - Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber.
16. ASTM D3678 - Standard Specification for Rigid Poly(Vinyl Chloride) (PVC) Interior-Profile Extrusions.
17. ASTM E90 – Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements.
18. ASTM E119 - Standard Test Methods for Fire Tests of Building Construction and Materials.
19. ASTM G21 – Standard Practice for Determining Resistance of Synthetic Polymeric Materials to Fungi.
20. GA 201 - Gypsum Board for Walls and Ceilings.
21. GA 214 - Recommended Specifications for Levels of Gypsum Board Finish, Glass Mat and Fiber-Reinforced Gypsum Panels.
22. GA 216 - Recommended Specifications for the Application and Finishing of Gypsum Board.
23. GA 220 - Recommended Specifications for Gypsum Board Winter Related Job Problems.
24. UL - Fire Resistance Directory.
25. UL 723 - Tests for Surface Burning Characteristics of Building Materials.

26. All applicable federal, state and municipal codes, laws and regulations regarding flammability and smoke generation of interior finishes.

B. Sustainability Requirement Reference: The following sustainability requirements are hereby made a part of this Section by reference thereto:

1. High Performance Schools Exchange, Northeast Energy Efficiency Partnerships NE-CHPS, (referred to herein as “NE-CHPS”).

1.4 ADMINISTRATIVE REQUIREMENTS

A. Coordination:

1. General: Coordinate the work of this Section with the respective trades responsible for installing interfacing and adjoining work for proper sequence of installation, and ensure that the work performed hereunder is acceptable to such trades for the installation of their work.

2. Work of this Section shall be closely coordinated with the work of Section 09 22 16 - NON-STRUCTURAL METAL FRAMING, to assure the steady progress of the Contract.

B. Sequencing:

1. Do not install gypsum board until all pipes, ducts, conduits, and other such items which are to be enclosed thereby, have been permanently installed, inspected and approved.

1.5 SUBMITTALS

A. Information and Review Submittals: Submit the following under provisions of Section 01 33 00 - SUBMITTAL PROCEDURES:

1. Product Data: Manufacturer's product data sheets, specifications, performance data, physical properties for each item furnished hereunder.

2. Shop Drawings:

a. Details of any special conditions associated with fireproofing.

b. Mark-up a set of blackline interior elevations indicate corrections to grid layout and provide dimensioning showing locations of all proposed control joints and expansion joints.

1) Provide interior elevation drawings for interior elevations which are not included as part of the Contract Drawing set.

3. Sustainable Design Submittals: As required by NE CHPS.

1.6 QUALITY ASSURANCE

A. General: Notify the Architect where conflicts apply between referenced standards, specified materials, and methods of construction.

B. Sole Source: Obtain products required for the Work of this Section from a single manufacturer, or from manufacturers recommended by the prime manufacturer of gypsum board.

1.7 DELIVERY, STORAGE AND HANDLING

A. Delivery and Acceptance Requirements:

1. Do not deliver items to the site, until all specified submittals have been submitted to, and approved by, the Architect.
2. Deliver materials in original packages, containers or bundles bearing brand name and identification of manufacturer or supplier.

B. Storage and Handling Requirements:

1. Store materials inside, under cover and in manner to keep them dry, protected from weather, direct sunlight, surface contamination, corrosion and damage from construction traffic and other causes.
    a. Neatly stack board materials flat to prevent sagging.
2. Handle board materials so to prevent damage to edges, ends and surfaces.
3. Protect trim, accessories and corner beads from being bent or damaged.

1.8 SITE CONDITIONS

A. Environmental Conditions: In accordance with GA 216, maintain minimum ambient temperature of 50 degrees Fahrenheit 48 hours before, during taping and compounding, and until completely dry thereafter.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Acceptable Manufacturers: Subject to compliance with the requirements specified herein, manufacturers offering products which may be incorporated in the work include the following, or approved equal:

1. Gypsum board products:
    a. United States Gypsum Company, Chicago IL. (USG).
    b. National Gypsum Company, Gold Bond Products Division, Charlotte NC. (Gold Bond).
    c. G-P Gypsum Corporation, Atlanta GA.
    d. Lafarge Corporation, Hendron VA.
2. Abuse resistant gypsum board (ARGB): United States Gypsum Company, Chicago IL. (USG).
3. Polyvinyl chloride trim and accessories:
    a. Plastic Components, Inc., Miami FL.

b. Trim-Tex Drywall Products, Lincolnwood IL.

c. Vinyl Corporation, Miami FL.

d. Alabama Metal Industries Corporation, (AMICO)Birmingham, AL.

4. Reveal trim:

a. Flannery, Inc., San Fernando, CA.

b. Fry Reglet Corporation, Norcross GA.

c. Gordon Inc., Shreveport LA.

d. Pittcon Industries, Inc., Riverdale MD.

e. Stockton Products, North Las Vegas, NV.

5. Joint Sealants:

a. Tremco, Beachwood OH.

b. United States Gypsum Company, Chicago IL.

c. Pecora Corporation, Harleysville PA.

B. The design and details as shown on the Drawings and the model numbers specified herein are to establish the standards of design and quality and not to limit competition.

2.2 DESCRIPTION

A. Regulatory Requirements

1. Obtain certificate of compliance from authority having jurisdiction indicating approval of specified products.

2. Fire resistance ratings: Where gypsum board systems with fire-resistance ratings are indicated, provide materials and assemblies of the rating required, tested per ASTM E119, which are identical to those indicated by reference to Gypsum Association file numbers in "Fire Resistance Design Manual" or to design designation in the Underwriters Laboratories "Fire Resistance Directory" or in listing of other testing agencies acceptable to authorities having jurisdiction and to the Owners' insurance underwriters.

2.3 BOARD MATERIALS

A. Fire rated gypsum board: UL fire resistance rated, ASTM C1396 ‘Type X’ board, 5/8 inch thick, 48 inch width, of lengths to minimize end joints, with tapered edges.

1. Acceptable products include the following, or approved equal:

a. USG Sheetrock brand “Firecode Core”

b. National Gypsum Company, Gold Bond brand product “Fireshield Gypsum Board”.

c. G-P Gypsum Corporation product, “Toughrock Fireguard”.

d. CertainTeed Corporation, product “Type X Drywall”.

B. Sag-resistant gypsum board ceiling panels: Non-rated 1/2 inch thick, 48 inch width, of lengths to minimize end joints, with tapered edges, conforming to ASTM C1396, ASTM C1395 and ASTM C1396.

1. Acceptable products include the following or approved equal:
    a. USG Sheetrock brand product “Ultralight Panels Mold Tough”.
    b. National Gypsum Company, Gold Bond brand product “High Strength Ceiling Board”.
    c. G-P Gypsum Corporation product, “ToughRock CD Ceiling Board”.
    d. CertainTeed Corporation, product “Easi-Lite 30 Minute Lightweight Drywall”.
2. At fire-resistant rated ceilings, provide 5/8 inch thick fire-rated gypsum board as specified herein.

C. Abuse-Resistant Gypsum Board (ARGB): UL type FRX fire resistance type, ASTM C-1278 board, complying with ASTM C1658 and ASTM C36.

1. ASTM C1629 Test Result Characteristics, minimum Level ratings:
    a. Abrasion: Level 2.
    b. Indention: Level 1.
    c. Soft Body Impact: Level 2.
    d. Hard Body Impact: Level 1.
2. Acceptable products include the following or approved equal:
    a. USG Sheetrock brand product “Moldtough AR”, or “Fiberock AR panels”.
    b. National Gypsum Company, Gold Bond brand product “Hi Abuse XP”.
    c. G-P Gypsum Corporation product, “Dense Armor Plus Abuse”.
    d. CertainTeed Corporation, product “Extreme Abuse Resistant Drywall with M2Tech”.

D. Mold and moisture resistant (MR) gypsum board, fire resistant: water-resistant, mold-resistant interior wall panel; conforming to ASTM C630 and C1396 (Section 5), with Type “X” core 5/8 inch thick, 48 inch width, of lengths to minimize end joints, with tapered edges.

1. Treated paper faced acceptable products include the following or approved equal:
    a. USG Sheetrock brand “Mold Tough Firecode Panels”.
    b. National Gypsum Company, Gold Bond brand product “XP Fireshield Gypsum Board”.
    c. CertainTeed Corporation, product “Moisture Resistant Gypsum Board.

E. Impact-Resistant Gypsum Board (IRGB): UL type FRX fire resistance type, ASTM C-1278 board, complying with ASTM C1658 and ASTM C36.

1. ASTM C1629 Test Result Characteristics, minimum Level ratings:
    a. Abrasion: Level 3.
    b. Indention: Level 1.
    c. Soft Body Impact: Level 3.
    d. Hard Body Impact: Level 2.
2. Acceptable products include the following or approved equal:
    a. USG Sheetrock brand product “Mold-Tough VHI”.
    b. National Gypsum Company, Gold Bond brand product “Hi Impact XP”.
    c. G-P Gypsum Corporation product, “Dense Armor Plus Impact”.
    d. CertainTeed Corporation product “Extreme Impact Resistant Drywall with M2Tech”.

2.4 REVEAL TRIM

A. Reveal trim: extruded aluminum trim with 1 inch wide recess by nominally 5/8 inch deep reveal channel with punched tapered fins.
    1. Fry Reglet Corporation, model number: DRM 625-100 (Basis of Design).

B. Reveal trim: extruded aluminum trim with 1/4 inch wide recess by nominally 5/8 inch deep reveal channel with punched tapered fins.
    1. Fry Reglet Corporation, model number: DRM 625-025 (Basis of Design).

C. Reveal trim: Non-vented “Z” shape extruded aluminum transition trim with 1 inch wide (except as otherwise indicated on Drawings) recess by nominally 5/8 inch deep reveal with punched tapered fins, with brushed aluminum finish.
    1. Fry Reglet Corporation, model number: DRMZ-625-1000. (Basis of Design)

D. Reveal trim: Vented “Z” shape extruded aluminum transition trim with 1 inch wide recess (except as otherwise indicated on Drawings) by nominally 5/8 inch deep reveal with punched tapered fins, with brushed aluminum finish.
    1. Fry Reglet Corporation, model number: DRMZ-625-V-100. (Basis of Design)

2.5 ACCESSORIES

A. Gypsum board polyvinyl chloride trim accessories, conforming to ASTM D 1784 and C 1047.
    1. J Bead: Edge trim with exposed 1/2 inch face cap, furnish trim model number corresponding to the board thickness where installed.
        a. Plastic Components model number: 200X-50 (for 1/2 inch thick board) or 200S-58 (for 5/8 inch thick board).
        b. Trim-Tex, model: 1110 (for 1/2 inch thick board) or 1210 (for 5/8 inch thick board).

c. Vinyl Corp. model number: JB50 (for 1/2 inch thick board) or JB58 (for 5/8 inch thick board).

d. AMICO. model number: AMJB50 (for 1/2” thick board) or AMJB58 (for 5/8” thick board).

2. L Bead: casing edge trim, furnish trim model number corresponding to the board thickness where installed

a. Plastic Components model number: 221-50 (for 1/2 inch thick board) or 221-58 (for 5/8 inch thick board).

b. Trim-Tex, model: 1710 (for 1/2 inch thick board) or 1810 (for 5/8 inch thick board).

c. Vinyl Corp. model number: SB50 (for 1/2 inch thick board) or SB58 (for 5/8 inch thick board).

d. AMICO. model number: AMSB50 (for 1/2 inch thick board) or AMSB58 (for 5/8 inch thick board).

3. L-Bead with removable leg: Casing edge trim for joints at ceilings doors and windows, with removable leg strip, furnish trim model number corresponding to the board thickness where installed

a. Plastic Components model number: 224-50 (for 1/2 inch thick board) or 224-58 (for 5/8 inch thick board).

b. Trim-Tex model: 9002 (for both 1/2 inch thick board and 5/8 inch thick board).

c. Vinyl Corp. model number: CT-50(for 1/2 inch thick board) or CT-58 (for 5/8 inch thick board).

d. AMICO product “Zip Strip” model number: AMZIP50 (for 1/2 inch thick board) or AMZIP58 (for 5/8 inch thick board).

4. Corner beads, 90 degree with 1-1/4 inch flanges:

a. Plastic Components model number: 209.

b. Trim-Tex model: 4010.

c. Vinyl Corp. model number: CB125.

d. AMICO. model number: AMCB125.

5. Control joints: “V” type joint with nominal 3/16 inch reveal and removable temporary tape:

a. Gold bond model “EZ Strip Expansion Joint”.

b. Plastic Components model number: 2027-16.

c. Vinyl Corp. model number: CJV16.

d. AMICO. model number: AMDCJV16.

B. Paper faced trim accessories for use with Abuse Resistant Gypsum Board:

1. Corner beads (at outside corners): Paper-faced galvanized steel sheet for finishing with joint compound conforming with ASTM C-1047, equal USG product “Sheetrock” Brand Paper-Faced Metal Corner Bead.
2. Casing beads: Paper-faced galvanized steel sheet for finishing with joint compound conforming with ASTM C-1047, equal to USG product “Sheetrock” Brand Paper-Faced Metal Beads and Trims.
    a. LC-Bead (J-Bead): Use at exposed panel edges.
    b. L-Bead: Use where indicated
    c. U-Bead: Use where indicated.
3. Control joints: Solid zinc “V-shaped control joint, having 3/32 inch thick perforated grounds, equal to USG Control Joint No. 093.

C. Tapes and compound:

1. Joint tape: Nominal 2 inch wide, high strength, cross-fibered paper drywall tape.
2. Joint Compound for setting tape: ‘Speed-setting type compound’, field mixed equal to USG “Durabond 20” or Gold bond “Stay Smooth 30”.
3. Joint Compound for finishing: field mixed joint compound equal to USG “Durabond 90” and Gold bond “Stay Smooth 90”, or factory pre-mixed compound equal to USG “Ready-Mixed Joint Compound” and Gold Bond “All Purpose Compound”.

D. Fasteners (interior board systems):

1. Type S, bugle head screws complying with ASTM C 1002, for applying gypsum board to metal framing, ceiling grid system, and furring channels.
    a. Not less than 1 inch long for single layer gypsum board.
    b. Not less than 1-5/8 inch [41mm] long for double-layer gypsum board.
2. Type W, bugle head screws complying with ASTM C 1002, for applying gypsum board to wood framing and furring.
    a. Not less than 1-1/4 inch [31mm] long for single layer gypsum board
    b. Not less than 1-5/8 inch [41mm] long for double-layer gypsum board,
3. Type S-12, fine thread self-drilling screws complying with ASTM C 1002, for applying gypsum board to light gage metal framing.
    a. Not less than 1 inch [25 mm] long for 1/2 inch thick single layer gypsum board.
    b. Not less than 1-1/4 inch [31mm] long for 5/8 inch thick single layer gypsum board.
    c. Not less than 1-5/8 inch [41mm] long for double-layer gypsum board,

E. Grommets at Gymnasium ceiling [key note 09 29 00.71]: 3 inch diameter thermoplastic polymer (ABS) fire-retardant treated grommet with nylon brush insert, to prevent air infiltration through grommet opening.

1. Basis of Design: Access Floor Systems.com Inc., Covington, LA. Product “AirBlock 3 inch Brush Grommet”, model number AFSG3BR.

F. Laminating adhesive: USG Durabond Joint Compound 90, USG Ready-mixed All Purpose Compound, or equal.

G. Joint Sealers (interior acoustical sealant type): One component acrylic latex, permanently elastic, non-staining, non-shrinking, non-migrating and paintable. Acceptable products include the following, or approved equal.

1. Tremco, Beachwood OH; product, “Acoustical Sealant”.
2. United States Gypsum Company, Chicago IL; product “USG Acoustical Sealant”.
3. Pecora Corporation, Harleysville PA; product “AC-20 FTR”.

H. Liquid sealer for cuts, holes and ends of moisture resistant board; provide one of the following or acceptable equal.

1. Shellac type sealer: mix 4 pounds of orange or bleached shellac dissolved in 1 gallon of denatured ethyl-alcohol.
2. Varnish type sealer: Fast setting marine varnish.

2.6 SOURCE QUALITY CONTROL

A. Obtain gypsum board and shaft wall products from a single manufacturer, or from manufacturers recommended by the prime manufacturer of gypsum boards.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that all items which are to be enclosed by Work of this Section, have been permanently installed, inspected and approved.

B. Inspect framing and other substrates; verify that they are in proper condition to receive the work of this Section.

C. Beginning of installation means acceptance of existing substrate and site conditions.

3.2 PREPARATION

A. During the operation of gypsum board work, protect all wood, metal, glass, flooring, and other finished materials against undue soilage and damage by the exercise of reasonable care and precautions. Repair or replace any work so damaged and soiled.

3.3 INSTALLATION - GENERAL

A. General: Perform erection procedures for the various gypsum board system conditions, except as otherwise specified, as set forth in GA 201, GA 216, GA 220, the written instructions of gypsum board manufacturer, together with the additional requirements specified herein and as indicated on the Drawings.

B. Where fire-resistive rated assemblies are indicated, erect gypsum board systems in strict accordance with the manufacturers' UL listed test constructions for the required fire rating on each specific assembly.

C. Install specified control joints where indicated on Drawings and where run of partitions, or furred surfaces exceeds 30 feet. Show locations of all control joints on shop drawings.

1. Locate control joints at corners of head frames of doors.
2. Run vertical control joints continuously to top of partition, shaft wall or furred area, as applicable.

3.4 INSTALLATION OF GYPSUM BOARD

A. Screw fasten only, gypsum board to framing and furring, with ends and edges occurring over firm bearing. At all door jambs screw fasten gypsum panels 8 inches on center to both box studs

1. Erect single layer fire-resistance rated gypsum board vertically.
2. Erect standard and moisture resistant layer board in most economical direction.
3. Erect ceiling and soffit gypsum boards to meet UL requirements, where applicable, stagger end joints over supports. Secure gypsum board with fasteners inserted through ceiling buttons; anchor fasteners directly to framing or suspended support system.

B. Install gypsum board to provide ¼ inch gap above concrete slab.

C. Wherever items penetrate the gypsum board surfaces, use extra care in cutting the gypsum board to ensure a uniformly dimensioned joint between the penetrating item and the gypsum board, and fill joints with specified sealant material. Verify the expected deflection factor of the penetrating members, and cut the gypsum accordingly, to prevent damage thereto from the deflecting members.

D. Treat cut edges and holes in moisture resistant gypsum board with approved liquid sealer.

1. If shellac is used, apply in thin layers to dry quickly.

3.5 INSTALLATION OF REVEAL TRIM

A. General: Install reveal trim in accordance with trim manufacturer’s recommendations and as follows:

1. Lay out drywall surface with chalk lines to exact heights and locations indicated. Cut out gypsum board with router.
2. Cut extrusions to proper lengths and dry-fit to drywall. Mitre all corners for hairline joints.
3. Screw install trim through at 8 inches on center maximum with standard bugle head drywall screws.

3.6 APPLICATION OF JOINT TREATMENT

A. Install joint tape at all joints where gypsum boards abut and where boards form internal corners, whether or not such joints will be concealed from view.

B. Apply compound to all joints, edges, corners, fastener head depressions and abrasions in the surfaces, whether or not such conditions will be concealed from view. Sand completely smooth all compound surfaces, which will be exposed to view, and leave ready to receive applied coatings or finish.

C. Provide the minimum levels of gypsum board finishes as defined by the Gypsum Association recommended specifications GA-214 and GA-216, per the following:

1. At areas hidden from view, except as otherwise specified: Level 1.
2. At areas hidden from view, requiring a fire resistance rating: Level 1.
3. At areas hidden from view, requiring smoke-resistance: Level 1.
4. At areas hidden from view, corridor side of all corridor partitions: Level 1.
5. At concealed plenum spaces above ceilings: Level 1.
6. At non-occupied spaces: Level 1.
7. At surfaces scheduled to receive rigid sheet vinyl wall cladding: Level 3.
8. At surfaces scheduled to receive painted finishes: Level 4.
9. At surfaces scheduled to receive abuse resistant and impact resistant gypsum board: Level 4.

3.7 TOLERANCES

A. Maximum variation for gypsum board partitions and ceilings from true flatness: 1/8 inch per 10 feet, noncumulative.

3.8 CLEANING

A. Daily clean work areas by sweeping and disposing of debris, scraps, and deposits of compound and gypsum fill.

B. After completion of the work of this Section, remove equipment, and clean all wall, partition, and floor areas free from deposits of gypsum fill, and other materials installed under this Section.

End of Section

Section 09 51 00

ACOUSTICAL CEILINGS

PART 1 – GENERAL

1.1 SUMMARY

A. General: The work of this Section consists of acoustical ceiling systems where shown on the Drawings, as specified herein, and as required for a complete and proper installation.

B. Furnish and install the following:

1. Suspended acoustical tile ceiling including suspension system and associated edge moldings.
2. Furnish and install joint sealant at ceiling edge angles where abutting walls.

C. Install the following furnished under the designated Sections:

1.2 RELATED REQUIREMENTS

A. Section 01 74 19 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL: Procedural and administrative requirements relating to recycling goals, waste management program and reporting.

B. Section 01 81 13 - SUSTAINABLE DESIGN REQUIREMENTS: Procedural and administrative requirements relating to required *Northeast CHPS Verified Program,* (NE-CHPS) Certification.

C. Section 08 31 00 - ACCESS DOORS AND PANELS, and by trades requiring the same: Shop primed access panels, occurring in partitions and walls.

D. Section 09 22 16 – NON-STRUCTURAL METAL FRAMING: Metal ceiling and soffit framing for gypsum board, including hanger attachments, wire hangers, and screwable metal tee grid system.

E. Section 09 29 00 - GYPSUM BOARD: Suspended drywall construction ceilings and soffits.

F. Section 07 92 00 – JOINT SEALANTS: Sealant at gaps between new acoustical ceiling edge angles and all irregular walls.

G. Section 14 22 00 – COMPACT TRACTION ELEVATOR: Elevator cab ceiling.

H. Division 21 – FIRE PROTECTION: Sprinkler heads in ceiling system.

I. Division 23 - MECHANICAL: Air diffusion devices in ceiling.

J. Division 26 - ELECTRICAL:

1. Fire alarm and smoke detection equipment mounted in ceiling system.
2. Light fixtures and independent hangers for suspended fixtures.

1.3 REFERENCES

A. Referenced Standards: Comply with applicable requirements of the following standards and those others referenced in this Section, under the provisions of Section 01 42 00 - REFERENCES. The standards referenced herein are included to establish recognized minimum quality only. Where these standards conflict with other specified requirements, the most restrictive requirements shall govern. Equivalent quality and testing standards will be acceptable, subject to their timely submission, review and acceptance by the Architect.

1. ASTM A641 - Standard Specification for Zinc-Coated (Galvanized) Carbon Steel Wire.
2. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
3. ASTM A1008/A1008M - Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, Required Hardness, Solution Hardened, and Bake Hardenable.
4. ASTM C423 - Standard Test Method for Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method "UL Classified".
5. ASTM C523 (Withdrawn Standard) - Method of Test for Light reflectance of Acoustical Material by the Integrating Sphere Reflectometer.
6. ASTM C635/C635M - Standard Specification for Manufacture, Performance, and Testing Metal Suspension Systems for Acoustical Tile and Lay-in Panel Ceilings.
7. ASTM C636/C636M - Standard Practice for Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-In Panels.
8. ASTM D3273 - Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber
9. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Material "UL Classified"
10. ASTM E119 - Standard Test Methods for Fire Tests of Building Construction and Materials.
11. ASTM E413 - Classification for Rating Sound Insulation.
12. ASTM E580 – Standard Practice for Installation of Ceiling Suspension Systems for Acoustical Tile and Lay-in Panels in Areas Subject to Earthquake Ground Motions.
13. ASTM E1111 - Standard Test Method for Measuring the Interzone Attenuation of Ceilings Systems
14. ASTM E1264 – Standard Classification of Acoustical Ceiling Products.

15. ASTM E1414/E1414M - Standard Test Method for Airborne Sound Attenuation Between Rooms Sharing a Common Ceiling Plenum. "UL Classified".
16. UL Fire Resistance Directory and Building Material Directory.
17. All applicable federal, state and municipal codes, laws and regulations regarding flammability and smoke generation of interior finishes.

B. General References The following reference materials are hereby made a part of this Section by reference thereto:

1. CISCA (Ceilings and Interior Systems Contractors Association) - Acoustical Ceilings: Use and Practice.

C. Sustainability Requirement Reference: The following sustainability requirements are hereby made a part of this Section by reference thereto:

1. High Performance Schools Exchange, Northeast Energy Efficiency Partnerships NE-CHPS, (referred to herein as “NE-CHPS”).

1.4 ADMINISTRATIVE REQUIREMENTS

A. Coordination: Coordinate the work of this Section with the respective trades responsible for installing interfacing and adjoining work for proper sequence of installation, and ensure that the work performed hereunder is acceptable to such trades for the installation of their work.

B. Sequencing:

1. Field Measurements
   a. Take field measurements before preparation of shop drawings and fabrication, where possible, to ensure proper fitting of Work.
   b. Allow for adjustments within specified tolerances wherever taking of field measurements before fabrication might delay Work.
2. Coordinate the work of this Section with the respective trades responsible for installing interfacing work, to allow work which will be concealed by the ceilings to be completed prior to commencing installing the ceilings in such locations.

C. Scheduling:

1. Install acoustical units after interior wet work is dry.
2. Schedule work to ensure acoustical ceilings are not installed until building is enclosed, sufficient heat is provided, dust generating activities have terminated and overhead work is completed, tested and approved.

1.5 SUBMITTALS

A. Information and Review Submittals: Submit the following under provisions of Section 01 33 00 - SUBMITTAL PROCEDURES:

1. Product Data: Manufacturer's product data sheets, specifications, performance data, physical properties for each item furnished hereunder.
2. Shop Drawings:
    a. 1/4 inch scale plans of each room or space; indicate grid layout and related dimensioning, junctions with other work or ceiling finishes, interrelation of mechanical and electrical items related to the system.
    b. All drawings bearing dimensions of actual measurements taken at the project.
    c. Large scale installation details of special conditions.
3. Verification Samples:
    a. 12 by 12 inch samples of acoustical units, illustrating material and finish.
    b. 12 inch long samples of suspension system components including main runners, cross runner and edge trim.
    c. 12 inch long samples of existing exposed spline suspension system components including runners and edge trim for comparison with supplied materials.
4. Sustainable Design Submittals: As required by NE CHPS.

B. Closeout Submittals: Submit the following under provisions of Section 01 78 00 - CLOSEOUT SUBMITTALS.
1. Bonds and Warranty Documentation:
    a. Manufacturer’s Warranties and guarantees as specified elsewhere herein this Section.

C. Maintenance Material Submittals: Submit the following under provisions of Section 01 78 00 - CLOSEOUT SUBMITTALS. Clearly label and package extra materials securely to prevent damage. Deliver to the Owner extra ceiling tiles and suspension framing for future repairs and maintenance, from the same manufacturer as those installed, in the following amounts.
1. Provide to the Owner, extra ceiling panel and suspension components, 3 percent of each type installed.
2. Acoustical ceiling tiles: 3 percent of each type and color, installed.
3. Suspension framing: 50 linear feet of each type and color utilized on the project.

1.6 QUALITY ASSURANCE

A. General: Notify the Architect where conflicts apply between referenced standards and existing materials, and existing methods of construction.

B. Sole Source: Obtain products required for the Work of this Section from a single manufacturer, or from manufacturers recommended by the prime manufacturer of acoustical ceiling panels.

C. Qualifications:

1. Installer/Applicator: Minimum of 3 years documented experience demonstrating previously successful work of the type specified herein, and approved by product manufacturer.

1.7 DELIVERY, STORAGE AND HANDLING

A. Delivery and Acceptance Requirements:

1. Do not deliver items to the site, until all specified submittals have been submitted to, and approved by, the Architect.
2. Do not deliver acoustical ceiling panels to the project until all concrete, masonry, plaster and other wet work has been completed and dry.
3. Deliver acoustical ceiling panels in original, unopened packages and store protected in a fully enclosed space.

B. Storage and Handling Requirements:

1. Protect materials from damage due to moisture, direct sunlight, excessive temperatures, surface contamination, corrosion and damage from construction operations and other causes.

C. Packaging Waste Management: Comply with packaging requirements specified under Section 01 60 00 - PRODUCT REQUIREMENTS.

1. Shipping materials: Manufacturer shall utilize to the greatest extent possible packaging materials which are biodegradable an recyclable.
2. Jobsite packaging waste management: Recycle packaging materials coordinated with general construction waste management specified under Section 01 74 19 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL

D. Damaged material: Remove any damaged or contaminated materials from job site immediately, including materials in broken packages, packages containing water marks, or show other evidence of damage, unless Architect specifically authorizes correction thereof and usage on project.

1.8 SITE CONDITIONS

A. Maintain uniform temperature of minimum of 60 degrees Fahrenheit and humidity of 20 to 40 percent prior to, during, and after installation.

1.9 WARRANTY

A. General: Submit warranties under provisions of Section 01 78 00 - CLOSEOUT SUBMITTALS.

B. Manufacturer Warranty:

1. In addition to the specific guarantee requirements of the GENERAL CONDITIONS and SUPPLEMENTAL GENERAL CONDITIONS, the

Contractor shall obtain in the Owner's name the standard written manufacturer's guarantee of all materials furnished under this Section where such guarantees are offered in the manufacturer's published product data. All these guarantees shall be in addition to, and not in lieu of, other liabilities which the Contractor may have by law or other provisions of the Contract Documents.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Basis of Design: To establish a standard of quality, design and function desired, Drawings and specifications have been based on Rockfon company.

B. Acceptable Manufacturers: Subject to compliance with the requirements specified herein, manufacturers offering products which may be incorporated in the work include the following, or approved equal:

1. Acoustical ceiling panels:
    a. Rockfon North America., Chicago IL.
    b. Armstrong World Industries, Inc., Lancaster PA.
    c. USG Interiors Inc., Chicago IL.
    d. Certainteed Corporation, Valley Forge, PA.
2. Suspension systems:
    a. Rockfon North America (Chicago Metalllic Brand), Chicago IL.
    b. Armstrong World Industries, Inc., Lancaster PA.
    c. USG Interiors Inc., (Donn® Brand) Chicago IL.

2.2 DESCRIPTION

A. General Description: Manufacturer's standard panels of configuration indicated that comply with ASTM E1264 classifications as designated by types, patterns, acoustical ratings, and light reflectance as indicated.

B. Sustainability Requirements:

1. Recycled content of acoustical ceiling panels: Use maximum available percentage of materials by weight. Products incorporated into the work shall contain not less than 50 percent of recycled content.
2. Recycled content of steel used in grid framing: Use maximum available percentage of recycled steel. Steel framing products incorporated into the work shall contain not less than 25 percent of recycled steel.

2.3 PERFORMANCE/DESIGN CRITERIA

A. Fire Resistance: Where fire-resistance ratings are indicated or required by authorities having jurisdiction, provide materials and construction which are

identical to assemblies whose fire-resistance ratings have been tested in compliance with ASTM E119 by independent agencies acceptable to the Architect and authorities having jurisdiction.

B. Surface Burning Characteristics: Provide UL Classified material whose surface burning characteristics, when tested in compliance with ASTM E84 are Class A.

C. Where the following ratings are specified, provide materials and construction which are identical to those tested by Underwriters Laboratories or equivalent independent testing agencies acceptable to the Architect.

1. Noise Reduction Coefficient (NRC): Ratings have been tested in compliance with ASTM C423.
2. Ceiling Attenuation Class (CAC) : Ratings have been tested in accordance with ASTM E1414.
3. Light Reflectance (LR): Ratings has been tested in compliance with ASTM C523.

2.4 ACOUSTICAL CEILING PANELS

A. Type ACT-1 Ceiling (corridors, nurse, teacher planning):

1. Panel size: 24 by 48 inch by 5/8 inch thick.
2. Panel edge: Square tegular edge.
3. Description: ASTM E1264 Type III, Form 2, Pattern CE, Class A flame spread, wet formed mineral fiber smooth, non-fissured, medium textured panel, non-combustible, vinyl latex paint finish.
4. Color: White.
5. Minimum light reflectance range: LR 0.84.
6. Acoustical characteristics:
    a. Minimum NRC: 0.70.
    b. CAC: 22.
    c. AC: 170
7. Acceptable products:
    a. Ceiling Panel:
        1) (Basis of Design) Rockfon product “Education Standard” product number “41301”.

B. Type ACT-2 Ceiling (classrooms, small group rooms, conference rooms, private offices):

1. Panel size: 24 by 48 inch by 3/4 inch thick.
2. Panel edge: Square edge.

3. Description: ASTM E1264 Type III, Form 2, Pattern CE, Class A flame spread, wet formed mineral fiber smooth, non-fissured, medium textured panel, non-combustible, vinyl latex paint finish.
4. Color: White.
5. Minimum light reflectance range: LR 0.82.
6. Acoustical characteristics:
    a. Minimum NRC: 0.80.
    b. CAC: 22.
    c. AC: 170
7. Acceptable products:
    a. Ceiling Panel:
        1) (Basis of Design) Rockfon product “Education Plus” product number “42301”.

C. Type ACT-3 Ceiling (media commons):
1. Panel size: 24 by 24 inch by 1 inch thick.
2. Panel edge: Beveled tegular edge.
3. Description: ASTM E1264 Type III, Form 2, Pattern CE, Class A flame spread, wet formed mineral fiber smooth, non-fissured, medium textured panel, non-combustible, vinyl latex paint finish.
4. Color: White.
5. Minimum light reflectance range: LR 0.84.
6. Acoustical characteristics:
    a. Minimum NRC: 0.90.
    b. CAC: 22.
    c. AC: 170
7. Acceptable products:
    a. Ceiling Panel:
        1) (Basis of Design) Rockfon product “Education Premium” product number “43300”.

D. Type ACT-4 Ceiling (media commons, student commons):
1. Panel size: 24 by 48 inch by 1 inch thick.
2. Panel edge: Beveled tegular edge.
3. Description: ASTM E1264 Type III, Form 2, Pattern CE, Class A flame spread, wet formed mineral fiber smooth non-fissured, medium textured panel, non-combustible, vinyl latex paint finish.
4. Color: White.

5. Minimum light reflectance range: LR 0.84.
6. Acoustical characteristics:
   a. Minimum NRC: 0.90.
   b. CAC: 22.
   c. AC: 170
7. Acceptable products:
   a. Ceiling Panel:
      1) (Basis of Design) Rockfon product “Education Premium” product number “43301”.

E. Type ACT-5 Ceiling (kitchen, locker rooms):
1. Panel size: 24 by 24 inch by 5/8 inch thick.
2. Panel edge: Beveled tegular edge.
3. Description: ASTM E1264 Type III, Form 2, Pattern CE, Class A flame spread, wet formed mineral fiber smooth non-fissured, medium textured panel, non-combustible, vinyl latex paint finish.
4. Color: White.
5. Minimum light reflectance range: LR 0.85.
6. Acoustical characteristics:
   a. Minimum NRC: 0.85.
   b. CAC: 22.
   c. AC: 170
7. Acceptable products:
   a. Ceiling Panel:
      1) (Basis of Design) Rockfon product “Koral” product number “1160”.

F. Type ACT-6 Ceiling (band, choral):
1. Panel size: 24 by 24 inch by 1 inch thick.
2. Panel edge: Beveled tegular edge.
3. Description: ASTM E1264 Type III, Form 2, Pattern CE, Class A flame spread, wet formed mineral fiber smooth non-fissured, medium textured panel, non-combustible, vinyl latex paint finish.
4. Color: White.
5. Minimum light reflectance range: LR 0.85.
6. Acoustical characteristics:
   a. Minimum NRC: 0.90.
   b. CAC: 22.

c. AC: 170

7. Acceptable products:

a. Ceiling Panel:

1) (Basis of Design) Sound Quality product “Pyramid Sound Diffusers” or Rockfon product “Education Premium, product number “43300”.

G. Type ACT-7 Ceiling (auditorium):

1. Panel size: 24 by 48 inch.
2. Panel edge: Lay-in- reveal edge, 15/16 inch.
3. Description: Class A flame spread, solid, no perforation., non-combustible, vinyl latex paint finish.
4. Color: Black.
5. Acoustical characteristics:

a. Minimum NRC: 0.80.

b. AC: 170

6. Acceptable products:

a. Ceiling Panel:

1) (Basis of Design) Rockfon product “Planostile” product number “252588:PLST:PL5.”

H. Type ACT-8 Ceiling (auditorium):

1. Panel size: 24 by 72 inch.
2. Panel edge: SHOP: hook-on.
3. Description: Class A flame spread, solid, no perforation., non-combustible, vinyl latex paint finish.
4. Color: 653R Oak.
5. Acoustical characteristics:

a. Minimum NRC: 0.80.

b. AC: 170

6. Acceptable products:

a. Ceiling Panel:

1) (Basis of Design) Rockfon product “Spanair” product number “252589:SPAN:SHOP”.

I. Type ACT-9 Ceiling (student commons):

1. Panel size: 2 by 6 inch.
2. Description: 0.032 aluminum
3. Color: 653R Oak.

4. Acceptable products:
    a. Ceiling Panel:
        1) (Basis of Design) Rockfon product “Open Plenum Ceiling System.”

J. Type ACT-10 Ceiling (student commons behind ACT-9):
1. Panel size: 24 by 48 inch by 5/8 inch thick.
2. Panel edge: Square lay-in.
3. Description: ASTM E1264 Type III, Form 2, Pattern CE, Class A flame spread, wet formed mineral fiber non-directional fissured, medium textured panel, non-combustible, vinyl latex paint finish.
4. Color: Black.
5. Acoustical characteristics:
    a. Minimum NRC: 0.85.
    b. CAC: 22.
    c. AC: 170
6. Acceptable products:
    a. Ceiling Panel:
        1) (Basis of Design) Rockfon product “Cinema Black” product number “1201”.

K. Type ACT-11 Ceiling (auditorium):
1. Panel size: 24 by 72 inch by 1-1/2 inch thick.
2. Panel edge: Square tegular edge.
3. Description: Class A flame spread, solid, no perforation., non-combustible, vinyl latex paint finish.
4. Color: 653R Oak.
5. Acoustical characteristics:
    a. AC: 170
6. Acceptable products:
    a. Ceiling Panel:
        1) (Basis of Design) Rockfon product “Curvgrid EZ-Flex System” product number “252574”.

2.5 CEILING GRIDS

A. Type ACT-1 Ceiling grid: 15/16 inch exposed tee grid, hot dipped galvanized and finished in baked polyester paint, white or black color matching ceiling panel; acceptable products include the following or approved equal:
1. Rockfon (Chicago Metallic); 200 Snap-Grid System.

2. Armstrong; 15/16" Prelude XL Exposed Tee System.
3. USG; DX Series.

2.6 CEILING GRID PERIMETER EDGE TRIM SYSTEM

A. Extruded aluminum perimeter edge trim system at “Floating” suspended ceiling areas. Edge trim shall be nominal 4 height, designed to accommodate straight edges as well as converse curved and convex curved edges as may be indicated on Drawings. Attachment to grid system is provided by a specially designed attachment clip, which snaps into the locks against hems of trim and is screw-attached to the bulb of the intersection suspension system member. Independent sections of trim are joined together using the splice plate. Acceptable products are:

1. Rockfon: Infinity suspension trim.
2. Armstrong: Axiom Perimeter Trim.
3. USG: Compasso Elite series.

2.7 ACCESSORIES

A. Edge moldings: Standard edge trim: Grid system manufacturer’s standard L-shape edge trim compatible with exposed grid system and color matched.

1. Rockfon (Chicago Metallic): Model 1430.
2. Armstrong: Model 7800.
3. USG: Model M7.

B. Edge/wall moldings where ceiling abuts walls and drop down soffits: Stepped profile “shadow” molding compatible with exposed grid system and color matched

1. Rockfon (Chicago Metallic): Model 1460.
2. Armstrong: Model 7873.
3. USG: Model MS174.

C. Hanger attachments: Of the most appropriate types for the specific receiving surfaces.

D. Hangers: ASTM A641 Soft temper, pre-stretched galvanized carbon steel wire, with a yield stress of at least 3 times design load, but not less than 12 gage.

E. Sound isolation hangers: Precompressed rubber and spring isolation hanger; designed for up to 200 pounds per hanger load capacity.. Size and space hangers as recommended by manufacturer for anticipated ceiling load.

1. LD Peters & Sons, Inc., New Rochelle NY, type ARH-1
2. Mason Industries, Inc., Happauge NY, WHR series
3. Kinetics, Inc., type AF series.

F. Supplementary carrying channels: 2 inches deep, 16 gage cold-rolled channels, galvanized.

G. Supplementary support channels: 3/4 inches deep, 16 gage cold-rolled channels, galvanized.

H. Retention clips:

1. Rockfon (Chicago Metallic): product number “935”
2. Armstrong product number “0414,”
3. USG product number “20428.”

I. Joint Sealer: One component acrylic latex, permanently elastic, non-staining, non-shrinking, non-migrating and paintable.

1. Tremco, Beachwood OH.; product, “Acoustical Sealant”.
2. United States Gypsum Company, Chicago IL.; product “USG Acoustical Sealant”.
3. Pecora Corporation, Harleysville PA.; product “ AC-20 FTR”.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verification of Conditions: Inspect all surfaces and verify that they are in proper condition to receive the work of this Section.

1. Beginning of installation means acceptance of existing substrate and project conditions.

3.2 PREPARATION

A. Protection of In-situ Conditions: During the operation of work of this Section, protect surrounding materials and finishes against undue soilage and damage by the exercise of reasonable care and precautions. Clean, or repair all existing surfaces which are soiled or otherwise damaged by Work of this Section, to match indicated profiles and specified finishes. Materials and finishes which cannot be cleaned, or repaired shall be removed and replaced with new work in conformance with the Contract Documents.

B. Surface Preparation:

1. Carefully examine all receiving surfaces, to which attachments will be made hereunder, and determine the most practical way of making such attachments. Request Architect's approval of any attachment method which differs from that indicated on the approved shop drawings before proceeding with installation.
2. Permit acoustical ceiling tile to reach room temperature and a stabilized moisture content prior to installation.

3.3 INSTALLATION

A. Locate system on room axis, leaving equal sized border units of not less than one-half tile width.

B. Install all components of the suspended grid systems in accordance with the manufacturer's instructions, the approved shop drawings, conforming to ASTM C636 requirements. Ensure a deflection not to exceed 1/360 span of 48-inch simple span.

C. Install specified edge moldings wherever ceilings intersect a wall or partition surface, and around all items having any dimension of 4 inches or more which penetrate the ceilings, including circular penetrations. Set moldings absolutely level, using as long lengths as practicable, and secure with fasteners recommended by manufacturer for the type of substrate.

1. Sealant Bed: Apply continuous ribbon of acoustical sealant, concealed on back of vertical leg before installing moldings.
2. Screw-attach moldings to substrate at intervals not over 16 inches on center. and not more than 3 inches from ends, leveling with ceiling suspension system to tolerance of 1/8 inch in 12'-0". Miter corners accurately and connect securely.

D. Install hanger attachments to overhead construction in accordance with the approved shop drawings, spacing the attachments not more than 48 inches on centers over location of each main tee member.

1. Aluminum Suspension Systems: Provide hangers spaced not more than 30 inches on center in each direction and not more than 8 inches from ends
2. Where ducts or other equipment prevent the regular spacing of hangers, reinforce the nearest affected hangers to span the extra distance.
3. Install hanger wire to attachments with triple twists.

E. Install main tees parallel to the long dimension of each area, spacing the tees 48 inches on centers. Secure the bottom of hanger wires through slots in the main tee members and tie with triple twists. Level the main tees as the work progresses.

F. Uniformly space the cross tees at 24 inches on centers, and secure the cross tees into the main tees as recommended by the system manufacturer.

G. Provide sealant at gaps between new acoustical ceiling edge angles and all irregular walls.

H. Fit acoustical ceiling tile units in place, free from damaged edges or other defects detrimental to appearance and function. Install acoustical ceiling tile level, in uniform plane, and free from twist, warp or dents.

1. Field cut tegular type tile with a tegular reveal at all edge conditions.
2. Where required by governmental agencies having jurisdiction, install retention clips, provide two clips per ceiling panel installed on opposite sides of panel.

3.4 TOLERANCES

A. Maximum variation from flat and level surface: 1/8 inch in 10 feet.

B. Maximum variation from plumb of grid members caused by eccentric loads: 2 degrees.

3.5 CLEANING

A. Properly clean surfaces of panels and open grids free from dirt and handling marks. Wherever surfaces cannot be cleaned by normal methods or have defects, remove and replace with new components.

B. Upon completion of the work of this Section in any given area, remove tools, equipment and all rubbish and debris from the work area; leave area in broom-clean condition.

C. Clean work under provisions of Section 01 73 00 – EXECUTION.

3.6 PROTECTION

A. Protect finished work under provisions of Section 01 50 00 - TEMPORARY FACILITIES AND CONTROLS.

End of Section

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Section 09 64 29

WOOD STRIP AND PLANK FLOORING

PART 1 - GENERAL

1.1 SUMMARY

A. Furnish and install floor system at front of stage, and Lobby wall.:
   1. Sheet vapor retarder and sleepers.
   2. Nailed hardwood strip flooring systems.
   3. Vented rubber base.

B. Perform complete sanding and finishing operations for exposed to view surfaces of all wood strip flooring and other wood items to be furnished hereunder.

C. Provide independent testing laboratory services to perform relative humidity, moisture vapor emission, and pH tests on in situ concrete slabs, which shall be in addition to testing as may be performed by Owner.

1.2 RELATED REQUIREMENTS

A. Section 01 60 00 - PRODUCT REQUIREMENTS: Listing of VOC requirements for adhesives, cleaning/maintenance materials, paints, coatings, and sealants.

B. Section 01 74 19 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL: Procedural and administrative requirements relating to recycling goals, waste management program and reporting.

C. Section 01 81 13 - SUSTAINABLE DESIGN REQUIREMENTS: Procedural and administrative requirements relating to required *Northeast CHPS Verified Program,* (NE-CHPS) Certification.

1.3 REFERENCES

A. Referenced Standards: Comply with applicable requirements of the following standards and those others referenced in this Section, under the provisions of Section 01 42 00 - REFERENCES. The standards referenced herein are included to establish recognized minimum quality only. Where these standards conflict with other specified requirements, the most restrictive requirements shall govern. Equivalent quality and testing standards will be acceptable, subject to their timely submission, review and acceptance by the Architect.
   1. ASTM E 84 - Surface Burning Characteristics of Building Materials.
   2. FSC (Forest Stewardship Council): “FSC Certification Program”
   3. FS MM-L-736 - Lumber; Hardwood.
   4. MFMA.
   5. WSFI - Recommendations for the Correct Preparation, Finishing, and Testing of Concrete Subfloor Surfaces to Receive Wood Flooring.

6. ASTM F-1869 – Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride.
7. All applicable federal, state and municipal codes, laws and regulations regarding flammability and smoke generation of interior finishes.

B. Sustainability Requirement Reference: The following sustainability requirements are hereby made a part of this Section by reference thereto:
   1. High Performance Schools Exchange, Northeast Energy Efficiency Partnerships NE-CHPS, (referred to herein as “NE-CHPS”).

1.4 SUBMITTALS

A. Information and Review Submittals: Submit the following under provisions of Section 01 33 00 - SUBMITTAL PROCEDURES:
   1. Literature: Manufacturer's product data sheets, specifications, performance data for each type of wood flooring and finish system materials, with manufacturer's installation instructions and recommended maintenance procedures.
   2. Installation instructions: Submit manufacturer’s MFMA instructions, indicating special procedures, and perimeter conditions requiring special attention.
   3. Manufacturer's warranties: Wood flooring and finish system manufacturers' standard written guarantees covering defects in materials and workmanship, clearly defining the terms included in the coverage.
   4. Certificates: Wood products lacking acceptable documentation for the following will be rejected and their removal required.
      a. Chain-of-Custody: Written documentation providing evidence of compliance with Chain-of-Custody supply of wood products, and compliance with FSC standards.
         1) Demonstrate that products are FSC-certified by providing vendor invoices. Invoices will contain the vendor’s chain of custody number and identify each chain of custody certified product on a line-item basis. A “vendor” is defined as the company that furnishes wood products to project contractors and/or subcontractors for on-site installation.
   5. Shop drawings: Indicate floor joint pattern and termination details.
   6. Verification samples:
      a. Strip flooring: At least six (6) 12-inch long pieces of specified specie, grade, and size of flooring, indicating complete range of color variation which may be expected for the project.
   7. Sustainable Design Submittals: As required by NE CHPS.

B. Closeout Submittals: Submit the following under provisions of Section 01 78 00 - CLOSEOUT SUBMITTALS:
   1. Maintenance data: Include maintenance procedures, recommended maintenance materials, a suggested schedule for cleaning, stripping, and re-finishing, stain removal methods, and polishes and waxes.

1.5 QUALITY ASSURANCE

A. Manufacturer: Companies specializing in manufacturing the products specified in this Section, each with minimum 5 years documented experience.

B. Installer specializing in applying the work of this Section with a minimum of 5 years documented experience of the type of flooring system specified.

C. Each board of flooring shall bear grade stamp on underside identifying Grading authority, manufacturer's identification, wood species and grade.

D. Perform work in accordance with MFMA.

E. Sustainability Standards Certifications:

1. Chain of Custody wood products: All wood products furnished under this Specification Section shall be “FSC certified” according to the rules of the Forest Stewardship Council (FSC).

a. FSC Certification includes the following certification bodies of forests and forest products:

1) Certification Systems.
2) SmartWood.
3) SGS Qualifor.
4) Soil Association.

b. Wood products lacking acceptable documentation for Chain of Custody, will be rejected and their removal required.

1.6 REGULATORY REQUIREMENTS

A. Conform to applicable codes for Class 1 flame spread rating of finished floor surface when tested in accordance with ASTM E 84. Provide certificate of compliance from authority having jurisdiction.

1.7 DELIVERY, STORAGE AND HANDLING

A. Deliver wood flooring a minimum of 7 days prior to installation to allow materials moisture content to stabilize to ambient conditions. Do not deliver wood until all concrete, masonry, plaster and other wet work is complete and dry, and ambient air at installation space has moisture content stabilized.

B. Protect wood flooring from excessive moisture in shipment and handling; store all materials in an elevated, protected, and dry location.

1.8 PROJECT CONDITIONS

A. Maintain ambient temperature between 55 and 80 degrees Fahrenheit, with a relative humidity of between 35 and 50 percent for 48 hours prior to delivery and storage of the flooring materials at the area; maintain such conditions throughout the installation and finishing period, and thereafter until Owner’s Final Acceptance or Owner’s occupancy.

1.9 SEQUENCING AND SCHEDULING

A. Sequence work to ensure wood flooring is not delivered until building is enclosed, sufficient heat is provided, and proper humidity conditions can be maintained.

B. Install wood flooring after interior wet work is complete and fully cured, and ambient air at installation space has a moisture content stabilized.

1.10 MOISTURE VAPOR EMISSION AND ACIDITY/ALKALINITY (PH)TESTING

A. Concrete slabs and floors:

1. Subcontractor shall employ and pay for services of an independent testing laboratory to perform relative humidity, moisture vapor emission, and pH tests on concrete slabs as follows. The test shall be witnessed by the General Contractor, and Owner's Project Manager.

a. Moisture Vapor Emission and pH Testing on all concrete slabs over-which a finished floor is to be installed.

2. Requirements: As specified under Part 3 of this Section.

a. Submit 1 copy of test data to the installers of all flooring materials or coating materials scheduled to be installed.

b. Provide additional testing in the event test results indicate higher moisture content than recommended by the flooring material and coating material manufacturers for the installation of their products. Perform such additional testing, at no additional cost to the Owner, after procedures have been performed to reduce moisture content to ratings acceptable to the various flooring and coating manufacturers.

1.11 WARRANTY

A. Provide 5 year warranty under provisions of the Section 01 78 00 - CLOSEOUT SUBMITTALS. Warranty shall include coverage for all costs to repair or replace flooring, which shrinks, warps, cracks, or otherwise deteriorates excessively, or which breaks its anchorage, or bond with substrate, or otherwise fails. Warranty shall cover failures due to materials or workmanship. The Installer is not responsible for failure due to excessive moisture penetration through concrete substrate or other similar causes for failure which are beyond the Work of this Section, except verification of acceptable substrates, specified herein.

1.12 EXTRA MATERIALS

A. Upon completion of the Work of this Section, deliver to the Owner extra materials for future repairs and maintenance, an amount equal to [10] square yards of finish and type flooring installed, with an appropriate quantity of adhesive for installation.

B. Clearly label and package extra materials securely to prevent damage.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Acceptable Manufacturers: Subject to compliance with the requirements specified herein, manufacturers offering products which may be incorporated in the work include the following, or approved equal:

1. Tarkett Wood, Johnson City, TN.
2. Bruce Hardwood Floors Div. of Armstrong World Industries, Lancaster PA.
3. Junkers Hardwood, Inc., New York, NY.
4. Boen Hardwood Flooring, Inc., Martinsville, VA.
5. Aacer Flooring, LLC, Peshtigo, WI.

2.2 FLOORING MATERIALS

A. Sustainable Forest Certification: All wood shall be “Chain-of-Custody” certified as FSC Certified.

B. Flooring: Nominal 3/4 inch (25/32 inch) thick by 5-1/4 inches wide kiln-dried plain sawn White Hard Maple (Acer Saccharum), MFMA grade-marked, tongue and grooved and end-matched, and delivered to the project in bundles bearing the specified grade marking.

1. Grade: MFMA Standard grade.
    a. Second and Better Grade: 100 percent of installation.
2. Individual strip length: Random lengths, ranging from a minimum of 9 inches to a maximum of 102 inches. Proportion of board lengths shall be in accordance with specified MFMA grade.
3. Floor edgings: Plain sawn solid White Hard Maple, AWI Custom Grade, of sizes and profiles indicated on the Drawings.

2.3 FINISHING MATERIALS

A. Sandpapers: Number 1-1/2 graduating to 1/2; followed by Numbers 0 and 00 for final sanding, except as otherwise recommended by the flooring manufacturer.

B. Filler: Paste wood filler, in tone as selected by the Architect where clear floor finish is required.

C. Clear floor finish: Water based catalyzed urethane coating system, as manufactured by Basic Coatings, Des Moines IA., product “Street Shoe XL Commercial Wood Floor Finish”.

1. VOC: Catalyzed, not exceeding 350 grams per liter.
2. Solid’s content: 31 percent.
3. Luster Satin finish, 30 units at 60 degrees on wood.

2.4 ACCESSORIES

A. Wall base: Vented molded rubber cover base, 4 by 3 inches with premolded outside corners as supplied by flooring manufacturer.

B. Divider strip: Mill finish aluminum to profiles recommended by manufacturer.

C. Plywood underlayment: CD-EXT-APA, 5/8-inch thick.

D. Sleepers and shims: Softwood lumber, pressure treated for moisture protection, nominal 2 by 4 inch size.

E. Vapor retarder: 6 mil thick black polyethylene sheeting and 2 inch wide waterproof sealing tape for joints.

F. Protection paper: Waxed kraft paper or red rosin paper.

G. Fasteners:

1. Fasteners for plywood underlayment: Power-actuated fasteners of appropriate size for the specific substrate.
2. Fasteners for flooring: 7d or 8d cut nails or screw-type nails, or other fasteners as recommended by the flooring manufacturer, for blind-method installation over plywood underlayment.

H. Filler for patching, smoothing and leveling subfloors and underlayment: Portland cement-based latex underlayment acceptable to flooring manufacturer, equal to the following:

1. Ardex, Inc., products “Feather Flash” and “Ardex SD-P”.
2. Quikrete Companies, product “Fast-Set Underlayment 1248”.
3. Silpro Masonry Systems Inc., product “Masco Latex Cement”

PART 3 - EXECUTION

3.2 EXAMINATION

A. Verify concrete substrate has cured for at least 60 days. Test concrete with 3 percent solution of phenolphthalein in grain alcohol for dryness. Do not proceed with installation until substrate passes dryness test, immediately notify Architect of unacceptable substrate conditions.

B. Verify that permanent heat, light, and ventilation is complete and operational prior to installation.

C. Inspect all substrate surfaces and verify that they are in proper condition to receive the work of this Section.

1. Verify that concrete substrate surfaces are smooth and flat to plus or minus 1/8 inch in 10 feet, free of scaling, oil, grease, dust, and foreign substance.
2. Verify that wood subfloor is properly secured, is smooth and flat to plus or minus 1/8 inch in 10 feet, free of foreign substances.

D. Verify that required flooring mounted utilities are in proper location.

E. Beginning of installation means acceptance of existing substrate and site conditions.

3.3 TESTING IN SITU CONCRETE SUBSTRATES

A. Scope:

1. Provide in situ concrete surface pH testing to all concrete slabs specified to be covered with floor coverings. Includes concrete placed as part of this Work which occurs below grade, above grade (suspended slabs), and slabs on grade.

B. Scheduling:

1. Testing shall take place after allowing concrete to dry for a minimum of 90 days. Testing to be scheduled no less than one, nor more than three weeks prior to scheduled flooring installation.
    a. DO NOT conduct testing unless the slab environment is identical to that In which the finished flooring Is to be installed.

C. Test result submittals:

1. Report all test results in chart form listing test dates, time, depth of test well, in situ temperature, moisture vapor and pH levels.
2. List test locations on chart and show same on marked up Floor Plan Drawings.
3. Submit results In duplicate. Deliver copies directly to Architect, Owner's Project Representative and General Contractor.

D. Testing equipment: shall be equal to the following

1. For calcium chloride testing:
    a. Anhydrous calcium chloride testing in accordance with Rubber Manufacturer's Association (RMA) Test requirements.
    b. Test kits: Vaprecision, inc. 2941 West MacArthur Boulevard, Suite 135. Santa Ana, CA 92704 (telephone 800-449-6194).
2. For pH testing:
    a. pH test paper by Micro Essential Laboratory, Inc., P.O. Box 100824 4224 Avenue “H”, Brooklyn, NY 11210.
    b. Distilled or de ionized water.

E. Testing Procedures - Quantification of Concrete Moisture Vapor Emission through Calcium Chloride Testing.

1. The test site should be maintained at the same temperature and humidity conditions as those anticipated during normal occupancy. These temperature and humidity levels should be maintained for 48 hours prior and during test period. If meeting this criteria is not possible, then minimum conditions should be 75 degrees F (plus or minus 10 degrees F) and 50 percent relative humidity (plus or minus 10 percent). When a building is not under HVAC control, a recording hygrometer or data logger shall be in place recording conditions during the test period. A transcript of this information must be included with the test report.

2. The number of vapor emission test sites is determined by the square footage of the facility. The minimum number of tests to be placed is equal to 3 In the first 1.000 square feet and I per each additional 1,000 square feet.
3. Tests sites are to be cleaned of all adhesive residue, curing compounds, paints, sealers, floor coverings, and similar materials. 24 hours prior to the placement of test kits.
4. Weigh test dish on site prior to start of test. Scale must report weight to 0.1 grams. Record weight and start time.
5. Expose Calcium Chloride and set dish on concrete surface.
6. Install test containment dome and allow test to proceed for 60 to 72 hours.
7. Retrieve test dish by carefully cutting through containment dome. Close and reseal test dish.
8. Weigh test dish on site recording weight and stop time.
9. Calculate and report results as pounds of emission per 1,000 square feet per 24 hours."

F. Testing Procedures Quantification of Acidity/Alkalinity (pH) Level

1. At or near the relative humidity test site and each vapor emission (calcium chloride) test site, perform pH test.
   a. At each testing site, lay down a loose 2 foot by 2 foot sheet of non-perforated sheet backed by plywood. Leave in place for 48 hours.
   b. Remove sheet and place several drops of distilled or de ionized water onto the concrete surface to form a puddle approximately 1 inches in diameter.
   c. Allow the water to set for approximately 60 seconds.
   d. Dip the pH paper into the water and remove immediately, compare color to chart provided by paper supplier to determine pH reading
2. Record and report results.

G. Testing Procedures:

1. Initial testing: Provide 3 tests for the first 1,000 square feet.
2. Add one test for each additional 1,000 square feet.
3. Concrete surface area to be tested shall be completely clean. Remove all adhesives, residue, debris and sealing compounds. Remove all dust by vacuum or other methods. Do not use chemicals of any kind to clean concrete.
4. Perform moisture tests in strict accordance with the kit manufacturer's Instructions. Moisture tests shall remain undisturbed for 60 to 72 hours.
5. Immediately after moisture test has been removed from test area, conduct pH test in area previously covered by plastic dome of moisture test kit.
6. After completion of tests submit 2 copies of test data to the Architect. Submit a copy of the test data to all installers of flooring materials and resinous flooring materials scheduled to be installed.

7. Provide additional testing in the event test results indicate higher moisture content than recommended by the flooring material and coating material manufacturers for the installation of their products. Perform such additional testing, at no additional cost to the Owner, after procedures have been performed to reduce moisture content to ratings acceptable to the various flooring and coating manufacturers.

3.4 FLOOR PREPARATION – GENERAL REQUIREMENTS

A. General: Comply with ASTM F 710-92 and manufacturer's recommendations for surface preparation. Remove substances incompatible with resilient flooring adhesive by method acceptable to manufacturer.

1. Concrete floors with steel troweled (slick) finish shall be properly roughened up (sanded) to ensure suitable adhesion.
2. Concrete floors with curing, hardening, and breaking compounds shall be abraded with mechanical methods only to remove compounds. Use shot blast machine or similar equipment.

B. Fill voids, cracks, and depressions with trowel-applied leveling compounds acceptable to manufacturer. Remove projections and repair other defects to tolerances acceptable to manufacturer.

C. Vacuum subfloors immediately prior to installation to remove loose particles.

3.5 ADHESIVE BOND TESTING

A. Use the specified flooring and recommended adhesive, install approximately 3 by 3 foot sized flooring as specified under individual flooring specification sections. Install test samples approximately 50 feet apart throughout the area. Areas next to walls or other light traffic areas should be selected for the bond test. Tape down the perimeter of the flooring to prevent drying of the adhesive at the edges. After a minimum period of 72 hours the flooring should be pulled from the subfloor. If an unusual amount of force is required, the bond could be considered sufficient. Floors demonstrating unsuitable bond to substrate require modifications to flooring installation and may require application of moisture mitigation products. Review all conditions with Architect/Engineer.

3.6 PREPARATION WOOD STRIP AND PLANK FLOORING

A. Comply with flooring manufacturer's requirements for preparation of substrate to receive wood flooring.

B. Remove sub-floor ridges and bumps. Fill minor or local low spots, cracks, joints, holes, and other defects with subfloor filler to achieve smooth, flat, hard surface. Prohibit traffic until filler is cured.

C. Thoroughly vacuum clean all receiving surfaces before commencing installation work.

D. Open bundles of flooring, and permit the pieces to properly acclimatize prior to installing same.

3.7 INSTALLATION - GENERAL

A. Install in accordance with manufacturer's instructions and the WSFI recommendations for subfloor preparation.

B. Lay flooring in patterns shown in the Drawings. Arrange strips with staggered end joints and end grain, matched, set joints flush and tight.

C. Terminate flooring at centerline of door openings where adjacent floor finish is dissimilar. Provide divider strips.

D. Expansion Space: Provide adequate expansion space at walls, columns or other projections into the floor surface. Provide expansion space per the following:

1. In wood floor areas of less than 1,000 square feet, allow an expansion space equal to 1/16 inch per foot of width of installation.
2. In wood floor areas of greater than 1,000 square feet, allow an expansion space of 1-3/4 inch at walls and 1 inch at columns and other projections.

3.8 INSTALLATION - NAILED

A. Perform the installation in strict accordance with the referenced installation standards and specifications, and with additional requirements as specified herein.

B. Lay specified polyethylene sheet vapor retarder in a continuous manner over all concrete receiving surfaces, lapping all joints at least 6 inches and continuously sealing the joints with specified tape to provide an unbroken vapor-retardant surface throughout. Spot glue in place. Extend the sheet up onto walls and other intersecting vertical surfaces, where base is to be installed, a distance of at least 3 inches.

C. Place sleepers over subfloor surface 12 inches on center. Shim underside of sleepers to level line. Place sheathing paper, lap edges and ends 12 inches; staple in place.

D. Blind-nail flooring in place through the tongue edges with specified fasteners spaced 10 to 12 inches apart, driving the fasteners at an approximate 45-degree angle.

E. Install wood treads, risers, facings, and edgings, in accordance with the details on the Drawings, blind-nailing throughout.

3.9 SANDING AND FINISHING PREPARATION

A. Mask off adjacent surfaces and take precautions to contain dust.

B. Sand all flooring, facings, and edgings, after installation of flooring and adjacent work is completed. Use a power sander, taking precautions to contain dust, sand flooring in several complete passes, commencing with 1-1/2 graduating to 1/2; followed by Numbers 0 and 00 for final sanding. Leave floor finish with no evidence of sander marks.

C. Thoroughly vacuum-clean all sanded surfaces and other finish surfaces within space, clean surfaces completely free from dust, and dry-mop with a tack cloth-clad mop.

3.10 FINISHING

A. Apply the first coat of sealer immediately following completion of sanding.

B. Apply two coats of sealer with recommended applicator at a rate of 500-700 square feet per gallon. Comply with application instructions.

1. Screen lightly between coats. Vacuum and pick up dust with a water-dampened towel.
2. Allow to dry overnight.

C. Apply two coats of floor finish with recommended applicator at rate of 600-800 square feet per gallon. Comply with application instructions.

1. Mix pre-measured catalyst with finish prior to application.
2. It is not necessary to screen between coats unless more than six hours has elapsed since the application of the first coat of finish.
3. Allow to dry overnight. The floor may be open to light traffic in 24 hours.
4. When dry, the finish should present a uniform finish, free of visible laps.

3.11 CLEANING

A. General: Comply with requirements of Section 01 74 19 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL for handling and disposition of all construction and demolition waste.

B. Clean and polish floor surfaces in accordance with manufacturer’s instructions.

3.12 PROTECTION

A. Provide protection of completed flooring areas from construction traffic until Substantial Completion of the General Contract. Prohibit construction traffic for a minimum of 48 hours on completed areas of adhesive applied flooring.

B. Cover the all wood floor surfaces, facings, and edgings, with heavyweight non-staining kraft paper and overlay with red-rosin paper, taping the edges to maintain position of the protection paper. Reapply papers to maintain floor protection.

End of Section

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Section 09 64 53

RESILIENT WOOD FLOORING ASSEMBLIES

PART 1 - GENERAL

1.1 SUMMARY

A. Furnish and install:
   1. Stage Flooring System, including:
      a. Stage Floor.
      b. Dust Barrier.
      c. Stage Floor Subfloor.
      d. Sleepers.
      e. Resilient Pads.
      f. Vapor retarder.

1.2 RELATED REQUIREMENTS

A. Section 01 60 00 - PRODUCT REQUIREMENTS: Listing of VOC requirements for adhesives, cleaning/maintenance materials, paints, coatings, and sealants.

B. Section 01 74 19 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL: Procedural and administrative requirements relating to recycling goals, waste management program and reporting.

C. Section 01 81 13 - SUSTAINABLE DESIGN REQUIREMENTS: Procedural and administrative requirements relating to required *Northeast CHPS Verified Program,* (NE-CHPS) Certification.

D. Section 03 30 00 - CAST-IN-PLACE CONCRETE: Concrete substrate.

E. Section 05 50 00 – METAL FABRICATIONS: Embedded steel angle at door openings.

F. Section 06 10 00 - ROUGH CARPENTRY: Wood framing, blocking, edgings, nailers curbs, cants, cants grounds, furring, and underlayment.

G. Section 09 91 00 - PAINTING: Field applied surface finish to WD.3 flooring.

H. Division 26 - ELECTRICAL: Electrical floor receptacles.

1.3 REFERENCES

A. Referenced Standards: Comply with applicable requirements of the following standards and those others referenced in this Section, under the provisions of Section 01 42 00 - REFERENCES. The standards referenced herein are included to establish recognized minimum quality only. Where these standards conflict with other specified requirements, the most restrictive requirements shall govern. Equivalent quality and testing standards will be acceptable, subject to their timely submission, review and acceptance by the Architect.

1. ASTM E 84 - Surface Burning Characteristics of Building Materials.
2. AWPA Standard UCFA – Fire Protection as Required by Codes Above Ground Interior Construction.
3. AWPA Standard UCFB – Fire Protection as Required by Codes Above Ground Exterior Construction.
4. FS MM-L-736 - Lumber; Hardwood.
5. MIL L-1914OE - Lumber and Plywood, Fire Retardant Treated.
6. UL - Building Materials Directory
7. WSFI - Recommendations for the Correct Preparation, Finishing, and Testing of Concrete Subfloor Surfaces to Receive Wood Flooring.
8. All applicable federal, state and municipal codes, laws and regulations regarding flammability and smoke generation of interior finishes.

B. Sustainability Requirement Reference: The following sustainability requirements are hereby made a part of this Section by reference thereto:
   1. High Performance Schools Exchange, Northeast Energy Efficiency Partnerships NE-CHPS, (referred to herein as “NE-CHPS”).

1.4 SUBMITTALS

A. Information and Review Submittals: Submit the following under provisions of Section 01 33 00 - SUBMITTAL PROCEDURES:
   1. Literature: Manufacturer's product data sheets, specifications, performance data for each type of wood flooring and finish system materials, with manufacturer's installation instructions and recommended maintenance procedures.
      a. Adhesives: Include certification of data indicating Volatile Organic Compound (VOC) content of all field-applied adhesives. Submit MSDS highlighting VOC limits.
      b. Paints and coatings (field applied): Include certification of data indicating Volatile Organic Compound (VOC) content of all paint materials. Submit Green Seal Certification to GS-11 and description of the basis for certification.
   2. Certifications: Wood products lacking acceptable documentation for the following will be rejected and their removal required.
      a. Written certification from the respective treatment plants indicating types of fire-retardant treatment used, treatments method, applications instructions, and conformance to the requirements specified herein.
         1) Provide certification that fire retardant treatment materials do not contain ammonium phosphate.
         2) Provide report from ICC Evaluation Service on fire retardant treated wood flame spreading, strength, corrosion and hygroscopic properties.
      b. Urea-formaldehyde Resins: Written documentation certifying that all composite wood and agrifiber products used on this Project contain no added urea-formaldehyde.

1) Written certification from Millworker, that only “no added urea-formaldehyde” manufactured composite panel products are incorporated into the Work, including all concealed components. Composite panel products include but are not limited to particle board (PB), Medium Density Fiberboard (MDF) and similar manufactured products.
2) Written certification from Millworker that laminating adhesives used in product fabrication on or off site do not contain any added urea-formaldehyde resins.

3. Installation instructions: Submit manufacturer’s instructions, indicating special procedures, and perimeter conditions requiring special attention.
4. Manufacturer's warranties: Wood flooring and finish system manufacturers' standard written guarantees covering defects in materials and workmanship, clearly defining the terms included in the coverage.
5. Shop drawings: Indicate floor joint pattern and termination details.
6. Verification samples:
   a. Strip flooring: At least six (6) 12-inch long pieces of specified specie, grade, and size of flooring, indicating complete range of color variation which may be expected for the project.
7. Sustainable Design Submittals: As required by NE CHPS.

B. Closeout Submittals: Submit the following under provisions of Section 01 78 00 - CLOSEOUT SUBMITTALS:
1. Maintenance data: Include maintenance procedures, recommended maintenance materials, a suggested schedule for cleaning, stripping, and re-finishing, stain removal methods, and polishes and waxes.

1.5 QUALITY ASSURANCE

A. Manufacturer: Companies specializing in manufacturing the products specified in this Section, each with minimum 5 years documented experience.

B. Installer specializing in applying the work of this Section with a minimum of 5 years documented experience of the type of flooring system specified.

C. Each board of flooring shall bear grade stamp on underside identifying Grading authority, manufacturer's identification, wood species and grade.

1.6 REGULATORY REQUIREMENTS

A. Conform to applicable codes for Class 1 flame spread rating of finished floor surface when tested in accordance with ASTM E 84. Provide certificate of compliance from authority having jurisdiction.

1.7 DELIVERY, STORAGE AND HANDLING

A. Deliver wood flooring a minimum of 7 days prior to installation to allow materials moisture content to stabilize to ambient conditions. Do not deliver wood until all concrete, masonry, plaster and other wet work is complete and dry, and ambient air at installation space has moisture content stabilized.

B. Protect wood flooring from excessive moisture in shipment and handling; store all materials in an elevated, protected, and dry location.

1.8 PROJECT CONDITIONS

A. Maintain ambient temperature between 55 and 80 degrees Fahrenheit, with a relative humidity of between 35 and 50 percent for 48 hours prior to delivery and storage of the flooring materials at the area; maintain such conditions throughout the installation and finishing period, and thereafter until Owner's Final Acceptance or Owner's occupancy.

1.9 SEQUENCING AND SCHEDULING

A. Sequence work to ensure wood flooring is not delivered until building is enclosed, sufficient heat is provided, and proper humidity conditions can be maintained.

B. Install wood flooring after interior wet work is complete and fully cured, and ambient air at installation space has a moisture content stabilized.

1.10 WARRANTY

A. Provide 5 year warranty under provisions of the Section 01 78 00 - CLOSEOUT SUBMITTALS. Warranty shall include coverage for all costs to repair or replace flooring, which shrinks, warps, cracks, or otherwise deteriorates excessively, or which breaks its anchorage, or bond with substrate, or otherwise fails. Warranty shall cover failures due to materials or workmanship. The Installer is not responsible for failure due to excessive moisture penetration through concrete substrate or other similar causes for failure which are beyond the Work of this Section, except verification of acceptable substrates, specified herein.

PART 2 - PRODUCTS

2.1 FLOORING MATERIALS AT STAGE

A. Stage Floor: 1/4 inch thick stage floor, equal to GRT Genesis, Brampton Ontario Canada, product "Stagelam".

B. Dust Barrier: Building felt, ASTM D 226, Non-perforated, No. 15 (73 kg/sq m) asphalt-saturated building felt.

C. Stage Subfloor (Two layers 3/4-inch Flooring underlayment: Square edge APA graded C-C PLUGGED EXT Species Group 1 touch sanded.

1. Thickness: Fire-resistant treated 3/4 inch (19.1 mm) thick, except as otherwise indicated on the Drawings.

D. Sleepers: Nominal 2x4 framing, No. 2 Spruce/Pine/Fir (SPF), or No. 2 Southern Pine, Grade-stamped S-Dry or other surface dried wood species, Number 2 grade or better having a minimum bending stress Fb of 775 PSI (890 PSI repetitive) and modulus of elasticity E not less than 1100 KSI.

E. Resilient Pads: With air voids for resiliency and installed at manufacturer's standard spacing for product designation indicated above.

1. Material: Neoprene.
2. Thickness: 3/8 inch (10 mm)

F. Vapor retarder: 6 mil thick black polyethylene sheeting and 2 inch wide waterproof sealing tape for joints.

G. Fasteners:
1. Fasteners for plywood underlayment: Power-actuated fasteners of appropriate size for the specific substrate.
2. Fasteners for flooring: Screw fasteners.

H. Filler for patching, smoothing and leveling subfloors and underlayment: Portland cement-based latex underlayment acceptable to flooring manufacturer, equal to the following:
1. Ardex, Inc., products “Feather Flash” and “Ardex SD-P”.
2. Quikrete Companies, product “Fast-Set Underlayment 1248”.
3. Silpro Masonry Systems Inc., product “Masco Latex Cement”

2.2 WOOD TREATMENTS

A. Treated wood products shall be produced by a single treatment plant, fully licensed by the chemical manufacturers, and conforming to the requirements specified herein.
1. Toxicity and Environmental Quality:
a. Fire-retardant-treated wood products shall be free of halogens, sulfates, ammonium phosphate and formaldehyde.
2. Kiln dry all treated lumber and plywood to the following maximum moisture content after treatment.
a. Lumber: 19 percent.
b. Plywood 15 percent.
c. Discard pieces with defects which might impair quality of work.
3. Quality marks: Each piece of lumber and plywood shall be permanently affixed with a quality mark, containing the following information:
a. Identification of the inspection agency.
b. Standard to which material was treated.
c. Identification of the treating plant.
d. Fire retardant treated wood shall include: stamp signifying a FR-S rating

B. Fire retardant treated wood. Designated as “FRTW”
1. Chemical Manufacturer: Subject to compliance with the requirements specified herein, Products which may be incorporated in the work include:
a. Arch Wood Protection, Atlanta, GA., product, “Dricon FRT Wood”.
b. Osmose, Inc., Griffin GA., product “FirePro”.
c. Hoover Treated Wood Products, Inc., Thomson, GA product “PyroGuard”.

d. Viance, LLC., Charlotte, NC, product: “D-Blaze FRT”.

2. Fire retardant treated wood shall comply with the following requirements:
   a. All fire-retardant lumber and plywood must have an Underwriters Laboratories stamp signifying a FR-S rating certifying a 25 or less flame spread and smoke developed value, when tested in accordance to ASTM E-84, or UBC Standard No. 42-1.
   b. Corrosion rates: Less than one mil per year for carbon steel, galvanized steel, aluminum, copper and red brass in contact with the fire retardant treated wood when tested in accordance with Federal Specification MIL-L-19140E Paragraph 4.6.5.2.
   c. The fire retardant treated wood must have an equilibrium moisture content of not more than 25 percent when tested in accordance with ASTM D 3201 procedures at 95 percent relative humidity and 80 degrees Fahrenheit.
   d. Fire retardant chemical: Registered for use as a wood preservative by the U.S. Environmental Protection Agency.
   e. Testing: Fire performance and strength properties for both lumber and plywood, of the fire retardant treated wood shall be recognized by issuance of a ICC Evaluation Service Report. Fire retardant chemical must not damage the middle lammella of the wood structure when exposed to 170 degrees Fahrenheit and 90 percent relative humidity for 23 days.

PART 3 - EXECUTION

3.2 EXAMINATION

A. Verify concrete substrate has cured for at least 60 days. Test concrete with 3 percent solution of phenolphtalein in grain alcohol for dryness. Do not proceed with installation until substrate passes dryness test, immediately notify Architect of unacceptable substrate conditions.

B. Verify that permanent heat, light, and ventilation is complete and operational prior to installation.

C. Inspect all substrate surfaces and verify that they are in proper condition to receive the work of this Section.
   1. Verify that concrete substrate surfaces are smooth and flat to plus or minus 1/8 inch in 10 feet, free of scaling, oil, grease, dust, and foreign substance.
   2. Verify that wood subfloor is properly secured, is smooth and flat to plus or minus 1/8 inch in 10 feet, free of foreign substances.

D. Verify that required flooring mounted utilities are in proper location.

E. Beginning of installation means acceptance of existing substrate and site conditions.

3.3 PREPARATION

A. Comply with flooring manufacturer's requirements for preparation of substrate to receive wood flooring.

B. Remove sub-floor ridges and bumps. Fill minor or local low spots, cracks, joints, holes, and other defects with subfloor filler to achieve smooth, flat, hard surface. Prohibit traffic until filler is cured.

C. Thoroughly vacuum clean/broom-clean all receiving surfaces before commencing installation work.

D. Open bundles of flooring, and permit the pieces to properly acclimatize prior to installing same.

3.4 INSTALLATION - GENERAL

A. Install in accordance with manufacturer’s instructions and the WSFI recommendations for subfloor preparation.

B. Lay flooring in patterns shown on approved shop drawings or as directed by the Architect. Arrange strips with staggered end joints and end grain, matched, set joints flush and tight.

C. Terminate flooring at centerline of door openings where adjacent floor finish is dissimilar. Provide divider strips.

D. Expansion Space: Provide adequate expansion space at walls, columns or other projections into the floor surface. Provide expansion space per the following:

1. In wood floor areas of less than 1,000 square feet, allow an expansion space equal to 1/16 inch per foot of width of installation.
2. In wood floor areas of greater than 1,000 square feet, allow an expansion space of 1-3/4 inch at walls and 1 inch at columns and other projections.

E. Install flooring tight to floor access covers.

3.5 INSTALLATION

A. Install polyethylene with joints lapped a minimum of 6 inches.

B. Place sleepers and pads at 16 inches on center. Install sleepers end to end, staggering end joints in adjacent rows.

C. Install first plywood subfloor layer parallel to sleeper channels and secure 6 inches on center into channel sleepers. Place second layer at 45 degree angle to first layer and fasten as recommended by the manufacturer.

D. Install dust barrier (building paper) between subfloor assembly and stage flooring.

E. Screw fasten finished stage flooring over subfloor in fastener pattern as recommended by the manufacturer.

1. Countersink all screws. No burrs or sharp edges allowed.

3.6 CLEANING

A. General: Comply with requirements of Section 01 74 19 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL for handling and disposition of all construction and demolition waste.

B. Daily clean work areas by sweeping and disposing of scraps and sawdust.

C. As work progresses, remove excess adhesive from floor, base and wall surfaces without damage.

D. Upon completion of the work of this Section in any given area, remove tools, equipment and all rubbish and debris from the work area; leave area in broom-clean condition.

E. Clean and polish floor surfaces in accordance with manufacturer's instructions.

3.7 PROTECTION

A. Provide protection of completed flooring areas from construction traffic until Substantial Completion of the General Contract. Prohibit construction traffic for a minimum of 48 hours on completed areas of adhesive applied flooring.

B. Cover the all wood floor surfaces, facings, and edgings, with heavyweight non-staining kraft paper and overlay with red-rosin paper, taping the edges to maintain position of the protection paper. Reapply papers as required to maintain floor protection.

End of Section

Section 09 64 66

WOOD ATHLETIC FLOORING

PART 1 - GENERAL

1.1 SUMMARY

A. The work of this Section consists of wood athletic flooring where shown on the Drawings, as specified herein, and as additionally required for a complete and proper installation. Work includes, but is not limited to the following.

1. Provide full wood athletic flooring system, including finished floor and related substrate materials.
2. Perform complete sanding and finishing operations for exposed to view surfaces of all wood strip flooring and other wood items to be furnished hereunder.
3. Installation of 1 set of volleyball sleeves furnished under Section 11 66 23 – GYMNASIUM EQUIPMENT, including necessary prep and grouting into concrete substrate.
4. Provide vented wall base at gymnasium flooring.
5. Provide thresholds between wood flooring and abutting finished flooring.
6. Paint all field colors, game lines, borders and school logos and stenciled lettering.

1.2 RELATED REQUIREMENTS

A. Section 01 60 00 - PRODUCT REQUIREMENTS: Listing of VOC requirements for adhesives, cleaning/maintenance materials, paints, coatings, and sealants.

B. Section 01 74 19 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL: Procedural and administrative requirements relating to recycling goals, waste management program and reporting.

C. Section 01 81 13 - SUSTAINABLE DESIGN REQUIREMENTS: Procedural and administrative requirements relating to required *Northeast CHPS Verified Program,* (NE-CHPS) Certification.

D. Section 03 30 00 – CAST-IN-PLACE CONCRETE: Concrete substrate.

E. Section 09 05 06 - COMMON WORK RESULTS FOR FLOORING: General requirements for flooring preparation and installation.

F. Section 11 66 25 – GYMNASIUM EQUIPMENT: Furnishing sleeves for volleyball standards to be installed under this Section 09 64 66.

1.3 REFERENCES

A. Referenced Standards: Comply with applicable requirements of the following standards and those others referenced in this Section, under the provisions of Section 01 42 00 - REFERENCES. The standards referenced herein are included to

establish recognized minimum quality only. Where these standards conflict with other specified requirements, the most restrictive requirements shall govern. Equivalent quality and testing standards will be acceptable, subject to their timely submission, review and acceptance by the Architect.

1. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.
2. ASTM E96 – Standard Test Methods for Water Vapor Transmission of Materials.
3. FSC (Forest Stewardship Council): “FSC Certification Program”
4. FS MM-L-736 - Lumber; Hardwood.
5. NFSHSA - Basketball Rule Book.
6. NFSHSA - Volleyball Rule Book.
7. MFMA – Floor Finish List and Specifications
8. MFMA – Sanding, Sealing, Court Lining and Finish Maple Gym Floors
9. MFMA – Grading Rules
10. WSFI - Recommendations for the Correct Preparation, Finishing, and Testing of Concrete Subfloor Surfaces to Receive Wood Flooring.
11. All applicable federal, state and municipal codes, laws and regulations regarding flammability and smoke generation of interior finishes.

B. Sustainability Requirement Reference: The following sustainability requirements are hereby made a part of this Section by reference thereto:

1. High Performance Schools Exchange, Northeast Energy Efficiency Partnerships NE-CHPS, (referred to herein as “NE-CHPS”).

1.4 SUBMITTALS

A. Information and Review Submittals: Submit the following under provisions of Section 01 33 00 - SUBMITTAL PROCEDURES:

1. Literature: Manufacturer's product data sheets, specifications, performance data for each type of wood flooring and finish system materials, with manufacturer's installation instructions and recommended maintenance procedures.
2. Manufacturer's warranties: Wood flooring and finish system manufacturers' standard written guarantees covering defects in materials and workmanship, clearly defining the terms included in the coverage.
3. Shop drawings:
    a. Measured plan drawing indicating all game lines. Identify color of lines.
    b. Large scale drawing of center court school logo.
    c. Section showing vented base, and section showing transitions with abutting flooring materials.
4. Verification samples: Finished 24 by 24 inch section of completed flooring with all components including logo, graphics and game line color samples for approval of the Architect.

5. Certificates: Wood products lacking acceptable documentation for the following will be rejected and their removal required.
6. Certificates: Wood products lacking acceptable documentation for the following will be rejected and their removal required.
    a. Chain-of-Custody: Written documentation providing evidence of compliance with Chain-of-Custody supply of wood products, and compliance with FSC standards.
        1) Demonstrate that products are FSC-certified by providing vendor invoices. Invoices will contain the vendor's chain of custody number and identify each chain of custody certified product on a line-item basis. A "vendor" is defined as the company that furnishes wood products to project contractors and/or subcontractors for on-site installation.
7. Sustainable Design Submittals: As required by NE CHPS.

B. Closeout Submittals: Submit the following under provisions of Section 01 78 00 - CLOSEOUT SUBMITTALS:
1. Maintenance data: Include manufacturer's recommended maintenance procedures, recommended maintenance materials, a suggested schedule for cleaning, stripping, and re-finishing, stain removal methods, and polishes and waxes.
2. MFMA - Care and Preservation of Your Wood Floors.

1.5 QUALITY ASSURANCE

A. Manufacturer: Companies specializing in manufacturing the products specified in this Section, each with minimum 5 years documented experience.

B. Installer specializing in applying the work of this Section with a minimum of 5 years documented experience of the type of flooring system specified.

C. Chain of Custody: All wood products furnished under this Specification Section shall be "FSC certified" according to the rules of the Forest Stewardship Council (FSC).
1. FSC Certification includes the following certification bodies of forests and forest products:
    a. Certification Systems.
    b. SmartWood.
    c. SGS Qualifor.
    d. Soil Association.

D. Perform work in accordance with MFMA standards.

1.6 REGULATORY REQUIREMENTS

A. Conform to applicable codes for Class 1 flame spread rating of finished floor surface when tested in accordance with ASTM E 84. Provide certificate of compliance from authority having jurisdiction.

1.7 WARRANTY

A. Provide 5 year warranty under provisions of the Section 01 78 00 - CLOSEOUT SUBMITTALS, and in compliance with Section 01 78 36 – WARRANTIES.

1. Warranty shall include coverage for all costs to repair or replace flooring, which shrinks, warps, cracks, or otherwise deteriorates excessively, or which breaks its anchorage, or bond with substrate, or otherwise fails. Warranty shall cover failures due to materials or workmanship. The Installer is not responsible for failure due to excessive moisture penetration through concrete substrate or other similar causes for failure which are beyond the Work of this Section, except verification of acceptable substrates, specified herein.

PART 2 - PRODUCTS

2.1 FLOOR SYSTEM

A. Manufacture: To establish a standard of quality, design and function desired, Drawings and specifications have been based on Robbins, Inc., Wausau, WI, product “Bio-Channel Classic”, as modified below under flooring materials.

B. Manufacturers: Subject to compliance with the requirements specified herein, manufacturers offering products which may be incorporated in the work include the following, or approved equal:

1. Robbins, Inc., Wausau, WI.
2. Action Floor Systems, Inc., Mercer WI.
3. Aacer Flooring, LLC, Peshtigo, WI.

2.2 FLOORING MATERIALS

A. Sustainable Forest Certification: All wood shall be “Chain-of-Custody” certified as FSC Certified.

B. Membrane: 6 mil polyethylene

C. Flooring channels: Equal to Robbins “Bio-Channels” consisting of a 1-1/2 inch by 2-5/8 inch by 8 feet wood engineered wood sleeper with EPDM cushion attached, factory encased in a steel channel. Sleeper must be free to move vertically within steel channel confines to assure proper uniformity of resiliency and function.

1. EPDM Cushion: minimum 7/16 inch (11 mm) thick double-trapezoidal shaped EPDM rubber with reverse cavity having non-coextensive lower and upper surfaces.

D. Subflooring (one layer): Fir or southern pine plywood, Exposure 1 APA RATED CD SHEATHING 23/32 inch (18 mm) thickness, touch-sanded.

E. Flooring: Nominal 3/4 inch (25/32 inch) thick by 2-1/4 inches wide kiln-dried plain sawn Northern Hard Maple (Acer Saccharum), MFMA grade-marked, tongue and grooved, and delivered to the project in bundles bearing the specified grade marking.

1. Sustainable Forest Certification: All wood shall be “Chain-of-Custody” certified as FSC Certified.
2. Grade: MFMA Second and Better Grade, Mixed Grain, TGEM, KN.
3. Individual strip length: Random lengths, ranging from a minimum of 9 inches to a maximum of 102 inches. Proportion of board lengths shall be in accordance with specified MFMA grade.
4. Floor edgings: Plain sawn solid White Hard Maple, AWI Custom Grade, of sizes and profiles indicated on the Drawings.

F. Fasteners:
1. Flooring: 1-3/5 inch (45mm) barbed cleats or equivalent.
2. Subfloor: 1-5/8 to 1-3/4 inch (40mm) subflooring nails or staples.
3. Channel anchors: 1-1/4 inch (35mm) long steel power actuated or pneumatic anchors.

2.3 ACCESSORIES

A. Wall base: Vented molded rubber cover base, 4 by 3 inches with premolded outside corners as supplied by flooring manufacturer.

B. Divider strip: Angle, anodized aluminum to profiles recommended by manufacturer.

C. Sheathing protection paper: Red rosin or waxed kraft paper.

D. Fasteners:
1. Fasteners for underlayment: Power-actuated fasteners of appropriate size for the specific substrate.
2. Fasteners for flooring: 7d or 8d cut nails or screw-type nails, or other fasteners as recommended by the flooring manufacturer, for blind-method installation over plywood underlayment.

E. Filler for patching, smoothing and leveling subfloors and underlayment: Portland cement-based latex underlayment acceptable to flooring manufacturer, equal to the following:
1. Ardex, Inc., products “Feather Flash” and “Ardex SD-P”.
2. Quikrete Companies, product “Fast-Set Underlayment 1248”.
3. Silpro Masonry Systems Inc., product “Masco Latex Cement”

2.4 FINISHING

A. Sandpaper: Number 1-1/2 graduating to 1/2; followed by Numbers 0 and 00 for final sanding, except as otherwise recommended by the flooring manufacturer.

B. Filler: Paste wood filler, in tone as selected by the Architect.

C. Floor finish: MFMA Group 3 Surface Finish complying with the following requirements:
1. Non-Volatile Content: 40%-60%

2. Viscosity: A-C
3. Flash Point: ≥ 38ºc (100ºF)
4. Gloss: ≥90
5. Color : Shall not be darker than Gardner Color Standard, number 12
6. Dry Film Color : Upon comparison, an oven-aged panel should not have darkened when compared to an unexposed panel.
7. Package Stability: All Groups shall be free from sediment and suspended solid matter (Group 1 sanding sealers need not meet this requirement). All groups shall be resistant to skinning and show no color change after aging.
8. Dry Time: Shall set to touch in not less than one hour nor more than three hours. They shall dry hard for re-coat or service in less than seven hours without developing tackiness.
    a. Shall spread easily 15 minutes after coating.
    b. Shall show no evidence of tackiness
9. Hardness (Sward Hardness Rocker)- Tested seven days after applications. Must exhibit a minimum hardness of 30
10. Abrasion Resistance –Sand Coefficient - ≥120 – James Machine Weight loss shall not exceed 1% - Black Heel mark Resistance – All products must have a minimum rating of excellent.
11. Flexibility: pass the 1/8” mandrel Test. No cracking shall occur between points 1/4” inch from each side of the panel.
12. Adhesion: provide good adhesion properties when recoated after 24 hours.
13. Maintenance –easily removed by using conventional physical or chemical methods. Shall be capable of blending with patched worn areas.
14. Stain Resistance – Shall show no whitening, no more than very slight dulling and no other visible defects when exposed to the following staining agents: Distilled Water, Light duty, all-purpose cleaner (Spic & Span®), 1% solution in water), Vegetable Oil.
15. Alcohol, Naphtha, Beer and Coca-Cola® Resistance – Shall show no evidence of damage, dulling or whitening by the introduction of a 50% alcohol/water solution, Naphtha, Beer and Coca-Cola®.
16. Perspiration Resistance – Shall exhibit no discoloration or loss of adhesion by the introduction of synthetic perspiration.
17. Coefficient of Friction – Must achieve a minimum Coefficient of Friction reading of 0.50.

D. Staining and Painting: Provide field colors, center court logo graphic, game lines and accent areas in colors selected by Architect to define the gymnasium floor as indicated on the Drawings. Game lines, accents and stains include:
    1. One basketball court game lines, up to two colors.
    2. Three pickleball courts game lines, one color.
    3. Pair of lines 4 feet from either side of gymnasium curtain divider, one color.
    4. Accent colors:

a. Border: one color.

b. Accent colors at basketball free-throw line, two colors.

5. Stained accent: field color (traditional stain), and whitewash stain at three point line.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify concrete substrate has cured for at least 60 days. Test concrete with 3 percent solution of phenolphthalein in grain alcohol for dryness. Do not proceed with installation until substrate passes dryness test, immediately notify Architect of unacceptable substrate conditions.

B. Verify that permanent heat, light, and ventilation is complete and operational prior to installation.

C. Inspect all substrate surfaces and verify that they are in proper condition to receive the work of this Section.

1. Verify that concrete substrate surfaces are smooth and flat to plus or minus 1/8 inch in 10 feet, free of scaling, oil, grease, dust, and foreign substance.

2. Verify that wood subfloor is properly secured, is smooth and flat to plus or minus 1/8 inch in 10 feet, free of foreign substances.

D. Verify that required flooring mounted utilities are in proper location.

E. Beginning of installation means acceptance of site conditions.

3.2 PREPARATION

A. Comply with flooring manufacturer's requirements for preparation of substrate to receive wood flooring.

B. Remove sub-floor ridges and bumps. Fill minor or local low spots, cracks, joints, holes, and other defects with subfloor filler to achieve smooth, flat, hard surface. Prohibit traffic until filler is cured..

C. Thoroughly vacuum clean all receiving surfaces before commencing installation work.

D. Open bundles of flooring, and permit the pieces to properly acclimatize prior to installing same.

3.3 INSTALLATION – GENERAL

A. General Install in accordance with manufacturer’s instructions.

B. Install polyethylene with joints lapped a minimum of 6 inches.

C. Place channels 16 inches on center, end to end, staggering end joints in adjacent rows. Anchor channels at predetermined locations using power actuated or

pneumatic anchoring methods. Sleepers will be placed perpendicular to the intended direction of the maple flooring.

D. Install plywood subfloor parallel to sleeper channels and secure 6 inches on center into channel sleepers.

E. Machine fasten kerfed maple flooring at 12 inches on center, perpendicular to sleeper channels with end joints properly driven up and provide proper spacing for humidity conditions in specific regions. Provide manufacturer's recommended expansion void at perimeter and at all vertical obstructions.

F. Volleyball Sleeves:

1. Install in accordance with manufacturer's written instructions, plumb and at equal height.
2. Deliver standards to Owner prior to Substantial Completion.

3.4 SANDING AND FINISHING PREPARATION

A. Mask off adjacent surfaces and take precautions to contain dust.

B. Sand flooring in gymnasium including facings, and edgings, after installation of flooring and repairs, and after adjacent work is completed.

1. Sanding: Sand flooring with drum sander, edger, buffer and hand scraper.
   a. Use a power sander, taking precautions to contain dust, sand flooring in several complete passes, commencing with 1-1/2 graduating to 1/2; followed by Numbers 0 and 00 for final sanding.
   b. After sanding, buff entire floor using 100 grit screen back or equal grit sandpaper with a heavy-duty buffing machine.
   c. Vacuum and/or tack floor before first coat of sealer.
   d. Floor shall present a smooth surface without drum stop marks, gouges, streaks or shiners.

C. Sand all flooring, facings, and edgings, after installation of flooring and adjacent work is completed.. Leave floor finish with no evidence of sander marks.

D. Thoroughly vacuum-clean all sanded surfaces and other finish surfaces within space, clean surfaces completely free from dust, and dry-mop with a tack cloth-clad mop.

3.5 FINISHING

A. Prior to commencing application of finishing products, measure moisture content of flooring using moisture meter, and record results.

B. Stain wood to color and tone to match architect's accepted sample, applying stain at approximately 100 square feet per gallon; allow stain to fully dry, verify with moisture meter.

C. When stain has cured, apply one coat of Basic Coatings product “Hydroline sealer” as recommended by manufacturer. When that moisture content of wood is same as original prior to application, sand/buff coat with a used 120 grit screen.

D. Vacuum up all dust and tack with a clean water dampened towel. Apply second coat of sealer and, repeat sanding and cleaning procedures.

E. Permit sealer to dry overnight prior to finishing with catalyzed urethane. Re-sand and clean.

F. Mix catalyst with urethane in strict adherence to manufacturers' instructions. Apply one coat of catalyzed urethane with a coverage rate as recommended by manufacturer. When manufacturer recommends first coat should be dry, check the moisture content of wood. When moisture content is same as original prior to application, sand with used 120 grit screen, clean and apply second coat. This should occur between 3 and 5 hours after first coat. If more than 5 hours has lapsed prior to starting the second coat of urethane, repeat sanding and cleaning procedures specified above and apply second coat.

G. Installation of Perimeter Molding and thresholds.

1. Install aluminum threshold or screws and anchors, plumb and at equal height.
2. Install vented cove base anchored to walls with recommended adhesive, screws, or anchors. Use pre-molded outside corners and neatly miter inside corners.

3.6 CLEANING

A. Daily clean work areas by sweeping and disposing of scraps and sawdust.

B. As work progresses, remove excess adhesive from floor, base and wall surfaces without damage.

C. Upon completion of the work of this Section in any given area, remove tools, equipment and all rubbish and debris from the work area; leave area in broom-clean condition.

D. Clean and polish floor surfaces in accordance with manufacturer’s instructions.

3.7 PROTECTION

A. Provide protection of completed flooring areas from construction traffic until Substantial Completion of the General Contract. Prohibit construction traffic for a minimum of 48 hours on completed areas of adhesive applied flooring.

B. Cover the all wood floor surfaces, with heavyweight non-staining kraft paper and overlay with red-rosin paper, taping the edges to maintain position of the protection paper. Reapply papers to maintain floor protection.

End of Section

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Section 09 65 13

RESILIENT BASE AND ACCESSORIES

PART 1 – GENERAL

1.1 SUMMARY

A. Prepare substrate to receive resilient base.

B. Furnish and install the following:

1. Coved resilient base.
2. Straight (non-coved) resilient base.

1.2 RELATED REQUIREMENTS

A. Section 01 74 19 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL: Procedural and administrative requirements relating to recycling goals, waste management program and reporting.

B. Section 01 81 13 - SUSTAINABLE DESIGN REQUIREMENTS: Procedural and administrative requirements relating to required *Northeast CHPS Verified Program,* (NE-CHPS) Certification.

C. Section 03 30 00 - CAST-IN-PLACE CONCRETE: Concrete substrate for resilient base.

D. Section 06 10 00 - ROUGH CARPENTRY: Plywood wood blocking and nailers .

E. Section 09 29 00 - GYPSUM BOARD: Gypsum board substrate to receive resilient base.

F. Section 09 65 19 – RESILIENT TILE FLOORING: Vinyl composition tile (VCT) flooring.

G. Section 09 65 23 – RUBBER FLOORING: Rubber tile and sheet flooring, rubber stair treads and risers.

H. Section 09 65 36 – STATIC CONTROL RESILIENT FLOORING.

I. Section 09 68 00 – CARPETING: Carpet and transition strips.

J. Section 09 68 13 – TILE CARPETING: Carpet tile and transition strips.

1.3 REFERENCES

A. Referenced Standards: Comply with applicable requirements of the following standards and those others referenced in this Section, under the provisions of Section 01 42 00 - REFERENCES. The standards referenced herein are included to establish recognized minimum quality only. Where these standards conflict with other specified requirements, the most restrictive requirements shall govern. Equivalent quality and testing standards will be acceptable, subject to their timely submission, review and acceptance by the Architect.

1. ASTM E84 – Standard Test Method for Surface Burning Characteristics of Building Materials.
2. ASTM F1861 - Standard Specification for Resilient Wall Base
3. All applicable federal, state and municipal codes, laws and regulations regarding flammability and smoke generation of interior finishes.

B. Sustainability Requirement Reference: The following sustainability requirements are hereby made a part of this Section by reference thereto:

1. High Performance Schools Exchange, Northeast Energy Efficiency Partnerships NE-CHPS, (referred to herein as “NE-CHPS”).

1.4 ADMINISTRATIVE REQUIREMENTS

A. Coordination:

1. General: Coordinate the work of this Section with the respective trades responsible for installing interfacing and adjoining work for proper sequence of installation, and ensure that the work performed hereunder is acceptable to such trades for the installation of their work.

B. Pre-installation Meetings: Installer of the Work of this Section is required to attend pre-installation conference specified under Section 09 05 60 - COMMON WORK RESULTS FOR FLOORING

C. Sequencing:

1. Sequence work to ensure resilient base is not installed until building is enclosed, sufficient heat is provided, dust generating activities have terminated, wet work is dry and cured, and work overhead is completed.
2. Sequence resilient base installation after flooring is installed and when base cabinets or other built-in casework is present on the substrate.
3. Field Measurements
   a. Take field measurements before preparation of shop drawings and fabrication, where possible, to ensure proper fitting of Work.
   b. Allow for adjustments within specified tolerances wherever taking of field measurements before fabrication might delay Work.

1.5 SUBMITTALS

A. Information and Review Submittals: Submit the following under provisions of Section 01 33 00 - SUBMITTAL PROCEDURES:

1. Product Data: Manufacturer's product data sheets, specifications, performance data, physical properties and installation instructions.
   a. Include certification of data indicating Volatile Organic Compound (VOC) content of all adhesives. Submit MSDS highlighting VOC limits.
2. Selection Samples: Manufacturers' sample chain of colors available for selection by Architect.
3. Verification Samples: Each type resilient base and color selected, 24 inches long.

4. Sustainable Design Submittals: As required by NE CHPS.

B. Closeout Submittals: Submit the following under provisions of Section 01 78 00 - CLOSEOUT SUBMITTALS.

1. Bonds and Warranty Documentation:

a. Manufacturer's Warranties and Guarantees as specified elsewhere herein this Section.

C. Maintenance Material Submittals: Submit the following under provisions of Section 01 78 00 - CLOSEOUT SUBMITTALS. Clearly label and package extra materials securely to prevent damage.

1. Extra Stock Materials: Upon completion of the Work of this Section, deliver to the Owner extra materials for future repairs and maintenance, an amount equal 24 linear feet for each color and type of resilient base installed.

1.6 QUALITY ASSURANCE

A. General: Avoid color and pattern differential; provide base from one production run in any single room or contiguous areas.

1.7 DELIVERY, STORAGE AND HANDLING

A. Delivery and Acceptance Requirements:

1. Do not deliver items to the site, until all specified submittals have been submitted to, and approved by, the Architect.
2. Do not deliver resilient base materials to the project until all concrete, masonry, plaster and other wet work has been completed and dry.
3. Deliver materials in original unopened packages, containers or bundles bearing brand name, and identification of manufacturer, with labels and package seals intact and legible.

B. Storage and Handling Requirements:

1. Store and handle materials following manufacturer's recommended procedures, and in accordance with material safety data sheets.
2. Protect materials from damage due to moisture, direct sunlight, excessive temperatures, surface contamination, corrosion and damage from construction operations and other causes.

C. Packaging Waste Management: Comply with packaging requirements specified under Section 01 60 00 - PRODUCT REQUIREMENTS.

1. Shipping materials: Manufacturer shall utilize to the greatest extent possible packaging materials which are biodegradable and recyclable.
2. Jobsite packaging waste management: Recycle packaging materials coordinated with general construction waste management specified under Section 01 74 19 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL

1.8 SITE CONDITIONS

A. Maintain uniform temperature of minimum of 65 degrees Fahrenheit and humidity of 20 to 40 percent 48 hours prior to, during, and 48 hours after installation. Store resilient flooring materials and accessories in the spaces where they will be installed for at least 48 hours before beginning installation. Thereafter, maintain a minimum temperature of 55 degrees Fahrenheit in the areas where the work is completed.

1.9 WARRANTY

A. General: Submit the following warranties under provisions of Section 01 78 00 - CLOSEOUT SUBMITTALS, and in compliance with Section 01 78 36 – WARRANTIES.

B. Manufacturer Warranty:

1. Resilient Base: Provide manufacturer's standard one year limited product warranty for resilient base materials.
2. Adhesives: Provide manufacturer's one year limited product warranty for adhesion reliability.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Basis of Design (Specified Manufacturer): To establish a standard of quality, design and function desired, Drawings and specifications have been based on Tarkett Inc., Houston, TX,. designated as "RB".

B. Acceptable Manufacturers: Subject to compliance with the requirements specified herein, manufacturers offering products which may be incorporated in the work include the following, or approved equal:

1. AHF Products, LLC., Mountville PA.
2. Flexco Corporation, Tuscmbia, AL.
3. Mannington Commercial Flooring, Salem NJ.
4. Roppe Corporation, Fostoria OH.
5. Tarkett Inc., Houston TX.
6. VPI Corporation, Sheboygan WI.

2.2 DESCRIPTION

A. Regulatory Requirements:

1. Provide materials and assemblies conforming to applicable building codes and regulatory agencies for flame/fuel/smoke rating requirements of base trim in accordance with ASTM E84.

2.3 RESILIENT BASE

A. Rubber Base: 4 inches high, ribbed back, 1/8 inch thick, rounded top complying with ASTM F1861, Type TP, Thermoplastic Rubber (TBR). Colors shall be as

selected. Rubber base shall be furnished in continuous lengths, approximately 100 feet long.

1. Provide coved base at resilient flooring.
2. Coved base at sealed concrete floors, and back-of-house spaces not having a finished floor.
3. Provide straight (non-coved) base at carpeted and walk-off entrance mat areas.

B. Base accessories: Premolded end stops of same material, size and color as base. Job-form all external and internal corners from base material, pre-molded corner pieces will not be acceptable

2.4 ACCESSORIES

A. Adhesives

1. General: Water resistant, low VOC, acceptable to the resilient flooring manufacturer, for substrate conditions.
   a. Cove Base Adhesives: Maximum VOC 50 [gIL less water]
2. Acceptable manufacturers/products, include the following or approved equal:
   a. Advanced Adhesive Technology, Inc, Dalton GA, product: “No. 432 Modified Acrylic Cove Base Adhesive”.
   b. DAP Incorporated, Dayton OH, product: ”Cove Base Construction Adhesive”.
   c. W.W. Henry Company, Aliquippa PA., product: “Henry 440 Cove Base Adhesive”.
   d. Roberts Consolidated Industries, Inc., City of Industry, CA, product: ”Premium Solvent-Free Cove Base Adhesive”.
   e. Tarkett Inc., Houston, TX., product “960 Wall Base Adhesive”.

B. Joint Sealer for between the top of wall base and irregular wall surfaces: Plastic filler as recommended by manufacturer.

C. Cleaning material: Domestic neutral floor detergent having a pH 7 or pH 8, as recommended by the flooring manufacturer.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Inspect all surfaces and verify that they are in proper condition to receive the work of this Section.

B. Verify that wall surfaces are smooth and flat within the tolerances specified for that type of work, are dust-free, and are ready to receive resilient base.

C. Beginning of installation means acceptance of existing substrate and site conditions.

3.2 INSTALLATION

A. Install all products in strict accordance with each manufacturer's written installation procedures and other provisions specified herein.

B. Spread only enough adhesive to permit installation of materials before initial set.

C. Install Resilient base: Install base on solid backing, bond to vertical substrate with continuous contact at horizontal and vertical surfaces. Apply wall base to walls, columns, casework and other permanent fixtures in areas where base is required.

1. Install in lengths as long as practical.
2. Scribe to fit to door frames and other interruptions.
3. Form all external and internal corners in accordance with manufacturer's written instructions. Cope inside corners and fit neatly.
4. Fill voids with plastic filler along the top edge of the resilient wall base on masonry surfaces or other similar irregular substrates.

3.3 CLEANING

A. Comply with requirements of Section 01 74 19 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL for handling and disposition of all construction and demolition waste.

B. Post-installation Cleaning: As installation progresses, continually remove excess adhesive from floor, base and wall surfaces without damage.

End of Section

Section 09 65 19

RESILIENT TILE FLOORING

PART 1 - GENERAL

1.1 SUMMARY

A. Prepare substrates to receive flooring and ensure specified tolerance level for surface of finished floor. Preparation work includes patching, smoothing and leveling substrate as specified under Section 09 05 60 - COMMON WORK RESULTS FOR FLOORING.

B. Furnish and install the following:

1. Vinyl composition tile (VCT) flooring.
2. Solid vinyl tile (luxury vinyl tile, “LVT”) flooring.
3. Vinyl stair nosings.
4. Metal edge and transition strips wherever edges of resilient tile flooring materials abut dissimilar flooring, where no thresholds occur.

1.2 RELATED REQUIREMENTS

A. Section 01 23 00 – ALTERNATES: Alternate 4 revises the Work of this Section 09 65 19.

1. Base bid: Provide and install Vinyl Composition Tile (VCT).
2. Alternate number 4: Provide and install Luxury Vinyl Tile Flooring (LVT).

B. Section 01 74 19 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL: Procedural and administrative requirements relating to recycling goals, waste management program and reporting.

C. Section 01 81 13 - SUSTAINABLE DESIGN REQUIREMENTS: Procedural and administrative requirements relating to required *Northeast CHPS Verified Program,* (NE-CHPS) Certification.

D. Section 09 65 13 - RESILIENT BASE AND ACCESSORIES: Coved and straight base.

E. Section 09 65 23 - RUBBER FLOORING: Rubber tile and sheet flooring, rubber stair treads and risers.

F. Section 09 65 36 – STATIC-CONTROL RESILIENT FLOORING.

1.3 REFERENCES

A. Referenced Standards: Comply with applicable requirements of the following standards and those others referenced in this Section, under the provisions of Section 01 42 00 - REFERENCES. The standards referenced herein are included to

establish recognized minimum quality only. Where these standards conflict with other specified requirements, the most restrictive requirements shall govern. Equivalent quality and testing standards will be acceptable, subject to their timely submission, review and acceptance by the Architect.

1. ASTM D2047 – Standard Test Method for Static Coefficient of Friction of Polish-Coated Flooring Surfaces as Measured by the James Machine.
2. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.
3. ASTM E648 – Standard Test Method for Critical Radiant Flux of Floor-Covering Systems Using a Radiant Heat Energy Source.
4. ASTM E662 - Standard Test Method for Specific Optical Density of Smoke Generated by Solid Materials.
5. ASTM F710 - Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring.
6. ASTM F970 – Standard Test Method for Static Load Limit.
7. ASTM F1066 – Standard Specification for Vinyl Composition Floor Tile.
8. ASTM F1700 – Standard Specification for Solid Vinyl Floor Tile.
9. ASTM F1869 - Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride.
10. ASTM F2170 - Standard Test Method for Determining Relative Humidity in Concrete Floor Slabs Using in situ Probes.
11. FS SS-T-312 - Tile, Floor: Asphalt, Rubber, Vinyl, Vinyl Composition.
12. NFPA 99 – Standard for Health Care Facilities
13. NFPA 253 - Critical Radiant Flux of Floor Covering Systems Using a Radiant Heat Energy Source.
14. NSF/ANSI 332 – Sustainability Assured for Resilient Floor Coverings.
15. SCSglobal Services – SCS-EC10.3 – Indoor Air Quality Product Performance Standard for Building Interiors (FloorScore).
16. All applicable federal, state and municipal codes, laws and regulations regarding flammability and smoke generation of interior finishes.

B. Sustainability Requirement Reference: The following sustainability requirements are hereby made a part of this Section by reference thereto:

1. High Performance Schools Exchange, Northeast Energy Efficiency Partnerships NE-CHPS, (referred to herein as “NE-CHPS”).

1.4 SUBMITTALS

A. Information and Review Submittals: Submit the following under provisions of Section 01 33 00 - SUBMITTAL PROCEDURES:

1. Literature: Manufacturer's product data sheets, specifications, performance data, physical properties and installation instructions for each item furnished hereunder.
2. Submit the manufacturer’s certification that the resilient flooring has been tested by an independent laboratory and complies with the required fire tests.
3. Shop drawings: 1/4 inch scale plans of each flooring area scheduled for Work of this Section. Drawings shall bear dimensions of actual measurements taken at the project.
    a. Identify each flooring type, colors and patterns, indicate layout of tile units and direction of tile patterns.
    b. Where more than one adhesive type is specified or otherwise required by flooring manufacturer, identify on shop drawings areas for each adhesive type.
4. Selection samples: Manufacturers' sample chain of colors and patterns available for selection by Architect.
5. Verification samples:
    a. Full sized flooring tile, illustrating color, and pattern for each color and type of tile selected.
    b. Edging: 12 inches long demonstrating profile, thickness, size and color.
6. Sustainable Design Submittals: As required by NE CHPS.

1.5 QUALITY ASSURANCE

A. Provide Types of Resilient tile and accessories supplied by one manufacturer, including leveling and patching compounds, and adhesives.

B. Avoid color and pattern differential; provide flooring from one production run in any single room or contiguous areas.

1.6 DELIVERY, STORAGE AND HANDLING

A. Deliver resilient flooring materials in original, unopened packages and store protected for three days prior to installation in area of installation to achieve temperature stability.

B. Store materials in a clean dry, enclosed space off the ground and protected from the weather. Protect adhesives from freezing.

1.7 ENVIRONMENTAL CONDITIONS

A. Maintain uniform temperature of minimum of 65 degrees Fahrenheit and humidity of 20 to 40 percent 48 hours prior to, during, and 48 hours after installation. Store resilient flooring materials and accessories in the spaces where they will be installed for at least 48 hours before beginning installation. Thereafter, maintain a minimum temperature of 55 degrees Fahrenheit in the areas where the work is completed.

1.8 SEQUENCING AND SCHEDULING

A. Coordinate the work of this Section with the respective trades responsible for installing interfacing work.

B. Sequence work to ensure resilient flooring is not installed until building is enclosed, sufficient heat is provided, dust generating activities have terminated, wet work is dry and cured, and work overhead is completed.

C. Ensure that installation of flooring and accessories occurs after other finishing operations, including painting.

1.9 WARRANTY

A. Under the provisions of Section 01 78 00 - CLOSEOUT SUBMITTALS, and in compliance with Section 01 78 36 – WARRANTIES.

1. Provide manufacturer's standard wear warranties (minimum of 2 year), for all flooring and stair tread materials installed under this Section.

1.10 EXTRA MATERIALS

A. Upon completion of the Work of this Section, deliver to the Owner extra flooring materials for future repairs and maintenance, from the same manufacturing runs as those installed, in the following amounts.

1. Vinyl composition tile: 3 percent of each material in each color, and pattern installed.
2. Furnish a quantity of adhesive of each type used in sealed cans or containers sufficient to apply the above materials.

PART 2 - PRODUCTS

2.1 REGULATORY REQUIREMENTS

A. Provide materials and assemblies conforming to applicable building codes and regulatory agencies for flame/fuel/smoke rating requirements of flooring in accordance with ASTM E84.

B. Provide flooring material to meet the following fire test performance criteria as tested by a recognized independent testing laboratory:

1. ASTM E648 (Critical Radiant Flux) of 0.45 watts per sq. cm. or greater, Class 1.
2. ASTM E662 (Smoke Generation) Maximum Specified Optical Density of 450 or less.

2.2 MANUFACTURERS

A. Subject to compliance with the requirements specified herein, manufacturers offering products which may be incorporated in the work include the following, or approved equal:

1. Vinyl composition tile:
    a. AHF Products, LLC., Mountville PA.
    b. Tarkett Inc., Houston TX.
2. Luxury vinyl tile:
    a. Tarkett North America, Solon, OH. (Tarkett), (Basis of Design), “Event Series”.
    b. Mannington Commercial. Salem NH. “Color Anchor Collection”.
    c. Daltile, Dallas TX. “Daltile Loften Collection”.
3. Leveling filler:
    a. Ardex, Inc., Coraopolis, PA.
    b. Quikrete Companies., Atlanta, GA.
    c. Silpro Masonry Systems Inc., Ayer MA.
4. Adhesives:
    a. Advanced Adhesive Technology, Inc, Dalton GA.
    b. DAP Incorporated, Dayton OH.
    c. W.W. Henry Company, Huntington Park CA.
    d. Roberts Consolidated Industries, Inc., City of Industry, CA.

2.3 VINYL COMPOSITION TILE FLOORING

A. Vinyl Composition Tile (VCT): 12 x 12 inch by 1/8 inch thick with solid color extending through thickness of tile; composed of vinyl resins, non-asbestos inorganic mineral fillers, and colorfast pigments complying ASTM F1066 Composition 1, Class 2.

1. Acceptable products include the following, or approved equal:
    a. AHF Products, LLC.,”Armstrong Brand”, product “Standard Excelon Imperial Texture”.
    b. Tarkett products “Tarkett VCT II”.
2. Colors shall be as selected by the Architect from manufacturer's full available range. In patterns as indicated on Drawings. Multiple colors will be required, without consideration of minimums.

2.4 LUXURY VINYL TILE FLOORING

A. Vinyl Plank Flooring: FloorScore certified, heterogeneous, straight edge, Ortho-phthalate-free vinyl plank flooring 3.0 mm thick (nominal 0.12 inches) having a minimum 0.30 inch (0.762 mm) thick wear layer, with manufacturers abrasive-resistant urethane coating, complying with the requirements of ASTM F1700, Class III, Type B. Pattern and color shall be as selected by the Architect from manufacturer's full available range.

1. Basis of Design:

   a. Tile (square): Tarkett, North America, product: "Tarkett Event Series Luxury Vinyl Floor".

   b. Plank (rectangular): Tarkett, North America, product: "Tarkett Event Series Luxury Vinyl Floor".

   c. To establish a standard of quality, design and function desired, Drawings and specifications have been based on the vinyl flooring products indicated. Products from other manufacturers meeting the requirements of these specifications with equivalent ranges of available color groups and pricing within those color groups shall be considered as equal upon submission of complete product information as described in Section 01 25 13 – PRODUCT SUBSTITUTION PROCEDURES. Further additional information may be requested by the Owner or Architect for determination that the proposed product substitution is fully equal to the specified product(s).

2. Sizes:

   a. Tile sizes vary per color and pattern design, and also by manufacturer, but in general a nominal 18 inch by 18 inch sized tile is desired for Project.

   b. Plank sizes vary per color and pattern design, and also by manufacturer, but in general a nominal 4 or 6 inch width by 36 or 48 inch length sized plank having wood grain pattern is desired for Project.

3. Colors/patterns: Selected by Architect from manufacturer's full available color range and patterns available.

   a. Field areas shall consist of upwards of 3 colors as subsequently selected by the Architect. Designs may consist of multiple patterns required for field colors. Each pattern may vary by location as determined by the Architect.

   b. Floor accent tile: In patterns as indicated on the Drawings. In addition to the selected field color flooring, flooring colors may require upwards of of 12 separate colors for striping, borders, accent bands, dots, and other accent patterns.

2.5 ACCESSORIES

A. Stair nosings: Visually impaired recessed vinyl stair nosing, nominal 2 inch hinged nose configuration, 3 inch (7.62 cm) tread depth with 2 inch (5.08 cm) wide co-

extruded contrasting color strip, undercut for 1/8 inch (3.17 mm) resilient or 3/16 inch butt with lip removed, equal to Tarkett, Houston, TX, Model “VIRCN-XX-B2”. Color of nosing, and contrasting strip as selected by Architect from manufacturers available colors.

B. Metal edge strips: Tarkett, Houston, TX., model “Metaledge 001” in color selected by Architect, from manufacturers available colors.

C. Filler for patching, smoothing and leveling subfloors and underlayments: Portland cement-based latex underlayment acceptable to flooring manufacturer, equal to the following:

1. Ardex, Inc., products “Feather Flash” and “Ardex SD-P”.
2. Quikrete Companies, product “Fast-Set Underlayment 1248”.
3. Silpro Masonry Systems Inc., product “Profinish”.

D. Adhered flooring systems general requirements for adhesives (except as otherwise specified in individual Specification Sections):

1. General Flooring Adhesives: High moisture resistant and alkali resistant adhesive: Synthetic Polymer, non-flammable in wet state, with NFPA, Class A rated, VOC compliant, capable of withstanding the following in continuous service:
   a. Up to 95% RELATIVE HUMIDITY when measured in accordance with ASTM F2170 – Standard Test Method for Determining Relative Humidity in Concrete Floor Slabs Using in-situ Probes.
   b. Up to 8 lbs./1000 sq. ft./ 24 hours MVER when measured in accordance with ASTM F1869 - Standard Test Method for Measuring Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride.
   c. VOC content: Less than 50 g/L.
2. Acceptable adhesives, include the following, or approved equal, (subject to acceptance of flooring manufacturer for performance and compliance with warranty requirements, for each type of floor system specified):
   a. Advanced Adhesive Technology Inc., Dalton GA. Adhesive: “AAT-Go2 Adhesiver” (maximum 95% RH / 8pounds MVER).
   b. Armstrong World Industries, Inc., Flooring Division, Lancaster PA., adhesive: “S-515” (maximum 95% RH / 5 pounds MVER).
   c. DriTac Corp., Clifton NJ., adhesive: “5900 Mega Bond” (maximum 99% RH / 8 pounds MVER).
   d. W.W. Henry Company (Ardex), Aliquippa PA. adhesive: “695 High RH Vinyl Flooring Adhesive” (maximum 95% RH / 3 pounds MVER).
   e. Mapei Corporation, Elk Grove IL Adhesive: “Ultrabond ECO 711” (maximum 95% RH / 8 pounds MVER).
   f. Mohawk Group, Dalton, GA.
      1) Adhesive: “Aquaflex M100Plus” (maximum 100% RH)
      2) Adhesive: “Aquaflex M99” (maximum 95% RH)

E. Cleaning material: Domestic neutral floor detergent having a pH 7 or pH 8, as recommended by the flooring manufacturer.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Inspect all surfaces and verify that they are in proper condition to receive the work of this Section.

B. Verify concrete substrate has been cured and is sufficiently dry to achieve a bond with the adhesive, in accordance with the manufacturer's recommended bond and moisture test.

C. Beginning of installation means acceptance of existing substrate and site conditions.

3.2 PREPARATION - GENERAL

A. General: Comply with flooring manufacturer's requirements for preparation of substrate to receive resilient flooring.

1. Close spaces to traffic during the installation of the flooring.

B. Remove, by light sanding and grinding, all protruding edges, high spots. Ensure that substrate is free from paint, varnish, wax, oil, or other foreign matter.

C. Fill minor or local low spots, cracks, joints, holes, and other defects with subfloor filler. Apply, trowel and float finish subfloor filler and leave a smooth, level, hard surface. Prohibit traffic from area until filler is cured.

D. Vacuum clean substrate, and ensure that substrate is dry, clean and smooth prior to application of flooring.

3.3 INSTALLATION - GENERAL

A. Install all products in strict accordance with each manufacturer's written installation procedures and other provisions specified herein.

1. Apply primers as recommended by adhesive manufacturer's written instructions.

B. Patterns and colors: Resilient tile flooring patterns are shown on the Sample Wall and Flooring Patterns Drawings. The purpose of these Drawings is to facilitate pricing by the Resilient Flooring subcontractor. Final Drawings indicating patterns of equal complexity will be provided by the Architect once approved samples have been processed. The Resilient Flooring subcontractor shall note the required flooring layouts including fields, borders, striping, accent patterns, dots, number of colors, and required cutting necessary to produce the representative pattern(s). No adjustment in the Contract Sum will be provided on the basis that the final pattern

provided by the Architect differs from the representative pattern provided at the time the Resilient Flooring subcontractor's bid was submitted.

1. The Resilient Flooring subcontractor shall note locations where the installation of tile flooring is not perpendicular to the primary room axis. Provide all cutting and calculate resulting waste in order to produce patterns containing elements where the orientation of the flooring has been placed at an angle to that axis.

C. Spread only enough adhesive to permit installation of materials before initial set.

D. Mix tile to ensure that concentration of surface patterns is uniform throughout. Use tile from cartons in same sequence as manufactured and packaged, if so numbered.

3.4 INSTALLATION - FLOOR TILE

A. Lay flooring in patterns indicated on the final Drawings issued by the Architect with pattern-grain running in singular direction. Lay tile with joints straight and continuous in both directions.

B. Neatly fit resilient materials to all intersecting surfaces, and make joints as inconspicuous as possible.

C. Terminate flooring at centerline of door in closed position where adjacent floor finish is of different material or color.

D. Apply resilient materials to have uniform contact with receiving surfaces throughout, with tight joints, and with all finish surfaces smooth, in true plane, free from buckles, waves, and other imperfections.

E. Extend resilient flooring to wall lines beneath all movable equipment and movable casework. Fit resilient flooring onto breaks and recesses, against non-resilient bases, around pipes and other protrusions, under saddles, and to and around other fixed surfaces, making neat cuts in the flooring and minimizing joints.

3.5 INSTALLATION OF ACCESSORIES

A. Resilient edge and transition strips:

1. Install edge strips at all edges of flooring which would otherwise be exposed.
2. Place resilient edge strips tightly butted to flooring and secure with adhesive recommended by the edge strip manufacturer.

3.6 PROTECTION

A. Prohibit traffic on finished floor areas until flooring adhesive has fully set.

B. Prohibit washing, scrubbing or other similar 'wet' operations to occur on finished floor areas for a minimum period of 5 calendar days after installation.

C. Provide protection of completed flooring areas from construction traffic until Substantial Completion of the General Contract. Cover all resilient tile floor surfaces with non-staining heavyweight kraft paper and overlay with red-rosin paper, taping the edges to maintain position of the protection paper. Reapply papers to maintain floor protection.

D. After post-installation cleaning ensure that the flooring is be protected as specifed under Section 09 05 60.

3.7 POST-INSTALLATION CLEANING

A. As installation progresses, continually remove excess adhesive from floor, and wall surfaces without damage.

1. Protect installed flooring as recommended by the flooring manufacturer against damage from rolling loads, other trades, or the placement of fixtures and furnishings.

B. Sweep floors to remove all loose dirt and debris.

C. After specified waiting period, clean all materials installed hereunder with a non-abrasive commercial detergent approved by the material manufacturers, and thoroughly rinse with clear water.

1. Vinyl tile floors: Wait at least 5 full days following completion of tile installation before commencing with cleaning.

3.8 FINAL CLEANING

A. General: Perform final cleaning not before 4 days prior to Owner's intended occupancy date.

End of Section

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Section 09 65 23

RUBBER FLOORING

PART 1 – GENERAL

1.1 SUMMARY

A. Prepare substrates to receive flooring and ensure specified tolerance level for surface of finished floor. Preparation work includes patching, smoothing and leveling substrate as specified under Section 09 05 60 - COMMON WORK RESULTS FOR FLOORING.

B. Furnish and install the following:

1. Hammered rubber flooring tile (includes stair landings and elevator cab).
2. Hammered surface athletic rubber flooring tile.
3. Hammered sheet rubber stair treads/risers.
4. Rubber base.
5. Transition strips wherever edges of resilient rubber flooring materials abut dissimilar flooring, where no thresholds occur.

1.2 RELATED REQUIREMENTS

A. Section 01 74 19 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL: Procedural and administrative requirements relating to recycling goals, waste management program and reporting.

B. Section 01 81 13 - SUSTAINABLE DESIGN REQUIREMENTS: Procedural and administrative requirements relating to required *Northeast CHPS Verified Program,* (NE-CHPS) Certification.

C. Section 02 41 19 - SELECTIVE DEMOLITION: Removal of existing flooring.

D. Section 03 30 00 - CAST-IN-PLACE CONCRETE: Concrete substrate for rubber flooring.

E. Section 06 10 00 - ROUGH CARPENTRY: Plywood underlayment.

F. Section 09 05 60 - COMMON WORK RESULTS FOR FLOORING: General requirements for flooring preparation, substrate testing requirements, installation and temporary protection.

G. Section 09 65 13 - RESILIENT BASE AND ACCESSORIES: Resilient base.

H. Section 09 65 36 – STATIC CONTROL RESILIENT FLOORING.

I. Section 09 68 00 - CARPETING: Carpet and transition strips.

J. Section 09 68 13 – TILE CARPETING: Carpet tile and transition strips.

1.3 REFERENCES

A. Referenced Standards: Comply with applicable requirements of the following standards and those others referenced in this Section, under the provisions of Section 01 42 00 - REFERENCES. The standards referenced herein are included to establish recognized minimum quality only. Where these standards conflict with other specified requirements, the most restrictive requirements shall govern. Equivalent quality and testing standards will be acceptable, subject to their timely submission, review and acceptance by the Architect.

1. ASTM E 84 - Surface Burning Characteristics of Building Materials.
2. ASTM F-1344 - Specification for rubber floor tile.
3. ASTM F-710 - Preparing Concrete Floors to Receive Resilient Flooring.
4. ASTM F-1869 – Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride.
5. FS SS-W-40 - Wall Base: Rubber and Vinyl Plastic.
6. All applicable federal, state and municipal codes, laws and regulations regarding flammability and smoke generation of interior finishes.

B. Sustainability Requirement Reference: The following sustainability requirements are hereby made a part of this Section by reference thereto:

1. High Performance Schools Exchange, Northeast Energy Efficiency Partnerships NE-CHPS, (referred to herein as “NE-CHPS”).

1.4 REGULATORY REQUIREMENTS

A. Provide materials and assemblies conforming to applicable building codes and regulatory agencies for flame/fuel/smoke rating requirements of flooring and base trim in accordance with ASTM E 84.

B. Provide flooring material to meet the following fire test performance criteria as tested by a recognized independent testing laboratory:

1. ASTM E 648 (Critical Radiant Flux) of 0.45 watts per sq. cm. or greater, Class 1.
2. ASTM E 662 (Smoke Generation) Maximum Specified Optical Density of 450 or less.

1.5 SUBMITTALS

A. Information and Review Submittals: Submit the following under provisions of Section 01 33 00 - SUBMITTAL PROCEDURES:

1. Literature: Manufacturer's product data sheets, specifications, performance data, physical properties and installation instructions for each item furnished hereunder.
2. Submit the manufacturer’s certification that the resilient flooring has been tested by an independent laboratory and complies with the required fire tests.
3. Shop drawings: 1/4 inch scale plans of each flooring area scheduled for Work of this Section; indicate layout of tile units and direction of tile patterns, identify selected colors and patterns.

4. Selection samples:
    a. Manufacturers' sample chain of colors and patterns available for selection by Architect.
5. Verification samples:
    a. Full sized flooring tile, illustrating color, and pattern for each type of tile selected.
    b. Resilient base: Each type and color selected, 24 inches long.
    c. 12 inch lengths of stair treads, illustrating color.
    d. Edging: 12 inches long demonstrating profile, thickness, size and color.
    e. Adhesives, mastics, crack fillers, primers, cleaner, and polish: 1/2 pint metal cans.
    f. MSDS (Material Safety Data Sheets) are available for adhesives and cleaning agents.
6. Sustainable Design Submittals: As required by NE CHPS.

B. Closeout Submittals: Submit the following under provisions of Section 01 78 00 - CLOSEOUT SUBMITTALS.
1. Maintenance data: Include maintenance procedures, recommended maintenance materials, a suggested schedule for cleaning, stain removal methods, and polishing.

1.6 QUALITY ASSURANCE

A. Manufacturer: Provide resilient flooring manufactured by a firm with a minimum of 10 years' experience in the fabrication of resilient flooring of types equivalent to those specified.
1. Manufacturer capable of providing field service representation.

B. Installer's Qualifications: Installer experienced (minimum of 2 years) to perform work of this section who has specialized in the installation of work similar to that required for this project and who is acceptable to the product manufacturer.

C. Materials: For each type of material required for the work of this Section, provide primary materials which are the products of one manufacturer. Provide secondary materials which are acceptable to the manufacturer of the primary materials. Comply with applicable regulations regarding VOC (volatile organic compound) content of adhesives.

D. Color Matching: Provide resilient flooring products, including wall base and accessories, from one manufacturer to ensure color matching.
1. Avoid color and pattern differential; provide flooring from one production run in any single room or contiguous areas.

1.7 DELIVERY, STORAGE AND HANDLING

A. Deliver resilient flooring and base materials in original, unopened packages and store protected for three days prior to installation in area of installation to achieve temperature stability.

B. Store materials in a clean dry, enclosed space off the ground and protected from the weather. Protect adhesives from freezing.

1.8 ENVIRONMENTAL CONDITIONS

A. Maintain uniform temperature of minimum of 65 degrees Fahrenheit and humidity of 20 to 40 percent 48 hours prior to, during, and 48 hours after installation. Store resilient flooring materials and accessories in the spaces where they will be installed for at least 48 hours before beginning installation. Thereafter, maintain a minimum temperature of 55 degrees Fahrenheit in the areas where the work is completed.

1.9 SEQUENCING AND SCHEDULING

A. Coordinate the work of this Section with the respective trades responsible for installing interfacing work.

B. Sequence work to ensure resilient flooring is not installed until building is enclosed, sufficient heat is provided, dust generating activities have terminated and work overhead is completed.

C. Install flooring and base after interior wet work is dry.

1.10 WARRANTY

A. General: Submit warranties under provisions of Section 01 78 00 - CLOSEOUT SUBMITTALS.

1. Manufacturer Warranty: provide manufacturer’s standard wear warranties for all flooring and stair tread materials installed under this Section.

1.11 EXTRA MATERIALS

A. Upon completion of the Work of this Section, deliver to the Owner extra materials for future repairs and maintenance, from the same manufacturing runs as those installed, in the following amounts:

1. Rubber tile: 3 percent of each material in each color, and pattern installed.
2. Resilient base: 24 linear feet of each type and color installed.
3. Furnish a quantity of adhesive of each type used in sealed cans or containers sufficient to apply the above materials.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Specified Manufacturer: To establish a standard of quality, design and function desired, Drawings and specifications have been based on Tarkett, Houston, TX.

B. Acceptable Manufacturers: Subject to compliance with the requirements specified herein, manufacturers offering products which may be incorporated in the work include the following, or approved equal:

1. Tarkett, Houston, TX.

2. Nora Systems, Inc., Salem, NH. .
3. Burke Flooring, San Jose, CA..
4. Roppe Corporation, Fostoria OH.

2.2 TEXTURED SURFACE RUBBER FLOORING TILE

A. Rubber flooring tile: Hammered surface, 3.5mm (0.14 inches) overall thickness.
   1. Basis of Design Product:
      a. Tarkett, Houston, TX, product “Microtone Rubber Tile Flooring” or approved equal. Tile size: nominal 39-3/8 inches by 39-3/8 inches square (actual 100cm by 100cm).
   2. Material: Natural fillers and environmentally compatible color pigments.
   3. Back of tile: Smooth, doubled sanded back
   4. Warranty: 10 years
   5. Abrasion Resistance: Taber abrasion test, ASTM D 3389, H-18 wheel, 500 gram load, 1000 cycles, gram weight loss not greater than .60
   6. Hardness: ASTM D 2240, Shore A, not less than 85
   7. Slip Resistance: Static coefficient of friction (James Test), ASTM 2047, equal to or greater than 0.5
   8. Flammability: ASTM E 648; NFPA 253; NBS smoke density, less than 450
   9. Burn Resistance: Cigarette and solder burn resistance
   10. Halogen Free: Products shall contain no halogens
   11. Asbestos-Free: Products shall contain no asbestos
   12. Colors:
      a. Field areas shall consist of 1 color as indicated on the Drawings. As multiple patterns are required the field color for each pattern will vary by location as determined by the Architect.
      b. Floor accent tile: In patterns as indicated on the Drawings. In addition to the selected field color tile flooring shall require a minimum of 5 separate colors for striping, borders, accent bands, dots, and other accent patterns.

B. Athletic rubber flooring tile: Hammered surface, 9.0mm (0.36 inches) overall thickness:
   1. Basis of Design Product:
      a. Tarkett, Houston, TX, product “Triumph Sports & Multi-Function Rubber Floor” or approved equal. Tile size: nominal 39-3/8 inches by 39-3/8 inches square (actual 100cm by 100cm).
   2. Material: Natural fillers and environmentally compatible color pigments.
   3. Back of tile: Smooth, doubled sanded back
   4. Limited Wear Warranty: 5 years
   5. Abrasion Resistance: Taber abrasion test, ASTM D 3389, H-18 wheel, 500 gram load, 1000 cycles, gram weight loss not greater than .50

6. Hardness: ASTM D 2240, Shore A, equal or greater than 70
7. Slip Resistance: Static coefficient of friction (James Test), ASTM 2047, equal to or greater than 0.5
8. Flammability: ASTM E 648; NFPA 253; NBS smoke density, less than 0.45 watts per square centimeter, Class 1.
9. Burn Resistance: Cigarette and solder burn resistance
10. Halogen Free: Products shall contain no halogens
11. Asbestos-Free: Products shall contain no asbestos
12. Colors:
    a. Field areas shall consist of 1 color as indicated on the Drawings. As multiple patterns are required the field color for each pattern will vary by location as determined by the Architect.
    b. Floor accent tile: In patterns as indicated on the Drawings. In addition to the selected field color tile flooring shall require a minimum of 5 separate colors for striping, borders, accent bands, dots, and other accent patterns.

2.3 RUBBER STAIR TREADS/RISERS AND LANDINGS

A. Floor and stair treads: One piece nosing-tread-riser combination, Tarkett, Houston, TX, product “Stairwell Management” as required for stair width or approved equal. Hammered surface, fleck multi-color design, 5.0 mm (0.20 inches) overall thickness with smooth double-sanded back. Fabricate flooring from synthetic rubber free from reground rubber, natural rubber or coarse fillers, having no asbestos, halogens or polyvinyl chloride (PVC).

1. Wear Warranty: 10 year limited warranty.
2. Standard: ASTM F 1344, for solid color homogeneous tiles and through-mottled tiles as applicable.
3. Abrasion Resistance: Taber abrasion test, ASTM D 3389, H-18 wheel, 500 gram load, 1000 cycles, gram weight loss not greater than < 0.60.
4. Hardness: ASTM D 2240, Shore A, not less than > 75.
5. Slip Resistance: Static coefficient of friction (James Test), ASTM D 2047, equal to or greater than 0.8, ADA guidelines compliance.
6. Flammability: ASTM E 648; NFPA 253; NBSIR 75 950 result to be not less than > 0.45 watts per square centimeter, Class 1.
7. Smoke Density: ASTM E 662, NFPA 258, NBS smoke density, less than < 450.
8. Bacteria Resistance: Products shall be resistant to bacteria, fungi, and micro-organism activity, according to ASTM E 2180 and ASTM G 21.
9. Color: As selected from manufacturer’s full range.

B. Landings: Match stair treads:

2.4 RUBBER BASE

A. Rubber Base: Synthetic rubber straight base, nominally 4 inches high and 0.11 inch thick. Colors shall be as selected by the Architect from manufacturer's full library of colors available.

1. Base accessories: Premolded end stops of same material, size and color as base. Job-form all external and internal corners from base material, pre-molded corner pieces will not be acceptable

2.5 ACCESSORIES

A. Filler for patching, smoothing and leveling flooring substrate: Refer to Section 09 05 60 – COMMON WORK RESULTS FOR FLOORING.

B. General Requirements for flooring Adhesives: Refer to Section 09 05 60 – COMMON WORK RESULTS FOR FLOORING.

1. Adhesives: Moisture vapor, relative humidity and alkali resistant adhesive, Class A rated, VOC compliant, and capable of withstanding the following in continuous service:
   a. Not less than 85% relative humidity when measured in accordance with ASTM F2170 – Standard Test Method for Determining Relative Humidity in Concrete Floor Slabs Using in-situ Probes.
   b. Not less than 6 lbs./1000 sq. ft./ 24 hours MVER when measured in accordance with ASTM F1869 - Standard Test Method for Measuring Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride.
   c. VOC content: Less than 50 g/L.
   d. Acceptable manufacturers and products: Subject to compliance with the requirements specified herein, manufacturers offering products which may be incorporated in the work include the following, or approved equal:
      1) Nora Systems, Inc., Salem, NH, product "385" or "485".
      2) Burke Flooring, San Jose, CA, product "BR-711"
      3) Roppe Corporation, Fostoria OH, product "Excelsior AW-510"

C. Transition strips: Homogeneous vinyl, of profiles required for thickness of abutting materials, in colors as selected by the Architect.

D. Cleaning material: Domestic floor detergent, as recommended by the flooring manufacturer.

E. For sealing joints between the top of wall base and irregular wall surfaces such as masonry, provide plastic filler applied according to the manufacturer's recommendations.

F. Provide transition/reducing strips, tapered to meet abutting materials.

G. Provide threshold of thickness and width as shown on the drawings.

H. Provide resilient edge strips of width shown on the drawings, of equal gauge to the flooring, rubber composition, tapered or bull nose edge, with color to match or contrast with the flooring, or as selected by the Architect from standard colors available.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Inspect all surfaces and verify that they are in proper condition to receive the work of this Section.

1. Substrates shall be dry and clean.
2. Substrates shall be free of depressions, raised areas, or other defects which would telegraph through installed flooring.
3. Temperature of resilient flooring and substrate shall be within specified tolerances.

B. Insure that concrete substrate is dry having a maximum moisture content of 2.5 percent by weight. Perform moisture test in several locations using carbide method dampness meter.

C. Beginning of installation means acceptance of existing substrate and site conditions.

3.2 PREPARATION

A. General: Comply with flooring manufacturer's requirements for preparation of substrate to receive resilient flooring.

B. Patterns and colors: Resilient tile flooring patterns are shown on the Sample Wall and Flooring Patterns Drawings. The purpose of these Drawings is to facilitate pricing by the Resilient Flooring Trade Contractor. Final Drawings indicating patterns of equal complexity will be provided by the Architect once approved samples have been processed. The Resilient Flooring Trade Contractor shall note the required flooring layouts including fields, borders, striping, accent patterns, dots, number of colors, and required cutting necessary to produce the representative pattern(s). No adjustment in the Contract Sum will be provided on the basis that the final pattern provided by the Architect differs from the representative pattern provided at the time the Resilient Flooring Trade Contractor’s bid was submitted.

1. The Resilient Flooring Trade Contractor shall note locations where the installation of tile flooring is not perpendicular to the primary room axis. Provide all cutting and calculate resulting waste in order to produce patterns containing elements where the orientation of the flooring has been placed at an angle to that axis.

C. Remove, by light sanding and grinding, all protruding edges, high spots. Ensure that substrate is free from paint, varnish, wax, oil, or other foreign matter.

D. Fill minor or local low spots, cracks, joints, holes, and other defects with subfloor filler. Apply, trowel and float finish subfloor filler and leave a smooth, level, hard surface. Prohibit traffic from area until filler is cured.

E. Vacuum clean substrate, and ensure that substrate is dry, clean and smooth prior to application of flooring.

F. Apply primers as recommended by adhesive manufacturer's written instructions.

G. Condition flooring materials, accessories and adhesives to room temperatures for a period of 48 hours minimum.

3.3 INSTALLATION - GENERAL

A. General: Install all products in strict accordance with each manufacturer's written installation procedures and other provisions specified herein.

B. Install resilient flooring and accessories after the other finishing operations, including painting, have been completed. Close spaces to traffic during the installation of the flooring. Do not install resilient flooring over concrete slabs until they have been cured and are sufficiently dry to achieve a bond with the adhesive, in accordance with the manufacturer's recommended bond and moisture test.

C. Spread only enough adhesive to permit installation of materials before initial set.

3.4 INSTALLATION - FLOOR TILE

A. Unless otherwise indicate lay flooring in a square grid pattern, with joints and seams parallel to building lines. Lay tile with joints straight and continuous in both directions and with border tile not less than 1/2 the width of the tile.

B. Lay resilient flooring with arrows in the same direction.

C. Neatly fit resilient materials to all intersecting surfaces, and make joints as inconspicuous as possible.

D. Terminate flooring at centerline of door in closed position where adjacent floor finish is of different material or color.

E. Apply resilient materials to have uniform contact with receiving surfaces throughout, with tight joints, and with all finish surfaces smooth, in true plane, free from buckles, waves, and other imperfections.

F. Extend resilient flooring to wall lines beneath all movable equipment and movable casework. Fit resilient flooring onto breaks and recesses, against non-resilient bases, around pipes and other protrusions, under saddles, and to and around other fixed surfaces, making neat cuts in the flooring and minimizing joints.

G. Install reducer strips at exposed edges.

3.5 INSTALLATION OF TREADS AND RISERS

A. Begin installation at bottom step and continue upwards towards each landing. Cut riser part of the tread to fit to the riser of the step below. Trim even with the edge of the riser.

B. Cut and dry fit treads and risers before installation.

C. Apply contact adhesive to the substrate and back of the step-tread. Permit contact adhesive to dry to touch.

1. Apply adhesives to steps and risers.

D. Install tread-riser combination units as recommended by manufacturer using manufacturers removable slip sheet or wax paper to locate step tread before adhering in place.

1. Fit nosing material tight to the nosing of the stair.

E. Use roller or stair tool to press stair materials into place. Remove excess adhesive.

F. After installation check adhesive bond to treads and risers.

3.6 INSTALLATION OF ACCESSORIES

A. Resilient base: Install base on solid backing, bond to vertical substrate with continuous contact at horizontal and vertical surfaces. Apply wall base to walls, columns, casework and other permanent fixtures in areas where base is required.

1. Install in lengths as long as practical.
2. Scribe to fit to door frames and other interruptions.
3. Form all external and internal corners in accordance with manufacturer's written instructions. Cope inside corners and fit neatly.
4. Fill voids with plastic filler along the top edge of the resilient wall base on masonry surfaces or other similar irregular substrates.

B. Resilient edge and transition strips:

1. Install edge strips at all edges of flooring which would otherwise be exposed.
2. Place resilient edge strips tightly butted to flooring and secure with adhesive recommended by the edge strip manufacturer.

3.7 PROTECTION

A. Prohibit all traffic on finished floor areas for a minimum period of 12 hours.

B. Protect finished floor areas from sun and moisture and construction traffic for a minimum period of 2 calendar days after installation.

C. Prohibit washing, scrubbing or other similar ‘wet’ operations to occur on finished floor areas for a minimum period of 5 calendar days after installation.

D. Provide protection of completed flooring areas from construction traffic until Substantial Completion of the General Contract. Cover all resilient floor surfaces

with heavyweight kraft paper and overlay with red-rosin paper, taping the edges to maintain position of the protection paper. Reapply papers to maintain floor protection.

3.8 CLEANING

A. General: Comply with requirements of Section 01 74 19 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL for handling and disposition of all construction and demolition waste.

B. As installation progresses, continually remove excess adhesive from floor, base and wall surfaces without damage.

1. Protect installed flooring as recommended by the flooring manufacturer against damage from rolling loads, other trades, or the placement of fixtures and furnishings.

C. Sweep floors to remove all loose dirt and debris.

D. Not sooner than five days after installation, clean all materials installed hereunder with a non-abrasive commercial detergent approved by the material manufacturers, and thoroughly rinse with clear water.

E. After cleaning and polishing, ensure that the flooring is be protected with heavy kraft paper.

End of Section

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Section 09 65 36

STATIC-CONTROL RESILIENT FLOORING

PART 1 – GENERAL

1.1 SUMMARY

A. Prepare substrates to receive flooring and ensure specified tolerance level for surface of finished floor. Preparation work includes patching, smoothing and leveling substrate as specified under Section 09 05 60 - COMMON WORK RESULTS FOR FLOORING.

B. Furnish and install the following:

1. Static dissipative tile (SDT) resilient flooring.
2. Vinyl transition strips wherever edges of resilient tile flooring materials abut dissimilar flooring, where no thresholds occur.

1.2 RELATED REQUIREMENTS

A. Section 01 50 00 - CONSTRUCTION FACILITIES AND TEMPORARY CONTROLS: Application of protection paper to finished resilient flooring.

B. Section 01 60 00 - PRODUCT REQUIREMENTS: Listing of VOC requirements for adhesives, cleaning/maintenance materials, paints, coatings, and sealants.

C. Section 01 74 19 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL: Procedural and administrative requirements relating to recycling goals, waste management program and reporting.

D. Section 01 81 13 - SUSTAINABLE DESIGN REQUIREMENTS: Procedural and administrative requirements relating to required *Northeast CHPS Verified Program,* (NE-CHPS) Certification.

E. Section 02 41 19 - SELECTIVE DEMOLITION: Removal of existing finishes.

F. Section 03 30 00 - CAST-IN-PLACE CONCRETE: Concrete substrate for flooring systems.

G. Section 06 10 00 - ROUGH CARPENTRY: Plywood underlayment, wood blocking and nailers.

H. Section 06 20 00 - FINISH CARPENTRY: wood thresholds and saddles.

I. Section 09 05 60 - COMMON WORK RESULTS FOR FLOORING: General requirements for flooring preparation, substrate testing requirements, installation and temporary protection.

J. Section 09 65 13 - RESILIENT BASE AND ACCESSORIES: Resilient base.

K. Section 09 65 23 - RUBBER FLOORING: Rubber tile and sheet flooring, rubber stair treads and risers.

L. Section 09 68 00 - CARPETING: Carpet and transition strips.

M. Section 09 68 13 – TILE CARPETING: Carpet tile and transition strips.

N. Division 26 - ELECTRICAL: In-floor electrical receptacles.

1.3 REFERENCES

A. Referenced Standards: Comply with applicable requirements of the following standards and those others referenced in this Section, under the provisions of Section 01 42 00 - REFERENCES. The standards referenced herein are included to establish recognized minimum quality only. Where these standards conflict with other specified requirements, the most restrictive requirements shall govern. Equivalent quality and testing standards will be acceptable, subject to their timely submission, review and acceptance by the Architect.

1. ASTM D 2240 – Standard Test Methods for Rubber Property – Durometer Hardness
2. ASTM D 3389 – Standard Test Methods for Coated Fabrics Abrasion Resistance.
3. ASTM E 84 - Surface Burning Characteristics of Building Materials.
4. ASTM E 648 – Standard Test Method for Critical Radiant Flux of Floor-Covering Systems Using a Radiant Heat Energy Source.
5. ASTM E 662 – Smoke Generation Characteristics of Solid Materials
6. ASTM F 50 – Standard Test Method for Electrical Resistance of Conductive and Static Dissipative Resilient Flooring
7. ASTM F-710 - Preparing Concrete Floors to Receive Resilient Flooring.
8. ASTM F 970 – Standard Test Method for Static Load Limit.
9. ASTM F 1700 – Standard Specification for Solid Vinyl Floor
10. ASTM F-1869 – Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride.
11. NFPA 99 – Standard for Health Care Facilities
12. UL 779 – Standard for Safety for Electrically Conductive Floorings
13. All applicable federal, state and municipal codes, laws and regulations regarding flammability and smoke generation of interior finishes.

B. Sustainability Requirement Reference: The following sustainability requirements are hereby made a part of this Section by reference thereto:

1. High Performance Schools Exchange, Northeast Energy Efficiency Partnerships NE-CHPS, (referred to herein as “NE-CHPS”).

1.4 REGULATORY REQUIREMENTS

A. Provide materials and assemblies conforming to applicable building codes and regulatory agencies for flame/fuel/smoke rating requirements of flooring in accordance with ASTM E 84.

B. Provide flooring material to meet the following fire test performance criteria as tested by a recognized independent testing laboratory:

1. ASTM E 648 (Critical Radiant Flux) of 0.45 watts per sq. cm. or greater, Class 1.
2. ASTM E 662 (Smoke Generation) Maximum Specified Optical Density of 450 or less.

1.5 SUBMITTALS

A. Information and Review Submittals: Submit the following under provisions of Section 01 33 00 - SUBMITTAL PROCEDURES:

1. Literature: Manufacturer's product data sheets, specifications, performance data, physical properties and installation instructions for each item furnished hereunder.
   a. Furnish manufacturer’s product literature on conductive flooring adhesive, highlight adhesive properties, including maximum moisture pressure limits for substrates.
2. Submit the manufacturer’s certification that the resilient flooring has been tested by an independent laboratory and complies with the required fire and electrical conductivity tests.
3. Shop drawings: 1/4 inch scale plans of each flooring area scheduled for Work of this Section. Drawings shall bear dimensions of actual measurements taken at the project.
   a. Identify each flooring type, colors and patterns, indicate layout of tile units and direction of tile patterns.
   b. Where more than one adhesive type is specified or otherwise required by flooring manufacturer, identify on shop drawings areas for each adhesive type.
4. Selection samples: Manufacturers' sample chain of colors and patterns available for selection by Architect.
5. Verification samples:
   a. Full sized flooring tile, illustrating color, and pattern for each color and type of tile selected.
   b. Edging: 12 inches long demonstrating profile, thickness, size and color.
6. Sustainable Design Submittals: As required by NE CHPS.

1.6 QUALITY ASSURANCE

A. Provide Types of Resilient tile and accessories supplied by one manufacturer, including leveling and patching compounds, and adhesives.

B. Avoid color and pattern differential; provide flooring from one production run in any single room or contiguous areas.

1.7 DELIVERY, STORAGE AND HANDLING

A. Deliver resilient flooring materials in original, unopened packages and store protected for three days prior to installation in area of installation to achieve temperature stability.

B. Store materials in a clean dry, enclosed space off the ground and protected from the weather. Protect adhesives from freezing.

1.8 ENVIRONMENTAL CONDITIONS

A. Maintain uniform temperature of minimum of 65 degrees Fahrenheit and humidity of 20 to 40 percent 48 hours prior to, during, and 48 hours after installation. Store resilient flooring materials and accessories in the spaces where they will be installed for at least 48 hours before beginning installation. Thereafter, maintain a minimum temperature of 55 degrees Fahrenheit in the areas where the work is completed.

1.9 SEQUENCING AND SCHEDULING

A. Coordinate the work of this Section with the respective trades responsible for installing interfacing work.

B. Sequence work to ensure resilient flooring is not installed until building is enclosed, sufficient heat is provided, dust generating activities have terminated, wet work is dry and cured, and work overhead is completed.

C. Ensure that installation of flooring and accessories occurs after other finishing operations, including painting.

1.10 WARRANTY

A. Under the provisions of Section 01 78 00 - CLOSEOUT SUBMITTALS, provide manufacturer’s standard wear warranties for all flooring materials installed under this Section.

PART 2 - PRODUCTS

2.1 STATIC DISSIPATIVE TILE FLOORING

A. Manufacturer: To establish a standard of quality, design and function desired, Drawings and specifications have been based on Forbo Industries, Inc., Hazleton, PA, Product: “Colorex EL 5000”. Manufacturers offering similar products which may be considered as equal, include the following:

1. Forbo Industries, Inc., Hazleton, PA.
2. Marley Flexco, Tuscumbia, AL.
3. VPI, Sheboygen, WI.

B. Flooring shall comply with the following minimum standards for physical characteristics and electrical properties when installed according to manufacturer's instructions with the required adhesive:

1. Size: 24 inch square by 0.080 inch thick.
2. Flexibility: Meet Federal Specification SS-T-312B, Type III, vinyl tile.
3. Electrical Resistance: 2.5 x 10^4 to 10^6 ohms.
4. Electrical resistance: Meets NFPA Bulletin 99.
5. Static Load Limit: 700 pounds per square inch.

6. Static Decay: Less than 0.01 second tested per FTMS 4046 (101C) 5,000 to 50 volts.
7. Static Propensity: Less than 100 volts per AATCC-134.
8. Slip resistance meeting ADA requirements.
9. Smoke Density: 450 or less per ASTM E-662/NFPA 258.
10. Flammability: Class 1 per ASTM E-648/NFPA 253.

C. Flooring colors: As selected by Architect from manufacturer's full range of standard and custom colors.

2.2 ACCESSORIES

A. Filler for patching, smoothing and leveling subfloors and underlayments: Portland cement-based latex underlayment acceptable to flooring manufacturer, equal to the following:
1. Ardex, Inc., products "Feather Flash" and "Ardex SD-P".
2. Quikrete Companies, product "Fast-Set Underlayment 1248".
3. Silpro Masonry Systems Inc., product "Ultra Skim and Speedtop"

B. Adhesives: Conductive epoxy adhesive provided by flooring manufacturer for specific use.

C. Transition and edge strips:
1. General: Homogeneous vinyl, of profiles required for thickness of abutting materials.
2. Edge strips: Tapered or bull nose edge.
3. Colors: Match or contrast with the flooring, as selected by the Architect from standard colors available, of width shown on the drawings.

D. Cleaning material: Domestic neutral floor detergent having a pH 7 or pH 8, as recommended by the flooring manufacturer.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Inspect all surfaces and verify that they are in proper condition to receive the work of this Section.

B. Verify concrete substrate has been cured and is sufficiently dry to achieve a bond with the adhesive, in accordance with the manufacturer's recommended bond and moisture test.

C. Beginning of installation means acceptance of existing substrate and site conditions.

3.2 PREPARATION

A. General: Comply with flooring manufacturer's requirements for preparation of substrate to receive resilient flooring.

1. Close spaces to traffic during the installation of the flooring, and maintain restriction to foot traffic for a minimum of 48 hours after flooring installation.

B. Remove, by light sanding and grinding, all protruding edges, high spots. Ensure that substrate is free from paint, varnish, wax, oil, or other foreign matter.

C. Fill minor or local low spots, cracks, joints, holes, and other defects with subfloor filler. Apply, trowel and float finish subfloor filler and leave a smooth, level, hard surface. Prohibit traffic from area until filler is cured.

D. Vacuum clean substrate, and ensure that substrate is dry, clean and smooth prior to application of flooring.

3.3 INSTALLATION - GENERAL

A. Install all products in strict accordance with each manufacturer's written installation procedures and other provisions specified herein.

1. Apply primers as recommended by adhesive manufacturer's written instructions.

B. Spread only enough adhesive to permit installation of materials before initial set.

1. Apply adhesive at coverage rate of 135 square foot per gallon.

C. Mix tile to ensure that concentration of surface patterns is uniform throughout. Use tile from cartons in same sequence as manufactured and packaged, if so numbered.

3.4 INSTALLATION - FLOOR TILE

A. Lay flooring in patterns indicated on the final Drawings issued by the Architect with pattern-grain running in singular direction. Lay tile with joints straight and continuous in both directions.

B. Neatly fit resilient materials to all intersecting surfaces, and make joints as inconspicuous as possible.

C. Terminate flooring at centerline of door in closed position where adjacent floor finish is of different material or color.

D. Apply resilient materials to have uniform contact with receiving surfaces throughout, with tight joints, and with all finish surfaces smooth, in true plane, free from buckles, waves, and other imperfections.

1. Set flooring, roll and cross roll with 150 pound sectional roller while adhesive is still wet.

E. Extend resilient flooring to wall lines beneath all movable equipment and movable casework. Fit resilient flooring onto breaks and recesses, against non-resilient

bases, around pipes and other protrusions, under saddles, and to and around other fixed surfaces, making neat cuts in the flooring and minimizing joints.

3.5 GROUNDING

A. Connect flooring copper grounding strip provided by manufacturer to the room ground bus bar provided and installed by Division 26 - ELECTRICAL. Fold excess ground strip behind ground bus bar. Coordinate flooring copper grounding strip location with Division 26 - ELECTRICAL ground bus bar location. Flooring Trade Contractor shall ensure adequate copper strip length to connect to ground bus bar.

B. Lay the balance of the grounding strip into the adhesive covering it with additional adhesive. Install the flooring over the grounding strip.

3.6 INSTALLATION OF ACCESSORIES

A. Resilient edge and transition strips:

1. Install reducer edge strips at all edges of flooring which would otherwise be exposed.
2. Place resilient edge strips tightly butted to flooring and secure with adhesive recommended by the edge strip manufacturer.

3.7 PROTECTION

A. Prohibit traffic on finished floor areas until flooring adhesive has fully set.

B. Prohibit washing, scrubbing or other similar ‘wet’ operations to occur on finished floor areas for a minimum period of 5 calendar days after installation.

C. Provide protection of completed flooring areas from construction traffic until Substantial Completion of the General Contract. Cover all resilient tile floor surfaces with non-staining heavyweight kraft paper and overlay with red-rosin paper, taping the edges to maintain position of the protection paper. Reapply papers to maintain floor protection.

3.8 POST-INSTALLATION CLEANING

A. As installation progresses, continually remove excess adhesive from floor, and wall surfaces without damage.

1. Protect installed flooring as recommended by the flooring manufacturer against damage from rolling loads, other trades, or the placement of fixtures and furnishings.

B. Sweep floors to remove all loose dirt and debris.

C. After required waiting period of 5 full days following completion of flooring installation, clean all materials installed hereunder with a non-abrasive commercial detergent approved by the material manufacturers, and thoroughly rinse with clear water.

3.9 FINAL CLEANING

A. General: Perform final cleaning not before 4 days prior to Owner's intended occupancy date, in strict compliance with manufacturer’s written directions.

3.10 PROTECTION

A. After cleaning and polishing, ensure that the flooring is be protected with heavy kraft paper.

End of Section

Section 09 67 23

RESINOUS FLOORING

PART 1 – GENERAL

1.1 SUMMARY

A. General: The work of this Section consists of resinous flooring where shown on the Drawings, as specified herein, and as required for a complete and proper installation. Work includes, substrate testing and preparation, furnishing and installation of resinous flooring, and temporary protection until Owner's acceptance.

B. Prepare substrates to receive flooring and ensure specified tolerance level for surface of finished floor. Preparation work includes patching, smoothing and leveling substrate as specified under Section 09 05 60 - COMMON WORK RESULTS FOR FLOORING.

C. Apply multilayered resinous waterproof flooring system with an integral waterproof base turned up at walls, bases, pipe sleeves and pads.

1. Provide subsequent flooring system touch-up and repairs as required to provide a complete seamless molded waterproof system.

1.2 RELATED REQUIREMENTS

A. Section 01 50 00 - CONSTRUCTION FACILITIES AND TEMPORARY CONTROLS: Application of protection paper to finished resilient flooring.

B. Section 01 60 00 - PRODUCT REQUIREMENTS: Listing of VOC requirements for adhesives, cleaning/maintenance materials, paints, coatings, and sealants.

C. Section 01 74 19 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL: Procedural and administrative requirements relating to recycling goals, waste management program and reporting.

D. Section 01 81 13 - SUSTAINABLE DESIGN REQUIREMENTS: Procedural and administrative requirements relating to required *Northeast CHPS Verified Program,* (NE-CHPS) Certification.

E. Section 03 30 00 – CAST-IN-PLACE CONCRETE.

F. Section 09 05 60 - COMMON WORK RESULTS FOR FLOORING: General requirements for flooring preparation, substrate testing requirements, installation and temporary protection, for flooring work provided under this Section 09 67 23.

1.3 REFERENCES

A. Referenced Standards: Comply with applicable requirements of the following standards and those others referenced in this Section, under the provisions of Section 01 42 00 - REFERENCES. The standards referenced herein are included to establish recognized minimum quality only. Where these standards conflict with other specified requirements, the most restrictive requirements shall govern.

Equivalent quality and testing standards will be acceptable, subject to their timely submission, review and acceptance by the Architect.

1. ASTM C 307 - Tensile Strength of Chemical-Resistant Mortar, Grouts, and Monolithic Surfacings.
2. ASTM C 903 - Preparing Refractory Castable Specimens by Cold Gunning.
3. ASTM D 412 - Vulcanized Rubber and Thermoplastic Elastomers—Tension.
4. ASTM D 570 - Water Absorption of Plastics.
5. ASTM D 2240 - Rubber Property - Durometer Hardness.
6. ASTM D 5420 - Impact Resistance of Flat, Rigid Plastic Specimen by Means of a Striker Impacted by a Falling Weight (Gardner Impact).
7. ASTM E 84 - Surface Burning Characteristics of Building Materials.
8. All applicable federal, state and municipal codes, laws and regulations for flammability and smoke generation of interior finishes.

B. Sustainability Requirement Reference: The following sustainability requirements are hereby made a part of this Section by reference thereto:

1. High Performance Schools Exchange, Northeast Energy Efficiency Partnerships NE-CHPS, (referred to herein as “NE-CHPS”).

1.4 ADMINISTRATIVE REQUIREMENTS

A. Pre-installation Meetings: Installer of the Work of this Section is required to attend pre-installation conference specified under Section 09 05 60 - COMMON WORK RESULTS FOR FLOORING.

B. Sequencing:

1. Sequence work to ensure resilient flooring is not installed until building is enclosed, sufficient heat is provided, dust generating activities have terminated, wet work is dry and cured, and work overhead is completed.
2. Ensure that installation of flooring and accessories occurs after other finishing operations, excluding painting.

1.5 SUBMITTALS

A. Information and Review Submittals: Submit the following under provisions of Section 01 33 00 - SUBMITTAL PROCEDURES:

1. Literature: Manufacturer's product data sheets, specifications, performance data, physical properties, material compositions, and application instructions for all products to be applied hereunder
   a. Include certification of data indicating Volatile Organic Compound (VOC) content of all floor system components.
2. Manufacturer’s instructions: Manufacturer’s installation instructions indicating special procedures, integral base, and perimeter conditions.
   a. The manufacturer's recommended methods of installation, when approved by the Architect, will become the basis for inspecting and accepting or rejecting actual installation methods used on the Work.

3. Certification: Material certificates signed by manufacturer certifying that the waterproof mechanical equipment room flooring complies with requirements specified herein.
4. Selection samples:
   a. Sample card indicating Manufacturer's full range of colors available for selection by Architect.
5. Verification samples:
   a. Samples of each level of slip resistance, aggregate, and pattern available in the specified products from the proposed manufacturer.
   b. 12 x 12 inch samples of finished surface illustrating material color, texture and finish.
6. Sustainable Design Submittals: As required by NE CHPS.
7. Qualification Submittals: Applicator’s qualifications.

B. Closeout Submittals: Submit the following under provisions of Section 01 78 00 - CLOSEOUT SUBMITTALS.
   1. Manufacturer’s warranties: Include coverage of materials and installation and resultant damage from failure of installation to resist penetration of moisture.
   2. Manufacturer’s warranties: Include coverage of materials and installation and resultant damage from failure of installation to resist penetration of moisture.

1.6 QUALITY ASSURANCE

A. Single-Source Responsibility: Obtain resinous flooring materials, including primers, resins, and finish coats, from a single manufacturer.

B. Qualifications:
   1. Applicator: Company specializing in performance of the work of this Section with 5 years minimum documented experience having installers trained by manufacturer in installing resinous flooring types similar to that required for this Project, and who is acceptable to manufacturer of primary materials.

C. Immediately notify the Architect in writing of conditions which may require a change in the specifications of this Section before proceeding with the work. Failure to do so, in a timely fashion, so as not to interfere with the schedule of work of this Contract, shall be construed as acceptance of the coatings specified. Perform all corrective measures, at no cost to the Owner, for any defects in the work, resulting from the use of such materials.

D. Do not order materials until all required schedules have been properly submitted, reviewed by the Contractor and Approved by Architect.

1.7 MOCK-UPS

A. Provide mock-up under provisions of Section 01 43 39 – MOCK-UPS.

B. Provide installed mock-up of flooring, minimum 25 square feet, illustrating color, texture and finish for each flooring type specified herein, and demonstrating the minimum standard for the Work.

C. Locate mock-ups where directed and include all surfaces and materials scheduled to receive a field applied finish.

D. Maintain mock-up during construction for workmanship comparison; remove and legally dispose of mock-up when no longer required.

E. Accepted mock-ups may remain as part of the work; the number of mock-ups shall not be restricted.

1.8 DELIVERY, STORAGE AND HANDLING

A. Deliver products to site in sealed and labeled containers; container labeling shall include manufacturer's name, type of paint, color mix designation, expected coverage, surface preparation instructions, instructions for mixing and reducing, drying time, and clean-up recommendations.

B. Store materials, conforming with applicable codes and fire regulations, in designated spaces. Keep storage area secure when direct access is not required or when not performing work under this Section. Take precautionary measures to prevent fire hazards and spontaneous combustion, maintain a dry-chemical type fire extinguisher in all areas where materials of this Section are being stored or used.

C. Store materials in a well-ventilated area at minimum ambient temperature of 45 degrees Fahrenheit and a maximum of 90 degrees Fahrenheit.

D. Do not use the sanitary system for mixing or disposal of refuse material. Carry water to mixing rooms and dump waste material in a suitable refuse receptacle. Remove oily rags and waste each day.

1.9 PROJECT CONDITIONS

A. Provide continuous ventilation and heating facilities to maintain surface and ambient temperatures above 50 degrees Fahrenheit for 24 hours before, during and 48 hours after application of finishes, unless required otherwise by manufacturer's instructions.

B. Apply flooring materials within temperature and humidity range specified by coating manufacturer.

C. Provide sufficient lighting to maintain 80 foot-candles measured mid-height at substrate surface.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Acceptable Manufacturers: Subject to compliance with the requirements specified herein, manufacturers offering products which may be incorporated in the work include the following, or approved equal:

1. Crossfield Products Corp. (Dex-o-Tex), Roselle Park, NJ.
2. Atlas Minerals and Chemicals, Mertztown, PA.

3. Dur-a-flex Inc., East Hartford Ct.
4. General Polymers Corporation, Cincinnati OH. .
5. Master Builders Inc., Cleveland OH.
6. Stonhard Inc., Maple Shade, NJ.

2.2 RESINOUS FLOORING SYSTEM TYPE 1

A. Specified manufacturer: To establish a standard of quality, design and function desired, Drawings and specifications have been based on Crossfield Products Corp. (Dex-o-Tex), product: “Tek-Crete SL-CF” urethane cement composition flooring system with decorative vinyl flake broadcast.
   1. Acceptable flooring systems, or approved equal:
      a. Crossfield Products Corp. (Dex-o-Tex), product: “Tek-Crete SL-CF”.
      b. Dur-a-Flex Inc., product: “Poly-Crete MDC”.
      c. Key Resin Co., product: “Key Urecon Chip/Flake 100.”

B. Waterproofing and crack-isolation membrane:
   1. Basis of Design: Crossfield Products Corp., product: Cheminert SC Membrane.
   2. Physical Properties:
      a. Compressive Strength (ASTM C579): 4,000 psi.
      b. Tensile Strength (ASTM C307): 1,500 psi.
      c. Tensile Elongation: 96 percent.
      d. Tear Strength: 120 pounds per inch.

C. Troweled Urethane Cement Composition Flooring with Decorative Vinyl Flake Broadcast:
   1. Basis of Design: Crossfield Products Corp. (Dex-o-Tex), product: Tek-Crete SL-CF.
   2. Physical Properties:
      a. Compressive Strength (ASTM C579): 6,100 psi (42.0 MPa).
      b. Thermal Distortion (250 degrees F Emersion): Passes.
      c. Tensile Strength (ASTM C307): 1,000 psi (6.89 MPa).
      d. Flexural Strength (ASTM C580): 2,000 psi (13.8 MPa).
      e. Thermal Co-Efficient of Thermal Expansion (ASTM C531): 1.4 x 10E5.
      f. Density (ASTM C905): 130 pcf (20.4 kN/cu.m).
      g. Water Absorption (MIL-PRF-3134): 0.64 percent.
      h. Surface Hardness (ASTM D2240) 85-90 Durometer "D".
      i. Abrasion Resistance (ASTM D1044): 33mg.
      j. Adhesion (ASTM D4541): 400 psi (2.76 MPa), 100 percent failure in concrete.
      k. Flammability-Critical Radiant Flux (ASTM E648): 1.07 watts/sq.cm.

l. Resistance to Fungal Growth (ASTM G21): Passes, Rating 1.

3. Colors: As selected by Architect. Up to two colors may be required in any one room or contiguous space.
4. Body Coat: 3/16 to 1/4 inch (5 to 6 mm) thick with colored Vinyl Flake broadcast.
5. Grout and Top Coat: Crossfield Products Corp. (Dex-o-Tex), product: “Quik-Glaze Clear Gloss”. UV and abrasion resistant High build Polyaspartic finish.

2.3 RESINIOUS FLOORING SYSTEM TYPE 2 (KITCHEN)

A. Specified manufacturer: To establish a standard of quality, design and function desired, Drawings and specifications have been based on Crossfield Products Corp. (Dex-o-Tex), product: “Tek-crete SL-B” self-leveling broadcast colored quartz, epoxy/aliphatic urethane topcoat seamless flooring system.
   1. Acceptable flooring systems, or approved equal:
      a. Crossfield Products Corp. (Dex-o-Tex), product: “Tek-crete SL-B”.
      b. Dur-a-Flex Inc., product: “Poly-Crete MDB”.
      c. Key Resin Co., product: “Key Urecon SL.”

B. Waterproofing and crack-isolation membrane:
   1. Basis of Design: Crossfield Products Corp., product: Cheminert SC Membrane.
   2. Physical Properties:
      a. Compressive Strength (ASTM C579): 4,000 psi.
      b. Tensile Strength (ASTM C307): 1,500 psi.
      c. Tensile Elongation: 96 percent.
      d. Tear Strength: 120 pounds per inch.

C. Troweled Urethane Cement Composition Flooring with Slip Resistant Broadcast:
   1. Basis of Design: Crossfield Products Corp., product: Dex-O-Tex Tek-Crete SL-B with Sealer CP.
   2. Physical Properties:
      a. Compressive Strength (ASTM C579): 6,100 psi (42.0 MPa).
      b. Thermal Distortion (350 degrees F Emersion): Passes.
      c. Tensile Strength (ASTM C307): 1,000 psi (6.89 MPa).
      d. Flexural Strength (ASTM C580): 2,000 psi (13.8 MPa).
      e. Thermal Co-Efficient of Thermal Expansion (ASTM C531): 1.5 x 10E5.
      f. Density (ASTM C905): 130 pcf (20.4 kN/cu.m).
      g. Water Absorption (MIL-PRF-3134): 0.64 percent.
      h. Surface Hardness (ASTM D2240) 85-90 Durometer "D".
      i. Abrasion Resistance (ASTM D1044): 33mg.
      j. Adhesion (ASTM D4541): 400 psi (2.76 MPa), 100 percent failure in concrete.

k. Flammability-Critical Radiant Flux (ASTM E648): 1.07 watts/sq.cm.

l. Resistance to Fungal Growth (ASTM G21): Passes, Rating 1.

3. Body Coat: 3/16 to 1/4 inch (5 to 6 mm) thick with slip resistant aggregate.
4. Colors: As selected by Architect. Up to two colors may be required in any one room or contiguous space.
5. Top Coat: Tek-Crete Sealer CP.
6. Anti-Microbial Additive: Prevents most bacteria, fungi, algae and actinomycetes.

D. UV Stable Polyurethane Composition Sealer:

1. Basis of Design: Dex-O-Tex Tek-Crete Sealer CP by Crossfield Products.
2. UV stable.
3. Withstands heavy and abusive service.
4. Excellent chemical resistance.

2.4 PRODUCT MIXING

A. Mix on site with manufacturer supplied mix and measure apparatus to ensure a timely, accurate mix ratio and minimize waste.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verification of Conditions: Inspect all surfaces and verify that they are in proper condition to receive the work of this Section. Notify Contractor of any condition that may potentially affect proper application of coatings.

B. Preinstallation Testing, Evaluation and Assessment: Moisture testing of concrete substrate, refer to Specification Section 09 05 60 – COMMON WORK RESULTS FOR FLOORING. Do not apply finishes unless moisture content of surfaces are below the following maximums:

1. Masonry or concrete: 12 percent.

C. Beginning Work of this Section means acceptance of existing substrate surfaces and site conditions.

3.2 PREPARATION - GENERAL

A. General: Comply with requirements specified under Section 09 05 60 – COMMON WORK RESULTS FOR FLOORING, the flooring manufacturer's requirements for preparation of substrate to receive flooring, and as additionally specified herein.

B. Surface Preparation:

1. Upon acceptance of completed existing surfaces, thoroughly remove all dust and debris by sweeping or be vacuum cleaning.

2. Remove laitance, curing sealers, existing adhesives and other foreign matter from concrete surfaces with necessary techniques such as shot blasting, muriatic acid etching, surface freezing and power scarification.
3. If a curing compound exists on concrete slab, thoroughly etch concrete surfaces using well mixed solution consisting of two parts by volume water diluted with one part by volume 30 percent commercial grade hydrochloric acid at a rate of one quart per ten square feet. Apply evenly to thoroughly saturated areas and scrub into surfaces using stiff-bristled broom. Allow solution to activate undisturbed for not less than five minutes or for duration of boiling effect.
4. Thoroughly remove etching solution by washing down surfaces with clean water; flooded at least three separate times at a rate of two gallons per ten square feet; thoroughly remove all contaminates that may be engrained or latent in surfaces.
5. Perform a test application of a square foot in three locations, such as beneath casework. Allow to set for 72 hours, and test adhesion as recommended by the manufacturer.

3.3 INSTALLATION - GENERAL

A. Mix and prepare coatings in accordance with manufacturer’s written instructions. Thoroughly mix to ensure uniformity of color and mass, unless otherwise directed by the manufacturer of the specific coating used. Except for epoxy mixtures, strain previously opened materials to remove skins, coating lumps, and other foreign matter prior to painting. Dispose of epoxy materials which have begun to set.

B. Apply all materials in strict accordance with the approved manufacturer's printed instruction, and in accordance with the best trade practices. Each coat shall be reviewed and approved by the Architect before succeeding coats are applied.

C. Do not apply successive coating until the preceding coat is thoroughly dry, except as otherwise specified, and in no case in less than minimum period of time recommended by manufacturer.

3.4 FLOOR SURFACING

A. Work shall be done only under optimum conditions as recommended by manufacturer. Surfaces over which matrix is to be applied shall be completely dry and thoroughly clean. Substrate and ambient temperature shall be 50 degrees F or above; if below 60 degrees F, temperature must be stable or rising.

B. Allow surfacing to set undisturbed for a minimum period of 48 hours. Maintain temperature at 50 degrees F minimum until floor surfacing has completely cured.

C. Finished surfaces shall be uniform in texture and pattern, and level within a degree of tolerance of 1/4 inch in 10'-0" in any direction.

3.5 INSTALLATION

A. System shall be installed in accordance with the manufacturer's specifications and shall include the following minimum applications:

1. Bonding coat of neoprene rubber and cement composition in aqueous dispersion applied by brush or trowel.
2. Rot-resistant woven cloth fabric waterproof membrane applied into thickened liquid latex applied over floors and up verticals, bases, curbs, pipe sleeves, mechanical pads.
3. Troweled smoothing coat of styrene butadiene liquid emulsion combined with alumnus cement and aggregate and applied to smooth off all laps and butt joints in membrane.
4. Two finish roller applications of elastomeric latex coating in color as selected by the Architect.
5. Cove base shall have a minimum of 2 inch cove. Cove shall splay back to meet door frames, forming a neat, sanitary base.
6. Finished floor shall be 1/4 inch thick, smooth, uniform in color and free of trowel marks.

B. Bonding coat, waterproof membrane and smooth coat shall be applied prior to the installation of mechanical equipment and shall cover all floor surfaces, bases, mechanical pads and pipe sleeves. Colored finish coats shall be applied to all surfaces after all equipment has been installed.

C. Apply composition flooring up vertical abutting surfaces to form a coved base terminating 4 inches above floor in a feathered edge.

D. Feather edge where composition flooring abuts dissimilar material.

E. Allow surfacing to set undisturbed for a minimum period of 48 hours. Maintain temperature at 50 degrees F minimum until floor surfacing has completely cured.

F. Finished surfaces shall be flush, true to plane, and shall be level within permissible degree of tolerance 1/4 inch in 10'-0" in any direction.

3.6 CLEANING

A. Upon completion of the work in each area, remove all coating splatters from glass, prefinished surfaces, bright metals, and from other surfaces that have not been painted or finished hereunder. Do not use abrasive paper or abrasive cleaner on any prefinished surface or bright metal. Remove all materials and debris; leave work area in a clean condition.

3.7 PROTECTION AND TOUCH-UP

A. General: Protect finished work under provisions of Section 09 05 60 – COMMON WORK RESULTS FOR FLOORING.

B. Clean up the work area at end of each work day. Remove all cartons, debris, emptied containers, as the work progresses, and finally at completion of work of this Section Legally dispose of same off the Site.

C. During application of coatings, protect the work of other trades against undue soilage and damage by the exercise of reasonable care and precautions. Properly clean, repair or replace any work so damaged and soiled.

D. Protect all finished surfaces against damage until the date of final acceptance of the work. The Architect will conduct a final review of all work performed. Re-coat or touch-up, all scratches and other blemishes on surfaces, and any areas found which do not comply with the requirements of this Section, and bear all costs therefor.

E. Any re-coating or touch-up work, required after the work of this Section has been reviewed and accepted by the Architect, will be paid for by the Contractor.

End of Section

Section 09 68 00
CARPETING

PART 1 - GENERAL

1.1 SUMMARY

A. General: The work of this Section consists of carpeting where shown on the Drawings, as specified herein, and as required for a complete and proper installation. Work includes, substrate testing and preparation, furnishing and installation of flooring, and temporary protection until Owner's acceptance.

B. Prepare substrates to receive flooring and ensure specified tolerance level for surface of finished floor. Preparation work includes patching, smoothing and leveling substrate as specified under Section 09 05 60 - COMMON WORK RESULTS FOR FLOORING.

C. Furnish and install

1. Carpeting directly adhered over floors, as indicated on Drawings, including all accessories necessary to complete the work.
2. Resilient nosing's at carpeted stairs.

1.2 RELATED REQUIREMENTS

A. Section 01 74 19 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL: Procedural and administrative requirements relating to recycling goals, waste management program and reporting.

B. Section 01 81 13 - SUSTAINABLE DESIGN REQUIREMENTS: Procedural and administrative requirements relating to required *Northeast CHPS Verified Program,* (NE-CHPS) Certification.

C. Section 03 30 00 - CAST-IN-PLACE CONCRETE: concrete substrate.

D. Section 06 10 00 - ROUGH CARPENTRY: Wood subfloor and underlayment.

E. Section 06 20 00 - FINISH CARPENTRY: Wood thresholds and bases, installing metal thresholds.

F. Section 08 71 00 - DOOR HARDWARE: Furnishing metal thresholds.

G. Section 09 05 60 - COMMON WORK RESULTS FOR FLOORING: General requirements for flooring preparation, substrate testing requirements, installation and temporary protection.

H. Section 09 65 13 - RESILIENT BASE AND ACCESSORIES: Straight resilient bases, where indicated in conjunction with carpeting.

I. Section 09 68 13 – TILE CARPETING: carpet tile, and related transition strips.

1.3 REFERENCES

A. Referenced Standards: Comply with applicable requirements of the following standards and those others referenced in this Section, under the provisions of Section 01 42 00 - REFERENCES. The standards referenced herein are included to

establish recognized minimum quality only. Where these standards conflict with other specified requirements, the most restrictive requirements shall govern. Equivalent quality and testing standards will be acceptable, subject to their timely submission, review and acceptance by the Architect.

1. ASTM D418 (Withdrawn Standard) – Standard Methods of Testing Pile Yarn Floor Covering Construction.
2. ASTM D2859 - Standard Test Method for Ignition Characteristics of Finished Textile Floor Covering Materials.
3. ASTM D3574 - Standard Test Methods for Flexible Cellular Materials—Slab, Bonded, and Molded Urethane Foams.
4. ASTM D5116 – Standard Guide for Small-Scale Environmental Chamber Determinations of Organic Emissions from Indoor Materials/Products.
5. ASTM D5252 - Standard Practice for the Operation of the Hexapod Drum Tester.
6. ASTM E84 – Standard Test Method for Surface Burning Characteristics of Building Materials.
7. ASTM E648 – Standard Test Method for Critical Radiant Flux of Floor-Covering Systems Using a Radiant Heat Energy Source.
8. ASTM E662 - Standard Test Method for Specific Optical Density of Smoke Generated by Solid Materials.
9. ASTM F1482 – Standard Practice for Installation and Preparation of Panel Type Underlayments to Receive Resilient Flooring.
10. CRI Indoor Air Quality Testing and Labeling Program.
11. CRI Test Method 101 – Assessment of Carpet Surface Appearance Change using the CRI Reference Scales.
12. NFPA: Publication 253 - Test for Critical Radiant Flux of Floor Covering Systems.
13. All applicable federal, state and municipal codes, laws and regulations regarding flammability and smoke generation of interior finishes.

B. Inclusionary References: The following reference materials are hereby made a part of this Section by reference thereto:
   1. CRI publication 104: Standard for Installation of Commercial Carpet.

C. Sustainability Requirement Reference: The following sustainability requirements are hereby made a part of this Section by reference thereto:
   1. High Performance Schools Exchange, Northeast Energy Efficiency Partnerships NE-CHPS, (referred to herein as “NE-CHPS”).

1.4 ADMINISTRATIVE REQUIREMENTS

A. Coordination:
   1. General: Coordinate the work of this Section with the respective trades responsible for installing interfacing and adjoining work for proper sequence of installation, and ensure that the work performed hereunder is acceptable to such trades for the installation of their work.

B. Pre-installation Meetings: Installer of the Work of this Section is required to attend pre-installation conference specified under Section 09 05 60 - COMMON WORK RESULTS FOR FLOORING.

C. Sequencing:

1. Ensure that installation of flooring and accessories occurs after other finishing operations and interior wet work is complete and fully cured, including painting.

1.5 SUBMITTALS

A. Information and Review Submittals: Submit the following under provisions of Section 01 33 00 - SUBMITTAL PROCEDURES:

1. Literature: Manufacturer's product data sheets, specifications, performance data, physical properties, for each item furnished hereunder, including carpet, accessories, adhesives, and leveling materials.
2. Manufacturer's installation instructions: Provide manufacturer's application methods or installation instructions for each item furnished hereunder. Indicate special procedures, and perimeter conditions requiring special attention.
3. Manufacturer's sample warranties.
4. Manufacturer's certificate: Provide certificate stating that the carpet, and other related materials to be supplied hereunder meet all requirements specified herein.
    a. Submit certification from the fiber producer verifying use of the branded fiber in the submitted carpet product.
5. Indoor Air Quality Test Reports: Submit for specified products, indicating that the test results do not exceed the stated emission criteria of the CRI Indoor Air Quality Testing Program.
6. Shop drawings: 1/8 inch scale plans of all carpeted areas indicating direction of carpet, location of seams and method of joining seams.
    a. In general, carpet layout shall comply with the following:
        1) All carpet to be laid in the same direction unless specifically shown otherwise.
        2) No seams shall occur at doorways and entries which are perpendicular to doors or entries.
        3) Seams occurring at corridor change of direction shall follow wall parallel to carpet direction.
    b. Show location of different patterns or styles of carpet.
    c. Show locations of all threshold conditions.
7. Selection samples:
    a. Sample swatches containing manufacturer's full color and blend range.
    b. Resilient edge strip sample illustrating manufacturer's full color range.
8. Verification samples:
    a. 12 inch long samples of edge strip.
    b. After initial selection of carpet and color blends has been made by the Architect 18 inches by 27 inches sample of selected carpet for final

approval of the Architect. Approved samples shall be used as the standard of quality and colors for materials furnished under this Contract.

9. Sustainable Design Submittals: As required by NE CHPS.

B. Closeout Submittals: Submit the following under provisions of Section 01 78 00 - CLOSEOUT SUBMITTALS.

1. Maintenance Data: Prior to final acceptance of the carpet installation, carpet subcontractor shall deliver to the Architect 3 printed copies of the carpet manufacturer's detailed maintenance recommendations for the care cleaning and stain-removal, and repair of the types of carpets installed. Include product data and Material Safety Data Sheets (MSDS) for cleaning materials.

C. Maintenance Material Submittals: Submit the following under provisions of Section 01 78 00 - CLOSEOUT SUBMITTALS. Clearly label and package extra materials securely to prevent damage.

1. Extra Materials: Upon completion of the Work of this Section, Deliver to the Owner extra materials for future repairs and maintenance. Clearly label and package securely to prevent damage.
   a. Owner's carpet stock: An amount equal to 3 percent of each color, pattern and type of carpet installed.
   b. carpet installed.
2. Deliver specified overrun and usable pieces of carpet to owner's designated storage space, properly packaged and identified. Redirect small pieces of waste carpet to be appropriately recycled.

1.6 QUALITY ASSURANCE

A. Applicator: Company specializing in carpet installation of the type specified herein with a minimum of three years documented experience, approved by carpet manufacturer and participation in manufacturer's environmental program including responsible carpet removal, recycling, and installation.

B. Environmental impact characteristics of carpet:

1. Product, inclusive of adhesive, to comply with the 1994 State of Washington protocol. The product, when tested as manufactured (no air-out period required), shall pass the protocol as written and shall have the following characteristics:
   a. Less than 0.05 ppm (part per million) of formaldehyde.
   b. Less than 0.50 mg/cubic meter of total volatile organics.
   c. Less than 50 ug/cubic meter of total particulates.
   d. Less than 1.0 ppb (part per billion) 4-PC.
   e. Test over a 96 hour time period.
   f. Submit compliance table.
2. Carpet to be delivered with a recycle bag for recycling of the plastic film used to protect the Microencapsulated Tackifier.
3. All carpet products must pass the University of Pittsburgh protocol for toxicity being "no more toxic than wood" when burned under the same conditions.
4. Carpet to be a reduction barrier to radon flow.

5. Carpet to provide asbestos enclosure properties. Enclosure means an airtight, impermeable, permanent barrier around ACBM (Asbestos Containing Building Material) to prevent the release of asbestos fibers into the air.
6. Carpet to be installed without the use of wet adhesives.
7. Company to have an in-place, operational recycling program for product (at the end of its useful life) and manufacturing waste. Program shall recycle 100 percent of the product in the same operation.
8. This program shall not consist of incineration.

1.7 ENVIRONMENTAL CONDITIONS

A. Do not install carpet until areas have been fully enclosed and environmental conditions have reached the levels indicated during occupancy.

B. Store materials for 3 days (72 hours) prior to installation in area of installation to achieve temperature and humidity stability. Carpet and adhesive must be stored at a minimum temperature of 68 degrees F.
   1. Unroll carpet for a period of 72 hours prior to beginning of installation for adjustment to environmental conditions.

C. Maintain area of installation at a temperature of at least 68 degrees Fahrenheit, with a relative humidity of between 15 and 65 percent, for a period of 72 hours before, during, and for 72 hours after installation.
   1. Ensure surface temperature of carpet substrate is great than 55 degrees Fahrenheit at commencement of carpet tile installation.

D. Ventilate spaces where work of this Section occurs, during and for a period of 72 hours after completion of curing. Ventilate to dissipate humidity, and to prevent accumulation of fumes, vapors, and gases. Provide temporary fan units and ducting as required to for venting operations

1.8 DELIVERY, STORAGE, AND HANDLING

A. Carpet subcontractor is responsible for scheduling, receiving and placement on floors of goods from the manufacturer. Goods shall be delivered to the job site in the manufacturer’s bundles and be clearly marked as to size, dye-lot and materials.

B. Deliver carpet in sealed protective rolls and accessories in sealed containers. Bind carpet materials with secure protective wrapping. Mark each carpet roll according to style, color, pattern, dye lot, run number, and quantity.

C. Waste Reduction: Collect polyethylene roll wrap at site and recycle into more roll wrap. Redirect small pieces of waste carpet to be appropriately recycled.

D. Store all carpeting material under cover in dry, well-ventilated spaces as soon as delivered. Protect carpeting from damage, dirt, stain, moisture, and mildew.

1.9 WARRANTY

A. Furnish the following warranties under provisions of Section 01 78 00 - CLOSEOUT SUBMITTALS, and in compliance with Section 01 78 36 – WARRANTIES:
   1. Carpet manufacturer’s 10 year warranty which shall include texture retention, wear, and static protection and edge ravel resistance and run resistance

strength for the life of the carpet. Commencing on the date of Project Substantial Completion.

2. Carpet manufacturer's 20 year printed, non-prorated warranty which shall include texture retention, wear, and static protection and edge ravel resistance and run resistance strength. Commencing on the date of substantial completion. All warranty items to be full term, not pro-rated, for the indicated period. If the product fails to perform as warranted when properly installed and maintained, the affected area will be repaired or replaced at the discretion of the Manufacturer.
   a. As a minimum, manufacturer's warranty shall include protection against:
      1) Excessive surface wear. Excessive wear means more than 15 percent loss of pile fiber weight measured before and after use.
      2) Edge ravel.
      3) Zippering.
      4) Backing delamination. Backing delamination is defined as separation of the secondary backing from the primary backing.
      5) Watermarking on any product not 100 percent loop construction. Watermarking means an apparent color difference between areas of the same carpet due to permanent pile reversal with random differences in pile lay direction and differences in the amount of light reflected by carpet fibers.
      6) Excessive static electricity. Excessive static electricity means more than 3.0 kilovolts when tested per AATCC 134 at a relative humidity of 20 percent and a room temperature of 70 degrees Fahrenheit.
   b. Chair pads are not required for carpet warranty coverage.
   c. All carpet warranties to be sole source responsibility of the Manufacturer. Second source warranties or warranties that involve parties other than the Manufacturer are unacceptable.
   d. Carpet warranties will be official standard documents, not customized, and shall not be created on a job by job basis.
   e. All carpet warranties shall be signed and notarized by a company representative.
3. Carpeting installer's written guarantee covering prompt and proper replacement of any and all carpeting which indicates improper installation workmanship and/or defective material within twelve months from completion of the installation and acceptance thereof by the Architect, said corrective work being performed by the Carpeting installer at no cost to the Owner.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Specified Manufacturer: To establish a standard of quality, design and function desired, Drawings and specifications have been based on Mannington Carpets Inc., Calhoun, GA, product "Urban Grid Collection".
   1. Manufacturers: Subject to compliance with the criteria specified herein, manufacturers offering products which may be considered the work include, the following, or approved equal.
      a. Mannington Carpets Inc., Calhoun, GA.
      b. Lees Carpet Company, Greensboro NC.

c. The Mohawk Group, Atlanta GA.

d. Shaw Industries Inc., Dalton, GA.

2.2 CARPET

A. General requirements: Carpet, shall conform with or pass tests of the following Standards:

1. CRI – Green Label Plus
2. ASTM D-2859 (Methenamine Reagent Pill Test).
3. ASTM E-648 (Flooring Radiant Panel Test): Class I (Minimum Average CRF of 0.48).
4. NBS Smoke Chamber Test: Maximum average of 450.
5. AATCC-134 (Electrostatic Propensity): Maximum electrostatic generation below level of human sensitivity.

B. Recyclable requirements: Carpet, including all components, shall be 100 percent recyclable. Floor coverings selected shall be recycled at the end of their useful life in an environmentally responsible program. The full resource potential of returned material shall be utilized by reusing and recycling 100 percent of the returned carpeting in new, value-added products. No carpeting returned for recycling shall be land filled or incinerated.

C. Colors shall be as selected by Architect from manufacturer's full available color range.

1. Field areas shall consist of 1 color in configuration indicated on the Drawings.
2. Accent colors shall consist of 3 colors. Provide striping and accent areas as indicated on the Drawings.

2.3 ACCESSORIES

A. Filler for patching, smoothing and leveling flooring substrate: Refer to Section 09 05 60 – COMMON WORK RESULTS FOR FLOORING.

B. Adhesives for carpeting: NFPA Class A or UBC Class 1 types, as determined by ASTM E-84 Tunnel Test, as recommended by Carpet manufacturer for application and intended use. Acceptable manufacturers include:

1. Advanced Adhesive Technology, Inc, Dalton GA.
2. DAP Incorporated, Dayton OH.
3. W.W. Henry Company, Huntington Park CA.
4. Macklanburg-Duncan Company, Oklahoma City, OK.
5. Roberts Consolidated Industries, Inc., City of Industry, CA.

C. Rubber coved cap: Cover cap terminating carpet at Large Group Lecture Hall equal to Johnsonite Model “CCC-XX-C” in color as selected by the Architect.

D. Rubber Stair Nosing: Cover cap terminating carpet at Auditorium and Lecture Hall equal to Johnsonite Model “RCN-XX-A” in color as selected by the Architect.

E. Transition strips, carpet reducers, edgings and accessories: Composition nitrile rubber alloy in colors as selected by the Architect.

1. Acceptable manufacturers:

a. American Biltrite (Canada) Ltd., Sherbrooke, Quebec.
b. Burke Industries, San Jose, CA.
c. Roppe Corporation, Fostoria, OH.
d. Freudenberg Building Systems Inc., Lawrence, MA.

2. Profiles as indicated, submit shop drawings for all conditions not indicated and obtain Architect's approval for each transition/reducer.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verification of Conditions: Inspect all surfaces and verify that they are in proper condition to receive the work of this Section.

1. Ensure that newly placed concrete has cured for a minimum period of 30 days and that moisture content of concrete is within range specified by adhesive manufacturer.
2. Verify that surfaces are smooth and flat with a maximum variation of 1/8 inch in 10 feet, and are ready to receive work.
3. Request correction of defects in receiving surfaces which are not correctable by the methods specified herein. Do not commence work until such defects are entirely corrected
4. Beginning of installation means acceptance of existing substrate and site conditions.

B. Preinstallation Testing, Evaluation and Assessment: Moisture testing of concrete substrate, refer to Specification Section 09 05 60 – COMMON WORK RESULTS FOR FLOORING.

3.2 PREPARATION

A. General: Comply with requirements specified under Section 09 05 60 – COMMON WORK RESULTS FOR FLOORING, the flooring manufacturer's requirements for preparation of substrate to receive resilient flooring, and as additionally specified herein.

B. Preheat areas to receive carpet to a minimum temperature of 60 degrees F for 72 hours prior to installation, with a relative humidity between 15 and 60 percent. Maintain minimum temperature of 60 degrees F thereafter.

C. Measure all areas to receive materials to be furnished and installed hereunder, and verify in the field their actual dimensions, including wall-to-wall dimensions, offsets, door locations, and details, fixed equipment, and all other installed items. Extra charges will not be allowed because of lack of familiarity with actual project conditions. Use largest carpet widths to produce minimum number of seams. Small pieces of carpet will not be acceptable.

D. Unroll carpet for adjustment to environmental conditions at least 72 hours prior to installation.

3.3 INSTALLATION – CARPET

A. Install carpet in compliance with CRI publication 104, and in accordance with carpet and environmentally approved carpet adhesive manufacturers' instructions. Immediately notify Architect of conflicts.

B. Layout carpet with location of seams per approved shop drawings.

C. Cement carpet directly to the substrate with specified installation adhesive. Trowel adhesive evenly on the substrate. Install the carpet within thirty minutes after spreading adhesive.

1. Apply a 6 inch wide band of specified seaming adhesive continuously at each seam location, before bedding the carpet therein, ensuring that each carpet edge will be embedded therein at least 3 inches.
2. Apply a continuous band of specified edge adhesive around entire perimeter edge of each carpeted area, and embed the carpeting therein.

D. Roll all carpet areas with a 30 pound carpet roller to ensure proper contact of carpet with adhesive, and to remove all bubbles and buckles. Carefully roll seams and edges with the roller centered over the seam.

E. Run all carpet in the same direction. Plan and install carpet in all areas so that single pieces per area shall be used to the fullest extent possible. No seams will be permitted in areas which are 12 feet, or less, in width.

F. Carefully measure all cut-outs at the project.

G. Make all seams in carpeting by back-cutting the carpet on an angle so that the face yarn of abutting pieces intermingles, and provides a practically invisible transition at each seam location.

1. Center seams, occurring at door openings, parallel to, and directly under, the doors.
2. Seams occurring at corridor changes in direction shall follow wall line parallel to carpet direction.
3. Do not center seams in travel path to doors.

H. Do not center seams in path, perpendicular to, in the path of, or travel to doors.

I. Install specified edging wherever carpeting abuts a dissimilar flooring material, except where wood thresholds, or resilient floor tile trim occurs.

3.4 CLEANING

A. Daily clean work areas by disposing of carpet scraps.

B. After completion of the work of this Section:

1. Remove equipment, and clean all wall, partition, and floor areas free from deposits of adhesives and other materials installed under this Section.
2. Remove excess adhesive, seam sealer, and other surface blemishes using cleaner recommended by carpet manufacturer.
3. Remove yarns that protrude from carpet surface.
4. Clean and vacuum carpet surfaces.

C. Perform finial cleaning and vacuuming carpet surfaces not less than 4 days prior to Owner's intended occupancy date.

3.5 PROTECTION

A. General: Protect finished work under provisions of Section 09 05 60 – COMMON WORK RESULTS FOR FLOORING.

B. Prohibit traffic from carpet areas for 24 hours after installation.

C. Protect carpet against damage during construction. Cover with specified fire-retardant treated covering specified under Section 09 05 60 - COMMON WORK RESULTS FOR FLOORING, with taped joints during construction period whenever protection is required, so that carpet will be without any indication of deterioration, wear, or damage at time of completion. Maintain protection of carpeting on each floor or area until work is accepted.

End of Section

Section 09 68 13

TILE CARPETING

PART 1 - GENERAL

1.1 SUMMARY

A. General: The work of this Section consists of tile carpeting where shown on the Drawings, as specified herein, and as required for a complete and proper installation. Work includes, substrate testing and preparation, furnishing and installation of flooring, and temporary protection until Owner's acceptance.

B. Prepare substrates to receive flooring and ensure specified tolerance level for surface of finished floor. Preparation work includes patching, smoothing and leveling substrate as specified under Section 09 05 60 - COMMON WORK RESULTS FOR FLOORING.

C. Furnish and install carpet tile directly adhered over floors, where indicated on the Drawings, including all accessories necessary to complete the work

1.2 RELATED REQUIREMENTS

A. Section 01 74 19 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL: Procedural and administrative requirements relating to recycling goals, waste management program and reporting.

B. Section 01 81 13 - SUSTAINABLE DESIGN REQUIREMENTS: Procedural and administrative requirements relating to required *Northeast CHPS Verified Program,* (NE-CHPS) Certification.

C. Section 03 30 00 - CAST-IN-PLACE CONCRETE: substrate.

D. Section 08 71 00 - DOOR HARDWARE: Furnishing metal thresholds.

E. Section 09 05 60 - COMMON WORK RESULTS FOR FLOORING: General requirements for flooring preparation, substrate testing requirements, installation and temporary protection.

F. Section 09 65 13 - RESILIENT BASE AND ACCESSORIES: Straight resilient bases, where indicated in conjunction with carpeting.

G. Section 09 68 00 - CARPETING: Broadloom carpet, and related transition strips.

1.3 REFERENCES

A. Referenced Standards: Comply with applicable requirements of the following standards and those others referenced in this Section, under the provisions of Section 01 42 00 - REFERENCES. The standards referenced herein are included to establish recognized minimum quality only. Where these standards conflict with other specified requirements, the most restrictive requirements shall govern. Equivalent quality and testing standards will be acceptable, subject to their timely submission, review and acceptance by the Architect.

1. ASTM D2859 - Standard Test Method for Ignition Characteristics of Finished Textile Floor Covering Materials.
2. ASTM D5116 – Standard Guide for Small-Scale Environmental Chamber Determinations of Organic Emissions from Indoor Materials/Products.
3. ASTM E84 – Standard Test Method for Surface Burning Characteristics of Building Materials.
4. ASTM E648 – Standard Test Method for Critical Radiant Flux of Floor-Covering Systems Using a Radiant Heat Energy Source.
5. ASTM F1482 - Standard Practice for Installation and Preparation of Panel Type Underlayments to Receive Resilient Flooring.
6. CRI Indoor Air Quality Testing and Labeling Program.
7. NFPA: Publication 253 - Test for Critical Radiant Flux of Floor Covering Systems.
8. All applicable federal, state and municipal codes, laws and regulations regarding flammability and smoke generation of interior finishes.

B. Inclusionary References: The following reference materials are hereby made a part of this Section by reference thereto:
1. CRI Indoor Air Quality Testing and Labeling Program.

C. Sustainability Requirement Reference: The following sustainability requirements are hereby made a part of this Section by reference thereto:
1. High Performance Schools Exchange, Northeast Energy Efficiency Partnerships NE-CHPS, (referred to herein as “NE-CHPS”).

1.4 ADMINISTRATIVE REQUIREMENTS

A. Coordination:
1. General: Coordinate the work of this Section with the respective trades responsible for installing interfacing and adjoining work for proper sequence of installation, and ensure that the work performed hereunder is acceptable to such trades for the installation of their work.

B. Pre-installation Meetings: Installer of the Work of this Section is required to attend pre-installation conference specified under Section 09 05 60 - COMMON WORK RESULTS FOR FLOORING.

C. Sequencing:
1. Ensure that installation of flooring and accessories occurs after other finishing operations and interior wet work is complete and fully cured, including painting.

1.5 SUBMITTALS

A. Information and Review Submittals: Submit the following under provisions of Section 01 33 00 - SUBMITTAL PROCEDURES:

1. Literature: Manufacturer's product data sheets, specifications, performance data, physical properties, for each item furnished hereunder, including carpet, accessories, adhesives, and leveling materials.
2. Manufacturer's installation instructions: Provide manufacturer's application methods or installation instructions for each item furnished hereunder. Indicate special procedures, and perimeter conditions requiring special attention.
3. Manufacturer's sample warranties.
4. Manufacturer's certificate: Provide certificate stating that the carpet, and other related materials to be supplied hereunder meet all requirements specified herein.
    a. Submit certification from the fiber producer verifying use of the branded fiber in the submitted carpet product.
5. Indoor Air Quality Test Reports: Submit for specified products, indicating that the test results do not exceed the stated emission criteria of the CRI Indoor Air Quality Testing Program.
6. Shop drawings: 1/8 inch scale plans of all carpeted areas indicating direction of carpet, location of seams and method of joining seams.
    a. Show location of different patterns or styles of carpet.
7. Selection samples:
    a. Sample swatches containing manufacturer's full color and blend range.
    b. Vinyl edge strip sample illustrating manufacturer's full color range.
8. Verification samples:
    a. 12 inch long samples of edge strip.
    b. After initial selection of carpet and color blends has been made by the Architect: 18 by 27 inch sample of selected carpet for final approval of the Architect. Approved samples shall be used as the standard of quality and colors for materials furnished under this Contract.
9. Sustainable Design Submittals: As required by NE CHPS.

B. Submit the following under provisions of Section 01 78 00 - CLOSEOUT SUBMITTALS.
1. Maintenance Data: Prior to final acceptance of the carpet installation, carpet subcontractor shall deliver to the Architect 3 printed copies of the carpet manufacturer’s detailed maintenance recommendations for the care cleaning and stain-removal, and repair of the types of carpets installed. Include product data and Safety Data Sheets (SDS) for cleaning materials.

C. Maintenance Material Submittals: Submit the following under provisions of Section 01 78 00 - CLOSEOUT SUBMITTALS. Clearly label and package extra materials securely to prevent damage.
1. Extra Materials: Upon completion of the Work of this Section, Deliver to the Owner extra materials for future repairs and maintenance. Clearly label and package securely to prevent damage.
    a. Owner’s carpet tile stock: An amount equal to 3 percent of each color, pattern and type of carpet installed.

b. Stock not turned over to Owner: Recycle waste, unusable scrap, and carpet tile damaged during installation through manufacturer's environmental program.

1.6 QUALITY ASSURANCE

A. Manufacturer: Mill specializing in manufacturing specified recyclable carpet tile with a minimum of three years documented experience.

B. Applicator: Company specializing in carpet installation of the type specified herein with a minimum of three years documented experience.

C. Environmental impact characteristics of carpet tile:

1. Product, inclusive of adhesive, to comply with the 1994 State of Washington protocol. The product, when tested as manufactured (no air-out period required), shall pass the protocol as written and shall have the following characteristics:
   a. Less than 0.05 ppm (part per million) of formaldehyde.
   b. Less than 0.50 mg/cubic meter of total volatile organics.
   c. Less than 50 ug/cubic meter of total particulates.
   d. Less than 1.0 ppb (part per billion) 4-PC.
   e. Test over a 96 hour time period.
   f. Submit compliance table.
2. Carpet to be delivered with a recycle bag for recycling of the plastic film used to protect the Microencapsulated Tackifier.
3. All carpet products must pass the University of Pittsburgh protocol for toxicity being "no more toxic than wood" when burned under the same conditions.
4. Carpet to be a reduction barrier to radon flow.
5. Carpet to provide asbestos enclosure properties. Enclosure means an airtight, impermeable, permanent barrier around ACBM (Asbestos Containing Building Material) to prevent the release of asbestos fibers into the air.
6. Carpet to be installed without the use of wet adhesives.
7. Company to have an in-place, operational recycling program for product (at the end of its useful life) and manufacturing waste. Program shall recycle 100 percent of the product in the same operation.
8. This program shall not consist of incineration.

1.7 MOCK-UPS

A. Provide mock-up under provisions of Section 01 43 39 – MOCK-UPS.

B. Provide mock-up sample of one room to be designated by Architect, demonstrating the minimum quality of installation for the Work.

C. Locate mock-ups where directed and include all surfaces scheduled to receive a carpeted finish.

D. Maintain mock-up during construction for workmanship comparison; remove and legally dispose of mock-up when no longer required.

E. Accepted mock-ups may remain as part of the work; the number of mock-ups shall not be restricted.

1. Protect mock-up from dust, soiling and damage until Project Substantial Completion.

1.8 ENVIRONMENTAL CONDITIONS

A. Do not install carpet until areas have been fully enclosed and environmental conditions have reached the levels indicated during occupancy.

B. Store materials for 3 days (72 hours) prior to installation in area of installation to achieve temperature and humidity stability. Carpet and adhesive must be stored at a minimum temperature of 68 degrees F.

C. Maintain area of installation at a temperature of at least 68 degrees Fahrenheit, with a relative humidity of between 15 and 65 percent, for a period of 72 hours before, during, and for 72 hours after installation.

1. Ensure surface temperature of carpet substrate is great than 55 degrees Fahrenheit at commencement of carpet tile installation.

D. Ventilate spaces where work of this Section occurs, during and for a period of 72 hours after completion of curing. Ventilate to dissipate humidity, and to prevent accumulation of fumes, vapors, and gases. Provide temporary fan units and ducting as required to for venting operations

1.9 DELIVERY, STORAGE, AND HANDLING

A. Delivery and Acceptance Requirements:

1. Do not deliver items to the site, until all specified submittals have been submitted to, and approved by, the Architect.

B. Storage and Handling Requirements:

1. Store all carpeting material under cover in dry, well-ventilated spaces as soon as delivered.

2. Protect carpeting materials from damage due to moisture, mildew, direct sunlight, excessive temperatures, surface contamination, dirt and stains, and damage from construction operations and other causes.

C. Packaging Waste Management: Comply with packaging requirements specified under Section 01 60 00 - PRODUCT REQUIREMENTS.

1. Shipping materials: Manufacturer shall utilize to the greatest extent possible packaging materials which are biodegradable and recyclable.

2. Jobsite packaging waste management: Recycle packaging materials coordinated with general construction waste management specified under Section 01 74 19 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL

1.10 WARRANTY

A. General: Submit the following warranties under provisions of Section 01 78 00 - CLOSEOUT SUBMITTALS, and in compliance with Section 01 78 36 – WARRANTIES.

1. Warranties shall be effective starting from Date of Project Substantial Completion and are effective for specified term lengths.

B. Furnish carpet installer's written guarantee covering prompt and proper replacement of any and all carpeting which indicates improper installation workmanship and/or defective material within twelve months from completion of the installation and acceptance thereof by the Architect, said corrective work being performed by the Carpet installer at no cost to the Owner.

C. Furnish carpet manufacturer’s warranty which shall contain the following:

1. Commencement date for warranty: Date of Project Substantial Completion.
2. Wear Warranty - Lifetime of Carpet. No more than 10% face yarn loss by weight in normal use.
3. Static Warranty - Lifetime of Carpet.
4. Edge Ravel Warranty - Lifetime of Carpet. Guaranteed no edge ravel in normal use (no seam sealers required).
5. Delamination Warranty - Lifetime of Carpet. Guaranteed no delamination in normal use (no chair pads required).
6. Tuft Bind Warranty - Lifetime of Carpet. Guaranteed not to zipper, wet or dry.

PART 2 - PRODUCTS

2.1 CARPET TILE

A. Manufacturers: Subject to compliance with the criteria specified herein, manufacturers offering products which may be considered the work include, but are not limited to, the following:

1. Tarkett USA, Inc., Aurora, OH.
2. Interface Americas, Inc., Atlanta, GA
3. Milliken Design, Inc., Spartansburg, SC.

B. General requirements: Carpet tiles, shall conform with or pass tests of the following Standards:

1. ASTM D-2859 (Methenamine Reagent Pill Test).
2. ASTM E-648 (Flooring Radiant Panel Test): Class I (Minimum Average CRF of 0.48).
3. NBS Smoke Chamber Test: Maximum average of 450.
4. AATCC-134 (Electrostatic Propensity): Maximum electrostatic generation below level of human sensitivity.

C. Carpet tile: To establish a standard of quality, design and function desired, specifications have been based on Tarkett USA, Inc., Aurora, OH, pattern “Metri II”,

modular carpet, nominal size 24 inches by 24 inches, having the following characteristics:

1. Green label Plus Certification.
2. Construction – Stratatec Patterned loop.
3. Face Yarn – Dynex SD nylon.
4. Total Thickness: 0.280 inch (per ASTM F386).
5. Pile Thickness: 0.120 inches (per ASTM D5848).
6. Average Pile Height: 0.185 inches
7. Gauge: 5/64
8. Stiches/Rows per inch: 10.
9. Pile Density: 3456 ounces per square yard
10. Dye System – Solution dyed.
11. Backing material primary: Synthetic non-woven.
12. Backing material secondary: Ethos Modular with “Omnicoat” technology.
13. Colors: Up to four colors shall be required in any room or space.

D. Check matching of carpet before installation and ensure there is no visible variation between dye lots.

2.2 ACCESSORIES

A. Filler for patching, smoothing and leveling flooring substrate: Refer to Section 09 05 60 – Common Work Results for Flooring.

B. Adhesives for carpet tile: NFPA Class A or UBC Class 1 types, as determined by ASTM E-84 Tunnel Test, as recommended by Carpet manufacturer for application and intended use. Acceptable manufacturers include:

1. Advanced Adhesive Technology, Inc, Dalton GA.
2. DAP Incorporated, Dayton OH.
3. W.W. Henry Company, Aliquippa PA.
4. Macklanburg-Duncan Company, Oklahoma City, OK.
5. Roberts Consolidated Industries, Inc., City of Industry, CA.

C. Transition strips, carpet reducers, edgings and accessories: composition nitrile rubber alloy or , in colors as selected by the Architect.

1. Acceptable manufacturers:
   a. Freudenberg Building Systems Inc., Lawrence MA.
   b. American Billtrite (Canada) Ltd., Sherbrooke, Quebec.
   c. Burke Industries, San Jose, CA.
   d. Roppe Corporation, Fostoria OH.
2. Profiles as indicated, submit shop drawings for all conditions not indicated and obtain Architect’s approval for each transition/reducer.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verification of Conditions: Inspect all surfaces and verify that they are in proper condition to receive the work of this Section.

1. Ensure that newly placed concrete has cured for a minimum period of 30 days and that moisture content of concrete is within range specified by adhesive manufacturer.
2. Verify that surfaces are smooth and flat with a maximum variation of 1/8 inch in 10 feet, and are ready to receive work.
3. Request correction of defects in receiving surfaces which are not correctable by the methods specified herein. Do not commence work until such defects are entirely corrected
4. Beginning of installation means acceptance of existing substrate and site conditions.

B. Preinstallation Testing, Evaluation and Assessment: Moisture testing of concrete substrate, refer to Specification Section 09 05 60 – COMMON WORK RESULTS FOR FLOORING.

3.2 PREPARATION

A. General: Comply with requirements specified under Section 09 05 60 – COMMON WORK RESULTS FOR FLOORING, the flooring manufacturer's requirements for preparation of substrate to receive resilient flooring, and as additionally specified herein.

B. Preheat areas to receive carpet to a minimum temperature of 60 degrees F for 72 hours prior to installation, with a relative humidity between 15 and 60 percent. Maintain minimum temperature of 60 degrees F thereafter.

C. Measure all areas to receive materials to be furnished and installed hereunder, and verify in the field their actual dimensions, including wall-to-wall dimensions, offsets, door locations, and details, fixed equipment, and all other installed items. Extra charges will not be allowed because of lack of familiarity with actual project conditions. Small pieces of carpet will not be acceptable.

3.3 INSTALLATION

A. Install carpet tile in accordance with carpet and adhesive manufacturers' instructions. Immediately notify Architect of conflicts. Cement carpet directly to the substrate with specified installation adhesive. Trowel adhesive evenly on the substrate. Install the carpet within thirty minutes after spreading adhesive.

B. Lay carpet tile in a square grid pattern, with joints and seams parallel to building lines. Lay joints straight and continuous in both directions and with border carpet tile not less than 1/2 the width of the tile.

1. Install carpet tile using installation pattern (vertical ashlar, horizontal ashlar, quarter turn, herringbone, unidirectional or other), as directed by Architect.

2. Confirm tile orientational direction in rooms with Architect.

C. Install specified edging wherever carpeting abuts a dissimilar flooring material, except where wood thresholds, or resilient floor tile trim occurs.

3.4 CLEANING

A. Daily clean work areas by disposing of carpet scraps. After completion of the work of this Section, remove equipment, and clean all wall, partition, and floor areas free from deposits of adhesives and other materials installed under this Section.

B. Clean and vacuum carpet surfaces upon completion of the installation.

3.5 PROTECTION

A. General: Protect finished work under provisions of Section 09 05 60 – COMMON WORK RESULTS FOR FLOORING.

B. Prohibit traffic from carpet areas for 24 hours after installation.

C. Protect carpet against damage during construction. Cover with not less than 6-mil thick polyethylene covering with taped joints during construction period whenever protection is required, so that carpet will be without any indication of deterioration, wear, or damage at time of completion.

D. Maintain protection of carpeting on each floor or area until work is accepted.

End of Section

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Section 09 72 16

RIGID SHEET VINYL WALL CLADDING

PART 1 - GENERAL

1.1 SUMMARY

A. Furnish and install the following where indicated on Drawings.

1. Vinyl/acrylic wall surface protection panels.

1.2 RELATED REQUIREMENTS

A. Section 01 60 00 - PRODUCT REQUIREMENTS: Listing of VOC requirements for adhesives, cleaning/maintenance materials, paints, coatings, and sealants.

B. Section 01 74 19 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL: Procedural and administrative requirements relating to recycling goals, waste management program and reporting.

C. Section 01 81 13 - SUSTAINABLE DESIGN REQUIREMENTS: Procedural and administrative requirements relating to required *Northeast CHPS Verified Program,* (NE-CHPS) Certification.

D. Section 06 10 00 - ROUGH CARPENTRY: Wood blocking and nailers.

E. Section 09 29 00 - GYPSUM BOARD: Substrate for corner guards and vinyl wall protection panels.

1.3 REFERENCES

A. Referenced Standards: Comply with applicable requirements of the following standards and those others referenced in this Section, under the provisions of Section 01 42 00 - REFERENCES. The standards referenced herein are included to establish recognized minimum quality only. Where these standards conflict with other specified requirements, the most restrictive requirements shall govern. Equivalent quality and testing standards will be acceptable, subject to their timely submission, review and acceptance by the Architect.

1. ASTM A 167 - Stainless and Heat-resisting Chromium-nickel Steel Plate, Sheet and Strip.
2. ASTM E 84 - Test Method for Surface Burning Characteristics of Building Materials.
3. All applicable federal, state and municipal codes, laws and regulations regarding flammability and smoke generation of interior finishes.

B. Sustainability Requirement Reference: The following sustainability requirements are hereby made a part of this Section by reference thereto:

1. High Performance Schools Exchange, Northeast Energy Efficiency Partnerships NE-CHPS, (referred to herein as “NE-CHPS”).

1.4 SUBMITTALS

A. Submit the following under provisions of Section 01 33 00 - Submittal Procedures:

1. Literature: Manufacturer's product data sheets, specifications for each item furnished hereunder.
2. Installation instructions: Indicate installation rough-in measurements and instructions.
3. Manufacturer’s certification: Certify that corner guards and vinyl wall protection panels meet or exceed flame spread rating for surface finish.
4. Shop drawings: Large scale details of corner guards and vinyl wall protection panels, showing attachment clips and brackets; termination details, and complete installation details.
5. Selection samples:
   a. Sample card indicating Manufacturer's full range of colors available for selection by Architect.
   b. Provide samples requested by Architect for initial selection of colors and finishes
6. Verification samples: 12 inch long samples, each, of corner guards and vinyl wall protection panels illustrating selected color and finish.
7. Sustainable Design Submittals: As required by NE CHPS.

1.5 DELIVERY, STORAGE AND HANDLING

A. Do not deliver wall protection panels to the project until all concrete, masonry, plaster and other wet work has been completed and dry.

B. Deliver materials in original packages, containers or bundles bearing brand name, identification of manufacturer or supplier.

C. Store materials inside, under cover, and in manner to keep them dry, protected from weather, direct sunlight, surface contamination, corrosion and damage from construction traffic and other causes.

1.6 FIELD MEASUREMENTS

A. Take field measurements before preparation of shop drawings and fabrication, where possible, to ensure proper fitting of Work.

B. Allow for adjustments within specified tolerances wherever taking of field measurements before fabrication might delay Work.

1.7 SEQUENCING AND SCHEDULING

A. Coordinate the work with wall or partition Sections for installation of concealed blocking or anchor devices.

1.8 EXTRA MATERIALS

A. Upon completion of the Work of this Section, deliver to the Owner 10 percent of each wall protection item.

PART 2 - PRODUCTS

2.2 MANUFACTURERS

A. Subject to compliance with the requirements specified herein, manufacturers offering products which may be incorporated in the work include, but are not limited to, the following:

1. Altro USA, Inc., Wilmington, MA.
2. Inpro Corp., Muskego, WI.
3. Construction Specialties, Inc., Muncy, PA.
4. ProTek Systems, Inc., Boca Raton, FL.

2.3 HYGENIC WALL COVERINGS

A. Rigid Plastic Panels: Extruded, chemical- and stain-resistant, high-impact, polyvinyl chloride (PVC) or acrylic modified vinyl plastic, thickness as indicated. Comply with specified requirements of ASTM D 256 for impact resistance and ASTM E 84 for flame spread and smoke developed characteristics.

1. Specified Product: Altro USA, Inc., Wilmington, MA, product “Altro Whiterock Wall Designs”, and “Altro Whiterock Textured.”
2. Thickness: 0.10 inch (2.5 mm) minimum.
3. Colors and Textures:
    a. Type 1: Altro Whiterock Wall Designs; White Mineral 9905.
    b. Type 2: Altro Whiterock Wall Designs; Cool Mineral 9906.
    c. Type 3: Altro Whiterock Textured; satin finish, color as selected by Architect.
    d. Type 4: Altro Whiterock Textured; satin finish, color as selected by Architect.
    e. Type 5: Altro Whiterock Textured; satin finish, color as selected by Architect.

B. Adhesives: Provide manufacturer’s recommended full spread adhesive, low VOC type, for use with material on the substrate indicated.

2.4 ACCESSORIES

A. Trim profiles:

1. Equal to Fry Reglet model “WCTBT125-217” extruded aluminum with anodized finish.
2. Equal to Fry Reglet model “WCTF125-217” extruded aluminum with anodized finish.
3. Equal to Fry Reglet model “WCTCSC” extruded aluminum with anodized finish.

2.5 FABRICATION

A. Fabricate wall systems to comply with requirements indicated for design, dimensions, details, finish, and member sizes, including wall thicknesses of components.

B. Preassemble components in the shop to the greatest extent possible to minimize field assembly. Disassemble only as necessary for shipping and handling.

C. Fabricate components with tight welded seams and joints with exposed edges rolled. Provide surfaces free of evidence of wrinkling, chipping, uneven coloration, dents, and other imperfections. Fabricate members and fittings to produce flush, smooth, and rigid hairline joints.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Inspect all surfaces and verify that they are in proper condition to receive the work of this Section.

B. Verify that field measurements are as indicated on Drawings.

C. Beginning of installation means acceptance of existing substrate and project conditions.

3.2 INSTALLATION

A. Install components in accordance with manufacturer’s instructions, level and plumb, secured rigidly in position.

3.3 TOLERANCES

A. Maximum variation from required height: 1/4 inch.

B. Maximum variation from level from visible length: 1/4 inch.

3.4 CLEANING

A. Upon completion of the work of this Section in any given area, remove tools, equipment and all rubbish and debris from the work area; leave area in broom-clean condition.

End of Section

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Section 09 77 33

SANITARY WALL PANELS

PART 1 - GENERAL

1.1 SUMMARY

A. Furnish and install the following:

1. USDA approved glass fiber reinforced plastic panels.
2. Installation adhesive, non-corroding fasteners, vinyl moldings, and all other components.
3. Silicone sealant for all joints between panels and moldings, and between panel system and abutting materials.

B. Install access panels occurring in plastic panels furnished by Section 08 31 00 - ACCESS DOORS AND PANELS, and by trades requiring the same.

1.2 RELATED REQUIREMENTS

A. Section 01 74 19 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL: Procedural and administrative requirements relating to recycling goals, waste management program and reporting.

B. Section 01 81 13 - SUSTAINABLE DESIGN REQUIREMENTS: Procedural and administrative requirements relating to required *Northeast CHPS Verified Program,* (NE-CHPS) Certification.

C. Section 06 10 00 - ROUGH CARPENTRY: Plywood substrate, and blocking.

D. Section 08 11 13 - HOLLOW METAL DOORS AND FRAMES: Hollow metal door frames to receive ends of panel system.

E. Section 09 29 00 - GYPSUM BOARD: Gypsum board substrate:

F. Section 08 31 00 - ACCESS DOORS AND PANELS, and by trades requiring the same: Shop primed access panels, occurring in partitions and walls.

G. Section 11 40 00 - FOODSERVICE EQUIPMENT:

1. Stainless steel clad tray pass through.
2. Exhaust hoods and related ductwork including hangers.

H. Division 21 - FIRE SUPPRESSION: Fire suppression system.

I. Division 26 - ELECTRICAL: Recessed electrical receptacles.

1.3 REFERENCES

A. Referenced Standards: Comply with applicable requirements of the following standards and those others referenced in this Section, under the provisions of Section 01 42 00 - REFERENCES. The standards referenced herein are included to establish recognized minimum quality only. Where these standards conflict with other specified requirements, the most restrictive requirements shall govern. Equivalent quality and testing standards will be acceptable, subject to their timely submission, review and acceptance by the Architect.

1. ASTM D 256 - Standard Test Methods for Determining the Izod Pendulum Impact Resistance of Plastics.
2. ASTM D 570 - Standard Test Method for Water Absorption of Plastics.
3. ASTM D 638 - Standard Test Method for Tensile Properties of Plastics.
4. ASTM D 790 - Standard Test Methods for Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials.
5. ASTM D 2583 - Barcol Hardness.
6. ASTM D 5319 - Standard Specification for Glass-Fiber Reinforced Polyester Wall and Ceiling Panels.
7. ASTM E 84 - Standard Test Method for Surface Burning Characteristics of Building Materials.
8. All applicable federal, state and municipal codes, laws and regulations regarding wall finishes and smoke generation.

B. Sustainability Requirement Reference: The following sustainability requirements are hereby made a part of this Section by reference thereto:

1. High Performance Schools Exchange, Northeast Energy Efficiency Partnerships NE-CHPS, (referred to herein as “NE-CHPS”).

1.4 SUBMITTALS

A. Information and Review Submittals: Submit the following under provisions of Section 01 33 00 - SUBMITTAL PROCEDURES:

1. Literature: Manufacturer's product data sheets, specifications, performance data, physical properties and installation instructions.
2. Certification: Manufacturer's written certification stating that panel system and all related components to be furnished hereunder, meet or exceed the requirements specified under this Section that all fire-resistive requirements for the indicated requirements have been met.
3. Shop drawings: 1/4 inch scale elevations showing panel joint locations.
4. Selection samples:
    a. Sample card indicating Manufacturer's full range of colors available for selection by Architect.
5. Verification samples:

a. 12 x 12 inch samples of panel illustrating material and finish.

6. Sustainable Design Submittals: As required by NE CHPS.

1.5 QUALITY ASSURANCE

A. General: Notify the Architect where conflicts apply between referenced standards and existing materials, and existing methods of construction.

B. Qualifications:

1. Installer specializing in applying the work of this Section with a minimum of 3 years experience and approved by product manufacturer.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Do not deliver panels to the project until all concrete, masonry, plaster, and other wet work has been completed and dry.

B. Remove panels from shipping cartons/skids. Stack panels on a solid flat, dry surface. Do not stack panels direct on concrete flooring or any other surface that emits moisture. Lay Panels flat; do not stand panels on edge, do not store products near a heat source.

1.7 SEQUENCING AND SCHEDULING

A. Coordinate the work of this Section with the respective trades responsible for installing interfacing work, and ensure that the work performed hereunder is acceptable to such trades for the installation of their work.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Basis of Design (Specified Manufacturer): To establish a standard of quality, design and function desired, Drawings and specifications have been based on Marlite Inc., Dover OH (Marlite FRP products), product “Standard, Class A.”

B. Acceptable Manufacturers: Subject to compliance with the requirements specified herein, manufacturers offering products which may be incorporated in the work include the following, or approved equal:

1. Crane Composites, Joliet IL., (Glasbord and Kemlite Products).
2. Marlite Inc., Dover OH (Marlite FRP products).
3. Nudo Products, Inc., Springfield, IL. (Fiber-Lite Products).
4. Stabilit America., Moscow TN., (Glasteel products).

2.2 PERFORMANCE REQUIREMENTS

A. Fire and Smoke criteria: Conform to building code requirements for interior finish for smoke and flame spread requirements as tested in accordance with:

1. ASTM E 84 (Method of test for surface burning characteristics of building Materials).
2. Required Rating - Class A (I).

B. Sanitary Standards: System components and finishes to comply with:

1. United States Department of Agriculture (USDA) / Food Safety & Inspection Services (FSIS) requirements for food preparation facilities, incidental contact.
2. Food and Drug Administration (FDA) 2013 Food Code 6-101.11.
3. Canadian Food Inspection Agency (CFIA) requirements.

C. Performance Requirements:

1. Flexural Strength - 1.0 x 104 psi per ASTM D 790. (7.0 kilogram-force/square millimeter)
2. Flexural Modulus - 3.1 x 105 psi per ASTM D 790. (217.9 kilogram-force/square millimeter)
3. Tensile Strength - 7.0 x 103 psi per ASTM D 638. (4.9 kilogram-force/square millimeter)
4. Tensile Modulus - 1.6 x 105 psi per ASTM D 638. (112.5 kilogram-force/square millimeter)
5. Water Absorption - 0.72% per ASTM D 570.
6. Barcol Hardness (scratch resistance) of 35 55 as per ASTM D 2583.
7. Izod Impact Strength of 72 ft. lbs./in ASTM D 256

2.3 MATERIALS

A. Panels: Fiberglass reinforced plastic panels, ASTM E-84 Class A Fire Retardant Rated, having embossed / pebble finish.

1. Panel Thickness: 0.09 inch (2.3mm) thickness.
2. Panel Color: as selected by Architect from Manufacturer’s standard colors.
3. Panel finish texture: Pebble
4. Acceptable products include the following, or approved equal:
    a. Marlite product: “Marlite Standard FRP” panels (Class 1/A).
    b. Crane Composites, Kemlite product: “Glassbord Embossed Texture | FX”.
    c. Nudo products: Inc., “Fiber-Lite LP-F9-FR wall panels.” (Class A).

2.4 ACCESSORIES

A. Aluminum trim: Heavy weight extruded aluminum 6063-T5 alloy prefinished at the factory.

1. Finish: Factory thermo-set enamel or powder coat finish.

B. Fasteners: stainless steel or nylon fasteners as recommended by the panel manufacturer for the application indicated in the Drawings.

C. Adhesive: Multi-purpose non-flammable, non-staining, construction adhesive: Kemlite No. 260, Henry No. 444, or equal.

D. Sealant: One part acetoxy silicone rubber sealant, USDA approved as recommended by panel manufacturer.

E. Moldings: One piece extruded vinyl moldings, color matched with panels, for application between abutting panels, inside and outside corners , and panel edges as recommended by the panel manufacturer and where indicated in the Drawings.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify adequacy of blocking, backing and support framing for work of this Section. Inspect all gypsum wall and plywood substrates and verify that they are in proper condition to receive the work of this Section.

B. Beginning of installation means acceptance of existing substrate and site conditions.

3.2 PREPARATION

A. Surfaces receiving work of this Section must be absolutely dry, free from dirt, dust, grease and other foreign materials that will prevent proper adhesion of the wall panels.

B. Verify gypsum board substrate surfaces are flat, conforming to Gypsum Association specifications for a Level 3 finish.

C. Plywood substrate surfaces should be flat to within 1/8” in 10 feet, Sand smooth high spots, and fill low spots with wood filler approved by panel manufacturer.

3.3 INSTALLATION, GENERAL

A. Install work in strict accordance with the manufacturer’s written instructions.

B. Set and secure materials in place, plumb and level. Maintain 1/4” gap at ceiling and junction with flooring base. Maintain 1/8 inch gap between panels and division bar molding to allow for normal expansion and contraction. Allow 3/16 inch around pipes, electrical fitting and other projections.

3.4 APPLICATION OF PANELS WITH MECHANICAL FASTENERS

A. Install with non-corroding fasteners with as recommended by the panel manufacturer for the substrate. Predrill panels for fasteners with holes over-sized by 1/8 inch.

B. Locate fasteners in patterns as indicted on the Drawings.

C. Install fasteners no further than 8 inches apart along top and bottom edges and 16 inches apart on intermediate fasteners. Stagger fasteners on opposing panel edges and corners next to division bar for tight flat seam.

D. Drive fasteners to snug fit, do not overtighten

3.5 APPLICATION OF PANELS WITH ADHESIVE

A. Ensure that both panels and substrate are free of moisture, dirt, dust and other contaminants which may affect the bond of adhesive.

B. Apply adhesive when temperature is between 50 and 90 degrees F.

C. Trowel adhesive evenly on back of sheets, 1/4 deep with square notch trowel, or apply with cartridge gun spacing beads not more than 8 inches in center of panel and run a single bead along all edges of panel.

D. Set panels in position and press against wall. Pull panel away from wall to flash off solvents. Press panel against wall again, apply adequate pressure to make full contact between panel and wall. Brace panel along vertical edges until adhesive is cured.

E. Apply mechanical fasteners along top and bottom edges as specified in Article 3.04 above.

3.6 APPLICATION OF SEALANT AND MOLDINGS

A. Install sealant and moldings, in sequence as recommended by the panel manufacturer to achieve a moisture resistant application of the panel system.

B. After installation of panels and moldings has been completed, apply a continuous bead of specified sealant to all joints between the work of this Section and abutting surfaces. Tool the sealant to a uniformly dense surface, level with the edges of moldings. Immediately remove all excess sealant from finished surfaces.

1. Install joint bead back-up in joints with abutting materials where joints are in excess of 5/8-inch depth, and joints that have no back-up therein, placing the joint bead in the joint in a manner that will assure a constant depth 1/8 inch greater than the sealant and caulking material depth tolerances.

a. Set beads into joints continuously, by slightly stretching during placement, to permit compression against sides of joint, without surface wrinkles or buckles.

2. Apply sealant into joints in accordance with sealant manufacturer's instructions, using mechanical or power caulking gun equipped with nozzle of appropriate size, with sufficient pressure to completely fill the joints.

    a. The depth of sealant shall be in accordance with manufacturer's recommendations for the specific joint function, but in no case exceed 1/2-inch in depth, nor less than 1/4-inch, regardless of the joint width.

    b. Maintain the outer edge of the sealant, where side faces of joints are in the same plane, back 1/8-inch from the faces.

    c. After placement of the sealant in joints with abutting materials, concave-tool the surfaces to uniform density, using a water-wet tool. Do not use detergents or soapy water for the tooling operations.

    d. Remove the temporary masking tape immediately after tooling, and before the sealant or caulking material has taken initial set.

3.7 CLEANING

A. Daily clean work areas by sweeping and disposing of debris and scraps.

B. Completely clean all panel surfaces, clean all surfaces of adjacent surfaces which have been marked or soiled by the work of this Section, removing all excess sealants and adhesives with solvents which will not damage the surfaces in any way.

C. Upon completion of the work of this Section, remove tools, equipment and all rubbish and debris from the work area; leave area in broom-clean condition.

3.8 PROTECTION

A. During the operation of sealant work, protect the work of other trades against undue soilage and damage by the exercise of reasonable care and precautions. Repair or replace any work so damaged and soiled.

End of Section

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Section 09 81 00

ACOUSTICAL INSULATION

PART 1 - GENERAL

1.1 SUMMARY

A. The work of this Section consists of acoustical insulation where shown on the Drawings, as specified herein, and as required for a complete and proper installation. Work includes, but is not limited to the following.

B. Furnish and install:

1. Acoustical insulation as scheduled and where indicated.

1.2 RELATED REQUIREMENTS

A. Section 01 74 19 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL: Procedural and administrative requirements relating to recycling goals, waste management program and reporting.

B. Section 01 81 13 - SUSTAINABLE DESIGN REQUIREMENTS: Procedural and administrative requirements relating to required *Northeast CHPS Verified Program,* (NE-CHPS) Certification.

C. Section 06 10 00 - ROUGH CARPENTRY: Wood framing, blocking, nailers.

D. Section 07 21 00 – THERMAL INSULATION.

E. Section 09 22 16 - NON-STRUCTURAL METAL FRAMING.

F. Section 09 29 00 - GYPSUM BOARD: Installation of wall board over acoustical insulation.

G. Division 23 - HEATING, VENTILATING AND AIR CONDITIONING: Ductwork and piping insulation.

1.3 REFERENCES

A. Referenced Standards: Comply with applicable requirements of the following standards and those others referenced in this Section, under the provisions of Section 01 42 00 - REFERENCES. The standards referenced herein are included to establish recognized minimum quality only. Where these standards conflict with other specified requirements, the most restrictive requirements shall govern. Equivalent quality and testing standards will be acceptable, subject to their timely submission, review and acceptance by the Architect.

1. ASTM C518 - Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus.
2. ASTM C553 - Standard Specification for Mineral Fiber Blanket Thermal Insulation for Commercial and Industrial Applications.

3. ASTM C612 - Standard Specification for Mineral Fiber Block and Board Thermal Insulation.
4. ASTM C665 - Standard Specification for Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing.
5. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.
6. ASTM E96/E96M - Standard Test Methods for Gravimetric Determination of Water Vapor Transmission Rate of Materials.
7. ASTM E136 - Standard Test Method for Assessing Combustibility of Materials Using a Vertical Tube Furnace at 750°C.
8. All applicable federal, state and municipal codes, laws and regulations regarding flammability and smoke generation of interior finishes.

B. Sustainability Requirement Reference: The following sustainability requirements are hereby made a part of this Section by reference thereto:
1. High Performance Schools Exchange, Northeast Energy Efficiency Partnerships NE-CHPS, (referred to herein as “NE-CHPS”).

1.4 ADMINISTRATIVE REQUIREMENTS

A. Coordination:
1. General: Coordinate the work of this Section with the respective trades responsible for installing interfacing and adjoining work for proper sequence of installation, and ensure that the work performed hereunder is acceptable to such trades for the installation of their work.

1.5 SUBMITTALS

A. Information and Review Submittals: Submit the following under provisions of Section 01 33 00 - SUBMITTAL PROCEDURES:
1. Product Data: Manufacturer's product data sheets, specifications, performance data, physical properties for each item furnished hereunder.
2. Certificates:
a. Provide manufacturer’s written certification of recycled glass content in glass fiber acoustical insulation.
b. Provide manufacturer’s written certification of recycled slag content in mineral wool insulation.
3. Sustainable Design Submittals: As required by NE CHPS.

1.6 DELIVERY, STORAGE AND HANDLING

A. Delivery and Acceptance Requirements:
1. Do not deliver items to the site, until all specified submittals have been submitted to, and approved by, the Architect.
2. Deliver materials in original unopened packages, containers or bundles bearing brand name, and identification of manufacturer, with labels and package seals intact and legible.

B. Storage and Handling Requirements:

1. Store and handle materials following manufacturer's recommended procedures, and in accordance with material safety data sheets.
2. Protect materials from damage due to moisture, direct sunlight, excessive temperatures, surface contamination, corrosion and damage from construction operations and other causes.

C. Packaging Waste Management: Comply with packaging requirements specified under Section 01 60 00 - PRODUCT REQUIREMENTS.

1. Shipping materials: Manufacturer shall utilize to the greatest extent possible packaging materials which are biodegradable and recyclable.
2. Jobsite packaging waste management: Recycle packaging materials coordinated with general construction waste management specified under Section 01 74 19 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Acceptable Manufacturers: Subject to compliance with the requirements specified herein, manufacturers offering similar products include the following, or approved equal:

1. Fibrex Insulations Inc., Sarnia, Ontario
2. Thermafiber Inc., Wabash IN.
3. Roxul, Inc., Milton, Ontario.

2.2 MATERIALS

A. Acoustical batt insulation: Mineral wool fiber insulation batts, conforming to ASTM C665 Type 1, and ASTM C553 with a nominal density of 2.5 pounds per cubic foot.

1. Thickness: provide maximum thickness appropriate to framing depth, without compression of insulation.
   a. Thicknesses: 1, and 1.5, inches having a nominal density of 3.0 to 4 pounds per cubic foot.
   b. Thicknesses: 2, 2.5, 3, 3.5, 4, 5 and 6 inches having a nominal density of 2.5 pounds per cubic foot.
2. Flame Spread Classification: Class A (less than 25, per testing by NFPA 255, ASTM E84 or UL 723).
3. Recycled content of slag in mineral wool insulation: Use maximum available percentage of material (slag). Mineral wool insulation products incorporated into the work shall contain not less than 75 percent of recycled material (slag) by weight.
4. Acceptable products include:
   a. Fibrex Insulations Inc. product: “Fibrex Sound Attenuation Fire Batt (SAFB)”

b. Roxul, Inc., product “Roxul AFB”.

c. Thermafiber, Inc. product “Thermafiber SAFB”.

2.3 ACCESSORIES

A. Staples, tape, adhesives and fasteners required for the proper and complete installation for work of this Section shall be as recommended by each respective manufacturers of each insulation type.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install insulation in accordance with insulation manufacturer's instructions.

B. Install in interior walls, and ceiling spaces where indicated. Trim insulation neatly to fit spaces. Fit insulation tight in spaces. Leave no gaps or voids.

3.2 CLEANING

A. Daily clean work areas by sweeping and disposing of debris and scraps.

B. Upon completion of the work of this Section in any given area, remove tools, equipment and all rubbish and debris from the work area; leave area in broom-clean condition.

End of Section

Section 09 84 00

ACOUSTIC ROOM COMPONENTS

PART 1 - GENERAL

1.1 SUMMARY

A. Furnish and install interior acoustical panel systems for walls and ceilings, complete with all supporting accessories and associated work required for a complete assembly.

B. Furnish and install the following:

1. Fabric-covered mineral fiber core panels and mounting accessories.
2. Fabric-covered fiberglass core panels and mounting accessories.
3. Fabric-covered mineral fiber core ceiling baffles.
4. Fabric-covered fiberglass core ceiling baffles.

1.2 RELATED REQUIREMENTS

A. Section 01 74 19 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL: Procedural and administrative requirements relating to recycling goals, waste management program and reporting.

B. Section 01 81 13 - SUSTAINABLE DESIGN REQUIREMENTS: Procedural and administrative requirements relating to required *Northeast CHPS Verified Program,* (NE-CHPS) Certification.

C. Section 09 51 00 - ACOUSTICAL CEILINGS.

D. Section 09 91 00 - PAINTING.

1.3 REFERENCES

A. Referenced Standards: Comply with applicable requirements of the following standards and those others referenced in this Section, under the provisions of Section 01 42 00 - REFERENCES. The standards referenced herein are included to establish recognized minimum quality only. Where these standards conflict with other specified requirements, the most restrictive requirements shall govern. Equivalent quality and testing standards will be acceptable, subject to their timely submission, review and acceptance by the Architect.

1. ASTM C423 - Standard Test Method for Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method; 2002a.
2. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2005.
3. ASTM E795 - Standard Practices for Mounting Test Specimens During Sound Absorption Tests; 2005.
4. All applicable federal, state and municipal codes, laws and regulations regarding flammability and smoke generation of interior finishes.

B. Sustainability Requirement Reference: The following sustainability requirements are hereby made a part of this Section by reference thereto:

1. High Performance Schools Exchange, Northeast Energy Efficiency Partnerships NE-CHPS, (referred to herein as “NE-CHPS”).

1.4 ADMINISTRATIVE REQUIREMENTS

A. Coordination:

1. General: Coordinate the work of this Section with the respective trades responsible for installing interfacing and adjoining work for proper sequence of installation, and ensure that the work performed hereunder is acceptable to such trades for the installation of their work.

B. Sequencing:

1. Field Measurements

a. Take field measurements before preparation of shop drawings and fabrication, where possible, to ensure proper fitting of Work.

b. Allow for adjustments within specified tolerances wherever taking of field measurements before fabrication might delay Work.

1.5 SUBMITTALS

A. Information and Review Submittals: Submit the following under provisions of Section 01 33 00 - SUBMITTAL PROCEDURES:

1. Product Data: For each type of product indicated.

2. Shop drawings: Show fabrication and installation details for acoustical wall panels, including plans, elevations, sections, details, and attachments to other work.

a. Show orientation of fabric application, pattern matching, and seams.

3. Samples for Initial Selection: Manufacturer's color charts showing the full range of colors, textures, and pattern available for facing materials for each type of acoustical wall panel indicated. Include samples of installation devices and accessories.

4. Samples for Verification: 8-by-11 inch (200 by 280 mm) units of each type of acoustical wall panel indicated; in sets for each color, texture, and pattern for facing materials, showing the full range of variations expected in these characteristics. Include samples of installation devices and accessories.

5. Product Certificates: Signed by manufacturers of acoustical wall panels certifying that products furnished comply with requirements.

6. Qualification Data: For firms and persons specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.

7. Product Test Reports: From a qualified testing agency indicating acoustical wall panels comply with requirements, based comprehensive testing of current products.

8. Manufacturer’s Instructions: Written installation instructions.

9. Sustainable Design Submittals: As required by NE CHPS.
10. Qualification Submittals.

B. Closeout Submittals: Submit the following under provisions of Section 01 78 00 - CLOSEOUT SUBMITTALS.

1. Maintenance Data: For acoustical wall panels and facings to include in maintenance manuals specified in division.
2. Operation and Maintenance Data:
3. Bonds and Warranty Documentation:
    a. Manufacturer's Warranties and Guarantees as specified elsewhere herein this Section.

1.6 QUALITY ASSURANCE

A. Manufacturer Qualifications: A firm experienced in manufacturing acoustical wall panels similar to those indicated for this Project and with a record of successful in-service performance.

B. Testing Agency Qualifications: An independent testing agency, acceptable to authorities having jurisdiction, with the experience and capability to conduct the testing indicated, as documented according to ASTM E548.

C. Source Limitations for Acoustical Wall Panels: Obtain acoustical wall panels from one source with resources to provide products of consistent quality in appearance and physical properties.

D. Fire-Testing Response Characteristics: Provide acoustical wall panels with the following surface-burning characteristics as determined by testing identical products per ASTM E84 by UL or another testing and inspecting agency acceptable to authorities having jurisdiction. Identify acoustical wall panels with appropriate markings of applicable testing and inspecting agency.

1. Flame Spread: 25 or less.
2. Smoke Developed: 450 or less.

E. Mockups: Before installing acoustical wall panels, build mockups for each form of construction and finish required to verify selections made under sample Submittals and to demonstrate aesthetic effects and qualities of materials and execution. Build Mockups to comply with the following requirements, using materials indicated for the completed Work:

1. Build mockups in the location and of the size indicated or, if not indicated, as directed by Architect.
2. Notify Architect seven days in advance of dates and times when mockups will be constructed.
3. Demonstrate the proposed range of aesthetic effects and workmanship.
4. Obtain Architect's approval of mockups before starting acoustical wall panel fabrication.
5. Maintain mockups during construction in an undistributed condition as a standard for judging the completed work.

6. Demolish and remove when directed.
7. Approved mockups may become part of the completed Work if undisturbed at time of Substantial completion.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Delivery and Acceptance Requirements:
1. Do not deliver items to the site, until all specified submittals have been submitted to, and approved by, the Architect.
2. Protect acoustical panels from moisture during shipment, storage, and handling. Deliver in factory-wrapped bundles; do not open bundles until panels are needed for installation.

B. Storage and Handling Requirements:
1. Store and handle materials following manufacturer's recommended procedures, and in accordance with safety data sheets.
2. Protect materials from damage due to moisture, direct sunlight, excessive temperatures, surface contamination, corrosion and damage from construction operations and other causes.

C. Packaging Waste Management: Comply with packaging requirements specified under Section 01 60 00 - PRODUCT REQUIREMENTS.
1. Shipping materials: Manufacturer shall utilize to the greatest extent possible packaging materials which are biodegradable and recyclable.
2. Jobsite packaging waste management: Recycle packaging materials coordinated with general construction waste management specified under Section 01 74 19 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL.

1.8 PROJECT CONDITIONS

A. Environmental Limitations: Do not install acoustical wall panels until construction in spaces in complete and ambient temperature and humidity conditions are maintain at the levels indicated for Project when occupied for its intended use.

B. Air-Quality Limitations: Protect acoustical wall panels from exposure to airborne odors, such as tobacco smoke, and install panels under conditions free from color contamination of ambient air.

C. Field Maintenance: Verify wall surface dimensions by field measurements before fabrication and indicated measurements on Shop Drawings. Coordinate fabrication schedule with coordination progress to avoid delaying the Work.
1. Established Dimensions: Where field measurements cannot be made without delaying the Work, established surface dimensions and proceed with fabricating acoustical wall panels without field measurements. Coordinate wall construction to ensure that actual surface dimensions correspond to establish dimensions.

1.9 WARRANTY

A. General: Submit the following warranties under provisions of Section 01 78 00 - CLOSEOUT SUBMITTALS, and in compliance with Section 01 78 36 – WARRANTIES.

B. General Warranty: Special warranty specified in this Article shall not deprive Owner of other rights Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties make by Contractor under requirements of the Contract Documents.

C. Special Warranty: Written warranty, signed by manufacturer agreeing to repair or replace components of acoustical wall panel system that fail in performance, materials, or workmanship within specified warranty period. Failure in performance includes, but is not limited to, acoustical performance. Failure in materials includes, but is not limited to, sagging or distortion of facing or warping of core.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Specified Manufacturer: To establish a standard of quality, design and function desired, Drawings and specifications have been based on the products and materials specified in the following Articles.

B. Acceptable Manufacturers: Subject to compliance with the requirements specified herein, manufacturers offering products which may be incorporated in the work include the following, or approved equal:

1. Sound Concepts Canada, Inc., Manitoba, Canada
2. AVL Systems Inc., Ocala, FL.
3. Conwed Corporation, Ladysmith, WI.
4. Corporate Acoustic Systems, Poughkeepsie, NY.
5. Decoustics, Etobicok, Ontario, Canada.
6. Martin Acoustical Products, Bogart, GA.
7. Tectum Inc., Newark, OH.
8. Wenger Corporation, Owatonna, MN.
9. Koroseal Interior Products Group, Fairlawn, OH.

2.2 ACOUSTICAL WALL PANELS

A. Wall acoustical panels, Type xx (Student Commons, Auditorium, Band, Music, and Gymnasium).

1. Basis of Design: HIR (high impact resistant) Reflect panels by Sound Concepts or approved equal.
2. Panel thickness: 2 inches
3. Panel width: Custom, as indicated.
4. Panel core: 7 lb./ft.3 density rigid fiberglass core board with chemically-hardened (resin) edges and an acoustical reflective facer fused to core.

5. NRC rating: 0.90 minimum.
6. Panel finish: Guilford of Maine, pattern “FR701”, in colors selected by Architect from fabric manufacturer’s full range of colors..
7. Panel edge: Square
8. Mounting style: Concealed “Z” clip.
9. Colors: As selected by the Architect from the manufacturer’s full range of available colors.

B. Wall acoustical panels, Type xx (Band, Music, and Auditorium).
1. Basis of Design: LFT (low frequency tuner) panel by Sound Concepts or approved equal.
2. Panel thickness: 2 inches.
3. Panel width: Custom, as indicated.
4. Panel core: 7 lb./ft.3 density rigid fiberglass core board with chemically-hardened (resin) edges.
5. Panel finish: Vinyl covered, manufacturer’s standard in color/pattern selected by Architect.
6. Panel edge: Square.
7. Mounting style: Concealed “Z” clip.

C. Wall acoustical panels, Type xx (Auditorium and Student Commons).
1. Basis of Design: HIR (high impact resistant) Reflect panels by Sound Concepts or approved equal.
2. Panel thickness: 1 inch.
3. Panel width: Custom, as indicated.
4. Panel core: 7 lb./ft.3 density rigid fiberglass core board with chemically-hardened (resin) edges and an acoustical reflective facer fused to core.
5. NRC rating: 0.90 minimum.
6. Panel finish: Guilford of Maine, pattern “FR701”, in colors selected by Architect from fabric manufacturer’s full range of colors..
7. Panel edge: Square
8. Mounting style: Concealed “Z” clip.
9. Colors: As selected by the Architect from the manufacturer’s full range of available colors.

2.3 CEILING MOUNTED ACOUSTICAL WOOD FIBER PANELS

A. Ceiling Acoustical Panel Type xx:
1. Basis of Design: Wenger Pyramidal Ceiling diffuser, clip model.
2. Panel thickness: 6 inches.
3. Panel size: 24 by 24 inches.
4. Panel core and finish; Manufacturer’s standard construction of thermos-molded plastic, 0.125” (3mm) material thickness with white “lemon peel” finish.

5. Mounting: Hook mounting is attached to panel edges at each corner; panels are suspended by wire to ceiling.

2.4 FABRICATION

A. Fabricate panels to sized and configurations indicated; where required, attach facing materials to cores to produce installed panels with visible surfaces fully covered and free from waves in fabric weave, wrinkles, sage, blisters, seams, adhesive, or other foreign matter.

1. Fabricate back-mounted panels in factory to exact sized required to fit wall surfaces, based on field measurements of completed substrates indicated to receive acoustical wall panels.
2. Where square corners are indicated, tailor corners.
3. Where fabrics with directional or repeating patterns, or directional weave, are indicated, mark fabric top and attach fabric in same direction.
4. Where fabric facings with seams are indicated, fabricate invisible seams and comply with Shop Drawings for location.
5. Where radiused or mitered corners are indicated, install fabric to avoid seams or gathering of material.
6. For panels suspended from ceiling, provide fabric covering both sides, with seams only at panel edges.

2.5 ACCESSORIES

A. Spline-Mounting Accessories: Manufacturer's standard concealed connecting splines of extruded aluminum or plastic designed for screw attachment to walls, with coordinating moldings and trim for interior and exterior corners and miscellaneous conditions.

1. Color of Exposed Trim: As selected from manufacturer's standards; to match fabric.

B. Back-Mounting Accessories: Manufacturer's standard accessories for concealed support, designed to allow panel removal, and as follows:

1. Two-part clip and base-support bracket system; brackets designed to support full weight of panels and clips designed for lateral support, with one part mechanically attached to back of panel and the other attached to substrate.
2. Metal impaling clips designed to support full weight of panels, mechanically attached to substrate and adhesively bonded to back of panels.
3. Hook and loop strips adhered to substrate and to back of panels.
4. Z-clip hanger and magnet system with magnets recessed into panel frame and designed to engage steel mounting plates secured to substrate with screws.
5. Mechanically Mounted Metal-Framed Panels: Metal panel-clip system designed to engage metal framing of panels.

C. Ceiling-Suspended Accessories: Manufacturer's standard through-threaded eyelets bolted through concealed perimeter frame at 1/4 points; locations indicated on each panel, sized appropriately for weight of panels.

1. Provide galvanized wire; galvanized chain for suspension from ceiling at heights indicated.

D. Trim Moldings: Manufacturer's standard wood or vinyl trim moldings for concealing panel joints; color as selected from manufacturer's standards.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and blocking with Installer present, for compliance with requirements for installation tolerances and other conditions affecting acoustical wall panel performance. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Install acoustical panels in locations indicated, following installation recommendations of panel manufacturer. Align panels accurately, with edges plumb and top edges level. Scribe to fit accurately at adjoining work and penetrations.

B. Suspend ceiling baffles at locations and heights indicated.

C. Install panels to the following construction tolerances:

1. Plumb and level: plus or minus 1/16 inch.
2. Flatness: plus or minus 1/16 inch.
3. Width of joints: plus or minus 1/16 inch.

3.3 CLEANING

A. Clean fabric facing upon completion of installation from dust and other foreign materials, following manufacturer's instructions.

B. Remove surplus materials, trimmed portions of panels, and debris resulting from installation.

C. Clip loose threads; remove pills and extraneous materials.

3.4 PROTECTION OF FINISHED WORK

A. Provide protection of installed acoustical panels until completion of the Work.

B. Replace panels that cannot be cleaned and repaired to satisfaction of the Architect, before time of substantial completion.

End of Section

Section 09 91 00
PAINTING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes: This Section consists of painting work where shown on the Drawings, as specified herein, and as required for a complete and proper installation. Painting work includes, but is not limited to the surface preparation and application of coated finishes, and subsequent touch-up, of interior and exterior items and surfaces as indicated on the Contract Drawings and as scheduled herein.

1. No attempt is made in this Section to list all surfaces, fixtures and equipment requiring painting on this project. It is the responsibility of the Subcontractor to determine for itself the scope and nature of the Work required for a complete installation from the information provided herein and in the Drawings.

B. Surfaces and Materials: In general, without limiting the generality thereof, the following surfaces, fixtures and equipment require a painted finish:

1. Gypsum board partition and wall surfaces, ceilings and soffits.
2. Metal doors and frames.
3. Wood doors, designated to receive field painted finish.
4. Interior handrails and guardrails.
5. Wood trim.
6. Roof top equipment.
7. Exposed to view structural steel.
8. Factory primed aluminum counter supports.
9. Exposed to view sprinkler piping.
10. Exposed to view electrical conduit and raceways.
11. Exterior galvanized handrails.
12. Elevator ladder, exposed to view lintels and other miscellaneous metal items furnished under Section 05 50 00 - METAL FABRICATIONS which are not factory finished.
13. Access panels and frames.
14. Gromments at Gymnasium Ceiling.

C. DO NOT PAINT the following surfaces and materials.

1. Concealed from view surfaces, except as indicated otherwise in the Contract Documents or as specified herein.
2. Chrome or nickel plating, stainless steel, bronze, brass.
3. Aluminum other than mill finished or factory primed.
4. Factory finished mechanical and electrical equipment, pumps, machinery and similar items which occur in mechanical, storage or equipment rooms or areas.
5. Factory finished materials, specialties, and accessories unless otherwise specified.

6. Tile, terrazzo, acoustical tile, resilient flooring, wood flooring, and other integrally finished floor, wall and ceiling finishes.
7. Prefinished millwork items.
8. Fire resistant testing and certification labels, code required labels, safety warning labels, performance rating plates, nomenclature plates, identification plates, and similar other labels.

1.2 RELATED REQUIREMENTS

A. Section 01 74 19 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL: Procedural and administrative requirements relating to recycling goals, waste management program and reporting.

B. Section 01 81 13 - SUSTAINABLE DESIGN REQUIREMENTS: Procedural and administrative requirements relating to required *Northeast CHPS Verified Program,* (NE-CHPS) Certification.

C. Section 03 30 00 - CAST-IN-PLACE CONCRETE: Concrete partitions and walls.

D. Section 04 20 00 - UNIT MASONRY: Concrete masonry partitions.

E. Section 05 12 00 - STRUCTURAL STEEL FRAMING: Shop priming of structural steel framing.

F. Section 05 50 00 - METAL FABRICATIONS: Shop priming of designated miscellaneous metals.

G. Section 06 20 00 - FINISH CARPENTRY: Wood trim items, setting and filling of nails, sanding of wood trim.

H. Section 07 92 00 - JOINT SEALANTS: Requirements for sealant and backing materials.

I. Section 08 11 13 - HOLLOW METAL DOORS AND FRAMES: Shop priming of metal frames and steel doors.

J. Section 08 14 16 - FLUSH WOOD DOORS: Wood doors, both prefinished and unfinished.

K. Section 08 31 00 - ACCESS DOORS AND PANELS: Shop primed access panels, occurring in partitions and walls.

L. Section 09 29 00 - GYPSUM BOARD: Drywall partitions, ceilings and soffits, including joint treatment and sanding.

M. Document 09 91 13 - EXTERIOR PAINTING SCHEDULE: Painting schedule for exterior surfaces and materials:

N. Document 09 91 23 - INTERIOR PAINTING SCHEDULE:
   1. Painting schedule for interior surfaces and materials.
   2. Painting schedule for Mechanical and Electrical Equipment.

O. Section 09 96 00 - HIGH-PERFORMANCE COATINGS.

P. Section 10 40 00 - SAFETY SPECIALTIES: Shop priming of cabinet doors and frames; shop finishing of cabinet.

Q. Division 22 - PLUMBING: Prefinished items such as plumbing fixtures, sprinkler heads, convectors, anemostates and similar surfaces and materials.

R. Division 26 - ELECTRICAL: Prefinished items such as light fixtures, switch gear, electrical distribution cabinets and similar surfaces and materials.

S. Respective sections: Factory-finishing of food service, mechanical, plumbing, fire protection and electrical equipment.

1.3 REFERENCES

A. Referenced Standards: Comply with applicable requirements of the following standards and those others referenced in this Section, under the provisions of Section 01 42 00 - REFERENCES. The standards referenced herein are included to establish recognized minimum quality only. Where these standards conflict with other specified requirements, the most restrictive requirements shall govern. Equivalent quality and testing standards will be acceptable, subject to their timely submission, review and acceptance by the Architect.

1. ANSI/ASTM D16 - Definitions of Terms Relating to Paint, Varnish, Lacquer, and Related Products.
2. ASTM D2016 - Test Method for Moisture Content of Wood.
3. SSPC-Vis1 - Pictorial Surface Preparation Standards for Painting Steel Structures.
4. SSPC-SP2 - Steel Structures Painting Manual, Volume 2, Systems and Specifications.
5. All applicable federal, state and municipal codes, laws and regulations for flammability and smoke generation of interior finishes.

B. Definitions:

1. "Paint" includes coating systems materials, primers, emulsions, enamels, stains, sealers and fillers, and other applied materials specified herein, whether used as prime, intermediate or finish coats.
2. Sheen: Specular gloss readings in accordance with ASTM D52.
    a. Flat: less than 5 (measured at 85 degrees).
    b. Eggshell: 5 – 20 (measured at 60 degrees).
    c. Satin: 15-35 (measured at 60 degrees).
    d. Low Luster: 25 – 35 (measured at 60 degrees).
    e. Semi-Gloss: 30 -65 (measured at 60 degrees).
    f. Gloss: 65 or more (measured at 60 degrees).
3. Gloss as defined for LEED VOC requirements. Specified specular gloss readings below are as tested in accordance with ASTM D52.
    a. Flat: less than 15 (measured at 85 degrees), less than 5 (measured at 60 degrees).
    b. Non-Flat: greater than 15 (measured at 85 degrees), greater than 5 (measured at 60 degrees).

C. Sustainability Requirement Reference: The following sustainability requirements are hereby made a part of this Section by reference thereto:

1. High Performance Schools Exchange, Northeast Energy Efficiency Partnerships NE-CHPS, (referred to herein as “NE-CHPS”).

1.4 ADMINISTRATIVE REQUIREMENTS

A. Coordination:

1. General: The applicator of work specified herein is responsible to ensure that all paints, enamels, and coatings, proposed to be applied hereunder, are compatible with coatings used for shop-primed items and items which have been prime-coated under the work of other trades.
2. Immediately notify the Architect in writing of conditions which may require a change in the specifications of this Section before proceeding with the work. Failure to do so, in a timely fashion, so as not to interfere with the schedule of work of this Contract, shall be construed as acceptance of the coatings specified. Perform all corrective measures, at no cost to the Owner, for any defects in the work, resulting from the use of such materials.

B. Scheduling:

1. Sequence painting work to ensure primers and painting is not applied until building is enclosed, sufficient heat is provided, all dust-generating activities have terminated, wet work is dry and cured, and work overhead is completed.
    a. Painting work should be scheduled so as to minimize touch-ups. Interior painting is to be without flashmarks. Should flashmarks occur due to touch-ups, the Contractor shall be required to redo the entire surrounding wall surface.
    b. Concrete, masonry, plaster, tile and marble setting and polishing and other wet work shall be completed and dry before commencement of painting work.
    c. Finish flooring and ceiling work may be scheduled by Contractor to be completed after painting. In such cases, paint subcontractor is required to perform touch-ups as necessary following floor and ceiling installations, without additional cost to Owner.

C. Do not order materials until all required schedules have been properly submitted, reviewed by the Contractor and Approved by Architect.

1.5 SUBMITTALS

A. Information and Review Submittals: Submit the following under provisions of Section 01 33 00 - SUBMITTAL PROCEDURES:

1. Literature: Manufacturer's product data sheets, specifications, performance data, physical properties, material compositions, and application instructions for all finishing products to be applied hereunder.
    a. Include certification of data indicating Volatile Organic Compound (VOC) content of all paint materials.
2. Samples:
    a. Manufacturer's color selector for custom mixed colors for Architect's color scheduling.

b. Opaque coatings: Two 9 x 12 inch finished samples on hardboard of each color scheduled in each finish for review and approval. Identify boards with finish type, color mix number and scheduled substrate surfaces or materials.

c. Transparent finishes and stains: Two 9 x 12 inch finished samples on same species of solid wood and plywood to be furnished under Section 06 20 00 - FINISH CARPENTRY, of each color scheduled in each finish for review and approval. Identify boards with finish type, color mix number and scheduled substrate surfaces or materials.

B. Submit the following under provisions of Section 01 78 00 - CLOSEOUT SUBMITTALS:

1. Color chips: After final approval of all colors and tints by the Architect, submit to the Owner, color chips of all coatings used, with manufacturer's name and mix designation of the coating for the purpose of future re-ordering of coatings. Color chips shall be at least six (6) square inches in size, for each color and tint.
2. Sustainable Design Submittals: As required by NE CHPS.

1.6 QUALITY ASSURANCE

A. Single source responsibility: Provide primers and other undercoat paint produced by same manufacturer as finish coats. Use only thinners approved by paint manufacturer, and use only within recommended limits.

B. Environmental Requirements for Volatile Chemicals: The volatile organic compound (VOC) content of all field-applied architectural paints, used on the interior walls and ceilings of this Project must meet the VOC limits defined in the California Air Resources Board (CARB) 2007, Suggested Control Measure (SCM) for Architectural Coatings or the South Coast Air Quality Management District (SCAQMD) Rule 1113, and effective February 5, 2016, refer to Section 09 91 00 – Painting for additional restrictions and requirements.

1. For interior applications use paints and coatings that comply with the following limits for VOC content when calculated according to 40 CFR 59, Subpart D (EPA method 24) and the following chemical restrictions:

		VOC Limit [g/L less water]
a.	Flat coatings	50
b.	Nonflat coatings	10
c.	Nonflat - High gloss coatings	150
d.	Aluminum roof coatings	400
e.	Basement specialty coatings	400
f.	Bituminous roof coatings	50
g.	Bituminous roof primers	350
h.	Bond breakers	350
i.	Concrete curing compounds	350
j.	Concrete/Masonry sealers	100
k.	Driveway sealers	50
l.	Dry-fog coatings	150
m.	Faux finishing coatings	350

n.	Fire resistive coatings	350
o.	Floor coatings	100
p.	Form-release compounds	250
q.	Graphic arts coatings (sign paints)	500
r.	High temperature coatings	420
s.	Industrial maintenance coatings	250
t.	Low solids coatings	120
u.	Magnesite cement coatings	450
v.	Mastic texture coatings	100
w.	Metallic pigmented coatings	500
x.	Multi-color coatings	250
y.	Pre-treatment wash primers	420
z.	Primers, sealers, and undercoaters	100
aa.	Reactive penetrating sealers	350
bb.	Recycled coatings	250
cc.	Roof coatings	50
dd.	Rust preventative coatings	250
ee.	Shellac - Clear	730
ff.	Shellac - Opaque	550
gg.	Specialty primers, sealers, and undercoaters	100
hh.	Stains	250
ii.	Stone consolidants	450
jj.	Swimming pool coatings	340
kk.	Traffic marking coatings	100
ll.	Tub and tile refinish coatings	420
mm.	Waterproofing membranes	250
nn.	Wood coatings	275
oo.	Wood preservatives	350

2. Emissions Testing: All interior paints must be tested and determined compliant in accordance with California Department of Public Health (CDPH) Standard Method V1.2-2017, including statement of total VOCs after 14 days.
3. Do not use water based paints formulated with aromatic hydrocarbons (organic solvent with a benzene ring in its molecular structure), formaldehyde, halogenated solvents, mercury or mercury compounds, or tinted with pigments of lead, cadmium, chromium VI and their oxides. Water based paints shall be low VOC and shall have a flash point of 61 degrees C or greater.
4. Where it is necessary to use solvent-based paints, with less than 1.0 percent by weight total aromatic compounds (hydrocarbon compounds containing one or more benzene rings).
5. The following shall be low VOC and not be formulated with aromatic hydrocarbons (organic solvent with a benzene ring in its molecular structure).
   a. High performance water based acrylic coatings.

b. Pigmented acrylic sealers.
c. Catalyzed epoxy coatings.
d. High performance silicone grafted epoxy coatings.

6. Restricted Components: Paints and coatings used on this Project shall not contain any of the following compounds. (Excluded from this restriction are residual quantities of naturally occurring elements and chlorinated organics which are found in chlorinated water supplies; contaminate levels shall be below that of the National Primary Drinking Water Standard):
   a. 1,2-dichlorobenzene
   b. Alkylphenol ethoxylates (APEs)
   c. Formaldehyde-donors
   d. Heavy metals, including lead, mercury, cadmium, hexavalent chromium and antimony in the elemental form or compounds
   e. Phthalates
   f. Triphenyl tins (TPT) and tributyl tins (TBT).

1.7 FIELD SAMPLES

A. Provide field samples under provisions of Section 01 45 00 - QUALITY CONTROL for purpose of verifying selected colors.

B. Paint on-site sample areas, minimum 40 square feet, illustrating selected color, and tint.

C. Locate samples where directed. The Contractor shall provide in the base Contract, a total amount of samples equal to one sample per room.

D. Accepted samples may not remain as part of the work.

1.8 DELIVERY, STORAGE AND HANDLING

A. Deliver products to site in sealed and labeled containers; container labeling shall include manufacturer's name, type of paint, color mix designation, expected coverage, surface preparation instructions, instructions for mixing and reducing, drying time, and clean-up recommendations.

B. Store materials, conforming with applicable codes and fire regulations, in designated spaces. Keep storage area secure when direct access is not required or when not performing work under this Section. Take precautionary measures to prevent fire hazards and spontaneous combustion, maintain a dry-chemical type fire extinguisher in all areas where materials of this Section are being stored or used.

C. Store paint materials in a well-ventilated area at minimum ambient temperature of 45 degrees Fahrenheit and a maximum of 90 degrees Fahrenheit.

D. Do not use the sanitary system for mixing or disposal of refuse material. Carry water to mixing rooms and dump waste material in a suitable refuse receptacle. Remove oily rags and waste each day.

1.9 PROJECT CONDITIONS

A. Provide continuous ventilation and heating facilities to maintain surface and ambient temperatures above 45 degrees Fahrenheit for 24 hours before, during and 48 hours after application of finishes, unless required otherwise by manufacturer's instructions.

B. Apply paints and finishes above minimum temperature conditions in strict accordance with manufacturer's instructions.

1. Do not apply exterior coatings during rain or snow, or when relative humidity is above 50 percent unless required otherwise by manufacturer's instructions.

C. Provide sufficient lighting to maintain 80 foot-candles measured mid-height at substrate surface.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Acceptable Manufacturers: Subject to compliance with the requirements specified herein, manufacturers offering products which may be incorporated in the work include the following, or approved equal:

1. Paints and general finishes:
    a. Benjamin Moore & Company, Montvale, NJ.
    b. California Paints, Andover MA.
    c. PPG Paint, Pittsburgh PA.
    d. Pratt & Lambert Inc., (division of Sherwin Williams), Buffalo, NY.
    e. Sherwin Williams, Cleveland OH.
2. Green Screen Paint:
    a. Rosco Laboratories, Inc., Stamford CT.
    b. ProCyc, Inc., Clackamas, OR.
    c. Ticonderoga Ventures, Inc., (Chromakey.org) New York, NY.
3. Interior stains and clear finishes for wood
    a. Samuel Cabot, Inc., Cleveland OH.
    b. PPG Architectural Finishes Inc., Olympic Home Care Products Division, Pittsburgh PA.
4. Cold galvanizing touch-up paint:
    a. ZRC Worldwide Inc., Marshfield MA.
    b. Duncan Galvanizing, Everett, MA.
    c. Rustoleum Corp., Vernon Hills IL.
5. Anti-graffiti Coatings:
    a. ProSoCo, Kansas City, KS.
    b. Rainguard Products Company, Newport Beach, CA.
    c. The Euclid Chemical Company, Cleveland, OH.

2.2 MATERIALS

A. Coatings: Ready mixed, except for field catalyzed coatings with good flow and brushing properties; capable of drying or curing free of streaks or sags. Color pigments shall be processed to a soft paste consistency, capable of being readily and uniformly dispersed to a homogeneous coating. Provide best quality grade, where manufacturer makes more than one grade of any material specified.

B. Liquid zinc coating, for touch-up of welds, scratches, and abrasions in galvanized steel: Low VOC organic zinc-rich coating containing 92% metallic zinc, by weight in the dried film (ASTM D520, Type III) and conforming to SSPC Paint 20, Type II, Level 1. Liquid zinc coating shall be recognized under the Component Program of Underwriter's Laboratories, Inc. as an equivalent to hot-dip galvanizing; conforming to MIL-P-21035B and SSPC Paint 29, Type II, Level I, for repair of hot-dip galvanizing and meeting the requirements for Zinc-Rich Paints.

1. VOC limit: not more than 250 g/L.
2. Specified manufacturer and product: ZRC Worldwide, Marshfield MA, product “ZRC-221”.

2.3 ACCESSORIES

A. Accessory materials: other materials not specifically indicated, but are required to achieve the finishes specified of commercial quality.

B. Cleaning Materials: Tri-Sodium Phosphate (TSP) substitute. Acceptable products include the following, or approved equal:

1. Savogran, Norwood MA, products “TSP-PF”, or “Liquid TSP Substitute”.
2. Custom Building Products, Seal Beach, CA., product “Custom T.S.P. Substitute”.
3. DAP Inc., Baltimore MD., product “T.S.P. Substitute Heavy Duty Cleaner”.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Inspect all surfaces and verify that they are in proper condition to receive the work of this Section. Notify Contractor of any condition that may potentially affect proper application of coatings.

B. Measure moisture content of surfaces, do not apply finishes unless moisture content of surfaces are below the following maximums:

1. Gypsum board and joint treatment: 12 percent.
2. Masonry or concrete: 12 percent.
3. Interior wood: 15 percent.
4. Exterior wood: 18 percent.

C. Beginning Work of this Section means acceptance of substrate surfaces and site conditions.

3.2 PREPARATION

A. Furnish and lay suitable drop cloths in all areas where coating work is being done to protect floors and all other surfaces from damage during the work. Protect adjoining surfaces with painters mask tape.

B. Prior to preparing surfaces or finishing, remove all finish hardware for painting doors and frames, except hinges and locks on exterior door; remove electrical plates, light fixture trim and fittings. Re-install hardware and other removed items after painted surfaces are thoroughly dry.

C. Mix coatings thoroughly, unless otherwise directed by the manufacturer of the specific coating used, to ensure uniformity of color and mass. Strain previously opened coatings to remove skins, lumps, and other foreign matter prior to painting.

D. Thin or reduce materials only as recommended by the specific material manufacturer, and only with the approval of the Architect.

E. Impervious surfaces: Remove mildew by scrubbing with solution of tri-sodium phosphate and bleach. Rinse with clean water and allow surface to thoroughly dry.

F. Brick, existing interior walls and partitions scheduled to receive paint:
   1. Remove existing paint.
   2. Remove all loose scale and mortar, dirt, salt or alkali powder and any other surface contaminate, using a detergent expressly formulated for cleaning of concrete and masonry.
   3. Remove oil and grease with a solution of tri-sodium phosphate.
   4. Thoroughly rinse the cleaned surfaces with clear water, and allow the surfaces to completely dry, allow a minimum of 24 hours before commencing application of coatings.

G. Concrete and unit masonry surfaces scheduled to receive paint finish:
   1. Remove all loose scale and mortar, dirt, salt or alkali powder and other surface contaminates, using a detergent expressly formulated for cleaning of concrete and masonry.
   2. Remove oil and grease with a solution of tri-sodium phosphate.
   3. Remove stains caused by weathering corroding metals with a solution of sodium metasilicate after thoroughly wetting with water.
   4. Thoroughly rinse the cleaned surfaces with clear water, and allow the surfaces to completely dry, allow a minimum of 4 hours before commencing application of coatings.

H. Uncoated steel and iron surfaces:
   1. Remove grease, scale, dirt, rust, and all foreign materials, down to bright metal by wire brushing, scraping, sanding, or sandblasting where heavy coatings of scale are evident.
   2. Wash steel with solvent, apply a treatment of phosphoric acid solution, ensuring weld joints, bolts and nuts are similarly cleaned.
   3. Spot prime after repairs with metal primer product of the finish coating manufacturer.

I. Shop primed steel surfaces:
   1. Remove rust, blistered and defective shop prime paint, and all foreign materials, down to bright metal by wire brushing, scraping, sanding, or commercial paint remover. Feather edges to make touch-up patches inconspicuous.
   2. Remove all grease or dirt with mineral spirits.
   3. Spot prime bare metal with metal primer product of the finish coating manufacturer. Seal top and bottom edges of metals doors with primer.

J. Previously painted steel surfaces:
   1. Remove rust, blistered and defective paint, down to bright metal by wire brushing, scraping, or sanding. Feather edges to make touch-up patches inconspicuous as possible
   2. Remove grease, dirt and all foreign materials.
   3. Spot prime bare metal with metal primer product of the finish coating manufacturer.

K. Previously painted surfaces to receive wall covering:
   1. Sand with 320 grit waterproof paper until surfaces are uniformly abraded.

L. New galvanized surfaces to receive field apply paint:
   1. Prepare surfaces in accordance with SSPC-SP16 to achieve a surface profile of 0.5 to 1.5 mils.

M. Aluminum surfaces scheduled for paint finish:
   1. Remove surface contamination by steam or high pressure water.
   2. Remove oxidation with acid etch and solvent washing.
   3. Apply etching primer immediately following cleaning.

N. New interior wood items scheduled to receive paint (opaque) finish.
   1. Smooth minor defects and remove all foreign matter by sanding, and if necessary, steel wool.
   2. Wash sap spots and knots with mineral spirits. When dry, touch up knots, pitch streaks, and sappy sections with commercial stain sealer.
   3. Fill up nail holes and cracks with wood putty or plastic wood after primer of first coat of finish is dry, and sand smooth.

O. New exterior wood scheduled to receive paint finish.
   1. Smooth minor defects by sanding and/or by the use of steel wool. Remove all foreign matter with commercial paint remover and fine sandpaper.
   2. Treat wood with a dip or heavy flood coat of Water Repellant Wood Preservative, allow to dry. Touch up knots, pitch streaks, and sappy sections with commercial stain sealer.
   3. Fill up nail holes and cracks with wood putty or plastic wood after primer of first coat of finish is dry, and sand smooth.

P. New cellular PVC exterior trim to receive paint finish:

1. Exterior PVC trim: If recommended by manufacturer, lightly sand surfaces and remove all sanding dust and foreign materials. Fill minor dents and defects with sealant Type P1 as specified in Section 07 92 00 - JOINT SEALANTS.

Q. Gypsum board surfaces: Fill minor defects with latex based spackle. Spot-seal all compound surfaces and repair areas in gypsum board, with specified first coat material before application of the first coat.

3.3 APPLICATION

A. Apply all materials in strict accordance with the approved manufacturer's printed instruction, and in accordance with the best trade practices. Each coat shall be reviewed and approved by the Architect before succeeding coats are applied.

B. Do not apply successive coating until the preceding coat is thoroughly dry, and in no case in less than 24 hours after the preceding coat.

C. Number of coats is indicated under Painting Schedules. Number of coats is indicated as a minimum number to be applied over scheduled substrates. An additional coat or coats may be required for proper color coverage of substrate as determined by the Architect, at no additional cost to the Owner. Examples of these conditions include, but are not limited to:

1. Dark colored substrates may require an additional primer or intermediate coat to stabilize color, if final applied top-coat color is light.
2. Pre-finished or pre-primed products may require an additional field applied coat to stabilize the shop/factory applied base color prior to application of top-coat finishes.
3. Dark color top coat finishes may require additional finish coat over white or light colored substrates to obtain correct color density.

D. Apply each coat to a uniform finish; Apply primer and first coat of slightly lighter in color tint than the scheduled color of the final coat.

E. Sand lightly between coats to achieve required finish and remove sanding dust prior to applying succeeding coat.

F. Where clear finishes are required, tint fillers to match wood. Work fillers into the grain before set. Wipe excess from surface.

G. Prime back surfaces of all interior and exterior woodwork scheduled for painted finish with primer.

H. Prime back surfaces of interior woodwork scheduled to receive stain or varnish finish with gloss varnish reduced 25 percent with mineral spirits.

3.4 APPLICATION – CONCRETE MASONRY

A. Apply block filler to concrete masonry partitions at maximum rate allowed by coating manufacturer. Apply by airless spray followed by back rolling to force material into voids. Use a squeegee to remove excess material prior to initial set, and provide a smooth surface texture. After initial set, touch-up and fill apparent voids and holidays with fresh material.

3.5 CLEANING

A. Upon completion of the work in each area, remove all coating splatters from glass, prefinished surfaces, bright metals, and from other surfaces that have not been painted or finished hereunder. Do not use abrasive paper or abrasive cleaner on any prefinished surface or bright metal. Remove all materials and debris; leave work area in a clean condition.

3.6 PROTECTION AND TOUCH-UP

A. During painting work, protect the work of other trades against undue soilage and damage by the exercise of reasonable care and precautions. Properly clean, repair or replace any work so damaged and soiled.

B. Protect all painted and finished surfaces against damage until the date of final acceptance of the work. The Architect will conduct a final review of all work performed hereunder. Re-coat or touch-up, all scratches and other blemishes on surfaces, and as directed by the Architect, any areas found which do not comply with the requirements of this Section, and bear all costs therefore.

C. Any re-coating or touch-up work, required after the work of this Section has been reviewed and accepted by the Architect, will be paid for by the Contractor.

3.7 PAINTING SCHEDULE

A. Colors: The Architect will furnish a schedule of colors for each area and surface. Tinting and matching shall be to the satisfaction of the Architect. No limit is placed on the number of colors that may be required, or the number of colors in any one room, area, or surface. Premium paints of deep-hued, bright, pigment intensive, accent and primary colors may be scheduled for up to 25 percent of all interior and exterior surfaces without additional cost to the Owner.

B. Colors of priming coats (and body coats where specified) shall be lighter in tint than those of finish coat.

C. Colorants: Pure, non-fading pigments, mildew-proof, ultra-violet resistant, finely ground in approved medium; and be limeproof, when used in coatings to be applied on masonry, concrete, plaster, and gypsum board surfaces.

D. Paint schedule for exterior surfaces and materials: Refer to Document 09 91 13.

E. Paint schedule for interior surfaces and materials: Refer to Document 09 91 23.

F. Paint schedule for labeling and identifying fire resistive and rated designations : Refer to Document 09 91 23.

G. Painting schedule for mechanical and electrical equipment: Refer to Document 09 91 23.

End of Section

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Document 09 91 13

EXTERIOR PAINTING SCHEDULE

PART 1 - GENERAL

1.1 GENERAL PROVISIONS

A. General: Number of coats scheduled herein below is minimum required, refer to Article entitled “APPLICATION” in specification Section 09 91 00 - PAINTING, regarding coverage.

1.2 PAINTING SCHEDULE FOR EXTERIOR SURFACES AND MATERIALS

A. Exterior METAL, galvanized (including structural steel canopies), excluding exterior handrails:
   1. Touch-up galvanizced coating with cold galvanizing paint.
   2. One coat of epoxy primer (dry film coat 3.0 to 4.0 mils)
      a. Moore: “Corotech Polyamide Epoxy Coating”, V400 series.
      b. PPG: “Amerlock 400 @ 4.0-6.0 mils DFT.
      c. Sherwin-Williams: “Macroproxy 646 Fast Cure” @ 3.0-5.0 mils DFT.
   3. Two coats of gloss finish epoxy coating (dry film coat 1.5 to 2.0 mils).
      a. Moore: “Corotech Aliphatic Acrylic Urethane” V500 series.
      b. PPG: “Pitt-Thane Ultra Urethane Enamel”, 95-812 Series.
      c. Sherwin-Williams: "Hi-Solids Polyurethane-Low VOC", B65 Series/B60 V 30 @ 3.5 mils DFT.

B. Anti-Graffiti coating over exterior concrete and masonry at indicated/scheduled locatons:
   1. Two coats of anti-graffiti coating
      a. ProSoCo, Kansas City, KS. product “Blok Guard & Graffiti Control WB15”. (Basis of Design).

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Document 09 91 23

INTERIOR PAINTING SCHEDULE

PART 1 - GENERAL

1.1 GENERAL PROVISIONS

A. General: Number of coats scheduled herein below is minimum required, refer to Article entitled “APPLICATION” in specification Section 09 91 00 - PAINTING, regarding coverage.

1.2 MANUFACTURER’S DESIGNATIONS

A. Manufacturer’s designations used in Schedule are defined as follows:

1. “California”: California Paints, Andover MA.
2. “Moore”: Benjamin Moore & Company, Montvale, NJ.
3. “PPG”: PPG Paints / PPG Industries, Inc., Pittsburgh PA.
4. “Sherwin Williams”: Sherwin Williams, Cleveland OH.
5. “Tnemec”: Tnemec Company, Inc., Kansas City, MO.

1.3 PAINTING SCHEDULE FOR INTERIOR SURFACES AND MATERIALS

A. Interior CONCRETE floors, (where schedule to be painted):

1. Two coats latex floor paint:
   a. California: “Allflor Epoxy Fortified Floor Enamel”, Nº. 530xx.
   b. Moore: “Moore's Latex Floor & Patio Enamel”, Nº. 122
   c. PPG: “Urethane Modified 100% Acrylic Latex Floor Porch & Deck Stain Latex”, 3-510 Series.
   d. Sherwin-Williams: “High Performance Floor Enamel”, A32 Series.

B. Interior CONCRETE MASONRY walls and partitions:

1. One coat block filler:
   a. California: “Mason-Cote 100% Acrylic Latex Block Filler”, Nº. 3751.
   b. Moore: “Ultra Spec Masonry Acrylic Sealer 608
   c. PPG: “Speedhide Interior Masonry Latex Block Filler”, 6-7 Series.
   d. Sherwin-Williams: "PrepRite Int. Ext Block Filler”, B25-W25 Series.
2. Two coats semi-gloss paint:
   a. California: “Fres-Coat Unite100% Acrylic Latex Semi-Gloss”, Nº. 563.
   b. Moore: “Ultra Spec 500 Semi Gloss N539.

c. PPG: “Speedhide”, 6-500 Series.

d. Sherwin-Williams: “ProMar 200 Latex Semi-Gloss”.

C. Interior GYPSUM BOARD (drywall) partitions:

1. One coat latex primer.

a. California: “Prime Touch Primer Sealer” Nºs. 545.

b. Moore: “Ultra Spec 500 Primer N534.

c. PPG: “Speedhide Interior Quick Drying Latex Sealer”, 6-2 Series.

d. Sherwin-Williams: "ProMar 200 Zero VOC Interior Latex Primer", B28w2600 Series.

2. Two coats latex eggshell paint:

a. California: “CalPro2000 Series Acrylic Eggshell”, Nº. 557.

b. Moore: “Ultra Spec 500 Low Sheen Eggshell N537.

c. PPG: “Speedhide Latex Eggshell Enamel”, 6-411 Series.

d. Sherwin-Williams: " ProMar 200 Zero VOC Interior Latex Eg-Shel”, B20-2600 Series.

D. Interior GYPSUM BOARD (drywall) partitions (Green Screen Walls):

1. One coat latex primer.

a. California: “Prime Touch Primer Sealer” Nºs. 545.

b. Moore: “Ultra Spec 500 Primer N534.

c. PPG: “Speedhide Interior Quick Drying Latex Sealer”, 6-2 Series.

d. Sherwin-Williams: "ProMar 200 Zero VOC Interior Latex Primer", B28w2600 Series.

2. Two coats vinyl acrylic, ‘green screen’ paint, flat sheen:

a. Rosco: “Video Paint, Chroma Key Green”, number 5711.

b. Pro Cyc, Inc.: “Virtual Green, Chroma Key Paint - Fluorescent - Flat”.

c. Ticonderoga Ventures, Inc., (Chromakey.org) New York, NY.

E. Interior GYPSUM BOARD (drywall) partitions, and ceilings, at toilet rooms, janitor’s closets, food preparation and dishwashing areas for VOC compliant epoxy finish:

1. One coat of sealer,

a. California: “Prime Choice ASAP Primer”, Nº. 50300.

b. Moore: “Ultra Spec 500 Primer N534.

c. PPG: “Speedhide Interior Quick Drying Latex Sealer”, 6-2 Series.

d. Sherwin-Williams: "ProMar 200 Zero VOC Interior Latex Primer", B28w2600 Series.

e. Tnemec: PVA 51-792 Sealer.

2. Two coats of semi-gloss Water Based Acrylic-Epoxy Coatings (3 mils DFT each coat).

a. California: No equivalent.

b. Moore: “Corotech Water Based (WB) Epoxy, V450 series.

c. PPG: “Pitt-Glaze Water Based Acrylic Epoxy Enamels”, 16 Series.

d. Sherwin-Williams: "Pro industrial Water Based (WB) Epoxy" B73 Series.

e. Tnemec: “Tneme-Tufcoat”, Nº. 112.

F. Interior GYPSUM BOARD (drywall) ceilings and underside of soffits:

1. One coat latex primer.

a. California: “Prime Touch Primer Sealer”, Nºs. 545.

b. Moore: “Ultra Spec 500 Primer N534.

c. PPG: “Speedhide Interior Quick Drying Latex Sealer”, 6-2 Series.

d. Sherwin-Williams: "ProMar 200 Zero VOC Interior Latex Primer", B28w2600 Series.

2. Two coats latex flat paint:

a. California: “CalPro2000 Series Acrylic Flat”, Nº. 556.

b. Moore: “Ultra Spec 500 Flat N536.

c. PPG: “Speedhide Latex Interior Flat Wall Paint”, 6-70 Series

d. Sherwin-Williams: “ProMar 200 Int. Latex Flat Wall Paint Series”.

G. Interior MDF, new, unfinished, to receive painted (opaque) finish:

1. One coat acrylic primer-sealer (undercoater):

a. California: “Wipe-Out 100% Acrylic Latex Stain Block”, Nº 52500.

b. Moore: “Fresh Start High-Hiding All Purpose Primer, Nº 046.

c. PPG: “Seal Grip Interior/Exterior Universal Primer/Sealer”, 17-921 series.

d. Sherwin-Williams: "PrepRite ProBlock Primer/Sealer", B51 W620 Series.

2. Two coats acrylic semi-gloss enamel:

a. California: “Fres-Coat Unite Semi-Gloss”, Nº. 563.

b. Moore: “Ultra Spec 500 Latex Semi Gloss N539.

c. PPG: “Speedhide Interior Semi-Gloss”, 6-500 Series.

d. Sherwin-Williams: “ProMar 200 Zero VOC Semi-Gloss”, B31-2600 Series.

H. Interior METAL, FERROUS, to receive semi-gloss finish: (includes galvanized metal doors and frames):

1. One coat of rust prohibitive primer for unfinished metal surfaces, and touch up bare metal at shop primed, existing and previously coated surfaces:
    a. California: “Rust-Stop DTM Primer/Finish”, Nº. 1061.
    b. Moore: “Acrylic Metal Primer”, Nº. P04.
    c. PPG: “Pitt-Tech DTM Primer/Finish 100% Acrylic”, 90-709/712 Series
    d. Sherwin-Williams: "DTM Acrylic Primer Finish", B66 W1 Series.
2. Two coats acrylic semi-gloss enamel:
    a. California: “Rust-Stop DTM Primer/Finish”, Nº. 1061.
    b. Moore: “Ultra Spec 500 DTM Acrylic Semi-Gloss”, Nº. HP29.
    c. PPG: “Pitt-Tech Plus High Performance, Semi -Gloss DTM Industrial Enamel”, 90-1210 Series.
    d. Sherwin-Williams: “Sher-Cryl HPA Semi-Gloss”, B66 Series.

I. Interior METAL, RAILINGS, (handrails and guardrails) to receive aliphatic acrylic polyurethane finish:
1. First coat, epoxy undercoat:
    a. International: “Interseal 670 HS” at 5.0 mils DFT.
    b. Tnemec: “69 Color High-Build Epoxoline II” at 3.0 mils DFT.
    c. Moore: “Corotech Polyamind Coating”, V400 series.
    d. PPG: “PPG All Weather DTR” 97 Series @ 5 mils DFT, 18 Month Recoat
    e. Sherwin-Williams: “Recoatable Epoxy Primer” @4.0-6.0 mils DFT.
2. Second coat, high gloss aliphatic acrylic polyurethane coating:
    a. International: “Interthane 990” at 4.0 mils DFT.
    b. Tnemec: “74 Endura Shield” at 4.0 mils DFT.
    c. Moore: “Corotech Aliphatic Acrylic Urethane”, V500 series.
    d. PPG: “Pitt-Thane Ultra” 95-800 Series @ 4 mils DFT.
    e. Sherwin-Williams: “Acrolon 218 HS Acrylic Polyurethane” @ 3.0-6.0 mils DFT.

J. Interior metal, galvanized, (includes exposed ductwork):
1. Touch-up with metal primer.
    a. California: “Rust-Stop DTM Primer/Finish”, Nº. 1061.
    b. Moore: “Acrylic Metal Primer”, Nº. P04.
    c. PPG: “Pitt-Tech DTM Primer/Finish 100% Acrylic”, 90-709/712 Series.
    d. Sherwin-Williams: "DTM Acrylic Primer Finish" B66 W1 Series.
2. Two coats acrylic semi-gloss enamel:

a. California: “Rust-Stop DTM Primer/Finish”, Nº. 1061.

b. Moore: “Ultra Spec 500 DTM Acrylic Semi-Gloss”, Nº. HP29.

c. PPG: “Pitt-Tech Plus High Performance, Semi -Gloss DTM Industrial Enamel”, 90-1210 Series.

d. Sherwin-Williams: “Sher-Cryl HPA Semi-Gloss”, B66 Series.

K. Interior exposed METAL, PIPING: Same as specified for ferrous metal.

1.4 PAINTING SCHEDULE FOR MECHANICAL AND ELECTRICAL EQUIPMENT

A. Paint interior surfaces of air ducts, and convector and baseboard heating cabinets that are visible through grilles and louvers with one coat of flat black enamel.

B. Paint dampers exposed behind louvers, grilles, and convector and baseboard cabinets to match face panels.

C. Plywood backboards for electrical panels and other equipment. Paint both front and back surfaces and all edges of plywood backboards before backboards are installed.

1. One coat latex primer-sealer (undercoater):

a. Moore: “Ultra Spec 500 Latex Primer N534.

b. PPG: “Pure Performance Interior Latex Primer”.

c. Sherwin-Williams: "Harmony Interior Latex Primer” B11W900.

2. Two coats latex semi-gloss paint:

a. Moore: “Ultra Spec 500 Semi Gloss N539.

b. PPG: “Pure Performance Interior Semi-gloss”, 9-500 Series.

c. Sherwin-Williams: "Harmony Interior Latex Semi-gloss" B10 Series.

D. Interior water piping system ‘non-potable water’, and ‘potable water’), Non-insulated, insulated and wrapped piping to receive field painted semi-gloss finish, including all concealed locations for recycled water.

1. General Comply with *International Plumbing Code,* 2018 Edition, as published by the International Code Council, Inc. (I.C.C.), as revised by *RHODE ISLAND PLUMBING CODE*, Regulation RISBC-3, and specification requirements of Division 22 – PLUMBING.

2. Paint types:

a. At non insulated conditions: Same as specified for ferrous metal.

b. At insulated conditions: Apply one prime coat and two finish coats of a paint recommended by the approved paint manufacturer for application on the exposed wrapping material.

3. Colors and patterns:

a. Potable water: (including hot water, cold water and return piping) Paint 3 inch wide bands of ‘Green’ at intervals of not more than 10 feet and at all points where piping penetrate through walls, floors and roofs.

1) Includes cold water piping, hot water piping and hot water return piping.

b. Non-potable water: Paint 3 inch wide bands of ‘Purple” at intervals of not more than 10 feet and at all points where piping penetrate through walls, floors and roofs.

E. Prime and paint insulated and exposed cold pipes, conduit, electrical boxes, insulated and exposed ducts, hangers, brackets, collars and supports, except where items are located in storage, mechanical or equipment spaces or those items which are factory prefinished.

F. Exposed to view un-insulated hot pipes within finished painted areas: Two coats heat-resistant enamel conforming to Federal Specification TT-E-496, Type I, applied when surfaces are less than 140 degrees Fahrenheit.

G. In compliance with *International Building Code*, 2018 edition, as published by the International Code Council, Inc. (I.C.C.), as revised by *RHODE ISLAND BUILDING CODE*, Regulation RISBC-1, effective February 1, 2022, and as additionally specified herein, provide identification for all fire walls, fire barriers, fire partitions, smoke barriers and smoke partitions and any other wall or partition which is required to have protected openings or penetrations.

1. Application:

a. Apply to outside of fire rated shafts, and to both sides of partitions at intervals not to exceed 30’-0” for entire length of partition or wall, or once on any partition 30’-0 feet or less in length.

b. Locate identification in all accessible concealed floor, floor-ceiling and attic spaces. Locate identification within 12 to 18 inches above finished ceilings.

c. Apply stenciled lettering by spray or brush, or provide permanent signage. Identification shall be waterproof, fade-proof and non-combustible. Signage shall be mechanically fastened or permanently adhered to partition.

d. Stencil character height: 1 inch minimum.

e. Color: Easily identifiable color, contrasting with background, acceptable to Owner.

2. Apply stenciled lettering to the following types of partitions using wording specified:

a. Applied identification for 4 hour fire rated partitions shall read: “4 HOUR FIRE WALL – PROTECT ALL OPENINGS”

b. Applied identification for 3 hour fire rated partitions shall read: “3 HOUR FIRE WALL - PROTECT ALL OPENINGS”.

c. Applied identification for 2 hour fire rated partitions shall read: “2 HOUR FIRE WALL - PROTECT ALL OPENINGS”.

d. Applied identification for 1 hour fire rated partitions shall read: “1 HOUR FIRE WALL - PROTECT ALL OPENINGS”.

e. Applied identification for Smoke barriers shall read: “1 HOUR SMOKE BARRIER - PROTECT ALL OPENINGS”.

f. Applied identification for Smoke partitions shall read: “SMOKE BARRIER PARTITION - PROTECT ALL OPENINGS”.

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Section 09 96 00

HIGH-PERFORMANCE COATINGS

PART 1 - GENERAL

1.1 SUMMARY

A. Prepare surfaces to receive special coatings.

B. Field application of special coatings and subsequent touch-up, of interior and exterior items and surfaces.

1.2 RELATED REQUIREMENTS

A. Section 01 60 00 - PRODUCT REQUIREMENTS: Listing of VOC requirements for adhesives, cleaning/maintenance materials, paints, coatings, and sealants.

B. Section 01 74 19 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL: Procedural and administrative requirements relating to recycling goals, waste management program and reporting.

C. Section 01 81 13 - SUSTAINABLE DESIGN REQUIREMENTS: Procedural and administrative requirements relating to required *Northeast CHPS Verified Program,* (NE-CHPS) Certification.

D. Section 09 91 00 - PAINTING: Conventional paint coatings.

1.3 REFERENCES

A. Referenced Standards: Comply with applicable requirements of the following standards and those others referenced in this Section, under the provisions of Section 01 42 00 - REFERENCES. The standards referenced herein are included to establish recognized minimum quality only. Where these standards conflict with other specified requirements, the most restrictive requirements shall govern. Equivalent quality and testing standards will be acceptable, subject to their timely submission, review and acceptance by the Architect.

1. SSPC-Vis1 - Pictorial Surface Preparation Standards for Painting Steel Structures.
2. SSPC-SP2 - Steel Structures Painting Manual, Volume 2, Systems and Specifications.
3. All applicable federal, state and municipal codes, laws and regulations for flammability and smoke generation of interior finishes.

B. Sustainability Requirement Reference: The following sustainability requirements are hereby made a part of this Section by reference thereto:

1. High Performance Schools Exchange, Northeast Energy Efficiency Partnerships NE-CHPS, (referred to herein as “NE-CHPS”).

1.4 SUBMITTALS

A. Information and Review Submittals: Submit the following under provisions of Section 01 33 00 - SUBMITTAL PROCEDURES:

1. Literature: Manufacturer's product data sheets, specifications, performance data, physical properties, material compositions, and application instructions for all finishing products to be applied hereunder.

B. Closeout Submittals: Submit the following under provisions of Section 01 78 00 - CLOSEOUT SUBMITTALS:

1. Color chips: After final approval of all colors and tints by the Architect, submit to the Owner, color chips of all coatings used, with manufacturer's name and mix designation of the coating for the purpose of future re-ordering of coatings. Color chips shall be at least six (6) square inches in size, for each color and tint.
2. Selection samples: Manufacturer's color selector for custom mixed colors for Architect's color scheduling.
3. Selection samples: Two 9 x 12 inch finished samples on hardboard of each color scheduled in each finish for review and approval. Identify boards with finish type, color mix number and scheduled substrate surfaces or materials.
4. Sustainable Design Submittals: As required by NE CHPS.

1.5 QUALIFICATIONS

A. Applicator: Company specializing in performance of the work of this Section with 3 years minimum documented experience and acceptable to coating manufacturer.

1.6 QUALITY ASSURANCE

A. Perform surface preparation work on primed or unfinished steel surfaces in accordance with SSPC Systems and Specifications as described herein. Maintain one copy of each document on site.

B. Single source responsibility: Provide primers and other undercoat materials produced by same manufacturer as finish coats. Use only thinners approved by coatings manufacturer, and use only within recommended limits.

1.7 DELIVERY, STORAGE AND HANDLING

A. Deliver products to site in sealed and labeled containers; container labeling shall include manufacturer's name, type of paint, color mix designation, expected coverage, surface preparation instructions, instructions for mixing and reducing, drying time, and clean-up recommendations.

B. Store materials, conforming with applicable codes and fire regulations, in designated spaces. Keep storage area secure when direct access is not required or when not performing work under this Section. Take precautionary measures to prevent fire hazards and spontaneous combustion, maintain a dry-chemical type fire extinguisher in all areas where materials of this Section are being stored or used.

C. Store materials in a well ventilated area at minimum ambient temperature of 45 degrees Fahrenheit and a maximum of 90 degrees Fahrenheit.

D. Do not use the sanitary system for mixing or disposal of refuse material. Carry water to mixing rooms and dump waste material in a suitable refuse receptacle. Remove oily rags and waste each day.

1.8 PROJECT CONDITIONS

A. Provide continuous ventilation and heating facilities to maintain surface and ambient temperatures above 45 degrees Fahrenheit for 24 hours before, during and 48 hours after application of finishes, unless required otherwise by manufacturer's instructions.

B. Do not apply exterior coatings during rain or snow, or when relative humidity is above 50 percent unless required otherwise by manufacturer's instructions.

C. Apply coatings and primers within temperature and humidity range specified by coating manufacturer.

D. Provide sufficient lighting to maintain 80 foot-candles measured mid-height at substrate surface.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Acceptable Manufacturers: Subject to compliance with the requirements specified herein, manufacturers offering products which may be incorporated in the work include the following, or approved equal:

1. Coatings:
    a. Courtaulds Coatings, Inc - International Paint and Porter Paint, Houston Texas.
    b. Tnemec Company, Inc., Kansas City, MO.
    c. PPG Industries, Inc., Pittsburgh PA.

2.2 ACCESSORIES

A. Accessory materials: Provide all accessory materials not specifically indicated, but are required to achieve the finishes specified, including linseed oil, shellac, turpentine, mineral spirits and other materials.

2.3 FINISHES

A. Refer to Schedule at end of this Section for surface finish schedule.

B. Colors: The Architect will furnish a schedule of colors for each area and surface. Tinting and matching shall be to the satisfaction of the Architect. No limit is placed on the number of colors that may be required, or the number of colors in any one room, area, or surface. Premium paints of deep-hued, bright, pigment intensive, accent and primary colors may be scheduled for up to 25% of all surfaces without additional cost to the Owner.

C. Colors of priming coats shall be lighter in tint or color than those of finish coats.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Inspect all surfaces and verify that they are in proper condition to receive the work of this Section. Notify Contractor of any condition that may potentially affect proper application of coatings.

B. Beginning Work of this Section means acceptance of existing substrate surfaces and site conditions.

3.2 PREPARATION - GENERAL

A. Furnish and lay suitable drop cloths in all areas where coating work is being done to protect floors and all other surfaces from damage during the work. Protect adjoining surfaces with painter’s mask tape.

B. Prior to preparing surfaces or finishing, remove all finish hardware for painting doors and frames, except hinges and locks on exterior door; remove electrical plates, light fixture trim and fittings. Re-install hardware and other removed items after painted surfaces are thoroughly dry.

C. Mix and prepare coatings in strict accordance with manufacturer’s written instructions. Thoroughly mix to ensure uniformity of color and mass, unless otherwise directed by the manufacturer of the specific coating used. Except for epoxy mixtures, strain previously opened materials to remove skins, coating lumps, and other foreign matter prior to painting. Dispose of epoxy materials which have begun to set.

D. Thin or reduce materials only as recommended by the specific material manufacturer, and only with the approval of the Architect.

E. Prepare substrate surfaces in accordance with SSPC (Steel Structures Paint Council) “Steel Structures Painting Manual, Volume 2”, to the preparation methods and specifications as specified herein for each coating type.

3.3 APPLICATION - GENERAL

A. Apply all materials in strict accordance with the approved manufacturer's printed instruction, and in accordance with the best trade practices. Each coat shall be reviewed and approved by the Architect before succeeding coats are applied.

B. Do not apply successive coating until the preceding coat is thoroughly dry, except as otherwise specified, and in no case in less than minimum period of time recommended by manufacturer.

C. Apply each coat to a uniform finish; Apply primer and first coat of slightly lighter in color tint than the scheduled color of the final coat.

3.4 CLEANING

A. Upon completion of the work in each area, remove all coating splatters from glass, prefinished surfaces, bright metals, and from other surfaces that have not been painted or finished hereunder. Do not use abrasive paper or abrasive cleaner on any prefinished surface or bright metal. Remove all materials and debris; leave work area in a clean condition.

3.5 PROTECTION AND TOUCH-UP

A. During application of coatings, protect the work of other trades against undue soilage and damage by the exercise of reasonable care and precautions. Properly clean, repair or replace any work so damaged and soiled.

B. Protect all painted and finished surfaces against damage until the date of final acceptance of the work. The Architect will conduct a final review of all work performed. Re-coat or touch-up, all scratches and other blemishes on surfaces, and as directed by the Architect, any areas found which do not comply with the requirements of this Section, and bear all costs therefor.

C. Any re-coating or touch-up work, required after the work of this Section has been reviewed and accepted by the Architect, will be paid for by the Contractor.

3.6 SCHEDULE - INTERIOR SURFACES

A. Coating System SC-1:
   1. Rust inhibitive “single coat” spray applied acrylic finish system (flat finish), custom colored:
      a. Application: Metal decking, joists and overhead steel (exposed to view), underside of exposed formed concrete decking, exposed sprinkler piping, conduits, ducts and similar items.
      b. Substrate preparation: Remove grease, scale, dirt, rust, and other contaminants.
      c. Single coat (touch up, apply two coats to underside concrete surfaces):
         1) Tnemec series 115 - “Uni-Bond DF” at 3.0 to 4.0 mils DFT.
         2) PPG series 6-157 – “SuperTech WB, Interior Dry-Fog Flat Latex”, at 2.0 to 2.5 mils DFT
         3) Sherwin Williams product “Waterborne Acrylic Dry Fall”.
         4) Benjamin Moore series M54 - “Sweep-Up Spray Latex Flat”

B. Coating System SC-2:
   1. Application: Concrete flooring surfaces scheduled to receive special coatings.
   2. Substrate preparation: Shotblast floor surface to create uniform 20 mil profile. Thoroughly clean and rinse surfaces; allow to completely dry. Allow a minimum of 4 hours before commencing application of coatings.
   3. First coat (primer):
      a. PPG product, PP1069 – “Acrylic Floor Enamel”.
      b. Sherwin Williams product, “Porch and Floor Enamel”.

c. Benjamin Moore product, Series 122 “Latex Floor & Patio Enamel”.

4. Second coat (finish coat):
   a. PPG product, PP1069 – “Acrylic Floor Enamel”.
   b. Sherwin Williams product, “Porch and Floor Enamel”.
   c. Benjamin Moore product, Series 122 “Latex Floor & Patio Enamel”.

C. Coating System SC-3
1. Application: Metal, Ferrous (new uncoated and shop primed, stair risers where indicated).
2. Substrate preparation: SSPC-SP3
3. First coat (primer), Zinc-rich primer (at surfaces previously primed, touch up bare steel):
   a. Courtaulds/International 26098 “Interlac 260, Gray” at 2.0 to 3.0 mils DFT.
   b. Tnemec product “37H-78- Primer, Gray”, at 2.0 to 3.0 mils DFT.
   c. PPG Pitt-Guard Rapid Coat DTR Epoxy, Series 95-240 at 5.0-7.0 mils DFT
4. Second coat (intermediate coat):
   a. Courtaulds/International “Interseal 670” at 5.0 to 6.0 mils DFT.
   b. Tnemec “Series 66 Color High-Build Epoxoline II” at 4.0 to 6.0 mils DFT.
   c. PPG Aquapon High Build Polyamide Epoxy, Series 97-130 at 4.0-6.0 mils DFT
5. Third coat (finish coat):
   a. Courtaulds/International “Interthane 870” at 3.0 to 5.0 mils DFT.
   b. Tnemec “Series 73 Endura Shield” at 2.0 to 3.0 mils DFT.
   c. PPG Pitthane High Build Acrylic Aliphatic Urethane, Series 97-840 at 4.0-6.0 mils DFT

3.7 SCHEDULE - EXTERIOR SURFACES

A. Coating System SC-3
1. Application: Metal, Ferrous (new uncoated).
2. Substrate preparation: SSPC-SP6
3. First coat (primer):
   a. Courtaulds/International “Interzinc 52” at 2.0 to 3.0 mils DFT.
   b. Tnemec “90-97 Zinc Rich Primer” at 2.5 to 3.5 mils DFT.
   c. PPG Moisture Cure Zinc Rich Primer, Series UC65147 at 3.0-4.0 mils DFT.
4. Second coat (finish coat):
   a. Courtaulds/International “Interthane 870” at 3.0 to 4.0 mils DFT.
   b. Tnemec Series 74 “Endura Shield” at 3.0 to 5.0 mils DFT.

c. PPG “Pitthane High Build Semi-Gloss Enamel 95-8800” at 4.0-6.0 mils DFT.

B. Coating System SC-4 – Aliphatic Acrylic Polyurethane

1. Application: Exterior galvanized metal handrails.
2. Substrate preparation: Mechanically abrade all surfaces.
3. Acid etch coat, if recommended by manufacturer:
   a. Courtaulds/International Polyvinyl Butyral Primer “Interprime Etch Primer” at 0.4 to 0.5 mils DFT or approved equal
4. First coat (intermediate coat):
   a. Courtaulds/International “Intergard 475” at 4.0 to 6.0 mils DFT.
   b. Tnemec Series 27 “F.C. Typoxy” at 4.0 to 6.0 mils DFT.
   c. PPG Pitt-Guard All Weather DTR, Series 97-948 at 5.0-7.0 mils DFT.
5. Second coat (finish coat):
   a. Courtaulds/International “Interthane 870” at 4.0 to 5.0 mils DFT.
   b. Tnemec Series 74 “Endura Shield” at 4.0 to 5.0 mils DFT.
   c. PPG Pitthane Ultra Acrylic Aliphatic Urethane, Series 95-800 at 2.0-3.0 mils DFT.

End of Section

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Section 09 96 46

INTUMESCENT PAINTS

PART 1 - GENERAL

1.1 SUMMARY

A. Provide intumescent thin-film coating with protective decorative paint finish for fireproofing of interior and exterior exposed steel framing, as indicated on the Drawings and as specified herein.

1. All preparatory work of materials and surfaces to receive intumescent paint beyond that specified to be done as work of other Sections, shall be included as work of this Section.

1.2 RELATED REQUIREMENTS

A. Section 01 74 19 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL: Procedural and administrative requirements relating to recycling goals, waste management program and reporting.

B. Section 01 81 13 - SUSTAINABLE DESIGN REQUIREMENTS: Procedural and administrative requirements relating to required *Northeast CHPS Verified Program,* (NE-CHPS) Certification.

C. Section 05 12 00 - STRUCTURAL STEEL FRAMING: Structural steel framing members.

D. Section 05 31 00 - STEEL DECKING: Roof deck.

E. Section 09 91 00 - PAINTING: Field applied coatings, except as specified herein.

F. Section 09 96 00 - HIGH-PERFORMANCE COATINGS: Field applied special coatings, except as specified herein.

1.3 REFERENCES

A. Referenced Standards: Comply with applicable requirements of the following standards and those others referenced in this Section, under the provisions of Section 01 42 00 - REFERENCES. The standards referenced herein are included to establish recognized minimum quality only. Where these standards conflict with other specified requirements, the most restrictive requirements shall govern. Equivalent quality and testing standards will be acceptable, subject to their timely submission, review and acceptance by the Architect.

1. ASTM D2240 - Rubber Property - Durometer Hardness.
2. ASTM D2794 - Resistance of Organic Coatings to the Effects of Rapid Deformation (Impact).
3. ASTM D3359 – Standard Test Methods for Rating Adhesion by Tape Test.
4. ASTM D3960 - Determining Volatile Organic Compound (VOC) Content of Paints and Related Coatings.

5. ASTM D4060 - Abrasion Resistance of Organic Coatings by the Taber Abrader.
6. ASTM D823 – Practices for Producing Films of Uniform Thickness of Paint, Varnish and Related Products on Test Panels.
7. ASTM E119 - Fire Tests of Building Construction and Materials.
8. ASTM E2924 – Standard Practice for Intumescent Coatings.
9. ASTM E595 - Total Mass Loss and Collected Volatile Condensable Materials from Out-gassing in a vacuum Environment.
10. ASTM E595 - Total Mass Loss and Collected Volatile Condensable Materials from Out-gassing in a vacuum Environment.
11. ASTM E736 - Cohesion/Adhesion of Sprayed Fire-Resistive Materials Applied to Structural Members.
12. ASTM E759 - Effect of Deflection on Sprayed Fire-Resistive Materials Applied to Structural Members.
13. ASTM E761 - Compressive Strength of Sprayed Fire-Resistive Materials Applied to Structural Members.
14. ASTM E84 - Surface Burning Characteristics of Building Materials.
15. AWCI Technical Manual 12-B, Third Edition: Standard Practice for the Testing and Inspection of Field-Applied Thin Film Intumescent Fire-Resistive Materials.
16. IAS AC291 – Accreditation Criteria for Special Inspection agencies.
17. International Standard ISO 20340 – Paints and Varnishes, Performance Requirements for Protective Paint Systems for Offshore and Related Structures.
18. SSPC - SP1 Solvent Cleaning.
19. SSPC - SP2 Hand Tool Cleaning.
20. SSPC - SP3 Power Tool Cleaning.
21. SSPC – SP6/NACE No. 3 - Commercial Blast Cleaning.
22. WH (Warnock Hersey Testing Services): Fire Resistance Directory.

B. Sustainability Requirement Reference: The following sustainability requirements are hereby made a part of this Section by reference thereto:

1. High Performance Schools Exchange, Northeast Energy Efficiency Partnerships NE-CHPS, (referred to herein as “NE-CHPS”).

1.4 ADMINISTRATIVE REQUIREMENTS

A. Coordination:

1. General: Coordinate the work of this Section with the respective trades responsible for installing interfacing and adjoining work for proper sequence of installation, and ensure that the work performed hereunder is acceptable to such trades for the installation of their work.

B. Sequencing:

1. Field quality control inspections shall occur prior to application of decorative/protective finish top-coat.
2. Ducts, piping, conduit, and other suspended equipment which would interfere with the uniform application of the intumescent coating material shall be positioned after application of intumescent coating system.

1.5 SUBMITTALS

A. Information and Review Submittals: Submit the following under provisions of Section 01 33 00 - SUBMITTAL PROCEDURES:

1. Product Data: Manufacturer's printed product data, specifications, standard details, installation instructions, use limitations and recommendations for each material used. Provide certifications that materials and systems comply with specified requirements.
2. Samples: Stepped sample panels consisting of manufacturer approved primer as first or lowest layer.. The middle layer is the intumescent fireproofing (white in color). The topcoat is a low VOC protective topcoat as recommended by manufacturer, and in architect’s selected color. The finished application will have a smooth paint like finish without orange peel textured appearance.
3. Finish Samples: Sample panels of sprayed-on intumescent thin-film coating on 20 gage (minimum) sheet steel, at least 12 by 12 inches, with proposed thickness, color, and surface finish.
4. Test Reports: Provide certified reports for all specified tests. Submit test designs for intumescent fireproofing prepared by a nationally recognized, certified, independent testing laboratory indicating full compliance with specified fire resistance performance requirements.
5. Certification:
    a. Provide certification that contractor/applicator utilized for application of intumescent fireproofing are approved by manufacturer and have attended the manufacturer’s required application training.
    b. Provide certification that specialized equipment as may be recommended by manufacturer for proper application of intumescent fireproofing shall be utilized for Work of this section.
6. Sustainable Design Submittals: As required by NE CHPS.

B. Closeout Submittals: Submit the following under provisions of Section 01 78 00 - CLOSEOUT SUBMITTALS.

1. Special Inspections: Submit prior to request for Certificate of Occupancy, to both Architect and local Building Official having jurisdiction, the following:
    a. All certifications, reports and programs required by the Rhode Island State Building code for fireproofing intumescent paint work performed under the requirements of this Section.

1.6 QUALITY ASSURANCE

A. Source: For each material type required for the work of this section, provide primary materials which are the product of one manufacturer. Provide secondary or

accessory materials which are acceptable to the manufacturers of the primary materials.

1. All materials shall conform to *International Building Code*, 2018 edition, as published by the International Code Council, Inc. (I.C.C.), as revised by *RHODE ISLAND BUILDING CODE*, Regulation RISBC-1, effective February 1, 2022, and be acceptable to Authorities having Jurisdiction.

B. Burning Characteristics: Provide materials whose surface burning characteristics, when tested in compliance with ASTM E84 are Class A.

C. Tests:

1. Fire Resistance Ratings: Where fire resistant ratings are indicated or required by authorities having jurisdiction, provide materials and construction which are identical to assemblies whose fire resistance ratings have been tested in compliance with ASTM E119 by independent agencies acceptable to the Architect and all authorities having jurisdiction.
2. Special Inspections for intumescent fire-resistant coatings shall be in accordance with AWCI-12B.

D. Qualifications:

1. Installer/Applicator: Minimum of 3 years documented experience demonstrating previously successful work of the type specified herein, and approved by product manufacturer.
2. Special Inspector of Intumescent Fire-Resistant Coatings:
   a. The Special Inspector shall be an independent third party hired directly by the General Contractor.
   b. Special Inspector Agency (company and Individual) Qualifications: Comply with IAS AC291, and having the competence necessary to inspect the work of this Section 09 96 46
   c. The Special Inspector (individual) shall have a valid and current ICC Spray-Applied Fireproofing Special Inspector Certificate, or ICC Fire Inspector 1 Certificate with not less than 1 year related experience.

1.7 MOCK-UPS

A. Provide mock-up under provisions of Section 01 43 39 – MOCK-UPS.

B. Provide mock-up areas using accepted intumescent coating system, minimum 25 square feet, including primer, intumescent coating and topcoat(s). Mock-up shall illustrate color, texture and finish, and demonstrate the minimum standard for the Work.

C. Apply intumescent coating system mock-up at a typical column where directed for joint approval by representative of intumescent coating system manufacturer, Architect, and local code authority having jurisdiction (if required).

1. Accepted mock-ups may remain as part of the work.

D. Applications of intumescent coating system in other areas shall not proceed until sample installation is approved.

E. Approved sample installation shall remain in place and open to observation as a standard for intumescent coating work.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Deliver factory mixed materials in original, unopened packages bearing the name of the product, manufacturer's name, and the Underwriters' Laboratories, Inc. label.

B. Storage and Protection

1. Store materials in a clean, dry, protected area. Stack containers raised off ground, using blocking or skids to provide drainage.
2. Store materials at temperatures not less than 50 degrees F
3. Protect material from freezing.
4. Discard materials which come in contact with contaminates, water, prior to actual use. Remove damaged materials from Site.

1.9 ENVIRONMENTAL REQUIREMENTS

A. Intumescent fireproofing shall not commence or proceed when steel surfaces are below 60 degrees F or when ambient temperature is less than 60 degrees F or expected within 24 hours.

B. Relative humidity shall not exceed 60 percent throughout total period of application and drying of intumescent fireproofing, and shall not exceed 85 percent throughout application and drying period for protective decorative finish coat.

C. Provide ventilation in areas to receive intumescent fireproofing during and for 24 hours following application to dry materials.

1.10 PROTECTION

A. Provide ventilation in areas to receive intumescent coating system during and 24 hours after application, to properly dry material and maintain nontoxic working area,

B. Protect adjacent surfaces and equipment from damage. Repair damage so caused. Mask adjacent work as required.

1.11 WARRANTY

A. General: Submit the following warranties under provisions of Section 01 78 00 - CLOSEOUT SUBMITTALS, and in compliance with Section 01 78 36 – WARRANTIES.

B. Manufacturer Warranty: In addition to the specific guarantee requirements of the GENERAL CONDITIONS and SUPPLEMENTAL GENERAL CONDITIONS, the Contractor shall obtain in the Owner’s name the standard written manufacturer’s guarantee of all materials furnished under this Section where such guarantees are offered in the manufacturer’s published product data. All these guarantees shall be in addition to, and not in lieu of, other liabilities which the Contractor may have by law or other provisions of the Contract Documents.

C. Provide Applicator's certificate stating that intumescent coating system has been completed in full accordance with requirements to provide necessary fire resistance ratings.

D. Extended Correction Period:

1. Provide warranty or bond stating applied intumescent coating system will remain free from cracks, checking, flaking, and blistering for Three (3) years from date of Project Substantial Completion, and that failure to provide such performance **will** constitute reinstallation or repair to satisfaction of Owner at no additional cost.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Acceptable Manufacturers: Subject to compliance with the requirements specified herein, manufacturers offering products which may be incorporated in the work include the following, or approved equal:

1. Albi Manufacturing (Division StanChem, Inc.), East Berlin CT.
2. AD Fire Protection Systems, Scarborough, ON. Canada.
3. International Coatings (Division of AkzoNobel),
4. Isolatek International, Inc. ("CAFCO" Brand), Stanhope NJ.
5. Sherwin Williams, Cleveland OH.

2.2 DESCRIPTION

A. Description: Materials, procedures for application, dry densities, and thickness necessary to provide the required protection shall be approved by UL for the uses indicated. Submit certification by an independent Testing Laboratory acceptable to the Owner that materials, thickness, and application procedures satisfy the requirements of the governing laws and building code, and UL requirements, with respect to the minimum protection requirements below when tested in accordance with ASTM E119.

B. General Characteristics:

1. Provide materials that have been fire tested and classified by Underwriters Laboratories in accordance with ASTM E84 and ASTM E119. Underwriters Laboratories Canada (ULC) certification will be acceptable subject to approval of local authorities having jurisdiction.
2. Fireproofing Performance: Structural steel members throughout the Project to receive intumescent coating system shall be protected under this Section in accordance with UL Ref. 1 to provide the required fire resistance ratings indicated.
3. System: Contractor shall assume full responsibility for the proper performance of all materials used, for appropriateness of method of application with respect to materials used and substrates encountered, and for the compatibility of any materials applied with shop coats and other coats previously applied, including primers. Follow manufacturers instructions for compatibility check.

2.3 INTERIOR THIN-FILM INTUMESCENT COATING SYSTEM

A. Basis of Design: To establish a standard of quality, design and function desired, Drawings and specifications have been based on Albi Manufacturing, product “Albi Clad TF”.

B. Interior Intumescent Coating system:

1. Performance Criteria:
   a. Surface Burning Characteristics (ASTM E84): rated “Class A”.
      1) Flame Spread: 0 to 20
      2) Smoke Developed: 0 to 50
   b. Hardness (ASTM D2240): Shore "D" hardness 60-70 (fully cured).
   c. Bond Strength: 125 psi minimum when tested per ASTM D4541 or 40 psi minimum when tested per ASTM D952.
   d. Impact Resistance (ASTM D256): 0.77 foot-pounds/inch of notch.
   e. Abrasion Resistance (ASTM D4060): maximum 103 mg loss for 1000 cycles.
2. Products: Subject to compliance with the requirements specified herein, products which may be incorporated in the work include the following:
   a. Albi Manufacturing, product “Albi Clad TF”.
   b. AD Fire Protection Systems, Scarborough, ON. Canada, product “A/D Firefilm III”.
   c. International Coatings (division of AkzoNobel), product “Interchar 1120”.
   d. Isolatek International, (“CAFCO” Brand), product “Sprayfilm WB-5”.
   e. Sherwin Williams, product “Firetex FX5120”.

C. Primer: As recommended by manufacturer of intumescent paint, fully compatible with furnished intumescent coating.

D. Protective Finish Topcoat (Required): Single component, low volatile organic compound (VOC compliant) silicone alkyd or acrylic coating, as required by manufacturer, fully compatible with furnished intumescent coating.

1. Finish topcoat will not affect the fire resistance performance of the intumescent fireproofing
2. Color: Nonmetallic gloss or semi-gloss finish, as selected by Architect

2.4 EQUIPMENT

A. Spray Equipment:

1. Provide airless type equipment recommended by intumescent paint manufacturer. Equipment shall be capable of maintaining rates of pressure measured at spray tip and for volume.
2. Remove filters and screens except displacement pump filter. Position pressure relief hose in material as far away as possible from pump to maximize recirculation of product.

B. Miscellaneous Equipment:

1. Provide the following equipment as required to suit project conditions and requirements of the intumescent fireproofing manufacturer for application, curing, and finishing of fireproofing system and verification of required fire ratings:
   a. Dry film thickness gage.
   b. Air movement equipment.
   c. Dehumidification equipment.
   d. Dry electric heat equipment.

PART 3 - EXECUTION

3.1 SURFACE PREPARATION

A. Examine surfaces to which intumescent coating system is to be applied, and notify Architect in writing of conditions detrimental to the proper and expeditious application of intumescent coating system which cannot be corrected by normal cleaning of surfaces. Starting of work within an area shall be construed as acceptance of the conditions of that area.

1. Where painted steel is to be fireproofed with intumescent coating, existing paint surface shall be checked for compatibility with intumescent coating prior to fireproofing application.
2. Where compatibility is a problem, existing steel shall be sandblasted and reprimed with acceptable primer material.

B. Clean surfaces to receive sprayed-on fireproofing, just prior to the application of the fireproofing, with hand tools (SSPC SP 2), power tools (SSPC SP 3) , or solvent cleaning (SSPC SP 1) methods to eliminate mill scale, dirt, grime, oil, grease, dust, loose rust or paint, and all other foreign material which would prevent satisfactory bonding of fireproofing to steel.

C. Application of intumescent coating system shall constitute acceptance of the suitability of the surface to receive this work by the intumescent coating system applicator.

3.2 VENTILATION

A. Provide ventilation to property dry all intumescent coatings during and after its application. In enclosed areas lacking openings for ventilation, circulate exterior air and exhaust it to the outside by use of temporary circulators and exhaust fans.

3.3 MIXING AND APPLICATION

A. Mixing: Thoroughly mix intumescent fireproofing in accordance with manufacturer's instructions and apply in sufficient thickness to achieve the fire resistance rating. Apply in as many passes as necessary to cover, with uniformed texture. Do not add water or solvent to material

B. Apply intumescent coating system exactly as described in certificates submitted to prove compliance with specified protection requirements. Control application to maintain uniform quality and thickness.

1. Apply intumescent fireproofing in strict adherence with manufacturer's instructions by spray method. Brush or roller application shall be allowed only when spray application is not practical.
2. Spray apply material using heavy duty, self-cleaning (reversible), type tip; 15 mil to 17 mil in size. Increase distance between tip and surface if necessary to reduce orange peel effect due to pressure. Adjust fan width accordingly.
3. Apply a multiple coat application in accordance with UL Ref. 1. Final wet film thickness application shall meet or exceed that required for specified rating.
4. Prior to drying of surface film, all surfaces shall be rolled to remove unsightly drippings or surface irregularities.

C. Apply intumescent fireproofing in strict adherence with manufacturer's instructions by spray method. Brush or roller application shall be allowed only when spray application is not practical.

D. Fireproofing material dries quickly, a viscosity increase may be experienced after container has been opened. Keep container covered a much as possible during application. Use recirculation feature on spray equipment at all times, especially at breaks or interruptions during spraying. Hoses shall be purged with water before breaks or interruptions to spraying process.

E. When applying fireproofing with roller or brush, work from small containers, mixing frequently. Original pail shall be kept tightly closed and surface of material covered with plastic sheet provided for that purpose.

F. Fireproofing materials are designed for high build with minimum number of coats, however do not exceed 30 mils per wet coat as shrinkage may occur. AD Base coat to be applied at 65-70 mils / coat with a 24 hour drying time between coats.

G. Drying time between coats will vary with ambient temperature and humidity conditions. Successive coats shall not be applied until previous coat is dry to touch (approximately 2 hours at 70 degrees F and 50 percent relative humidity). Allow a minimum of 24 hours between application final coat and application of protective topcoat.

H. Final thickness shall be measured by dry film thickness gage. Do not apply protective top coat until it has been determined that required dry film thickness of intumescent fireproofing has been provided.

I. Application of Protective Finish Topcoat:

1. Apply protective finish topcoat in strict compliance with manufacturer's instructions by spray method. Brush or roller applications shall be allowed only when spray application is not practical.
2. Spray apply material using manufacturer’s recommended airless spray with 2500 pounds per square inch (17.2 MPa) pressure; 0.015 inch (0.4 mm) tip size, and 100 mesh filter.

3. Apply protective finish top coat in compliance with wet and dry film thickness and spreading rates as recommended by manufacturer. Thickness of protective finish coat shall not exceed 4 mils dry per coat.
4. Drying time between coats will vary with ambient temperature and humidity conditions. Successive coats shall not be applied until previous coat is dry to touch (approximately 16 hours at 77 degrees F (25 degrees C) and 50 percent relative humidity.

3.4 FIELD QUALITY CONTROL

A. Inspection and testing is to be carried out to ensure that applied thickness and adhesion meet fire rating requirements, and to verify installation meets reviewed test reports,
   1. Material Characterization Testing: Prior to application, take random liquid samples of intumescent coating materials and submit for material characterization (fingerprinting) in accordance with procedures detailed in ISO Standard 20340. Submit samples to intumescent material manufacturer for confirmation.
   2. Special Inspections for intumescent fire-resistant coatings shall be in accordance with AWCI-12B.
   3. Perform Special Inspections prior to application of protective finish top coat. Make available all test results to General Contractor, Architect, Owner’s representative upon completion of each pre-designated work area.

B. Correct unacceptable work and pay for further testing required to prove acceptability of installation.

3.5 TOUCH-UP

A. Recoating and/or repairing of intumescent coating system resulting from cutting or damage by other trades shall be performed under this Section and paid for by the trade doing the cutting or causing the damage.

3.6 CLEAN-UP

A. Upon completion of intumescent coating system work, clean walls, floors, and surrounding surfaces.

End of Section