

# Project Manual

For



# Calcutt Middle School

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**City of Central Falls  
Rhode Island**

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prepared by:

**Ai3 Architects, LLC.**

526 Boston Post Road  
Wayland, Massachusetts 01778

Date of Issue:

May 20, 2022



PROJECT DIRECTORY

**OWNER**

City of Central Falls  
Central Falls School District  
949 Dexter Street, Lower Level  
Central Falls, Rhode Island 02863-1715

**OWNER'S PROJECT MANAGER**

Peregrine Group, LLC  
20 Newman Avenue, Suite 1005  
Rumford, Rhode Island, 02916

**ARCHITECT**

Ai3 Architects, LLC  
526 Boston Post Road  
Wayland, Massachusetts 01778

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**CONSULTANTS**

**LANDSCAPE ARCHITECTS**

Traverse Landscape Architects  
150 Chestnut Street, 4<sup>th</sup> Floor  
Providence, Rhode Island 02903

**MECHANICAL, ELECTRICAL, AND  
PLUMBING ENGINEERING**

Griffith & Vary, Inc.  
Wareham Industrial Park  
12 Kendrick Road  
Wareham, Massachusetts 02571

**CODE CONSULTANT**

Cosentini Associates, Inc.  
101 Federal Street, Suite 600  
Boston, Massachusetts 02110

**COST ESTIMATING CONSULTANT**

PM&C LLC  
20 Downer Avenue, Suite 1C  
Hingham, Massachusetts 02043

**SPECIFICATIONS CONSULTANT**

Wil-Spec LLC  
375 Main Street  
Boxford, Massachusetts 01921

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**DOCUMENT 00 11 13**

**ADVERTISEMENT FOR BIDS**

The Central Falls School Department hereinafter called the "CFSD" will receive sealed bids for the following:

**Calcutt Middle School: Facility Equity Initiative Projects**

Sealed Bids shall be received at the City of Central Falls City Clerk's Office, no later than 3:30 PM on June 9, 2022 for the "Calcutt Middle School: Facility Equity Initiative Projects" where they will be read aloud in person at 4:45pm at City Hall, 580 Broad Street, Central Falls, RI 02863.

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

All Bids must be submitted in sealed envelopes addressed to Jahaira Rodriguez - City Clerk, City Hall, 580 Broad St, Central Falls, RI 02863, and must be plainly marked in the lower left hand corner, "**Calcutt Middle School: Facility Equity Initiative Projects**". Please provide two (2) hard copies and one (1) electronic copy on USB with your submittal.

A **Non- Mandatory** Pre-Bid on site conference is scheduled for May 25, 2022 @ 3:00 pm at Calcutt Middle School, 112 Washington St, Central Falls, RI 02863. Copies of the bid documents may be downloaded from the City Hall website starting May 23, 2022.

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

Any Questions & Responses will be included in an **Addendum to be issued on June 2, 2022**, on the City Website.

The Central Falls School Department 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 School Department.

Under requirements of Rhode Island General Law 37-13, this project is a prevailing wage project and requires a 5% Bid Bond. The project requires 15% MBE/WBE Participation with a goal of 25%. The successful bidder will be required to furnish 100% Payment and Performance Bonds at the time of award.

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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 contractors ("Respondent") for the Project "Calcutt Middle School - FEI" ("Site"), located at the 112 Washington Street, Central Falls, RI.
1. The Work includes sitework, selective demolition, general construction, renovation work, and temporary facilities and controls to protect the existing building. The Owner 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 May 20, 2022.
1. Main Entrance:
    - a. Update the existing hardscaping/landscaping.
    - b. Remove and replace the existing guardrails and railings at the concrete stairs and ramps with new compliant painted steel rails.
    - c. Repair damage to the concrete ramp/stairs
    - d. Provide lighted canopy at front door
    - e. Whitewash face of brick.
    - f. Provide corrugated perforated metal panel with silk screening for custom graphic.
    - g. Back-lit aluminum building name lettering.
    - h. Paint existing metal entrance doors and frame.
  2. Main Entrance Lobby:
    - a. Repaint CMU and GWB walls.
    - b. Provide vinyl graphics adhered to CMU wall
  3. Secondary (Bus/Stair B) Entrance:
    - a. Provide corrugated perforated metal panels over existing brick façade with silk screening for custom graphic.
    - b. Provide post mounted corrugated perforated metal screening at existing emergency generator.
    - c. Provide aluminum signage of school log attached to metal panels.
    - d. Provide lighting to underside of existing exterior soffit.
    - e. Provide new metal panel plank for underside of existing exterior soffit.
  4. Secondary (Bus/Stair B) Entrance Lobby:
    - a. Repaint walls and soffits as indicated.
    - b. Provide vinyl graphic adhered to concrete masonry wall

- c. Provide rubber treads/risers/landing
  - d. Provide compliant painted steel railing to existing guardrail
  - e. Repaint guardrails, railings, stringers, and underside of stair.
  - f. Re-secure existing wall-mounted handrail to masonry wall
  - g. Replace all door hardware at all doors on the first and second floors that connect into Stair B. Salvage existing hardware and deliver to Owner.
  - h. Provide wayfinding signage.
  - i. Patch existing ACT ceilings and lighting where disturbed by the Work.
5. Science Classroom:
- a. Demolish and remove the following where indicated:
    - 1) Casework
    - 2) Sink
    - 3) Unit ventilators
    - 4) Emergency eyewash/shower
  - b. Patch exterior wall/curtainwalls at wall penetration where existing unit ventilators are removed.
  - c. Remove abandoned utilities and services, and cap. Provide new utilities, services, sink and sink accessories.
  - d. Provide modular metal casework, epoxy countertops, and goggle cabinet.
  - e. Paint all walls
  - f. Patch existing concrete deck/floor at removed services and prepare substrates for new flooring.
  - g. Provide ceilings, flooring and rubber wall base.
  - h. Remove existing lighting and re-install in new ceilings.
  - i. Provide stainless steel plant holder shelving at exterior windows with grow lighting
  - j. Provide recessed eyewash station.
  - k. Provide signage
  - l. Provide fire extinguisher cabinets and fire blanket cabinet.
  - m. Provide multi-zone heat pump (see HVAC narrative)
  - n. Provide wood stools at all window locations.
6. Library Media Center:
- a. Provide vinyl graphics adhered to concrete masonry wall.
  - b. Repaint all wall and soffit surfaces in the lobby outside of the Media Center entrance.
  - c. Replace and provide new doors and hardware as scheduled.
    - 1) Replace hardware at existing doors to remain within media center. Salvage hardware and deliver to Owner.
  - d. Repaint all walls and soffits in media center and adjacent storage room and small group room.
  - e. Provide framed operable glass wall between main media center and maker space.

- f. Provide ceilings, including specialty dropped ceilings and lighting.
    - 1) Remove designated existing lighting scheduled to remain and reinstall in new ceilings. Existing lighting to remain in situ, where located in areas where ceilings are not being replaced.
  - g. Provide multi-zone heat pump (see HVAC narrative)
  - h. Prepare substrates and provide flooring and resilient wall base.
  - i. Provide multi-media area pipe grid below ACT ceiling (green screen zone)
    - 1) Provide multi-media lighting and power at pipe grid
    - 2) Provide pre-molded green screen system.
  - j. Remove existing and provide aluminum framed exterior windows at library media center.
  - k. Provide wood stools at all window locations.
  - l. Patch exterior wall/curtainwalls at wall penetrations where existing unit ventilators are scheduled to be removed.
7. General Upgrades:
- a. Selective demolition, and cutting and patching as required by the Work.
  - b. Provide Wayfinding signage.
  - c. Provide Environmental Graphics.
8. 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. Availability of Documents: Copies of the bid documents may be downloaded from the City Hall website starting May 23, 2022.
- D. Time of Completion: The Project shall be Substantially Completed by August 19, 2022.
- E. 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).
- F. 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 1<sup>st</sup>, 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. Trainee Provisions shall not apply to this Contract. The training hour requirement is zero, and the goal is zero.

### 1.3 PERMITS, FEES AND TAXES

- A. Building Permits and Fees: Permits are required for the commencing and completion of the work.
- B. Rhode Island Sales Tax: The City is 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 is 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. Hard copies of plans, specifications, and all other bidding documents for the above-named project can be examined in the Office of the City of Central Falls Purchasing Department, City Hall, 580 Broad Street, Central Falls, RI, 02863 between the hours of 9:00 a.m. and 3:00 p.m.. Digital (.pdf) copies of the documents may be downloaded through the City of Central Falls website, [www.centralfallsri.us](http://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, Jahaira Rodriguez, at (401) 727-7400 or [jrodrigues@centralfallsri.us](mailto:jrodrigues@centralfallsri.us) for assistance. Arrangements for hard copies of bidding documentation can also be made by contacting the City Clerk. 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: Calcutt Middle School (located at 112 Washington Street, Central Falls, RI) on Wednesday, May 25, 2022 at 3:00 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 3:30 PM. in the Office of the City Clerk on Thursday, June 9, 2022. NO BIDS WILL BE ACCEPTED AFTER 3:30 PM.**
- B. Sealed bids will be accepted in the office of the City Clerk to the attention of Jahaira Rodriguez, 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 at 4:45 PM on June 9, 2022.
- C. Bid must be submitted in a sealed envelope and addressed to:

City of Central Falls  
Jahaira Rodriguez  
City Clerk  
580 Broad St.  
Central Falls, RI 02863

  1. Lower left corner of envelope must contain the following identification:

*"SEALED BID, Calcutt Middle School: Facility Equity Initiative Projects"*.
- 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.

## 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 data for the purpose as may be requested.

## 1.9 INDEMNIFICATION AND HOLD HARMLESS

- A. Any Questions and Responses will be included in an Addendum to be issued on Thursday, June 2<sup>nd</sup>.
- 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., 526 Boston Post Road, Wayland, MA 01778** and to be given consideration must be received prior to 5:00pm on Tuesday, May 31<sup>st</sup>.

## 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 and bidder, naming the City and the State of Rhode Island as an additional insured shall be made part of any contract between the City and bidder in an amount of not less than \$1,000,000 for projects in excess of \$500,000. 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, if 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 that a minimum of 10% of the value of the bid will be completed 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, Central Falls School District herein called the Owner, per the attention of:

City of Central Falls  
Purchasing Department  
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:

Calcutt Middle School - FEI  
112 Washington Street  
Central Falls, Rhode Island 02863

to the satisfaction of the Owner and the Architect and in accordance with the accompanying Bidding and Contract Documents, dated: May 20, 2022, as prepared by: Ai3 Architects, LLC., Wayland, 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. Alternates: The undersigned Bidder submits the following alternate prices, as described in the Bidding Documents, which are to be added to or deducted from the above stated Contract Price, 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".)

Table with 3 columns: Description, Add Alternates, Deduct Alternates. Rows for Alternates No. 1 through 4.

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

Addenda N°. \_\_\_\_, dated: \_\_\_\_\_. Addenda N°. \_\_\_\_, dated: \_\_\_\_\_.
Addenda N°. \_\_\_\_, dated: \_\_\_\_\_. Addenda N°. \_\_\_\_, dated: \_\_\_\_\_.
Addenda N°. \_\_\_\_, dated: \_\_\_\_\_. Addenda N°. \_\_\_\_, dated: \_\_\_\_\_.

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

\$ .....
(bond amount in numbers)

H. 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. Selective Demolition \$.....
6. Concrete \$.....
7. Masonry \$.....
8. Cold formed metal framing \$.....
9. Metal fabrications \$.....
10. Rough carpentry, Finish Carpentry \$.....
11. Vapor Retarders and Air Barriers \$.....
12. Building insulation, thermal and acoustical \$.....
13. Metal panel systems, soffit panels \$.....
14. Firestopping, expansion joints and joint sealants \$.....

CONSTRUCTION DOCUMENTS

CALCUTT MIDDLE SCHOOL - FEI

Ai3 Architects, LLC

Central Falls, Rhode Island

15. Doors and frames, operable glass partitions	\$.....
16. Storefront	\$.....
17. Door Hardware	\$.....
18. Glass	\$.....
19. Non-load bearing framing, gypsum board and sheathing	\$.....
20. Acoustical ceilings	\$.....
21. Resilient base, rubber and linoleum sheet flooring	\$.....
22. Carpet	\$.....
23. Painting and coatings	\$.....
24. Signage, markerboards and projection screens	\$.....
25. Canopies	\$.....
26. Exterior grilles and screens	\$.....
27. Casework	\$.....
28. Fire protection	\$.....
29. Plumbing	\$.....
30. Heating, ventilating & air conditioning	\$.....
31. Electrical	\$.....
32. Sitework and exterior improvements	\$.....
<b>Total ( Items 1 through 32 )</b>	
Total should equal amount of base bid.	\$.....

- I. 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.
  
- J. The Bidder hereby agrees to commence work within 7 days from Date of Agreement, to pursue the Work with diligence, and bring the Project to Substantial Completion, or Owner acceptance for occupancy before August 19, 2022.
  
- K. 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.

- L. The undersigned Bidder agrees to provide, as an integral part of this Bid, a separate attachment, entitled "CONTRACTOR'S QUALIFICATION STATEMENT".
- M. 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.
- N. The Bidder agrees that this Bid shall be good and may not be withdrawn for a period of 30 calendar days after the scheduled closing time for receipt of bids.
- O. The Bidder understands the Owner's right to reject any and all bids.
- P. 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

# 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.

**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.

**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.

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

\_\_\_\_\_  
(Witness)

\_\_\_\_\_  
(Witness)

« »

(Contractor as Principal)

(Seal)

« »

(Title)

« »

(Surety)

(Seal)

« »

(Title)





**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

Rev.09/26/2017

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<sup>1</sup>, 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.

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<sup>1</sup> 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

# 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

- 1 THE CONTRACT DOCUMENTS
- 2 THE WORK OF THIS CONTRACT
- 3 DATE OF COMMENCEMENT AND SUBSTANTIAL COMPLETION
- 4 CONTRACT SUM
- 5 PAYMENTS
- 6 DISPUTE RESOLUTION
- 7 TERMINATION OR SUSPENSION
- 8 MISCELLANEOUS PROVISIONS
- 9 ENUMERATION OF CONTRACT DOCUMENTS

### EXHIBIT A INSURANCE AND BONDS

#### 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.
- [  ] Established as follows:  
*(Insert a date or a means to determine the date of commencement of the Work.)*
- [  ]

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.

[ « » ] By the following date: « »

§ 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 « » day of a month, the Owner shall make payment of the amount certified to the Contractor not later than the « » day of the « » 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 « » ( « » ) 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.)*

« »

§ 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.)

<< >>

§ 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:

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## § 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.)

<< >> % << >>

## 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.)

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## § 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.)*

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.)*

<< >>

§ 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)*

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§ 8.3 The Contractor’s representative:

*(Name, address, email address, and other information)*

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§ 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)

« »« »

\_\_\_\_\_  
(Printed name and title)

\_\_\_\_\_  
**CONTRACTOR** (Signature)

« »« »

\_\_\_\_\_  
(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

- A.1 GENERAL
- A.2 OWNER'S INSURANCE
- A.3 CONTRACTOR'S INSURANCE AND BONDS
- A.4 SPECIAL TERMS AND CONDITIONS

#### 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.

**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 Required Property Insurance**

**§ 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.

**§ 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 « » (\$ « » ) each occurrence, « » (\$ « » ) 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 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 « » (\$ « ») per accident, 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 « » (\$ « ») 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.)*

- [ « » ] § 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.)*

« »

- [ « » ] § 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

Performance Bond

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**

# DRAFT AIA® Document A312™ - 2010

## 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**

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 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**

Company: \_\_\_\_\_ (Corporate Seal)

Signature: \_\_\_\_\_

Name and Title: « »« »

Address: « »

**SURETY**

Company: \_\_\_\_\_ (Corporate Seal)

Signature: \_\_\_\_\_

Name and Title: « »« »

Address: « »



# DRAFT AIA® Document A312™ - 2010

## 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)

**SURETY**

Company: (Corporate Seal)

Signature:

Name and « »

Title:

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**

Company: (Corporate Seal)

Signature:

Name and Title: « »« »

Address: « »

**SURETY**

Company: (Corporate Seal)

Signature:

Name and Title: « »« »

Address: « »

DOCUMENT 00 62 12  
PRODUCT SUBMITTAL FORM

This 2-page document is to be fully completed, and attached to, ALL submittals for the Project. Use additional sheets as needed. Attach cut sheets, technical data sheets, materials safety data sheets, and other documentation supporting product data.

**General Submittal Information:**

Calcutt Middle School – FEI  
Central Falls, Rhode Island

Architect:

Ai3 Architects, LLC  
526 Boston Post Road  
Wayland, Massachusetts 01778

Construction Manager / General Contractor:

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Trade Contractor /or/ Subcontractor /or/ Sub-subcontractor:

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Vendor:

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Date submitted: \_\_\_\_\_

Submittal #: \_\_\_\_\_

Resubmittal:: R-\_\_ \_\_\_\_\_

Specification Section Reference: \_\_\_\_\_

Page: \_\_\_\_\_ Article: \_\_\_\_\_

Drawing Number Reference: \_\_\_\_\_

Detail Number: \_\_\_\_\_

Quantity submitted:

Reproducibles: \_\_\_\_ Prints: \_\_\_\_\_

Standard References (ANSI, ASTM, FS, etc)

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Attachments:

- Product Data
- Drawings
- Samples
- Reports
- Tests
- Warranties
- MSDS
- Schedules
- Calculations
- 3rd. Party Certification

**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: \_\_\_\_\_

SUBCONTRACTOR COORDINATION IS REQUIRED WITH WORK IN THESE DIVISIONS

- 02  03  04  05  06  07  08  09  10  11  12  13  14
- 21  22  23  25  26  27  28  31  32  33

**REVIEW STAMPS**

**GENERAL CONTRACTOR:**

- 
- ARCHITECT**
- No Exceptions Taken  Confirm Revise And Resubmit
  - Make Corrections Noted  Rejected
  - Submit Specified Item

COMMENTS: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

- 
- CONSULTANT**
- Reviewed  Furnish As Corrected
  - Rejected  Revise and Resubmit

COMMENTS: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

**DISTRIBUTION AND COORDINATION**

Project File: \_\_\_\_\_

Site Office: \_\_\_\_\_

Owner's Project Manager: \_\_\_\_\_

Resident Engineer / Clerk: \_\_\_\_\_

END OF DOCUMENT

Document 00 63 13

REQUEST FOR INTERPRETATION (RFI) FORM

Date Submitted: \_\_\_\_\_

To the Architect: Ai3 Architects, LLC  
526 Boston Post Road  
Wayland, Massachusetts 01778

Architect's Assigned  
RFI #  
\_\_\_\_\_

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  \_\_\_\_\_  
 \_\_\_\_\_  \_\_\_\_\_  \_\_\_\_\_  
 \_\_\_\_\_  \_\_\_\_\_  File

Date Received at  
Architect  
\_\_\_\_\_

Date Returned by  
Architect  
\_\_\_\_\_

End of Document

**DO NOT REMOVE  
THIS PAGE INTENTIONALLY LEFT BLANK**

Document 00 63 25

SUBSTITUTION REQUEST FORM

Date Submitted: \_\_\_\_\_

Project: \_\_\_\_\_

To the Architect: Ai3 Architects, LLC  
526 Boston Post Road  
Wayland, Massachusetts 01778

Submitted By: Company Name: \_\_\_\_\_

The Contractor proposes the following substitution in accordance with the requirements of the Contract Documents:

References: Specification Section Number: ----- \_\_\_\_\_  
Article / Paragraph / Subparagraph: --- \_\_\_\_\_  
Drawing Number: ----- \_\_\_\_\_  
Detail Number: ----- \_\_\_\_\_

Scope of Substitution: \_\_\_\_\_  
\_\_\_\_\_

Reason for Substitution: \_\_\_\_\_  
\_\_\_\_\_

Impact on Project Cost: Savings to Owner for accepting 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. • Age of product availability in US marketplace  
• Point by point comparative with specified product. • 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:**

Approved: ----- \_\_\_\_\_

Approved as Noted:----- \_\_\_\_\_

Revise and Resubmit:----- \_\_\_\_\_

Not Approved:----- \_\_\_\_\_

**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)

<< >>< >>  
<< >>

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**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.

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## **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, 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.

## 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.

### § 5.3 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, 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 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.

### § 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.

§ 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 all rights against (1) each other and any of their subcontractors, sub-subcontractors, agents, and employees, each of the other; (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** 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.

### **§ 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.

### **§ 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. If the parties have selected arbitration as the method of binding dispute resolution, the Federal Arbitration Act 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 Claims against each other 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 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 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, 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, 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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## **DOCUMENT 00 73 46**

# **PREVAILING WAGE DETERMINATION SCHEDULE**

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 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 1<sup>st</sup>, 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 US System for Award Management (SAM).

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"General Decision Number: RI20220001 05/06/2022

Superseded General Decision Number: RI20210001

State: Rhode Island

Construction Types: Building, Heavy (Heavy and Marine) and Highway

Counties: Rhode Island Statewide.

BUILDING CONSTRUCTION PROJECTS (does not include residential construction consisting of single family homes and apartments up to and including 4 stories) HEAVY, HIGHWAY AND MARINE CONSTRUCTION PROJECTS

Note: Contracts subject to the Davis-Bacon Act are generally required to pay at least the applicable minimum wage rate required under Executive Order 14026 or Executive Order 13658. Please note that these Executive Orders apply to covered contracts entered into by the federal government that are subject to the Davis-Bacon Act itself, but do not apply to contracts subject only to the Davis-Bacon Related Acts, including those set forth at 29 CFR 5.1(a)(2)-(60).

If the contract is entered into on or after January 30, 2022, or the contract is renewed or extended (e.g., an option is exercised) on or after January 30, 2022:	. Executive Order 14026 generally applies to the contract. . The contractor must pay all covered workers at least \$15.00 per hour (or the applicable wage rate listed on this wage determination, if it is higher) for all hours spent performing on the contract in 2022.
If the contract was awarded on or between January 1, 2015 and January 29, 2022, and the contract is not renewed or extended on or after January 30, 2022:	. Executive Order 13658 generally applies to the contract. . The contractor must pay all covered workers at least \$11.25 per hour (or the applicable wage rate listed on this wage determination, if it is higher) for all hours spent performing on that contract in 2022.

The applicable Executive Order minimum wage rate will be adjusted annually. If this contract is covered by one of the Executive Orders and a classification considered necessary for performance of work on the contract does not appear on this wage determination, the contractor must still submit a conformance request.

Additional information on contractor requirements and worker protections under the Executive Orders is available at <https://www.dol.gov/agencies/whd/government-contracts>.

Modification Number	Publication Date
0	01/07/2022
1	01/21/2022
2	02/18/2022
3	02/25/2022
4	04/01/2022
5	05/06/2022

\* ASBE0006-006 12/01/2021

	Rates	Fringes
HAZARDOUS MATERIAL HANDLER (Includes preparation, wetting, stripping, removal scrapping, vacuuming, bagging & disposing of all insulation materials, whether they contain asbestos or not, from mechanical systems).....	\$ 37.80	25.05

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ASBE0006-008 09/01/2021

	Rates	Fringes
Asbestos Worker/Insulator Includes application of all insulating materials, protective coverings, coatings & finishes to all types of mechanical systems.	\$ 45.00	32.89

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BOIL0029-001 01/01/2021

	Rates	Fringes
BOILERMAKER.....	\$ 45.87	29.02

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BRRIO003-001 06/01/2020

	Rates	Fringes
Bricklayer, Stonemason, Pointer, Caulker & Cleaner.....	\$ 42.55	28.02

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BRRIO003-002 03/01/2020

	Rates	Fringes
Marble Setter, Terrazzo Worker & Tile Setter.....	\$ 40.78	28.92

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BRRIO003-003 03/01/2020

	Rates	Fringes
Marble, Tile & Terrazzo Finisher.....	\$ 34.10	27.88

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CARP0330-001 01/01/2021

	Rates	Fringes
CARPENTER (Includes Soft		

Floor Layer).....	\$ 39.72	28.66
Diver Tender.....	\$ 40.72	28.66
DIVER.....	\$ 51.47	28.66
Piledriver.....	\$ 39.72	28.66
WELDER.....	\$ 40.72	28.66

FOOTNOTES:

When not diving or tending the diver, the diver and diver tender shall receive the piledriver rate. Diver tenders shall receive \$1.00 per hour above the pile driver rate when tending the diver.

Work on free-standing stacks, concrete silos & public utility electrical power houses, which are over 35 ft. in height when constructed: \$.50 per hour additional.

Work on exterior concrete shear wall gang forms, 45 ft. or more above ground elevation or on setback: \$.50 per hour additional.

The designated piledriver, known as the ""monkey"": \$1.00 per hour additional.

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 CARP1121-002 01/06/2020

	Rates	Fringes
MILLWRIGHT.....	\$ 39.07	29.15

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 ELEC0099-002 06/02/2021

	Rates	Fringes
ELECTRICIAN.....	\$ 43.61	54.71%
Teledata System Installer.....	\$ 32.71	12.57%+14.93

FOOTNOTES:

Work of a hazardous nature, or where the work height is 30 ft. or more from the floor, except when working OSHA-approved lifts: 20% per hour additional.

Work in tunnels below ground level in combined sewer outfall: 20% per hour additional.

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 ELEV0039-001 01/01/2022

	Rates	Fringes
ELEVATOR MECHANIC.....	\$ 56.91	36.885+a+b

FOOTNOTES:

A. PAID HOLIDAYS: New Years Day; Memorial Day; Independence Day; Labor Day; Veterans' Day; Thanksgiving Day; the Friday after Thanksgiving Day; and Christmas Day.

B. Employer contributes 8% basic hourly rate for 5 years or more of service of 6% basic hourly rate for 6 months to 5 years of service as vacation pay credit.

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Rates Fringes

Operating Engineer: (power plants, sewer treatment plants, pumping stations, tunnels, caissons, piers, docks, bridges, wind turbines, subterranean & other marine and heavy construction work)

GROUP 1.....	\$ 43.55	28.25+a
GROUP 2.....	\$ 41.55	28.25+a
GROUP 3.....	\$ 37.17	28.25+a
GROUP 4.....	\$ 34.32	28.25+a
GROUP 5.....	\$ 40.60	28.25+a
GROUP 6.....	\$ 31.40	28.25+a
GROUP 7.....	\$ 25.40	28.25+a
GROUP 8.....	\$ 37.25	28.25+a
GROUP 9.....	\$ 41.17	28.25+a

a. BOOM LENGTHS, INCLUDING JIBS:

- 150 feet and over + \$ 2.00
- 180 feet and over + \$ 3.00
- 210 feet and over + \$ 4.00
- 240 feet and over + \$ 5.00
- 270 feet and over + \$ 7.00
- 300 feet and over + \$ 8.00
- 350 feet and over + \$ 9.00
- 400 feet and over + \$10.00

a. PAID HOLIDAYS:

New Year's Day, President's Day, Memorial Day, July Fourth, Victory Day, Labor Day, Columbus Day, Veterans Day, Thanksgiving Day, Christmas Day. a: Any employee who works 3 days in the week in which a holiday falls shall be paid for the holiday.

a. FOOTNOTES:

Hazmat work: \$2.00 per hour additional.  
 Tunnel/Shaft work: \$5.00 per hour additional.

POWER EQUIPMENT OPERATORS CLASSIFICATIONS

GROUP 1: Cranes, lighters, boom trucks and derricks

GROUP 2: Digging machine, Ross Carrier, locomotive, hoist, elevator, bidwell-type machine, shot & water blasting machine, paver, spreader, graders, front end loader (3 yds. and over), vibratory hammer & vacuum truck, roadheaders, forklifts, economobile type equipment, tunnel boring machines, concrete pump and on site concrete plants.

GROUP 3: Oilers on cranes.

GROUP 4: Oiler on crawler backhoe.

GROUP 5: Bulldozer, bobcats, skid steer loader, tractor, scraper, combination loader backhoe, roller, front end loader (less than 3 yds.), street and mobile-powered sweeper (3-yd. capacity), 8-ft. sweeper minimum 65 HP).

GROUP 6: Well-point installation crew.

GROUP 7: Utility Engineers and Signal Persons

GROUP 8: Heater, concrete mixer, stone crusher, welding machine, generator and light plant, gas and electric driven pump and air compressor.

GROUP 9: Boat & tug operator.

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\* ENGI0057-002 05/01/2022

	Rates	Fringes
Power Equipment Operator (highway construction projects; water and sewerline projects which are incidental to highway construction projects; and bridge projects that do not span water)		
GROUP 1.....	\$ 36.70	29.25+a
GROUP 2.....	\$ 31.40	29.25+a
GROUP 3.....	\$ 25.40	29.25+a
GROUP 4.....	\$ 31.98	29.25+a
GROUP 5.....	\$ 35.68	29.25+a
GROUP 6.....	\$ 35.30	29.25+a
GROUP 7.....	\$ 30.95	29.25+a
GROUP 8.....	\$ 32.33	29.25+a
GROUP 9.....	\$ 34.28	29.25+a

a. FOOTNOTE: a. Any employee who works three days in the week in which a holiday falls shall be paid for the holiday.

a. PAID HOLIDAYS: New Year's Day, President's Day, Memorial Day, July Fourth, Victory Day, Labor Day, Columbus Day, Veterans Day, Thanksgiving Day & Christmas Day.

POWER EQUIPMENT OPERATOR CLASSIFICATIONS

GROUP 1: Digging machine, crane, piledriver, lighter, locomotive, derrick, hoist, boom truck, John Henry's, directional drilling machine, cold planer, reclaimer, paver, spreader, grader, front end loader (3 yds. and over), vacuum truck, test boring machine operator, veemere saw, water blaster, hydro-demolition robot, forklift, economobile, Ross Carrier, concrete pump operator and boats

GROUP 2: Well point installation crew

GROUP 3: Utility engineers and signal persons

GROUP 4: Oiler on cranes

GROUP 5: Combination loader backhoe, front end loader (less than 3 yds.), forklift, bulldozers & scrapers and boats

GROUP 6: Roller, skid steer loaders, street sweeper

GROUP 7: Gas and electric drive heater, concrete mixer, light plant, welding machine, pump & compressor

GROUP 8: Stone crusher

GROUP 9: Mechanic & welder

-----  
ENGI0057-003 12/01/2021

BUILDING CONSTRUCTION

	Rates	Fringes
Power Equipment Operator		
GROUP 1.....	\$ 42.82	28.25+a
GROUP 2.....	\$ 40.82	28.25+a
GROUP 3.....	\$ 40.60	28.25+a
GROUP 4.....	\$ 36.60	28.25+a
GROUP 5.....	\$ 33.75	28.25+a
GROUP 6.....	\$ 39.90	28.25+a
GROUP 7.....	\$ 39.47	28.25+a
GROUP 8.....	\$ 36.79	28.25+a

a. BOOM LENGTHS, INCLUDING JIBS:

- 150 ft. and over: + \$ 2.00
- 180 ft. and over: + \$ 3.00
- 210 ft. and over: + \$ 4.00
- 240 ft. and over: + \$ 5.00
- 270 ft. and over: + \$ 7.00
- 300 ft. and over: + \$ 8.00
- 350 ft. and over: + \$ 9.00
- 400 ft. and over: + \$10.00

a. PAID HOLIDAYS: New Year's Day, President's Day, Memorial Day, July Fourth, Victory Day, Labor Day, Columbus Day, Veterans Day, Thanksgiving Day & Christmas Day. a: Any employee who works 3 days in the week in which a holiday falls shall be paid for the holiday.

- a. FOOTNOTE: Hazmat work: \$2.00 per hour additional.  
Tunnel/Shaft work: \$5.00 per hour additional.

POWER EQUIPMENT OPERATORS CLASSIFICATIONS

GROUP 1: Cranes, lighters, boom trucks and derricks.

GROUP 2: Digging machine, Ross carrier, locomotive, hoist, elevator, bidwell-type machine, shot & water blasting machine, paver, spreader, front end loader (3 yds. and over), vibratory hammer and vacuum truck

GROUP 3: Telehandler equipment, forklift, concrete pump & on-site concrete plant

GROUP 4: Fireman & oiler on cranes

GROUP 5: Oiler on crawler backhoe

GROUP 6: Bulldozer, skid steer loaders, bobcats, tractor, grader, scraper, combination loader backhoe, roller, front end loader (less than 3 yds.), street and mobile powered sweeper (3 yds. capacity), 8-ft. sweeper (minimum 65 hp)

GROUP 7: Well point installation crew

GROUP 8: Heater, concrete mixer, stone crusher, welding machine, generator for light plant, gas and electric driven



pump & air compressor

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IRON0037-001 09/16/2021

	Rates	Fringes
IRONWORKER.....	\$ 38.21	30.58

-----  
LAB00271-001 05/30/2021

BUILDING CONSTRUCTION

	Rates	Fringes
LABORER		
GROUP 1.....	\$ 33.55	26.15
GROUP 2.....	\$ 33.80	26.15
GROUP 3.....	\$ 34.30	26.15
GROUP 4.....	\$ 34.55	26.15
GROUP 5.....	\$ 35.55	26.15

LABORERS CLASSIFICATIONS

GROUP 1: Laborer, Carpenter Tender, Mason Tender, Cement Finisher Tender, Scaffold Erector, Wrecking Laborer, Asbestos Removal [Non-Mechanical Systems]

GROUP 2: Asphalt Raker, Adzemen, Pipe Trench Bracer, Demolition Burner, Chain Saw Operator, Fence & Guard Rail Erector, Setter of Metal Forms for Roadways, Mortar Mixer, Pipelayer, Riprap & Dry Stonewall Builder, Highway Stone Spreader, Pneumatic Tool Operator, Wagon Drill Operator, Tree Trimmer, Barco-Type Jumping Tamper, Mechanical Grinder Operator

GROUP 3: Pre-Cast Floor & Roof Plank Erectors

GROUP 4: Air Track Operator, Hydraulic & Similar Self-Powered Drill, Block Paver, Rammer, Curb Setter, Powderman & Blaster

GROUP 5: Toxic Waste Remover

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LAB00271-002 05/30/2021

HEAVY AND HIGHWAY CONSTRUCTION

	Rates	Fringes
LABORER		
COMPRESSED AIR		
Group 1.....	\$ 53.45	24.15
Group 2.....	\$ 50.98	24.15
Group 3.....	\$ 40.50	24.15
FREE AIR		
Group 1.....	\$ 44.05	24.15
Group 2.....	\$ 43.05	24.15
Group 3.....	\$ 40.50	24.15
LABORER		
Group 1.....	\$ 33.55	24.15
Group 2.....	\$ 33.80	24.15
Group 3.....	\$ 34.55	24.15
Group 4.....	\$ 27.05	24.15
Group 5.....	\$ 35.55	24.15

OPEN AIR CAISSON,  
UNDERPINNING WORK AND  
BORING CREW

Bottom Man.....	\$ 39.55	24.15
Top Man & Laborer.....	\$ 38.60	24.15
TEST BORING		
Driller.....	\$ 40.00	24.15
Laborer.....	\$ 38.60	24.15

LABORER CLASSIFICATIONS

GROUP 1: Laborer; Carpenter tender; Cement finisher tender; Wrecking laborer; Asbestos removers [non-mechanical systems]; Plant laborer; Driller in quarries

GROUP 2: Adzeperson; Asphalt raker; Barcotype jumping tamper; Chain saw operators; Concrete and power buggy operator; Concrete saw operator; Demolition burner; Fence and guard rail erector; Highway stone spreader; Laser beam operator; Mechanical grinder operator; Mason tender; Mortar mixer; Pneumatic tool operator; Riprap and dry stonewall builder; Scaffold erector; Setter of metal forms for roadways; Wagon drill operator; Wood chipper operator; Pipelayer; Pipe trench bracer

GROUP 3: Air track drill operator; Hydraulic and similar powered drills; Brick paver; Block paver; Rammer and curb setter; Powderperson and blaster

GROUP 4: Flagger & signaler

GROUP 5: Toxic waste remover

LABORER - COMPRESSED AIR CLASSIFICATIONS

GROUP 1: Mucking machine operator, tunnel laborer, brake person, track person, miner, grout person, lock tender, gauge tender, miner: motor person & all others in compressed air

GROUP 2: Change house attendant, powder watchperson, top person on iron

GROUP 3: Hazardous waste work within the ""HOT"" zone

LABORER - FREE AIR CLASSIFICATIONS

GROUP 1: Grout person - pumps, brake person, track person, form mover & stripper (wood & steel), shaft laborer, laborer topside, outside motorperson, miner, conveyor operator, miner welder, heading motorperson, erecting operator, mucking machine operator, nozzle person, rodperson, safety miner, shaft & tunnel, steel & rodperson, mole nipper, concrete worker, form erector (wood, steel and all accessories), cement finisher (this type of work only), top signal person, bottom person (when heading is 50' from shaft), burner, shield operator and TBM operator

GROUP 2: Change house attendant, powder watchperson

GROUP 3: Hazardous waste work within the ""HOT"" zone

	Rates	Fringes
PAINTER		
Brush and Roller.....	\$ 36.42	22.90
Epoxy, Tanks, Towers, Swing Stage & Structural Steel.....	\$ 38.42	22.90
Spray, Sand & Water Blasting.....	\$ 39.42	22.90
Taper.....	\$ 37.17	22.90
Wall Coverer.....	\$ 36.92	22.90

-----  
PAIN0011-006 06/01/2021

	Rates	Fringes
GLAZIER.....	\$ 39.98	22.90

FOOTNOTES:

SWING STAGE: \$1.00 per hour additional.

PAID HOLIDAYS: Labor Day & Christmas Day.

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PAIN0011-011 06/01/2021

	Rates	Fringes
Painter (Bridge Work).....	\$ 54.00	22.90

-----  
PAIN0035-008 06/01/2011

	Rates	Fringes
Sign Painter.....	\$ 24.79	13.72

-----  
PLAS0040-001 06/03/2019

BUILDING CONSTRUCTION

	Rates	Fringes
CEMENT MASON/CONCRETE FINISHER...	\$ 36.00	27.15

FOOTNOTE: Cement Mason: Work on free swinging scaffolds under 3 planks width and which is 20 or more feet above ground and any offset structure: \$.30 per hour additional.

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PLAS0040-002 07/01/2019

HEAVY AND HIGHWAY CONSTRUCTION

	Rates	Fringes
CEMENT MASON/CONCRETE FINISHER...	\$ 32.85	22.20

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PLAS0040-003 07/01/2019

	Rates	Fringes
PLASTERER.....	\$ 37.55	27.50

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PLUM0051-002 08/30/2021

	Rates	Fringes
Plumbers and Pipefitters.....	\$ 46.49	31.40

ROOF0033-004 12/01/2021

	Rates	Fringes
ROOFER.....	\$ 40.40	29.06

SFRI0669-001 04/01/2022

	Rates	Fringes
SPRINKLER FITTER.....	\$ 47.55	29.38

SHEE0017-002 12/01/2020

	Rates	Fringes
Sheet Metal Worker.....	\$ 38.58	36.73

TEAM0251-001 05/01/2019

HEAVY AND HIGHWAY CONSTRUCTION

	Rates	Fringes
TRUCK DRIVER		
GROUP 1.....	\$ 27.96	26.8525+A+B+C
GROUP 2.....	\$ 27.61	26.8525+A+B+C
GROUP 3.....	\$ 27.66	26.8525+A+B+C
GROUP 4.....	\$ 27.71	26.8525+A+B+C
GROUP 5.....	\$ 27.81	26.8525+A+B+C
GROUP 6.....	\$ 28.21	26.8525+A+B+C
GROUP 7.....	\$ 28.41	26.8525+A+B+C
GROUP 8.....	\$ 27.91	26.8525+A+B+C
GROUP 9.....	\$ 28.16	26.8525+A+B+C
GROUP 10.....	\$ 27.96	26.8525+A+B+C

FOOTNOTES:

A. Paid Holidays: New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day and Christmas Day, plus Presidents' Day, Columbus Day, Veteran's Day & V-J Day, providing the employee has worked at least one day in the calendar week in which the holiday falls.

B. Employee who has been on the payroll for 1 year or more but less than 5 years and has worked 150 Days during the last year of employment shall receive 1 week's paid vacation; 5 to 10 years - 2 weeks' paid vacation; 10 or more years - 3 week's paid vacation.

C. Employees on the seniority list shall be paid a one hundred dollar (\$100.00) bonus for every four hundred (400) hours worked, up to a maximum of five hundred dollars (\$500.00)

All drivers working on a defined hazard material job site shall be paid a premium of \$2.00 per hour over applicable rate.

TRUCK DRIVER CLASSIFICATIONS

GROUP 1: Pick-up trucks, station wagons, & panel trucks

GROUP 2: Two-axle on low beds

GROUP 3: Two-axle dump truck

GROUP 4: Three-axle dump truck

GROUP 5: Four- and five-axle equipment

GROUP 6: Low-bed or boom trailer.

GROUP 7: Trailers when used on a double hook up (pulling 2 trailers)

GROUP 8: Special earth-moving equipment, under 35 tons

GROUP 9: Special earth-moving equipment, 35 tons or over

GROUP 10: Tractor trailer

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WELDERS - Receive rate prescribed for craft performing operation to which welding is incidental.

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Note: Executive Order (EO) 13706, Establishing Paid Sick Leave for Federal Contractors applies to all contracts subject to the Davis-Bacon Act for which the contract is awarded (and any solicitation was issued) on or after January 1, 2017. If this contract is covered by the EO, the contractor must provide employees with 1 hour of paid sick leave for every 30 hours they work, up to 56 hours of paid sick leave each year. Employees must be permitted to use paid sick leave for their own illness, injury or other health-related needs, including preventive care; to assist a family member (or person who is like family to the employee) who is ill, injured, or has other health-related needs, including preventive care; or for reasons resulting from, or to assist a family member (or person who is like family to the employee) who is a victim of, domestic violence, sexual assault, or stalking. Additional information on contractor requirements and worker protections under the EO is available at <https://www.dol.gov/agencies/whd/government-contracts>.

Unlisted classifications needed for work not included within the scope of the classifications listed may be added after award only as provided in the labor standards contract clauses (29CFR 5.5 (a) (1) (ii)).

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The body of each wage determination lists the classification and wage rates that have been found to be prevailing for the cited type(s) of construction in the area covered by the wage determination. The classifications are listed in alphabetical order of ""identifiers"" that indicate whether the particular rate is a union rate (current union negotiated rate for local), a survey rate (weighted average rate) or a union average rate

(weighted union average rate).

#### Union Rate Identifiers

A four letter classification abbreviation identifier enclosed in dotted lines beginning with characters other than ""SU"" or ""UAVG"" denotes that the union classification and rate were prevailing for that classification in the survey. Example: PLUM0198-005 07/01/2014. PLUM is an abbreviation identifier of the union which prevailed in the survey for this classification, which in this example would be Plumbers. 0198 indicates the local union number or district council number where applicable, i.e., Plumbers Local 0198. The next number, 005 in the example, is an internal number used in processing the wage determination. 07/01/2014 is the effective date of the most current negotiated rate, which in this example is July 1, 2014.

Union prevailing wage rates are updated to reflect all rate changes in the collective bargaining agreement (CBA) governing this classification and rate.

#### Survey Rate Identifiers

Classifications listed under the ""SU"" identifier indicate that no one rate prevailed for this classification in the survey and the published rate is derived by computing a weighted average rate based on all the rates reported in the survey for that classification. As this weighted average rate includes all rates reported in the survey, it may include both union and non-union rates. Example: SULA2012-007 5/13/2014. SU indicates the rates are survey rates based on a weighted average calculation of rates and are not majority rates. LA indicates the State of Louisiana. 2012 is the year of survey on which these classifications and rates are based. The next number, 007 in the example, is an internal number used in producing the wage determination. 5/13/2014 indicates the survey completion date for the classifications and rates under that identifier.

Survey wage rates are not updated and remain in effect until a new survey is conducted.

#### Union Average Rate Identifiers

Classification(s) listed under the UAVG identifier indicate that no single majority rate prevailed for those classifications; however, 100% of the data reported for the classifications was union data. EXAMPLE: UAVG-OH-0010 08/29/2014. UAVG indicates that the rate is a weighted union average rate. OH indicates the state. The next number, 0010 in the example, is an internal number used in producing the wage determination. 08/29/2014 indicates the survey completion date for the classifications and rates under that identifier.

A UAVG rate will be updated once a year, usually in January of each year, to reflect a weighted average of the current negotiated/CBA rate of the union locals from which the rate is based.

1.) Has there been an initial decision in the matter? This can be:

- \* an existing published wage determination
- \* a survey underlying a wage determination
- \* a Wage and Hour Division letter setting forth a position on a wage determination matter
- \* a conformance (additional classification and rate) ruling

On survey related matters, initial contact, including requests for summaries of surveys, should be with the Wage and Hour National Office because National Office has responsibility for the Davis-Bacon survey program. If the response from this initial contact is not satisfactory, then the process described in 2.) and 3.) should be followed.

With regard to any other matter not yet ripe for the formal process described here, initial contact should be with the Branch of Construction Wage Determinations. Write to:

Branch of Construction Wage Determinations  
Wage and Hour Division  
U.S. Department of Labor  
200 Constitution Avenue, N.W.  
Washington, DC 20210

2.) If the answer to the question in 1.) is yes, then an interested party (those affected by the action) can request review and reconsideration from the Wage and Hour Administrator (See 29 CFR Part 1.8 and 29 CFR Part 7). Write to:

Wage and Hour Administrator  
U.S. Department of Labor  
200 Constitution Avenue, N.W.  
Washington, DC 20210

The request should be accompanied by a full statement of the interested party's position and by any information (wage payment data, project description, area practice material, etc.) that the requestor considers relevant to the issue.

3.) If the decision of the Administrator is not favorable, an interested party may appeal directly to the Administrative Review Board (formerly the Wage Appeals Board). Write to:

Administrative Review Board  
U.S. Department of Labor  
200 Constitution Avenue, N.W.  
Washington, DC 20210

4.) All decisions by the Administrative Review Board are final.

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END OF GENERAL DECISIO"

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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 Apprentice %	Date:	S	M	T	W	T	F	S	Total Hrs	Hourly Rate (List all Rates)	Hourly Fringe Benefit	Weekly Gross	Weekly Deductions						
			Hours Worked Each Day											Social Security	Medi-care	Withheld		RI TDI	*Other	Weekly Net
																Federal	State			
		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.																		
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		A.P.O.																		
		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: _____ | 4.) Disability: _____              |
| 2.) Pension or Retirement: _____    | 5.) Vacation, sick, holiday: _____ |
| 3.) Life Insurance: _____           | 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.

<b>SIGNATURE OF OWNER OR OFFICER OF CORPORATION</b>	<b>PRINT NAME &amp; TITLE</b>	<b>DATE</b>
<p>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.</p>		



## 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

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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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## **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 1<sup>st</sup> 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 1<sup>st</sup> 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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## Section 01 10 00

## SUMMARY

**PART 1 - GENERAL**

## 1.1 SUMMARY

- A. Project description.
- B. Project's environmental goals.
- C. Definitions – Owner, Owner's Project Manager, Architect.
- D. Work by Owner.
- E. Work sequence.
- F. Work restrictions.
- G. Specification Formats and Conventions.

## 1.2 PROJECT DESCRIPTION

- A. Summary of Work: In General the project consists of the following scope, and as additionally indicated on Drawings, and as specified:
  - 1. Main Entrance:
    - a. Update the existing hardscaping/landscaping.
    - b. Remove and replace the existing guardrails and railings at the concrete stairs and ramps with new compliant painted steel rails.
    - c. Repair damage to the concrete ramp/stairs
    - d. Provide lighted canopy at front door
    - e. Whitewash face of brick.
    - f. Provide corrugated perforated metal panel with silk screening for custom graphic.
    - g. Back-lit aluminum building name lettering.
    - h. Paint existing metal entrance doors and frame.
  - 2. Main Entrance Lobby:
    - a. Repaint CMU and GWB walls.
    - b. Provide vinyl graphics adhered to CMU wall
  - 3. Secondary (Bus/Stair B) Entrance:
    - a. Provide corrugated perforated metal panels over existing brick façade with silk screening for custom graphic.
    - b. Provide post mounted corrugated perforated metal screening at existing emergency generator.
    - c. Provide aluminum signage of school log attached to metal panels.
    - d. Provide lighting to underside of existing exterior soffit.
    - e. Provide new metal panel plank for underside of existing exterior soffit.
  - 4. Secondary (Bus/Stair B) Entrance Lobby:

- a. Repaint walls and soffits as indicated.
  - b. Provide vinyl graphic adhered to concrete masonry wall
  - c. Provide rubber treads/risers/landing
  - d. Provide compliant painted steel railing to existing guardrail
  - e. Repaint guardrails, railings, stringers, and underside of stair.
  - f. Re-secure existing wall-mounted handrail to masonry wall
  - g. Replace all door hardware at all doors on the first and second floors that connect into Stair B. Salvage existing hardware and deliver to Owner.
  - h. Provide wayfinding signage.
  - i. Patch existing ACT ceilings and lighting where disturbed by the Work.
5. Science Classroom:
- a. Demolish and remove the following where indicated:
    - 1) Casework
    - 2) Sink
    - 3) Unit ventilators
    - 4) Emergency eyewash/shower
  - b. Patch exterior wall/curtainwalls at wall penetration where existing unit ventilators are removed.
  - c. Remove abandoned utilities and services, and cap. Provide new utilities, services, sink and sink accessories.
  - d. Provide modular metal casework, epoxy countertops, and goggle cabinet.
  - e. Paint all walls
  - f. Patch existing concrete deck/floor at removed services and prepare substrates for new flooring.
  - g. Provide ceilings, flooring and rubber wall base.
  - h. Remove existing lighting and re-install in new ceilings.
  - i. Provide stainless steel plant holder shelving at exterior windows with grow lighting
  - j. Provide recessed eyewash station.
  - k. Provide signage
  - l. Provide fire extinguisher cabinets and fire blanket cabinet.
  - m. Provide multi-zone heat pump (see HVAC narrative)
  - n. Provide wood stools at all window locations.
6. Library Media Center:
- a. Provide vinyl graphics adhered to concrete masonry wall.
  - b. Repaint all wall and soffit surfaces in the lobby outside of the Media Center entrance.
  - c. Replace and provide new doors and hardware as scheduled.
    - 1) Replace hardware at existing doors to remain within media center. Salvage hardware and deliver to Owner.
  - d. Repaint all walls and soffits in media center and adjacent storage room and small group room.

- e. Provide framed operable glass wall between main media center and maker space.
  - f. Provide ceilings, including specialty dropped ceilings and lighting.
    - 1) Remove designated existing lighting scheduled to remain and reinstall in new ceilings. Existing lighting to remain in situ, where located in areas where ceilings are not being replaced.
  - g. Provide multi-zone heat pump (see HVAC narrative)
  - h. Prepare substrates and provide flooring and resilient wall base.
  - i. Provide multi-media area pipe grid below ACT ceiling (green screen zone)
    - 1) Provide multi-media lighting and power at pipe grid
    - 2) Provide pre-molded green screen system.
  - j. Remove existing and provide aluminum framed exterior windows at library media center.
  - k. Provide wood stools at all window locations.
  - l. Patch exterior wall/curtainwalls at wall penetrations where existing unit ventilators are scheduled to be removed.
7. General Upgrades:
- a. Selective demolition, and cutting and patching as required by the Work.
  - b. Provide Wayfinding signage.
  - c. Provide Environmental Graphics.
- B. Building Permits: Permits are required for the commencing and completion of the work. The City of Central Falls does not collect permit fees on City projects. Therefore, the only necessary fee will be the State ADA fee. The General Contractor shall receive the building, electrical and plumbing permits prior to performing any work on the Project. All other permits required by City, State Agencies or other public agencies will require 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 PROJECT ENVIRONMENTAL GOALS

- A. Objectives: Utilize pollution prevention materials, sustainable construction methods, low VOC and no off-gassing, products to maintain of healthy Indoor Air Quality (IAQ) during the construction process:
- 1. Incorporate green products and sustainable materials into the Project. To the greatest extent possible, the Contractor shall:
    - a. Use products with low embodied energy (production, manufacturing, and transportation).
    - b. Use products that maximize recycled content in materials products, and systems.
    - c. Use products easy to maintain, repair, and that can be cleaned using non-toxic substances..
    - d. Use products that will not negatively affect healthy indoor air quality.

- e. Use reusable and recyclable packaging.
  - f. Avoid use of ozone-depleting compounds, such as HCFCs from refrigerants or foam insulation materials.
- B. 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. Utilize water-conserving appliances and equipment.
- C. 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.
- 1. Use construction practices that achieve the most efficient use of resources and materials.

#### 1.4 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  
Central Falls School District  
949 Dexter Street, Lower Level  
Central Falls, Rhode Island 02863-1715
- 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 were included in the General Contractors Bid.
    - d. Fines and Penalties: Contractor and subcontractors are fully responsible for payment of all penalties and fines assessed 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" (OPM) is used in the Contract Documents, it refers to:

Peregrine Group, LLC  
20 Newman Avenue, Suite 1005  
Rumford, Rhode Island, 02916

- C. Wherever the term "Architect", "Designer", or "Architect/Engineer", is used in the Contract Documents, it refers to:

Ai3 Architects, LLC  
526 Boston Post Road  
Wayland, Massachusetts 01778

#### 1.5 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.

#### 1.6 PRODUCTS REQUIRING LONG LEAD TIME

- A. Several products specified in individual specification sections are "long lead time" products and thus require advance ordering. For the following categories of work, affirm early purchase orders under the requirements of Section 01 32 00 – Construction Progress Documentation.

1. Hardware for doors.
2. Equipment for heating, ventilating and air conditioning.
3. Light fixtures.

#### 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. 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.

## 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 or 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. Criminal Offender Record Information (CORI) Reporting. Central Falls School District will require criminal offender record information ("CORI") from the criminal history systems board, relating to any worker who is scheduled to work on any portions of the school property. The General Contractor, and subcontractors shall make every effort to provide the Owner's Project Manager 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 I.D. badges at all times. The Owner shall be responsible for issuing these badges. The General Contractor shall be responsible for enforcing this requirement with their staff and all contractors. 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, and subcontractors shall have no claim for damages, delay or time extensions against the Owner.
- B. 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.
- C. Access Restriction to existing elementary school: Construction Workers are prohibited to enter the existing elementary school without prior authorization from Owner.
- D. 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.

- E. General Conduct and Demeanor: All construction workers shall treat all other workers, Owner staff, student and the public with respect and courtesy.
- F. 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.
- G. 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.
- H. Smoking: Smoking is strictly prohibited on-site.
- I. Alcoholic Beverages: Alcoholic beverages are strictly prohibited on-site.
- J. Language: Foul and rude language is strictly prohibited.
- K. Physical Actions: Running, horseplay, fighting, and other unprofessional conduct is prohibited. Fighting is a major infraction of the work rules.
- L. 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.
- M. 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.
- N. 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.
- O. 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.

**PART 2 - PRODUCTS** (Not Used)**PART 3 - EXECUTION** (Not Used)

End of Section

WORK RESTRICTIONS

01 14 00 - 4

Construction Documents / 05.20.2022

Section 01 21 00  
ALLOWANCES**PART 1 - GENERAL**

## 1.1 SUMMARY

- A. This Section consists of:
1. General provisions for allowances.
  2. Description of cash allowances.

## 1.2 GENERAL PROVISIONS

- A. Work performed on an allowance basis shall be included in the Base Bid - Stipulated Sum or in a Bid Alternate as specified. Whenever the actual cost is more than or less than the allowance, the Contract shall be adjusted accordingly by Change Order. Procedures for submitting and handling Change Orders are included in the General Conditions.

Except as otherwise specified herein, or under individual specification Sections, the allowance shall include the cost of all materials and equipment required, delivered and installed, less any applicable trade discount and plus all applicable taxes.

- B. Cash allowance provisions:
1. Costs included in cash allowances: Cost of product to General Contractor or subcontractor, less applicable trade discounts; delivered to site and applicable taxes.
  2. Architect responsibilities:
    - a. Consult with General Contractor in consideration and selection of products and suppliers.
    - b. Select products in consultation with Owner, and inform General Contractor of decision.
    - c. Prepare Change Order.
  3. General Contractor Responsibilities:
    - a. Assist Architect in selection of products and suppliers.
    - b. Obtain proposals from suppliers and offer recommendations.
    - c. On notification of selection by Architect execute purchase agreement with designated supplier.
    - d. Arrange for and process shop drawings, product data and samples. Arrange for delivery.
    - e. Promptly inspect Products upon delivery for completeness, damage, and defects. Submit claims for transportation damage.
  4. Funds will be drawn from Cash Allowances only by Change Order.

## 1.3 CASH ALLOWANCES DESCRIPTION

- A. Cash Allowance 1 - Furnish and install wayfinding signage for the following:
1. For furnishing and installing 10 wayfinding signs (18 inches by 24 inches) as specified by Section 10 14 00 – SIGNAGE.

2. Costs to be included in Base Bid - Stipulated Sum and not included in allowance: Product handling at the site, including unloading, uncrating, and storage; protection of Products from elements and from damage.
- B. Cash Allowance 2 - Furnish and install environmental awareness signage for the for the following:
1. For furnishing and installing 6 environmental awareness signs (18 inches by 24 inches) as specified by Section 10 14 00 – SIGNAGE.
  2. Costs to be included in Base Bid - Stipulated Sum and not included in allowance: Product handling at the site, including unloading, uncrating, and storage; protection of Products from elements and from damage.
- C. Cash Allowance 3 - Furnish and install firestopping and patching of fireproofing at discovered unforeseen existing locations, for the stipulated sum of \$ 10,000, (Ten Thousand dollars) for the following:
1. Allowance includes patching of existing in situ fireproofing where damaged at existing structural steel, and metal decking at unforeseen conditions which have been exposed as part of the work, as specified by Section 07 81 00 – APPLIED FIREPROOFING.
  2. Allowance includes providing new firestopping at existing unforeseen openings in rated walls, partitions and ceilings which have been exposed as part of the work, as specified by Section 07 84 00 - FIRESTOPPING.
  3. Costs to be included in Base Bid - Stipulated Sum and not included in allowance: Product handling at the site, including unloading, uncrating, and storage; protection of Products from elements and from damage.

**PART 2 - PRODUCTS** (Not Used)

**PART 3 - EXECUTION** (Not Used)

End of Section



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 – CEILING and HVAC
  - 1. Base bid: Existing to remain.
  - 2. Alternate number 1: Science classrooms 222 & 302 (including HVAC), classroom 123 ceiling.
- B. ALTERNATE 2 - BUS ENTRANCE
  - 1. Base bid: Existing to remain.
  - 2. Alternate number 2: Exterior Perforated Metal Panel & Expanded sidewalk/sitework
- C. ALTERNATE 3 - PAINTING

1. Base bid: Existing to remain.
2. Alternate number 3: Paint Corridor Walls.

D. ALTERNATE 4 - PAINTING

1. Base bid: Existing to remain.
2. Alternate number 4: Paint Classroom Walls and Door frames.

**PART 2 - PRODUCTS** (Not Used)

**PART 3 - EXECUTION** (Not Used)

End of Section

## Section 01 25 13

## PRODUCT SUBSTITUTION PROCEDURES

**PART 1 - GENERAL**

## 1.1 SUMMARY

- A. Product options.
  - 1. Product selections.
  - 2. 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 with a provision for substitutions: Provide products of manufacturers named, or submit a request for substitution for any manufacturer or product not named.
- 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 2018 edition, *RHODE ISLAND BUILDING CODE*, Regulation RISBC-1, 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 LEED Credit requirements for Project LEED 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 2018 edition, *RHODE ISLAND BUILDING CODE*, Regulation RISBC-1 the Owner has determined that specific products shall be proprietary for 'sound reasons in the public interest'. This determination has been made under vote of the City of Central Falls represented by the Central Falls Permanent Building Committee, 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 SUMMARY

- 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 subcontractors, and submittal schedule.
- B. The General Contractor's construction schedule and submittal schedule are included in Section 01 33 00 - SUBMITTAL PROCEDURES.

1.3 SCHEDULE OF VALUES

- A. Coordinate preparation of the Schedule of Values with preparation of the General Contractor's Construction Schedule. Schedule of values shall reflect project phasing.
  - 1. Schedule of values shall be used only as basis for General Contractor's application for payment.
  - 2. Breakdown schedule of values into separate line items, each having a value of not more than \$25,000.
- 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.
1. Indicate retainage as a separate line item, as a negative number.
- 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.

#### 1.4 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. Schedule of Values.
  - 4. General Contractor's Construction Schedule (preliminary if not final).

5. Schedule of principal products.
6. Schedule of unit prices.
7. Submittal Schedule (preliminary if not final).
8. List of General Contractor's staff assignments.
9. List of General Contractor's principal consultants.
10. Copies of building permits.
11. Copies of authorizations and licenses from governing authorities for performance of the Work.
12. Initial progress report.
13. Report of pre-construction meeting.
14. Data needed to acquire Owner's insurance.
15. 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.
    - a. Payroll records shall include photocopies of each employee's OSHA card and identification of pay grade cross referenced to payroll records when submitted. Failure to provide accurate information may delay processing of application for payment.
  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.
    - a. All materials stored off-site shall be properly warehoused, protected, insured, and identified as specific to the project. The General Contractor shall provide timely access to the stored materials for inspection prior to submission of any application for payment. Payment shall be contingent on agreement by the Owner's Project Representative and the Architect.
  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. Construction progress photographs.
  10. Quality control reports and procedures in compliance with Section 01 45 00 - QUALITY CONTROL.
  11. Summary of Project waste and diversion report (updated each month) in compliance with Section 01 74 19 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL.

## 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. Advice on shifting insurance coverage.
  - 11. Final progress photographs.
  - 12. List of incomplete Work, recognized as exceptions to Architect's Certificate of Substantial Completion.
  - 13. Final summary of Project waste and diversion report in compliance with Section 01 74 19 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL.

## 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. Removal of temporary facilities and services.
  - 8. Removal of surplus materials, rubbish and similar elements.
  - 9. 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 Clerk 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 non-filed subcontractors. The Contractor and its non-filed 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 GENERAL PROJECT COORDINATION

- A. Coordination: The General Contractor is fully responsible for coordinating the Work of this Contract including scheduling, and submittals. 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.

#### 1.4 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.

## 1.5 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.

#### 1.6 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.

#### 1.7 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, 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. Indoor air quality standards and testing requirements.
- r. Quality Control.
- s. Sustainability product requirements and procedures.
- t. Procedures for maintaining record documents.
- u. Requirements for equipment start-up.
- v. Inspection and acceptance of equipment put into service during construction period.

#### 1.8 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 environmental/sustainability goals, procedures and requirements in all prefabrication meetings conducted with subcontractors, fabricators, and vendors.

#### 1.9 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.

#### 1.10 PROGRESS MEETINGS

- A. The Architect 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 General Contractor, Owner and participants of meeting only. General Contractor is responsible for distribution to subcontractors, vendors, suppliers and others who are affected by decisions made.
  - 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. Other business relating to Work.

#### 1.11 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.
  2. Construction waste management and recycling 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 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)

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## 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 mock-up and 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 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. High and low temperatures, general weather conditions (when exterior work is in progress)
  4. Meetings and significant decisions.
  5. Stoppages, delays, shortages, losses.
  6. Emergency procedures.
  7. Orders and requests of governing authorities.
  8. Change Orders received, and implemented.
  9. Services connected, disconnected.
  10. Meter readings and similar recordings.
  11. Equipment or system tests and start-ups.
  12. Partial Completions/occupancies.
  13. 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 - VERIFICATION OF BUILT TOLERANCES

- A. Verification of as-built tolerances: Frequently review work to ensure compliance with Contract Document requirements and verify built construction is plumb, level, and in proper alignment within specified tolerances.
1. Milestone certification: Inspect and verify the Work is installed is complete and complies with the Contract Documents and is within the specified tolerances. Submit certification to both Architect and Owner's Project Manager for the following milestones:
    - a. Completion of foundation systems and slabs on grade.
    - b. Completion of structural steel.
    - c. Completion of secondary supporting steel elements and decking.
    - d. Completion of light gage steel framing.
    - e. Completion of suspended concrete slabs.
    - f. Completion of exterior masonry walls.
    - g. Completion of interior masonry walls.
    - h. Completion of interior metal framing systems.
  2. Improper work: General Contractor is required to comply with requirements of Contract Documents. Correct all non-conforming and improper Work which deviates from the requirements of the Contract Documents or which exceed specified tolerances. Built work over non-conforming work is not acceptable and will require complete removal and reinstallation.

#### 1.7 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. Discs: 2 copies, monthly and at final project completion.
  2. LEED compliance photographs, submit within 3 days from date of photograph.
    - a. Discs: 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 exterior and 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. Views of site construction: 2
    - b. Exterior views of building: 2
    - c. Interior views: 5, each floor.
- 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: Identify each disc 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.
- E. Prints: if requested shall be furnished a prevailing commercial rates.
1. Prints: Furnish glossy color prints, 8 by 10 inch size mounted on 8-1/2 by 11 inch soft card stock, with left edge binding margin for three hole punch. Identify each print on the back with the following information:
    - a. Project identification.
    - b. Date and time of exposure , and orientation of view.
    - c. Photographer's name, address and phone number.
    - d. Negative exposure number.

**PART 2 - PRODUCTS** (Not Used)

**PART 3 - EXECUTION** (Not Used)

End of Section

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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. Shop drawings, product data and samples.
- E. Manufacturer's instructions.
- F. Manufacturer's certificates.
- G. Emergency addresses.
- H. 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 SUBMITTALS

- A. Schedule: Immediately after being awarded the Contract, meet with the Architect and Owner's Representative to discuss environmental submissions required, and submit with overall schedule of submissions.

- 1. Environmental Submissions as a minimum contain the following items:
  - a. Waste Management Plan (as specified under Section 01 74 19).
  - b. Construction Indoor Air Quality (IAQ) plan.
  - c. Manufacturer's product environmental declarations and safety data sheets.

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  
526 Boston Post Road  
Wayland, Massachusetts 01778  
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](http://www.adobe.com)), Bluebeam PDF Revu ([www.bluebeam.com](http://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. LEED 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. Environmental and sustainable related 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 -	<b>CALCUTT MIDDLE SCHOOL - FEI</b>
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:

<p>APPROVED FOR CONFORMANCE WITH THE CONTRACT DOCUMENTS.</p> <p>All dimensions and quantities have been reviewed and are accepted by _____</p> <p style="text-align: center;"><i>General Contractor’s Name</i></p> <p>All dimensions and field conditions have been or will be verified prior to fabrication of the items described herein.</p>
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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 ELECTRONIC SUBMISSIONS TO OWNER

- A. The General Contractor shall maintain files of all APPROVED submittals required by Article 1.7 SHOP DRAWINGS, Article 1.9 PRODUCT DATA, Article 1.11 MANUFACTURER'S INSTRUCTIONS, and Article 1.12 MANUFACTURER'S

CERTIFICATES of 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.

#### 1.14 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.

#### 1.15 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 16  
ALTERATION PROJECT PROCEDURES**PART 1 - GENERAL**

## 1.1 SUMMARY

- A. Special requirements and considerations for renovation and alternation work including, but not limited to, the following:
  - 1. Special requirements for temporary protection of existing finishes and building components.
  - 2. Transitions and adjustments.
  - 3. Procedural requirements for Alterations.
  - 4. Repair of damaged surfaces, finishes, and cleaning.
  - 5. General requirements for rehabilitation and renovations of existing spaces and materials.

## 1.2 RELATED REQUIREMENTS

- A. Section 01 73 29 - CUTTING AND PATCHING: Procedural and administrative requirements for cutting and patching.
- B. Section 02 41 19 - SELECTIVE DEMOLITION: Demolition of selected portions of the building for new construction.

## 1.3 GENERAL RENOVATION REQUIREMENTS

- A. General: The work required by the Contract Documents includes alterations and renovation of existing construction.
- B. Rework, rebuild, and repair existing construction and surfaces to eliminate damaged and deteriorated materials and construction, and to create continuous "like new appearance and conditions":
  - 1. At each interface between new and existing work.
  - 2. Where damage or holes are caused by installation of new work.
  - 3. At each location of demolition and removal of existing work.
  - 4. Wherever the Contract Documents indicate work on existing surfaces.
  - 5. At all existing construction and surfaces to remain except those specifically noted as "No Work Required".
- C. All items required to be moved to facilitate work shall be carefully carried or conveyed.
- D. Use qualified personnel for alteration and restoration work.
- E. Protect and maintain existing finishes, surfaces, and substrates indicated to remain, indicated to remain "with specific cleaning", or indicated to remain "with new finishes".
- F. Protect existing surfaces from damage, vandalism, graffiti, impressions, marks, and defects.

- G. Locate protection where it will serve the project adequately and result in minimum interference with performance of the work.
- H. Protection may be required to remain in place for the 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 as required.
- I. Renovation Work Patching: Comply with requirements indicated throughout the Contract Documents for each type of patching, repair, and finish work.

#### 1.4 SUBMITTALS

- A. Submit the following under provisions of Section 01 33 00 - SUBMITTAL PROCEDURES:
  - 1. Shop drawings: Show extent and location of temporary protection of existing building elements and finishes. Existing construction drawings may be used as base sheets for shop drawings.
  - 2. Proposed methods of protection for review and approval prior to the commencement of work.

#### 1.5 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. 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. ANSI A 10 - Safety Requirements for Construction and Demolition.
  - 2. NFPA 241 - Building Construction and Demolition Operations.
  - 3. ANSI-A10 Series standards for "Safety Requirements for Construction and Demolition".

#### 1.6 REGULATORY REQUIREMENTS

- A. Obtain and pay for required permits and licenses required from authorities prior to commencing demolition work. Arrange and pay for legal disposal of removed materials and equipment, obtain proper disposal receipts for verification.
- B. Do not close or obstruct egress width to exits. Do not disable or disrupt building fire or life safety systems without 3 days prior written notification to the Owner.

#### 1.7 QUALITY ASSURANCE

- A. The General Contractor is responsible for protection of all existing materials and components to remain or to be salvaged. In the event of damage, such items shall be immediately repaired or replaced by the Contractor, at his expense, to the satisfaction of the Architect.



- B. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and methods needed for proper performance of work in this section.
- C. The Contractor is hereby directed to recognize the value and significance of the building, and exercise special care during all phases of the work to ensure that the existing building, its details, materials and finishes which are to remain or to be salvaged are not damaged by the work being performed.
- D. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with specified requirements and methods needed for proper performance of the work of this Section.

#### 1.8 PROJECT CONDITIONS

- A. Do not allow hazardous dangerous or unsanitary conditions, or public nuisances to develop or persist on the site.
- B. Protections shall remain in place for the duration of the project unless determined otherwise by the Architect.
- C. Coordinate the performance of work of this section with related or adjacent work. Protection of items should be complete prior to commencement of demolition and construction.

#### 1.9 SEQUENCING AND SCHEDULING

- A. Conduct alteration and restoration 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.
- B. Coordinate and arrange with mechanical and electrical trades for their disconnecting, rerouting and maintenance of existing services in the buildings as required, as part of the work of this Contract.
- C. Adhere to approved locations for trash chutes, and areas for storage of materials.
- D. Provide necessary protection to completely cover all remaining adjacent surfaces, existing equipment, furniture and furnishing during demolition and construction operations.
- E. Equipment Access: Provide access for all large scale equipment furnished and installed under this contract. Should existing openings require enlargement, enlarge same and replace to former condition.

### **PART 2 – PRODUCTS**

#### 2.1 PRODUCTS FOR PROTECTION

- A. General: Materials used for protection of existing finishes and surfaces: sound materials and of adequate dimension for the intended use. Temporary protection

materials shall be properly supported, braced, tied, and arranged to ensure absolute safety for those using the equipment and sufficient to safely withstand all loading and stress.

1. Temporary protection shall not puncture, scar, or damage walls or other finish construction.
- B. Lumber and Plywood:
1. Lumber: Hem-Fir, Douglas Fir, Eastern Spruce, Eastern Hemlock, or Southern Pine, surfaced dried stud or utility grade.
  2. APA graded C-D-X EXT, Group 2 species, thickness as required.
- C. Wood fiber board, equal to Homasote Company, Trenton NJ., product "HCFR Homasote", 4 by 8 foot panel, 1/2 inch thick.
- D. Clear polyethylene film, 0.006 inches (6 mil) thick provided in full-wall length and width pieces, without joints, wherever possible.
- E. Neoprene: 1/4-inch or 1/2-inch stock sizes.
- 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."
- G. Accessories: Provide necessary and related parts, devices and anchors required for complete installation.

## 2.2 PRODUCTS FOR PATCHING AND EXTENDING WORK

- A. General: Provide new materials. If acceptable to the Architect, undamaged previously used materials in serviceable condition may be used. Provide materials suitable for the use intended.
- B. New Materials: As specified in individual Sections, match existing products and work for patching and extending work.
- C. Determine type and quality of existing products by inspection and any necessary testing, and workmanship by use of existing as a standard. Presence of a product, finish, or type of work, requires that patching, extending, or matching shall be performed as necessary to make Work complete and consistent with existing quality.

## 2.3 EQUIPMENT

- A. Existing Equipment Designated To Be Relocated: Relocate existing fixed equipment designated to be relocated.
1. Disconnect and reconnect existing relocated equipment to building services.
  2. Make all terminal connections to the mechanical and electrical services.
  3. Receive, check and place equipment in designated position.

4. A schedule of room locations of the items of existing equipment will be furnished by the Architect.

### **PART 3 – EXECUTION**

#### **3.1 PROTECTION OF EXISTING BUILDING FINISHES AND COMPONENTS**

- A. General: Provide temporary enclosure for protection of construction in progress and completed, from exposure, foul weather, other construction operations and similar activities.
  1. Provide all temporary protection, including planking, barricades, signs, necessary to protect personnel and the public from equipment and construction operations. Take all required measures to protect the existing building (contents, surfaces, or materials) and site from damage of any kind when performing the Work.
- B. Existing Building Elements to Remain:
  1. Interior finishes must be physically isolated from construction operations by means of protective barriers and coverings.
  2. Protect all existing building elements to remain in place which may be damaged by construction activities. In the event of new damage, inform the Architect immediately as to the nature and extent of damage and the proposed method of repair.
  3. Do not attach protection materials directly to existing finished surfaces which might be damaged by such attachment. Do not use duct tape or mechanical fasteners on existing finished materials unless so directed by Architect.
  4. Protection to be secured adequately so as to maintain a safe environment for workers and other individuals using the building throughout the duration of the project.
  5. Provide all temporary protections as may be required to ensure that all components of existing building indicated to remain are not damaged during the execution of the Work.
  6. Closed Areas: Closed areas shall be those rooms where access is not required for construction activities. These rooms shall be locked at the outset of construction for protection from construction activities, and shall be maintained locked during the entire course of construction. No construction activities shall be permitted in these areas, including storage of construction materials.
  7. Primary Path of Travel: Those areas which will experience a high degree of traffic, primarily at the lobbies and main corridors.
  8. Secondary Path of Travel: All other areas outside the required path for heavy construction, where access is required to perform secondary construction procedures. The Secondary Path of Travel shall be locked, and access shall be controlled and limited by the Contractor.
- C. Dust Protection where demolition work is required.
  1. General: Comply with requirements of Section 01 50 00 - TEMPORARY FACILITIES AND CONTROLS.
  2. Seal all floor, wall and ceiling openings to prevent the intrusion of dust into these spaces. Provide dust curtains at doors.

3. Construct temporary partitions surrounding the area of construction in these areas.
  4. Dust-Proof Wrap: Cover surfaces with polyethylene plastic. Seal seams completely with duct tape. Anchor to protection wherever possible. Attach to historic materials with preservation tape. Do not use duct tape or mechanical fasteners on historic materials.
  5. Dust-Proof Temporary Partitions: Construct floor to ceiling wood frame with 2 x 4-inch, or 2 x 6-inch lumber at 16-inches on center. Staple double layers of polyethylene plastic to either side, seal seams with duct tape. Seal interface with unprotected materials with preservation tape.
- D. Ceilings: Provide dust-proof wrap on all acoustical tile ceilings and other acoustic and fabric ceiling surfaces.
- E. Wood Doors and Frames:
1. Primary Path of Travel: Protection will consist of 1/2-inch soft fiberboard and plywood screwed to 2 by 4 inch shoring braces set at 16-inches to four feet apart. Existing door to be removed and stored during construction. Provide a temporary door and complete enclosure of existing door surrounds.
  2. Secondary Path of Travel: Verify extent of potential impact to these elements with General Contractor. If protection is required carefully remove these elements for reinstallation and protect frame as specified.
- F. Miscellaneous Hardware: Verify extent of potential impact to these elements with Architect. Where protection is required, carefully remove and catalog these elements for reinstallation.
- G. Light Fixtures: Verify extent of potential impact to these elements with Architect. Remove, catalog and store impacted fixtures.
- H. Weather Protection: Protect existing building interior and all materials and equipment from weather at all times.
- I. Temporary coverings shall be attended as necessary to insure effectiveness and to prevent displacement.
- J. 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.

### 3.2 PREPARATION

- A. Cut, move or remove items as necessary for access to alterations and renovations work; replace and restore at completion.
- B. Remove unsuitable material not marked for salvage, such as rotted wood, rusted metals, and deteriorated masonry and concrete; replace materials as specified for finished work.
- C. Remove debris and abandoned items from area and from concealed spaces.
- D. Prepare surfaces and remove surface finishes to provide for proper installation of new work and new finishes.

- E. In areas where new base is scheduled to be installed on existing surfaces, the existing base shall be removed and the surface patched in preparation for the installation of new material.
- F. Coordinate with trades involved for the installation of new materials in establishing exact locations of materials to be removed.
- G. Clean, prepare and level all existing floors. All floor surfaces shall be left smooth, free from abrupt ridges, pits, cracks, depressions, dust, oil or other materials which will have adverse effect on, or will cause discoloration or damage to finished floor materials.
- H. Where alterations occur or new and old work join, the immediate, adjacent surfaces shall be cut, removed, patched, repaired or refinished and left in as good a condition as existing prior to the start of the work. The materials and workmanship employed in the alterations involved by the new construction, unless otherwise indicated or specified shall conform to that of the original work.

### 3.3 PREPARATION – SUBFLOORS AND FINISH FLOORING SUBSTRATE

- A. General: Substrates: These requirements apply to existing subfloors and are in addition to preparation required for new subfloors and substrates.
- B. Removal of existing flooring, as specified under Section 02 41 19 - SELECTIVE STRUCTURE DEMOLITION with additional requirements specified herein.
  - 1. Completely remove existing flooring located in areas scheduled to receive new flooring surfaces and elsewhere as noted. Remove all layers of flooring down to the existing substrate. Where existing flooring is installed in a setting bed, the existing setting bed shall be completely removed.
  - 2. Remove resilient flooring and adhesive in strict accordance with the technical bulletin entitled " Recommended Work Practices for the Removal of Resilient Floor Covering", as issued by Resilient Floor Covering Institute, Rockville, MD.
- C. Preparation of existing floors:
  - 1. Remove all foreign materials from existing floor surfaces by use of mechanical abraders , grinders or other methods required to clean the existing surfaces to a smooth clean finish acceptable for the application of new flooring surfaces or cementitious underlayment.
- D. Patching and leveling of flooring substrates and subfloors damaged by demolition operations: Comply with requirements of Section 09 05 60 - COMMON WORK RESULTS FOR FLOORING

### 3.4 INSTALLATION

- A. Coordinate work of alterations and renovations to expedite completion of Work.
- B. Remove, cut, and patch work in a manner to minimize damage and to provide means of restoring products and finishes to original or specified condition.
- C. Refinish visible existing surfaces to remain in renovated rooms and spaces, to specified condition for each material, with a neat transition to adjacent new finishes.

- D. Install products as specified in individual Sections.

### 3.5 ENCLOSURE OF EXPOSED PIPES AND CONDUIT

- A. Exposed piping and conduit in existing spaces: Not all chases and enclosures required in renovated areas are shown on drawings.
  - 1. Provide chases with finishes matching surrounding materials to enclose and completely conceal all new piping, ducts, and conduits located in renovated finished spaces.
  - 2. Build chases out of new materials specified under individual product specification sections, matching surrounding abutting materials.
  - 3. Construct chases and enclosures as small as possible, unless otherwise approved by Architect.
  - 4. Align new chases and enclosures with existing major architectural lines and planes.

### 3.6 TRANSITIONS

- A. Where new work abuts or aligns with existing, make a smooth and even transition. Patched work shall match existing adjacent work in texture and appearance.
- B. When surfaces are cut so that a smooth transition with new work is not possible, terminate existing surface along a straight line at a natural line of division and notify Architect.

### 3.7 ADJUSTMENTS

- A. Where removal of partitions results in adjacent spaces becoming one, rework floors, walls, and ceilings to a smooth plane without breaks, steps or bulkheads.
- B. Trim existing doors as necessary to clear new floor finishes; refinish trimmed areas.
- C. In any existing area in which a wall is furred, floor raised or ceiling dropped, all mechanical and electrical devices at that area shall be moved, relocated or rerouted in such manner that all work within that area shall conform to the new lines of work established by such indicated furring of walls, raising of floors or dropping of ceilings. The attention of all trades is directed to existing conditions and the various drawings for locations of work.

### 3.8 REMOVAL OF TEMPORARY PROTECTION

- A. Remove temporary materials and construction at Substantial Completion. Comply with requirements of Section 01 50 00 - TEMPORARY FACILITIES AND CONTROLS.

### 3.9 FINISHES

- A. Finish surfaces as specified in individual product specification sections.
- B. Finish patches to produce uniform finish and texture over entire area. When finish cannot be matched, refinish entire surface to nearest intersections.
- C. Provide complete restoration of areas damaged due to work under the contract, to a condition equal to or similar to that existing before damage or injury. Restoration

shall include repairing, rebuilding, or replacing damaged items at contractor's expense.

### 3.10 REPAIR OF EXISTING SURFACES

- A. Restore existing facilities used during construction to original conditions. Restore permanent facilities used during construction to specified condition.
- B. Repair substrates prior to patching finish.
- C. Repair and clean existing finishes and materials damaged in the performance of the Work of this Contract.
- D. Repair existing finishes and materials damaged by installation or use of temporary work.
- E. General: Comply with cleaning requirements specified in Section 01 73 00 - EXECUTION.

### 3.11 CLEANING OF EXISTING SURFACES

- A. General Cleaning: Immediately before Owner occupancy, thoroughly and completely scrub and clean all existing interior finishes, and surfaces indicated to remain in the finished work. Leave floors, walls, windows, ceilings and all other surfaces clean and undamaged
  1. Remove all dirt, soil, stains, graffiti, and marks.
  2. Remove paint and smears.
  3. Clean all glass surfaces (inside and outside).
  4. Replace scratched glass.
  5. Clean and polish hardware and fixtures.
- B. Specific Cleaning: Where specific cleaning is indicated, thoroughly clean and scrub to "like new" condition using effective means, methods, and techniques which do not damage the substrates or other nearby finishes or substrates.
  1. Mock-Ups: Provide minimum 100 square feet mock-ups and obtain Architect's approval of cleaning before continuing work. Repeat mock-up procedure until Architect's approval is obtained. Employ several different cleaning agents and determine through trial and error which cleaning materials and techniques work best to achieve required results.
  2. Criteria for Acceptance: To be considered "clean", the surfaces shall be free of all dirt, soil, stains, graffiti, marks, mold, mildew, old wax, and foreign substances, and the surfaces shall match approved mock-ups. Do not damage the surfaces to be cleaned nor other nearby surfaces. Do not scratch or etch glazed and polished surfaces.

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. 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. Standards for Existing Schools, Regulation RISBC-13, effective January 4, 2022.
  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. Revised Ordinances, City of Central Falls Rhode Island, codified October 16, 2019, and as amended January 3, 2022
11. *Life Safety Code*, (NFPA-101) 2018 Edition, as published by National Fire Protection Association as revised by *RHODE ISLAND LIFE SAFETY CODE*, Rhode Island Public Laws Chapter 12-237.
12. National Fire Protection Association: NFPA 241 – Safeguarding Building Construction And Demolition Operations, 2022 edition.
13. United States Occupational Safety and Health Administration (OSHA): Standard N°. 29-CFR-1926.59 - HAZARD COMMUNICATION STANDARD.
14. United States Department of Justice, N° 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

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 statute: 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.

DCAMM	Massachusetts Division of Capital Asset Management
DOE	Massachusetts Department of Education
EPA	United States Environmental Protection Agency
IAQ	Indoor Air Quality
IEQ	Indoor Environmental Quality
HVAC&R	Heating, ventilating, air conditioning, and refrigeration systems.
LEED™	United States Green Building Council, <i>Leadership in Energy and Environmental Design Rating System</i> .
MEPA	Massachusetts Environmental Protection Agency
MGL	Massachusetts General Laws
MHD	Massachusetts Highway Department (Mass Highway)
MSDS	Material Safety Data Sheet
NIC	Not In Contract
OFCI	Owner Furnished, Contractor Installed
OFI	Owner Furnished and Installed
VOC	Volatile Organic Compounds

## 2. Abbreviations for measurements and quantities.

C	Celsius
cm	Centimeter
F	Fahrenheit
Hrs	Hours
Kg	Kilogram
L	Liter
M	meter
m <sup>2</sup> or SM	square meter
m <sup>3</sup> or CM	cubic meter
mm	Millimeter
Mths	Months

## REFERENCES

01 42 00 - 1

psi            Pounds per square inch  
t                ton

## 3. Abbreviations for Drawings.

A	Acre
AC	Air Conditioning
ACST	Acoustical
ACT	Acoustical Ceiling Tile
AD	Area Drain
ADD	Addendum
ADDL	Additional
ADJ	Adjustable, Adjacent
AFF	Above Finish Floor
AGGR	Aggregate
AHU	Air Handling Unit
ALT	Alternate
ALUM	Aluminum
ANOD	Anodized
AP	Access panel
APRX	Approximate
ARCH	Architectural
AVG	Average
&	And
<	Angle
@	At
BC	Brick Course
BD	Board
BG	Below Grade
BL	Building Line
BLDG	Building
BLK	Black
BLKG	Blocking
BLR	Boiler
BM	Beam, Bench Mark
BTM	Bottom
BTU	British Thermal Unit
BOW	Bottom of Wall
CAB	Cabinet
CB	Chalkboard
CBN	Catch Basin
CJ	Control Joint
CL	Center Line
CLG	Ceiling
CLKG	Caulking

## REFERENCES

01 42 00 - 2

Construction Documents / 05.20.2022

CLOS	Closet
CLR	Clear
CLSRM	Classroom
CMT	Ceramic Mosaic Tile
CMTB	Ceramic Mosaic Tile Base
CMU	Concrete Masonry Unit
COL	Column
COMP	Compressible
CONC	Concrete
CONST	Construction
CONT	Continuous
CONTR	Contractor
CORA	Corridor
CPT	Carpet
CRS	Course
CT	Ceramic Tile
CTB	Ceramic Tile Base
CTR	Center
CUH	Cabinet Unit Heater
CW	Coldwater
[	Channel
D	Deep
DBL	Double
DEG	Degree
DEMO	Demolition
DEPT	Department
DET	Detail
DF	Drinking Fountain
DIA	Diameter
DIFF	Diffuser
DIM	Dimension
DISP	Dispenser
DIV	Division
DN	Down
DPFG	Damp Proofing
DR	Door
DRW	Drawer
DS	Downspout
DWG	Drawing
E	East
EA	Each
EJ	Expansion Joint
EL	Elevation

## REFERENCES

01 42 00 - 3

Construction Documents / 05.20.2022

ELEC	Electrical
ELEV	Elevator
EMER	Emergency
ENCL	Enclosure
ENTR	Entrance
EP	Electrical Panel, Epoxy Paint
EQ	Equal
EQUIP	Equipment
EWC	Electric Water Cooler
EX	Existing
EXCV	Excavation
EXP	Exposed
EXT	Exterior
EXTR	Extruded
FA	Fire Alarm
FAB	Fabricate
FAAF	Fluid-Applied Athletic Flooring
FB	Flat Bar
FD	Floor Drain
FDVC	Fire Department Valve Cabinet
FE	Fire Extinguisher
FEC	Fire Extinguisher Cabinet
FEJ	Floor Expansion Joint
FF	Finish Floor
FH	Fire Hydrant
FIN	Finish
FINGR	Finish Grade
FIX	Fixed
FIXT	Fixture
FLASH	Flashing
FLEX	Flexible
FLOUR	Fluorescent
FLR	Floor
FND	Foundation
FPRF	Fire Proofing
FRT	Fire Retardant Treated
FS	Food Service
FT	Foot, Feet
FTG	Footing
FTR	Finned Tube Radiation
FURN	Furniture
FURR	Furring
FUT	Future

## REFERENCES

01 42 00 - 4

Construction Documents / 05.20.2022



GA	Gauge
GALV	Galvanized
GC	General Contractor
GEN	General, Generator
GFRG	Glass Fiber Reinforced Gypsum
GFRP	Glass Fiber Reinforced Plaster
GL	Glass
GND	Ground
GWB	Gypsum Wall Board
GYP	Gypsum
H	High
HC	Hollow Core
HDW	Hardware
HM	Hollow Metal
HORZ	Horizontal
HP	High Point
HR	Hour
HT	Height
HVAC	Heating Ventilation & Air Conditioning
HW	Hot Water
HWD	Hardwood
ID	Inside Diameter
IN	Inch, Inches
INCL	Include, Inclusive
INSUL	Insulation, Insulated
INT	Interior
INV	Invert, Inverse
JAN	Janitor
JT	Joint
KD	Knocked Down
KEC	Kitchen Equipment Contractor
KIT	Kitchen
KW	Kilowatt
KWH	Kilowatt Per Hour
L	Left, Long
LAM	Laminate, Laminated
LAV	Lavatory
LB	Pound
LF	Linear Foot, Linear Feet
LH	Left hand
LP	Low Point
LT	Light
LTG	Lighting

## REFERENCES

01 42 00 - 5

Construction Documents / 05.20.2022

MAT	Entrance Mats, Entrance Grate
MATL	Material
MAX	Maximum
MB	Marker Board
MECH	Mechanical
MEMB	Membrane
MFR	Manufacturer
MIN	Minimum
MISC	Miscellaneous
MO	Masonry Opening
MR	Moisture Resistant
MTD	Mounted
MTG	Mounting, Meeting
MTL	Metal
MUL	Mullion
N	North
NAT	Natural
NIC	Not In Contract
NO	Number
NOM	Nominal
NRC	Noise Reduction Coefficient
NTS	Not To Scale
OA	Overall
OC	On Center
OD	Outside Diameter
OFI	Owner Furnished Item
OFCI	Owner Furnished /Contractor Installed
OH	Overhead
OPER	Operable
OPNG	Opening
OPP	Opposite
OZ	Ounce
P	Paint
PAR	Parallel
PERF	Perforated
PERP	Perpendicular
PG	Paint Grade
PL	Plate
PLAM	Plastic Laminate
PLBG	Plumbing
PLAS	Plaster
PNL	Panel, Paneling
POL	Polished

## REFERENCES

01 42 00 - 6

Construction Documents / 05.20.2022

PPT	Porcelain Paver Tile
PPTB	Porcelain Paver Tile Base
PR	Pair
PRFB	Prefabricated
PRTBD	Particle Board
PSI	Pounds Per Square Inch
PT	Pressure Treated
PTD	Painted
PTN	Partition
PWD	Plywood
QR	Quarter Round
QT	Quarry Tile
QUAL	Quality
QUAN	Quantity
R	Radius, Riser, Rubber
RB	Rubber Base
RCPT	Receptacle
RD	Roof Drain
REC	Recessed
RECT	Rectangular
REF	Reference
REFL	Reflected
REFR	Refrigerator
REINF	Reinforced
REQD	Required
RESIL	Resilient
REV	Revise, Reverse
RH	Right Hand
RHR	Right Hand Reverse
RL	Rain Leader
RLG	Railing
RO	Rough Opening
RR	Rubber Riser
RIT	Right
RTR	Rubber Tile, Rubber Tread
S	South
SC	Solid Core
SCHD	Schedule
SCRFB	Static Control Resilient Flooring
SECT	Section
SEG	Segment
SF	Square Foot
SH	Shelf

## REFERENCES

01 42 00 - 7

Construction Documents / 05.20.2022

SHT	Sheet
SHR	Shower
SHVT	Seamless Sheet Vinyl
SIM	Similar
SLH	Slotted Horizontal
SLV	Slotted Vertical
SMFL	Seamless Flooring
SPEC	Specification
SQ	Square
SQIN	Square Inch
SS	Stainless Steel
SSM	Solid Surface Material
ST	Street
STA	Station
STC	Sound Transmission Classification
STD	Standard
STL	Steel
STOR	Storage
STR	Structure
STRL	Structural
SUB	Subcontractor
SUSP	Suspended
SWD	Softwood
SYM	Symmetrical
SYN	Synthetic
SYST	System
T	Tread
T&G	Tongue and Groove
TB	Tack Board
TC	Top of Curb
TEL	Telephone
TEMP	Temporary, Temperature
TFE	Thin-Film Epoxy Flooring
THK	Thick
THR	Threshold
TLT	Toilet
TO	Top of
TOB	Top of Blocking
TOC	Top of Concrete
TOF	Top of Foundation / Footing
TOS	Top of Steel
TRK	Track
TS	Tube Steel

## REFERENCES

01 42 00 - 8

Construction Documents / 05.20.2022

TV	Television
TW	Top of Wall
TYP	Typical
TZ	Terrazo
UC	Undercut
UL	Underwriters Laboratory
UNO	Unless Noted Otherwise
UR	Urinal
UV	Unit Ventilator, Ultraviolet
VB	Vinyl Base
VCT	Vinyl composite tile
VERT	Vertical
VEST	Vestibule
VIF	Verify in field
VP	Veneer plaster
VTR	Vent through roof
VWC	Vinyl Wallcovering
W	West, Wide, Width
W/	With
W/O	Without
WAB	Wood Athletic Flooring Vented Base
WAF	Wood Athletic Flooring
WC	Water Closet
WD	Wood
WEJ	Wall Expansion Joint
WF	Wide Flange
WH	Water Heater
WP	Work Point
WPGF	Water Proofing
WSF	Wood Strip Flooring
WT	Weight, Wt (Steel Shape)
XBAR	Crossbar
XH	Extra Heavy
XL	Extra Large
YD	Yard
YR	Year
YS	Yield Strength
Z	Modulus of Section
ZN	Zinc

### 1.3 DEFINITIONS

- A. Definitions of contracting parties (Owner, Owner's Project Manager, General Contractor, and Architect): Refer to Section 01 10 00 –SUMMARY.

### REFERENCES

01 42 00 - 9

Construction Documents / 05.20.2022

- 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" and "General Contractor" as used in the Project Manual have the same meaning and are interchangeable in Contract Documents. These terms refer to the same entity.
  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. "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.
  7. "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.
  8. "Not in Contract" or "N.I.C.": equipment, furnishings, or other materials not included as a part of this Contract.
  9. "Product": materials, systems and equipment.
- C. Definitions pertaining to sustainable development: As defined in ASTM E 2114 - *Standard Terminology for Sustainability Relative to the Performance of Buildings*, and as specified herein.
1. "Biobased Materials": As defined in the Farm Security and Rural Investment Act, for purposes of Federal procurement of biobased products, "biobased" means a "commercial or industrial product (other than food or feed) that is composed, in whole or in significant part, of biological products or renewable domestic agricultural materials (including plant, animal, and marine materials) or forestry materials." Biobased materials also include fuels, chemicals,

building materials, or electric power or heat produced from biomass as defined by The Biomass Research and Development Act of 2000.

- a. "Biobased Content": The amount of biobased carbon in the material or product as a percentage of weight (mass) of the total organic carbon in the material or product.
2. "Chain-of-Custody: Process whereby a product or material is maintained under the physical possession or control during its entire life cycle.
3. "Composite panel products": Manufactured wood products including, but are not limited to particle board (PB), Medium Density Fiberboard (MDF), wheatboard and strawboard and similar manufactured products
4. "Deconstruction: Disassembly of buildings for the purpose of recovering materials.
5. "DfE (Design for the Environment)": A technique that includes elements of resource conservation and pollution prevention as applied in various product sectors. A technique that incorporates approaches which are part of product (or assembly) concept, need and design. Considerations involve material selection, material and energy efficiency, reuse, maintainability and design for disassembly and recyclability. Refer to ISO Guide 64, and EPA's website at <http://www.epa.gov/dfe/> for additional clarification on Design for the Environment for additional clarification
6. "Environmentally preferable products": Products and services that have a lesser or reduced effect on the environment in comparison to conventional products and services. Refer to EPA's Final Guidance on Environmentally Preferable Purchasing for more information  
<<http://www.epa.gov/epp/guidance/finalguidancetoc.htm>>.
7. "Non-Renewable Resource": A resource that exists in a fixed amount that cannot be replenished on a human time scale. Non-renewable resources have the potential for renewal only by geological, physical, and chemical processes taking place over of millions of years. Examples include: iron ore, coal, and oil.
8. "Perpetual Resource": A resource that is virtually inexhaustible on a human time scale. Examples include solar energy, tidal energy, and wind energy.
9. "Recycled Content Materials": Products that contain preconsumer or post-consumer materials as all or part of their feedstock. Recycled content claim shall be consistent with Federal Trade Commission (FTC) Guide for the Use of Environmental Marketing Claims.
10. "Renewable Resource": A resource that is grown, naturally replenished, or cleansed, at a rate which exceeds depletion of the usable supply of that resource. A renewable resource can be exhausted if improperly managed. However, a renewable resource can last indefinitely with proper stewardship. Examples include: trees in forests, grasses in grasslands, and fertile soil.

#### 1.4 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.

#### REFERENCES

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- 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 phone numbers provided are for the Contractor's convenience and are believed to be current and accurate, however addresses and phone numbers frequently change, and no assurance is made on their accuracy:

AA	Aluminum Association 900 19th Street N.W., Suite 300 Washington, DC 20006 <a href="http://www.aluminum.com">www.aluminum.com</a>
ABAA	Air Barrier Association of America 1600 Boston-Providence Highway Walpole, MA 02081 <a href="http://www.airbarrier.org">www.airbarrier.org</a>
AAMA	American Architectural Manufacturer's Association 1827 Walden Office Sq., Suite 104 Schaumburg, IL 60173-4268 <a href="http://www.aamanet.org">www.aamanet.org</a>
AASHTO	American Assoc. of State Highway & Transportation Officials 444 N. Capitol Street NW, Suite 249 Washington, DC 20001 <a href="http://www.aashto.org">www.aashto.org</a>
ACI	American Concrete Institute, International 38800 Country Club Drive, Farmington Hills, Michigan 48331 <a href="http://www.aci-int.org">www.aci-int.org</a>
ACPA	American Concrete Pipe Association 222 West Las Colinas Boulevard, Suite 641, Irving TX <a href="http://www.concrete-pipe.org">www.concrete-pipe.org</a>
ADC	Air Diffusion Council 104 S. Michigan Ave, Suite 1500, Chicago, IL 60603 <a href="http://www.flexibleduct.org">www.flexibleduct.org</a>
AFPA	American Forest & Paper Association (Formerly NFPA National Forest Products Association) 1111 19 <sup>th</sup> St. N.W., Suite 800, Washington, DC 20036 <a href="http://www.afandpa.org">www.afandpa.org</a>
AGA	American Gas Association Inc. 1515 Wilson Blvd. Arlington, VA 22209-2469 <a href="http://www.agagas.com">www.agagas.com</a>
AGAI	American Galvanizers Association Inc. 12200 E.Lliff Ave, Suite 204, Aurora, CO 80014-1252 <a href="http://www.galvanizeit.org">www.galvanizeit.org</a>
AIA	American Institute of Architects 1735 New York Avenue, N.W., Washington, DC 20006-5292 <a href="http://www.aia.org">www.aia.org</a>
AISC	American Institute of Steel Construction 1 E. Wacker Dr., Suite 3100, Chicago, IL 60601-2001 <a href="http://www.aisc.org">www.aisc.org</a>
AMCA	Air Movement and Control Association 30 W. University Drive, Arlington Heights, IL 60004-1893

## REFERENCES

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	<a href="http://www.amca.org">www.amca.org</a>
ANSI	American National Standards Institute 11 W. 42 <sup>nd</sup> Street, 13 Floor, New York, NY 10036 <a href="http://www.ansi.org">www.ansi.org</a>
APA	APA - The Engineered Wood Association (formerly APA - American Plywood Association) P.O. Box 11700, Tacoma, WA 98411-0070 <a href="http://www.apawood.org">www.apawood.org</a>
ARI	Air-Conditioning and Refrigeration Institute 4301 N. Fairfax Dr., Suite 425, Arlington, VA 22203 <a href="http://www.ari.org">www.ari.org</a>
ASCA	Architectural Spray Coaters Association 230 West Wells Street, Suite 311, Milwaukee WI 53203 <a href="http://www.aecinfo.com">www.aecinfo.com</a>
ASCE	American Society of Civil Engineers 1015 15 <sup>th</sup> St. N.W., Washington, DC 20005 <a href="http://www.asce.org">www.asce.org</a>
ASHRAE	American Society of Heating, Refrigerating, and Air-Conditioning Engineers 1791 Tullie Circle NE, Atlanta GA.30329 <a href="http://www.ashrae.org">www.ashrae.org</a>
ASME	American Society of Mechanical Engineers 345 East 47th Street, New York, NY 10017-2392 <a href="http://www.asme.org">www.asme.org</a>
ASTM	American Society for Testing and Materials 100 Barr Harbor Drive, West Conshohocken, PA 19428 <a href="http://www.astm.org">www.astm.org</a>
AWI	Architectural Woodwork Institute 1952 Isaac Newton Square W., Reston, VA 20190 <a href="http://www.awinet.org">www.awinet.org</a>
AWPA	American Wood Preservers' Association P.O. Box 286, Woodstock, MD 21163-0286 <a href="http://www.awpa.com">www.awpa.com</a>
AWPI	American Wood Preservers' Institution 1945 Old Gallows Rd., Suite 150, Vienna, VA 22182 <a href="http://www.oas.org">www.oas.org</a>
AWS	American Welding Society 550 LeJeune Road, N.W., Miami, FL 33126 <a href="http://www.aws.org">www.aws.org</a>
BHMA	Builders Hardware Manufacturers Association, Inc. 355 Lexington Ave., 17 Floor New York, NY 10017 <a href="http://www.buildershardware.com">www.buildershardware.com</a>
CDA	Copper Development Association 260 Madison Ave., 16 <sup>th</sup> Floor, New York, NY 10016 <a href="http://www.copper.org">www.copper.org</a>
CISCA	Ceilings & Interior Systems Construction Association 579 W. North Ave., Suite 301, Elmhurst, IL 60126 <a href="http://www.cisca.org">www.cisca.org</a>
CRI	Carpet and Rug Institute 310 Holiday Ave, Dalton, GA 30720 <a href="http://www.carpet-rug.com">ww.carpet-rug.com</a>
CRSI	Concrete Reinforcing Steel Institute 933 N. Plum Grove Road, Schaumburg, IL 60173-4758

## REFERENCES

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	<a href="http://www.crsi.org">www.crsi.org</a>
DHI	Door and Hardware Institute 14170 Newbrook Dr., Chantilly, VA 22021-2223 <a href="http://www.dhi.org">www.dhi.org</a>
FM	Factory Mutual Engineering & Research Corp. 1151 Boston-Providence Turnpike Norwood, MA 02062 <a href="http://www.fmglobal.com">www.fmglobal.com</a>
FSC	Forest Stewardship Council (United States Chapter) 1155 30th Street NW, Suite 300, Washington, DC 20007 <a href="http://www.c-f-c.com">www.c-f-c.com</a>
GA	Gypsum Association 810 First Street, N.E., Suite 510 Washington, DC 20002 <a href="http://www.gypsum.org">www.gypsum.org</a>
GANA	Glass Association of North America 2945 S.W. Wanamaker Dr., Suite A, Topeka, KS 66612-5321 <a href="http://www.glass.org">www.glass.org</a>
GICC	Glazing Industry Code Committee 3310 Harrison St., Topeka, KS 66611-2279 <a href="http://www.glazingcodes.net">www.glazingcodes.net</a>
IGCC	Insulating Glass Certification Council 3933 US Route 11, PO Box 2040, Cortland, NY 13045 <a href="http://www.igcc.org">www.igcc.org</a>
LSGA	Laminators Safety Glass Association 3310 Harrison Street, Topeka KS 66611-2279 <a href="http://www.glass.org">www.glass.org</a>
MCAA	Mason Contractors Association of America 1910 S. Highland Ave. Suite 101, Lombard, IL 60148 <a href="http://www.masoncontractors.org">www.masoncontractors.org</a>
MFMA	Maple Flooring Manufacturers Association 60 Revere Drive, Suite 500, Northbrook, IL 60062 <a href="http://www.maplefloor.org">www.maplefloor.org</a>
MIL	Military Specifications and Standards Naval Publications and Forms Center 5801 Tabor Avenue, Philadelphia, PA 19120 <a href="http://www.milspec.com">www.milspec.com</a>
NAAMM	National Association of Architectural Metal Manufacturers 8 South Michigan Avenue, Suite 1000, Chicago, IL 60603 <a href="http://www.naamm.org">www.naamm.org</a>
NCMA	National Concrete Masonry Association 2302 Horse Pen Road, Herndon, VA 20171-3499 <a href="http://www.ncma.org">www.ncma.org</a>
NEBB	National Environmental Balancing Bureau 8575 Government Circle, Gaithersburg, MD 20877-4121 <a href="http://www.nebb.org">www.nebb.org</a>
NEMA	National Electrical Manufacturers' Association 1300 N. 17 <sup>th</sup> St., Suite 1846, Rosslyn, VA 22209 <a href="http://www.nema.org">www.nema.org</a>
NFPA	National Fire Protection Association 1 Battery March Park, PO Box 9101, Quincy, MA 02269 <a href="http://www.nfpa.org">www.nfpa.org</a>
NFSHSA	National Federation of State High School Associations PO Box 20626, Kansas City MO. 64195

## REFERENCES

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	<a href="http://www.nfhs.org">www.nfhs.org</a>
NRCA	National Roofing Contractors Association O'Hare International Center 10255 W. Higgins Road, Suite 600, Rosemont, IL 60018-5607 <a href="http://www.nrca.net">www.nrca.net</a>
PCA	Portland Cement Association 5420 Old Orchard Road, Skokie, IL 60077-1083 <a href="http://www.cement.org">www.cement.org</a>
PEI	Porcelain Enamel Institute 4004 Hillsboro Pike, Suite 224B, Nashville, TN 37215 <a href="http://www.porcelainenamel.com">www.porcelainenamel.com</a>
PS	Product Standard U. S. Department of Commerce <a href="http://www.omg.org">www.omg.org</a>
SDI	Steel Deck Institute P.O. Box 25, Fox River Grove, IL 60021-0025 <a href="http://www.sdi.org">www.sdi.org</a>
SDI	Steel Door Institute 30200 Detroit Road, Cleveland, OH 44145-1967 <a href="http://www.steeldoor.org">www.steeldoor.org</a>
SGCC	Safety Glass Certification Council RMS, P.O. Box 9 Henderson Harbor, NY 13651 <a href="http://www.sgcc.org">www.sgcc.org</a>
SIGMA	Sealed Insulating Glass Manufacturers Association 401 N. Michigan Ave., Suite 2400, Chicago, IL 60611 <a href="http://www.glasschange.com">www.glasschange.com</a>
SMACNA	Sheet Metal and Air Conditioning Contractors' National Association 4201 Lafayette Center Dr., Chantilly, VA 22022-1209 <a href="http://www.smacnapa.org">www.smacnapa.org</a>
SSMA	Steel Stud Manufacturer's Association 8 South Michigan Avenue, Chicago IL 60603 <a href="http://www.ssma.com">www.ssma.com</a>
SSPC	The Society for Protective Coatings 40 24 <sup>th</sup> Street, 6 <sup>th</sup> Floor, Pittsburgh PA 15222-4623 <a href="http://www.sspc.org">www.sspc.org</a>
SWRI	Sealant, Waterproofing & Restoration Institute 2841 Main Street, Suite 585, Kansas City, MO 64108 <a href="http://www.swrionline.org">www.swrionline.org</a>
TCNA	Tile Council of North America, Inc. 100 Clemson Research Blvd., Anderson, SC 29625 <a href="http://www.tileusa.com">www.tileusa.com</a> (formerly TCA, Tile Council of America)
UL	Underwriters' Laboratories, Inc. 333 Pfingston Road, Northbrook, IL 60602 <a href="http://www.ul.com">www.ul.com</a>
USGBC	United States Green Building Council 1800 Massachusetts Avenue NW, Suite 300 Washington DC 20036 <a href="http://www.usgbc.org">www.usgbc.org</a>
WDMA	Window & Door Manufacturers Association (formerly National Wood Window & Door Association, NWWDA) 205 E. Touhy Avenue, Suite G-54, Des Plaines, IL 60018 <a href="http://www.nwwda.org">www.nwwda.org</a>

## REFERENCES

01 42 00 - 15

**PART 2 - PRODUCTS** (Not Used)

**PART 3 - EXECUTION** (Not Used)

End of Section

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. 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 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 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. 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. Contractor's safety program: Prior to commencement of the Work, the 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. Contractor's 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 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 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 OSHA safety training and certification course. Submit with the first certified payroll report. Comply fully with all laws and regulations applicable to awards made subject to *RHODE ISLAND BUILDING CODE*, Regulation RISBC-1.

#### 1.5 CONTRACTOR'S QUALITY CONTROL PROGRAM

- A. Procedures: 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 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 Contractor's commitment to quality and implementing and managing the QC program.
  2. Identification of the 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 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 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. 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.
- 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.

**1.9 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



## 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 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 Bid sections are the responsibility of the respective Subcontractors.
  - 2. Temporary facilities removed from the Project shall remain the property of the 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 Awarding Authority 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, 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.

### 1.3 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.

### 1.4 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.

### 1.5 TEMPORARY WEATHER PROTECTION

- A. General, Protect building interior and all materials and equipment from weather at all times. Where removal of, or penetration of building envelope materials, including roofing, windows, doors, and other items is necessary to accomplish work, have materials and workmen ready to provide adequate and approve temporary covering of exposed areas.
1. Temporary coverings shall be attended as necessary to insure effectiveness and to prevent displacement.
  2. 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.
- B. 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 application of, or curing of, materials.
  2. General Contractor's Responsibilities:
    - a. The General Contractor shall furnish and install all "weather protection". 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 and restore all surfaces to first class condition.
3. 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.
  4. 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 at places designated by the Owner to determine whether the required temperature is being maintained.
  5. 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.
  6. 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 first class 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.
- C. 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. 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.

## 1.6 TEMPORARY UTILITIES, GENERAL

- A. General temporary utility installation:
1. Engage the local utility companies to install temporary service or connect to existing service. 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.

## 1.7 TEMPORARY UTILITIES, ELECTRICITY

- A. Temporary electricity: The General Contractor will pay for all electrical energy required for temporary light and power. The Electrical Subcontractor 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 Subcontractor 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 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 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.

## 1.8 TEMPORARY UTILITIES, LIGHTING

- A. Temporary lighting: The Electrical subcontractor 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 Subcontractor 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). Contractor is required to arrange for adequate outdoor lighting to illuminate stagings, 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.

## 1.9 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 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 Owner's Project Manager's Field Office
    - a. Provide three direct lines and touch-tone phones, dedicated for use by the Architect, Owner's Representative, the Architect's engineering consultants and other authorized agents of the Owner.
      - 1) Phones to be three lines each, with intercom, hands free speaker phone and 25 foot coiled cords connecting instrument's base and receiver. Instruments shall be connected to wall mounted jacks with cords not less than 10 feet long. A minimum of one phone shall have speaker phone function.
    - b. Provide telephone instrument and telephone service with unlimited long distance calling.
    - c. Costs of temporary phone service setup prior to installation of trailer offices shall be provided by the Owner's Representative.
  2. For Contractor's Field Office.
    - a. Provide two direct lines dedicated for use by the Contractor, subcontractors, 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 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 Contractor to maintain service.
      - 1. For 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 Contractor's field office.
- 1.10 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 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.
- 1.11 TEMPORARY UTILITIES, FUEL OIL
- A. Provide all fuel oil for temporary heating systems at no additional cost to the Owner.
- 1.12 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.
- 1.13 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. 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, Contractor shall meet or exceed the minimum requirements of the SMACNA IAQ Guideline for Occupied Buildings under Construction - 1995.
- B. Monitor Humidity: Provide Hygrometer to measure temperature and relative humidity in each construction 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: 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 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) 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, 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.

#### 1.14 FIELD OFFICES AND SHEDS

- A. General:
1. Availability: Provide Contractor's Field Office. Provide offices ready for occupancy within 15 days after date fixed in Notice to Proceed.
  2. 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.
3. Location: The location of the field office(s) 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 office 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.
  - c. Access to trailers shall conform to RISBC-1 Rhode Island Building Code.
4. General:
  - a. Contractor shall provide weekly periodic cleaning and maintenance of field offices and storage areas to the satisfaction of the Awarding Authority and the Owner's Project Manager or more frequently as required or requested.
  - 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 Contractor upon project completion.
  - e. The 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. Contractor's field office(s): Provide habitable office(s) or space, of size to accommodate personnel, include as a minimum the following:
  1. Size: Contractor field office shall be not less than 12 by 50 foot long office trailer. Sectioning of trailer shall be as required by 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 Contractor deems necessary.
- C. Storage and fabrication sheds: Provide sheds, equipped to accommodate materials and equipment involved.
1. Subcontractor's are responsible for their own storage facilities, coordinate locations.
- D. Maintain approach walks to field office and storage/fabrication sheds free of mud, water, and snow.
- E. When permanent facilities are enclosed with operable utilities, relocate offices and storage into building, with written agreement of Awarding Authority, and remove temporary buildings.

#### 1.15 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.

#### 1.16 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.

#### 1.17 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.

#### 1.18 CONSTRUCTION AIDS - USE OF PERMANENT ELEVATORS

- A. Temporary use of elevator(s): For temporary use of elevator equipment prior to final completion and final acceptance, make necessary arrangements with elevator installer, subject to approval of Awarding Authority and Architect and governing code compliance. 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.

#### 1.19 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 subcontractors. Install, operate and maintain in safe condition.
1. Do not charge applicators and installers for these services during normal working hours.
  2. Subcontractors are responsible for their own hoisting equipment, crane services and lift machinery required to perform the Work of their respective trade.

#### 1.20 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 subcontractors 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.
  2. Scaffolding required for used by Subcontractors shall be furnished, erected, maintained, and dismantled, by the Trade requiring such scaffolding.
    - a. Each Subcontractor 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.

### 1.21 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. 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 Awarding Authority.

### 1.22 VEHICULAR TRAFFIC CONTROL

- A. The 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 Contractor is responsible for coordinating, requesting, and paying the prevailing rate of wage for police traffic details directly with the 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 Contractors control, or affected by 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.

### 1.23 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. 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&R Subcontractor.
  2. HVAC&R Subcontractor 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.

#### 1.24 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 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 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. Engine idling for trucks is limited to 5 minutes maximum.
    - b. Use barrels or signage to detour traffic away from plated trenches.
    - c. 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. Interior work involving cutting, drilling, hammering or noise generating procedures shall be completed during times scheduled with the Owner in advance.

#### 1.25 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.

#### 1.26 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.
  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. Temporary concrete bases may be considered where fencing is scheduled for relocation.
- 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.

## 1.27 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.

#### 1.28 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.

#### 1.29 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 Contractor's basic rodent control program proves to be ineffective, obtain the services of a professional exterminator, at no additional cost to the Awarding Authority.
- D. Should rodenticides be considered necessary, submit copies of proposed program to Awarding Authority 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.

#### 1.30 FIRE PREVENTION MEASURES

- A. Prior to commencement of work at the site, the Owner's Project Manager, and General Contractor shall meet with the Central Falls Fire Marshal to plan site and building access in the event of fire.
  - 1. Access paths for heavy fire fighting 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 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.
  2. The 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.

### 1.31 SECURITY MEASURES

- A. Protect Work, and Awarding Authority's operations from theft, vandalism, and unauthorized entry. Initiate a security program at job mobilization.
- B. Maintain security program throughout construction period until Awarding Authority 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 Awarding Authority on request.

**1.32 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 Awarding Authority.
  - 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 positionable pressure activated pigmented adhesive.
    - b. Overlay protecting film, Scotchprint Film, clear overlaminating film, as manufactured by 3M company.
  - 2. List title of project, names of Awarding Authority, Owner's Project Manager, Architect, engineering sub-consultants, and Contractor and Subcontractors.
    - a. Text of project sign shall include the statement "This Project funded by the Central Falls School District".
  - 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".

**1.33 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

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Section 01 60 00  
PRODUCT REQUIREMENTS

**PART 1 - GENERAL**

## 1.1 SUMMARY

- A. Definition of Terms
- B. Basic product requirements.
- C. General environmental requirements for products.
- D. Owner's proprietary products.
- E. Recycled content of materials.
- F. Regional materials.
- G. Sustainable wood, chain of custody.
- H. Owner furnished products.
- 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.

## 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 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.
- 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 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 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 Contractor is fully responsible to determine method of fastening appropriate for each condition. The Contractor shall take into consideration substrate material(s) and product(s) being fastened, live and dead loading, and both atmospheric and visual exposure considerations. 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 GENERAL ENVIRONMENTAL REQUIREMENTS FOR PRODUCTS

- A. General: 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 manufacturer's of the products being adhered which are low-VOC or non-VOC, non-flammable, water-proof after cured, and odor free.

1. All adhesives, sealants and sealant primers used on the interior of the building (defined as inside of the weatherproofing system and applied on-site) shall comply with the requirements of the South Coast Air Quality Management District (SCAQMD) Rule #1168. VOC limits are listed below and correspond to an effective date of July 1, 2005 and rule amendment date of January 7, 2005.
 

a. Architectural Applications	VOC Limit [g/L less water]
1) Indoor Carpet Adhesives	50
2) Carpet Pad Adhesives	50
3) Wood Flooring Adhesives	100
4) Rubber Floor Adhesives	60
5) Subfloor Adhesives	50
6) Ceramic Tile Adhesives	65
7) VCT & Asphalt Adhesives	50
8) Gypsum Base & Panel Adhesives	50
9) Cove Base Adhesives	50
10) Multipurpose Construction Adhesives	70
11) Structural Glazing Adhesives	100



- |    |                                     |                            |
|----|-------------------------------------|----------------------------|
| b. | Specialty Applications              | VOC Limit [g/L less water] |
|    | 1) PVC Welding                      | 510                        |
|    | 2) CPVC Welding                     | 490                        |
|    | 3) ABS Welding                      | 325                        |
|    | 4) Plastic Cement Welding           | 250                        |
|    | 5) Adhesive Primer for Plastic      | 550                        |
|    | 6) Contact Adhesive                 | 80                         |
|    | 7) Special Purpose Contact Adhesive | 250                        |
|    | 8) Structural Wood Member Adhesive  | 140                        |
|    | 9) Sheet Applied Rubber Lining      | 850                        |
|    | 10) Top & Trim Adhesive             | 250                        |
| c. | Sealants                            | VOC Limit [g/L less water] |
|    | 1) Architectural                    | 250                        |
|    | 2) Nonmembrane Roof                 | 300                        |
|    | 3) Roadway                          | 250                        |
|    | 4) Single-Ply Roof Membrane         | 250                        |
|    | 5) Other                            | 420                        |
| d. | Substrate Specific Applications     | VOC Limit [g/L less water] |
|    | 1) Metal to Metal                   | 30                         |
|    | 2) Plastic Foams                    | 50                         |
|    | 3) Porous Material (except wood)    | 50                         |
|    | 4) Wood                             | 30                         |
|    | 5) Fiberglass                       | 80                         |
| e. | Sealant Primers                     | VOC Limit [g/L less water] |
|    | 1) Architectural Non Porous         | 250                        |
|    | 2) Architectural Porous             | 775                        |
|    | 3) Other                            | 750                        |
2. Aerosol Adhesives: Green Seal Standard for Commercial Adhesives GS-36 requirements in effect on October 19, 2000.
- |    |  |   |
|----|--|---|
| a. | Aerosol Adhesives                                | VOC Limit [g/L less water]<br>by weight |
|    | 1) General purpose mist spray                    | 65% VOCs                                |
|    | 2) General purpose web spray                     | 55% VOCs                                |
|    | 3) Special purpose aerosol adhesives (all types) | 70% VOCs                                |
- E. Carpet systems: Refer to Section 09 68 13 – TILE CARPETING for VOC and emissions criteria.
- F. 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.
- G. Sealants: Provide products that comply with specified VOC limits. Refer to Section 07 92 00 – JOINT SEALANTS for additional 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: 450 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.
  - 3. Avoid the use of the following products: Butyl Rubber; Solvent Acrylic; Neoprene; Styrene Butadiene Rubber; Nitril.
- H. Safety Data Sheets (SDS) {*formerly 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 SDS 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 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 Contractor's safety and emergency response procedures for safety precautions, accidents, emergency conditions, and clean-up methods.

#### 1.6 OWNER'S PROPRIETARY PRODUCTS

- A. Owner's proprietary products: The Owner has determined that specific products shall be proprietary for 'sound reasons in the public interest'. This determination has been made under vote of the City of Central Falls and has been recorded in writing for the public record. The following products are designated as proprietary:
  1. Designated Lighting Fixtures                      Lumenfocus
  2. Automatic Temperature Controls                      KME as available from  
Automatic Temperature Controls, Inc.  
Cranston RI, 401-946-5780

#### 1.7 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.

#### 1.8 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 Contractor.
    - b. Arrange and pay for product delivery to site.
    - c. On delivery, inspect products jointly with Contractor.
    - d. Submit claims for transportation damage, and replace damaged, defective, or deficient items.
    - e. Arrange for manufacturers' warranties, inspections, and service agreements.
  2. Contractor's responsibilities regarding Owner furnished products:
    - a. Review Owner reviewed shop drawings, product data, and samples to 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 Contractor shall coordinate Owner installed work with interfacing work of this Contract. The 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 Contractor.
- B. The 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.

#### 1.9 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 Subcontractor 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.

#### 1.10 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.

#### 1.11 MOLD PROTECTION

- A. General
  - 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.

#### 1.12 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 EXAMINATION OF AND ACCEPTANCE OF EXISTING CONDITIONS

- A. The General Contractor, and its subcontractors 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.

## 1.3 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.

#### 1.4 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.

#### 1.5 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.

#### 1.6 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.

## 1.7 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 Subcontractors 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 Subcontractor 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.

#### 1.8 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. Subcontractors are responsible for cleanup and removal of their own rubbish, debris, shipping materials and waste materials through-out the term of their work.
    - a. Subcontractors 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, Rhode Island 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.

## 1.9 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.

## 1.10 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. Cabinetry and woodwork: Dust and clean architectural woodwork, modular casework, 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.

#### 1.11 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

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Section 01 73 29  
CUTTING AND PATCHING

**PART 1 - GENERAL**

## 1.1 SUMMARY

- A. Examination of existing conditions and acceptance of conditions.
- B. Administrative and procedural requirements for cutting and patching, including attendant excavation and backfill as required to complete the Work. General Contractor is responsible for all cutting and patching work, including but not limited to:
  - 1. Perform all cutting, altering, patching, and fitting of the Work (new and existing) as necessary for the Work and the existing improvements. Fully integrate with existing and new construction, all cutting, alterations and patching, to present the visual appearance of an entire, completed, and unified project.
    - a. Make all products and their components of the work fit together properly.
  - 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 trades are responsible for designated types of coring and drilling penetrations for piping, conduit, ducts and other penetrations as defined elsewhere in this Section.
  - 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 by the Work.
  - 6. Remove samples of installed work as specified for testing.

## 1.2 RELATED REQUIREMENTS

- A. Section 02 41 19 - SELECTIVE DEMOLITION: Demolition of selected portions of the building for new construction.
- B. Individual product specification Sections:
  - 1. Cutting and patching of not-exposed-to-view materials incidental to work of the Section.
  - 2. Core drilling (up to 8 inches in diameter) of interior building components, incidental to work of individual Sections.
  - 3. Cutting and Patching work of particular exposed-to-view finish work, performed by trades as specified herein.

## 1.3 SUBMITTALS

- A. Submit written proposals to perform cutting and patching under provisions of Section 01 33 00 - SUBMITTAL PROCEDURES. Describe cutting and patching procedures in advance of the time cutting and patching.

1. Submit a written request 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.
  - d. Interruption or disturbance of utilities service. List utilities that will be relocated and those that will be temporarily out-of-service. Indicate how long service will be disrupted.
  - e. Efficiency, maintenance, or safety of operational elements and systems.
  - f. Aesthetic and visual qualities of exposed-to-view elements.
  - g.
  - h. Work of Owner or work performed under separate Contract.
  - i. Owners on-going operations or schedule.
2. Include in the request:
  - a. Identification of project.
  - b. Location and description of affected work.
  - c. Necessity for cutting or alteration.
  - d. Alternatives to cutting and patching.
  - e. Scope of proposed cutting, patching, alteration or excavation.
  - f. List of tradespeople who will execute the work.
  - g. Description of products to be used.
  - h. Extent of refinishing and cleaning to be performed.
  - i. Effect on work by Owner or work performed under separate Contract, and written permission of affected party.
  - j. Date and time cutting and patching is scheduled to be executed.
  - k. Cost proposal, when applicable.
  - l. Written permission of separate contractor(s) whose work will be affected.
3. Review by the Architect does not waive the Architect's right to later require complete removal and replacement of Work found to be unsatisfactory.
4. Should conditions of Work or the schedule indicate a change of products from original installation, Contractor shall submit a request for substitution in accordance with Section 01 25 13 - PRODUCT SUBSTITUTION PROCEDURES.

#### 1.4 QUALITY ASSURANCE

- A. Only tradespersons skilled and experienced in cutting and patching shall perform such Work.
- B. In performing Work which requires cutting, fixing, or patching, Contractor and subcontractors shall utilize best efforts to protect and preserve the visual appearance and aesthetics of the Project to the reasonable satisfaction of both Owner and Architect.

## 1.5 PERFORMANCE REQUIREMENTS

- A. General performance requirements: Execute work by methods to avoid damage to other Work, and which will provide appropriate surfaces to receive patching and finishing.
- 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 original structure.
- C. Exposed elements:
  - 1. Employ original installer of new construction to perform cutting and patching for weather exposed and moisture resistant elements, and sight exposed surfaces.
  - 2. Employ an appropriate tradesperson to perform cutting and patching of existing weather-exposed and moisture-resistant construction, and exposed-to-view 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.
  - 1. General: Restore work with new products in accordance with the requirements of the Contract Documents.
  - 2. Engage a firm recognized and experienced in the trade or specialty operation required to cut and patch the exposed-to-view work listed below.
    - a. Processed concrete finishes, including cast stone and pre-cast architectural concrete.
    - b. Concrete masonry and brick masonry concrete.
    - c. Stonework concrete.
    - d. Matched-veneer woodwork.
    - e. Preformed metal panels.
    - f. Windows, storefront and curtain wall system .
    - g. Portland Cement plaster .
    - h. Gypsum and ornamental plaster .
    - i. Acoustical ceilings .
    - j. Gymnasium wood flooring.

- k. Carpeting.
        - l. HVAC enclosures, cabinets, or covers .
      - 3. Engage a firm recognized and experienced in firestopping for patching of existing firestopping, smoke seals and firesafing in compliance with applicable codes and as additionally required by authorities having jurisdiction. Comply with requirements of Section 07 84 00 - FIRESTOPPING.
    - 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 or safety.
      - 1. Obtain approval of the cutting and patching proposal before cutting and patching the following operating elements or safety related systems:
        - a. Primary operational systems and equipment.
        - b. Fire resistance rated barriers and smoke barriers.
        - c. Fire protection systems.
        - d. Noise and vibration control elements and systems.
        - e. Control systems.
        - f. Communication systems.
        - g. Electrical wiring systems.
- 1.6 WARRANTY
  - A. Existing Warranties: Replace, patch, and repair material and surfaces cut or damaged by methods and with materials in such a manner as not to void existing applicable warranties.

## **PART 2 - PRODUCTS**

### **2.1 MATERIALS**

- A. Patching Materials: Use patching materials identical to existing materials. If identical materials are not available or cannot be used where exposed surfaces are involved, use materials that match existing adjacent surfaces to the fullest extent possible. Use materials whose installed performance will equal or surpass that of the existing materials. Comply with specifications and standards for each specific product involved.
  - 1. All materials used shall be approved by the Architect for consistency with the existing surfaces.

## **PART 3 - EXECUTION**

### **3.1 EXAMINATION**

- A. Pre-bid examination: General Contractor and its subcontractors shall inform themselves of existing conditions before submitting bids, and are 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 which are inconsistent with those assumed, except for fully concealed conditions.



- B. Examination - General: Inspect existing conditions prior to commencing Work, including elements subject to damage or movement during cutting and patching. After uncovering existing work, inspect conditions affecting performance of work. Take corrective action before proceeding, if unsafe or unsatisfactory conditions are encountered.

### 3.2 PREPARATION

- A. Protection:
  - 1. Provide temporary supports to ensure structural integrity of the Work.
  - 2. Protect existing construction during cutting and patching to prevent damage.
  - 3. Provide protection from adverse weather conditions.
  - 4. Provide protection from elements for areas which may be exposed by uncovering work.

### 3.3 GENERAL CUTTING AND PATCHING

- A. Performance: Execute work by methods to avoid damage to other Work, and which will provide appropriate surfaces to receive repairs, patching, and finishing.
- B. Execute cutting, fitting, and patching, including excavation and fill, to complete the work.
  - 1. Cut rigid materials using masonry saw or core drill. Pneumatic tools are not permitted without prior approval, from Architect
  - 2. Fit products together, to integrate with other work.
  - 3. Uncover work to install ill-timed work.
  - 4. Remove and replace defective or non-conforming work.
  - 5. Remove samples of installed work for testing, when requested.
  - 6. Provide openings in the work for penetration of mechanical and electrical work.
- C. Cutting: Cut existing construction using methods least likely to damage elements retained or adjoining construction. Where possible, review proposed procedures with the original Installer; comply with the original Installer's recommendations.
  - 1. In general, where cutting, use hand or small power tools designed for sawing or grinding, not hammering and chopping. Cut holes and slots as small as possible, neatly to size required, and with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use.
  - 2. To avoid marring existing finished surfaces, cut or drill from the exposed or finished side into concealed surfaces.
  - 3. Cut through concrete and masonry using a cutting machine, such as a Carborundum saw or a diamond-core drill.
  - 4. Comply with requirements of applicable Division 31 - EARTHWORK Sections where cutting and patching requires excavating and backfilling.
  - 5. Where services are required to be removed, relocated, or abandoned, by-pass utility services, such as pipe or conduit, before cutting. Cut-off pipe or conduit in walls or partitions to be removed. Cap, valve, or plug and seal the remaining portion of pipe or conduit to prevent entrance of moisture or other foreign matter after by-passing and cutting.

### 3.4 FINISHING OF PATCHED AREAS:

- A. General: Refinish surfaces to match adjacent finish. For continuous surfaces, refinish to nearest intersection or natural break; for assemblies, refinish entire unit.
  - 1. Patching: Patch with durable seams that are as invisible as possible, showing no evidence of patching and refinishing. Restore exposed finishes of patched areas and extend finish restoration into retained adjoining construction. Comply with specified tolerances.
    - a. 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.
    - b. Fit work tight to pipes, sleeves, ducts, conduit, and other penetrations through surfaces. Provide vapor and air seal when penetrating existing vapor and air seals.
    - c. Where feasible, inspect and test patched areas to demonstrate integrity of the installation.
  - 2. Where removing walls or partitions extends one finished area into another, patch and repair floor and wall surfaces in the new space. Provide an even surface of uniform color and appearance. Remove existing floor and wall coverings and replace with new materials, if necessary, to achieve uniform color and appearance.
    - a. Where patching occurs in a painted surface, extend final paint coat over entire unbroken surface containing the patch after the area has received primer and second coat. Extend re-painting to entire surface plane up to where plane changes direction.
  - 3. Patch, repair, or rehang existing ceilings as necessary to provide an even-plane surface of uniform appearance.

### 3.5 CORING AND DRILLING

- A. Coring and Drilling of holes incidental to work of individual sections shall be performed by the trade requiring the penetration, except as follows:
  - 1. Coring and Drilling of holes greater than 8 inches in diameter in concrete decks and slabs.
  - 2. The General Contractor is responsible for performing core drilling in wall and roof surfaces leading to, or from, the outside of the Building.
  - 3. The General Contractor is responsible for 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.

### 3.6 CLEANING

- A. Cleaning patched areas: Thoroughly clean areas and spaces where cutting and patching is performed or used as access. Remove paint, mortar, oils, putty and similar items.

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, and to salvage and recycle as much nonhazardous demolition waste as possible. This program goal shall be accomplished by the following processes:
1. Demolition and Construction Waste Diversion Requirement: **Minimum 50% waste diversion is mandatory for this project.**
  2. Efficiently use demolition waste materials to the maximum extent as economically feasible:
    - a. Reuse and renovation of existing structures in lieu of demolition as shown in the Contract Documents.
    - b. Segregate and salvage existing materials and items for salvage and reuse on site where possible.
    - c. Segregate demolished materials for salvage and recycling, or to be recycled as mixed debris.
  3. Ensure the reduction of waste generated due to errors, poor planning, breakage, mishandling, contamination, or other factors shall be employed.
  4. 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.
  5. The Contractor is encouraged to include additional resource efficient methods in the Project.
  6. 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:
1. In no case is the Contractor or subcontractors permitted to utilize Central Falls School District waste dumpsters.
  2. 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 and Demolition Waste: Solid wastes typically including building materials, packaging, trash, debris, and rubble resulting from construction, remodeling, repair and demolition operations.
1. Construction and demolition 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.
  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 comingled 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 AND DEMOLITION 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

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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.
- B. 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. The independent firm will perform services specified under Division 21 - Fire Suppression, Division 22 - Plumbing, and Division 23 - Heating, Ventilating, and Air Conditioning.
- D. 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 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 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

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Section 01 78 00  
CLOSEOUT SUBMITTALS**PART 1 - GENERAL**

## 1.1 SECTION INCLUDES

- 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, subcontractors 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 the following quantities of each submittal:

1. Record Project Manual: 4 bound copies.
2. Project record drawings (as built drawings):
  - a. 2 sets of Drawings in Autodesk Revit (version 2015) and Autocad MEP (version 2015) format.
  - b. 2 "blackline print" sets of Drawings.
3. Final Site Survey: 4 copies.
4. Operation and maintenance data, preventive maintenance instructions: 4 bound copies.
5. Owner Training Video for operation of building systems and major equipment.: 2 copies.
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: 4 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.
- 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 troubleshooting; 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: Provide additional window components as follows:
    - 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 09 51 00 - ACOUSTICAL CEILINGS: 3 percent of each ceiling type and suspension system installed.
  - 3. Section 09 65 13 - RESILIENT BASE AND ACCESSORIES: 24 linear feet for each color and type of resilient base installed.
  - 4. Section 09 65 23 - RUBBER FLOORING: 3 percent of each material in each color, and pattern installed. Furnish a quantity of adhesive of each type used in sealed cans or containers sufficient to apply the above materials.
  - 5. Section 09 65 43 - LINOLEUM FLOORING: 3 percent of each material in each color, and pattern installed. Furnish a quantity of adhesive of each type used in sealed cans or containers sufficient to apply the above materials.
  - 6. Section 09 68 13 - TILE CARPETING: 3 percent of each color, pattern and type of carpet tile installed. Furnish a quantity of adhesive of each type used in sealed cans or containers sufficient to apply the above materials.
  - 7. Section 23 00 00 – HEATING, VENTILATING AND AIR CONDITIONING: Provide a minimum of 5 filters of each type and size for all HVAC equipment.

#### 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, Subcontractors 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 two years.
  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. Warranty requirements specified in individual specification sections that specify a required warranty or guarantee greater than two years shall negate this requirement.
    - 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.
- B. Warranty Period Commencement Date: Effective starting 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. Warranty requirements specified in individual specification sections explicitly specify that a required warranty or guarantee shall be effective on date of shipment, date of manufacturer, or date of installation.
  - b. 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 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, Subcontractors, 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 warranted 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.

End of Section

Section 02 41 19  
SELECTIVE DEMOLITION**PART 1 - GENERAL**

## 1.1 GENERAL PROVISIONS

- A. The BIDDING REQUIREMENTS, CONTRACT FORMS, and CONTRACT CONDITIONS as listed in the Table of Contents, and applicable parts of Division 1 - GENERAL REQUIREMENTS, shall be included in and made a part of this Section.
- B. Examine all Drawings and all other Sections of the Specifications for requirements therein affecting the work of this Section.

## 1.2 SUMMARY

- A. General: The work described in this Section consists of selective demolition, cleaning, removal and legal disposal of all structures, equipment and materials indicated for demolition, or careful removal and temporary storage of materials and equipment indicated for salvage and re-use, or salvage and delivery to Owner. No attempt is made in this Section to list the entire scope of selective demolition required on this project or to describe each element to be removed. Drawings indicate both existing construction and final construction. It is the responsibility of the Contractor to determine for itself the scope and nature of the existing materials, equipment and finishes required for removal or salvage, based on the information provided in the full set of Contract Documents.
  - 1. Comply with requirements of Section 01 35 16 - ALTERATION PROJECT PROCEDURES, and Section 01 73 29 - CUTTING AND PATCHING.
- B. Permits: Obtain and pay for all demolition and construction permits required by local authorities having jurisdiction and other regulatory agencies and utility companies.
- C. Selective demolition and removal work includes the following at indicated locations, but is not limited to:
  - 1. Exterior guardrails and railings at existing concrete stairs and ramps.
  - 2. Remove existing lights, diffusers, grilles, speakers and similar equipment where scheduled to be replaced.
  - 3. Remove designated wood trim, cabinetry, casework and similar items
  - 4. Remove designated exterior walls, interior partitions, ceiling and suspension systems, and flooring systems.
    - a. Existing ceiling suspension grids to remain or removed, varies by location, refer to Drawings.
  - 5. Remove designated stair finishes.
  - 6. Remove existing exterior soffits with supporting materials, where indicated.
  - 7. Remove designated building specialties, including markerboards, tackboards, chalkboards, pegboards, projection screens toilet partitions and toilet accessories.

8. Remove designated doors, frames and associated hardware. Remove existing door hardware where scheduled or indicated for replacement with new door hardware on existing doors to remain. Disconnect abandoned wiring and accessories for electrified hardware.
  9. Remove existing building name (individual letter) signage.
  10. Remove fencing, posts and gates where designated.
  11. Remove all furnishings, utilities, equipment and fixtures, not indicated for salvage or re-use, and abandoned materials of all kinds.
  12. Remove from site all abandoned, disconnected and dismantled fire protection, plumbing and mechanical equipment, including piping, conduits, system wiring, meters and other devices.
  13. Remove from site all abandoned, disconnected and dismantled electrical fixtures and equipment, including conduits, wiring, meters and other devices.
  14. In addition to demolition specifically shown, cut, move or remove existing construction to remain as necessary to provide access or to allow alterations and new work to proceed. Coordinate such relocation's and removal to accommodate the demands and requirements of other trades.
  15. Removal of unsuitable or extraneous materials not marked for salvage, such as abandoned furnishings and equipment, and debris such as rotted wood, rusted metals and deteriorated concrete.
- D. Selective demolition and removal work by individual utility, mechanical and electrical trade subcontractors includes, but is not limited to the following:
1. Each trade subcontractor shall Disconnect cut, cap and make safe all utilities, equipment and fixtures which are not indicated for salvage or re-use, or otherwise indicated to be abandoned in place as well as any abandoned materials of any kind.
    - a. Disconnect cut, cap and make safe, all utility services indicated to be demolished at their primary source. Obtain the approval from authorities having jurisdiction, or applicable service provider prior to the execution of the work.
    - b. Cut, cap and make safe all existing utility services indicated to be abandoned in place, where so indicated on the Drawings.
  2. The fire suppression subcontractor shall disconnect, detach and dismantle all existing abandoned sprinkler/fire suppression components including, but not limited to, sprinkler heads, piping, hangers, valves, and appurtenances.
    - a. Suspended hangers, piping, fixtures and appurtenances scheduled for demolition, shall be disconnected and lowered to floor by the fire suppression subcontractor.
  3. The plumbing subcontractor shall disconnect, detach and dismantle all existing abandoned plumbing systems and equipment including, but not limited to, fixtures, equipment, water heaters, piping, hangers, valves, insulation and appurtenances.
    - a. Piping at slab will be disconnected by plumbing subcontractor.
    - b. Suspended hangers, piping, equipment, fixtures and appurtenances scheduled for demolition, shall be disconnected and lowered to floor by the plumbing subcontractor.

4. The HVAC subcontractor shall disconnect, detach, dismantle all existing abandoned heating, ventilating, and air conditioning systems including, but not limited to, air handlers, air conditioners, pumps, cabinet unit heaters, unit heaters, radiation, exhaust fans, intakes, louvers, diffusers, grilles, and all related piping, ductwork, controls, and appurtenances.
    - a. Suspended hangers, equipment, ductwork and appurtenances scheduled for demolition, shall be disconnected and lowered to floor by HVAC subcontractor.
  5. The Electrical subcontractor shall disconnect, detach, dismantle all existing abandoned electrical systems and equipment including, but not limited to, panelboards, light fixtures, fire alarm, intercom, speakers, wiring devices, and all related conduit and appurtenances.
    - a. Suspended wiring, conduit, hangers, fixtures, equipment, and appurtenances scheduled for demolition, shall be disconnected and lowered to floor by the Electrical subcontractor.
  6. Remove, salvage and furnish to the General Contractor designated equipment, fixtures or other items so identified. Refer to notes on Drawings.
  7. Identify locations of utilities for work of other sections.
- E. Remove, salvage and provide storage for removed materials, equipment and furnishings indicated for re-use, including but not limited to:
1. Designated light fixtures.
- F. Remove, salvage, and furnish to Owner for maintenance stock, or other future use, the following products. Carefully package and clearly identify prior to delivery to Owner.
1. Door hardware.
- G. Conduct walk-through of existing site prior to commencement of selective demolition work and jointly identify and tag with Owner items required to be salvaged. These products in general would be in addition to those indicated on Drawings.
1. All salvaged products not designated for re-use in project, shall be furnished to the Owner for its own use, carefully packaged and clearly identified.
- H. Identify locations of utilities for work of other sections.

### 1.3 RELATED REQUIREMENTS

- A. Section 01 35 16 - ALTERATION PROJECT PROCEDURES: Special requirements and considerations for renovation and alternation work.
- B. Section 01 50 00 - TEMPORARY FACILITIES AND CONTROLS: Procedural and administrative requirements for temporary facilities and controls, including:
  1. Temporary heat.
  2. Temporary barriers and barricades.
  3. Temporary fire protection.
- C. Section 01 73 29 - CUTTING AND PATCHING:
  1. Procedural and administrative requirements for cutting and patching.

- D. Section 01 74 19 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL: Procedural and administrative requirements for construction and demolition recycling.
- E. Division 21 - FIRE SUPPRESSION:
  - 1. Disconnection, salvage, re-working and re-installation of sprinkler system.
  - 2. Disconnection and dismantling designated fire suppression systems and components.
- F. Division 22 – PLUMBING:
  - 1. Disconnection, salvage, re-working and re-installation of plumbing system.
  - 2. Disconnection and dismantling designated plumbing systems and components.
- G. Division 23 - HEATING, VENTILATING AND AIR CONDITIONING (HVAC):
  - 1. Disconnection, salvage, re-working and re-installation of roof-top ventilator ducts.
  - 2. Disconnection and dismantling designated mechanical systems and components.
- H. Division 26 - ELECTRICAL:
  - 1. Disconnection and dismantling designated electrical systems and components.
  - 2. Disconnection, salvage, and re-installation of designated light fixtures.
- I. Individual specification sections: Cutting and patching incidental to work of individual specification sections shall be performed by respective trades, except as specified in Section 01 73 29 – CUTTING AND PATCHING.
- J. Individual specification sections: Utility shutoffs by respective trades.

#### 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. ANSI A10.6 – Safety Requirements for Demolition Operations.
  - 2. NFPA 241 – Standard for Safeguarding Construction, Alteration, and Demolition Operations.

#### 1.5 OWNERSHIP OF REMOVED MATERIALS

- A. If during the work, articles of unusual value, or of historical or archaeological significance, are encountered the ownership of such articles is retained by the Owner, and information regarding their discovery shall be immediately furnished to the Architect. Resolution shall be handled as a Change in the Work.



- B. Ownership of materials, equipment and furnishings designated for salvage for re-use in this Project or designated for Owner's use is retained by the Owner.
- C. Ownership of materials, equipment and furnishings to be removed from the Project which are not defined by the above two paragraphs is retained by the Contractor; if any of these are considered of salvageable value to the Contractor, they may be removed from the Project as work progresses.
  - 1. On-site storage or sale of removed items is prohibited.

## 1.6 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
  - 1. Comply with all requirements of this contract relative to protection, scheduling and coordination with the Owner.
  - 2. Coordinate and arrange with utility, 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.
  - 3. Coordinate Work of this Section with related utilities work identified in the Contract Documents.
- 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, Contractor's project manager and on-site superintendent, demolition subcontractor's project superintendent, and representatives of related utility trades.
  - 2. Conference 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 conditions of existing construction to be demolished.
      - 1) Review extent and location of selective demolition.
      - 2) Review special demolition and salvage procedures required for historic building elements.
      - 3) Exploratory demolition and concealed conditions.
    - d. Coordination of demolition work with work of other contracts.
    - e. Review shoring and bracing procedures, and structural load limitations of existing structure.
    - f. Review of site use, staging, and storage locations for salvaged materials and materials for recycling program.
    - g. Emergency weather protection procedures and weather limitations.
    - h. Review conditions of existing construction to be demolished.

- i. Review structural load limitations of existing structure.
  - j. Review extent and location of selective demolition. Review areas where existing construction is to remain and requires protection
  - k. Review special requirements for temporary protection of existing finishes and materials to remain.
  - l. Review requirements of work performed by other trades that rely on substrates exposed by demolition operations.
  - m. Procedures for processing field decisions.
  - n. Review fire protection procedures for cutting torches, and other potentially hazardous operations.
  - o. Review general safety regulations and requirements for demolition work.
- C. Sequencing:
- 1. Coordinate and arrange with mechanical and electrical trades for their disconnecting, rerouting and maintenance of existing services in the buildings as required, as part of the work of this Contract.
- D. Scheduling:
- 1. Comply with all requirements of this contract relative to protection, scheduling, phasing, and coordination with the Owner.

## 1.7 SUBMITTALS

- A. Information and Review Submittals: Submit the following under provisions of Section 01 33 00 - SUBMITTAL PROCEDURES:
- 1. Schedule: Prior to commencement of work, prepare a schedule indicating proposed methods and sequence of operations for demolition work.
    - a. Include coordination for shut-off, capping, and continuation of utility services as required, together with details for dust and noise control protection.
    - b. Provide detailed sequence of demolition and removal work to ensure uninterrupted progress of Owner's on-site operations. Receive acceptance from Architect prior to commencing work.
  - 2. Shop drawings: Indicate demolition sequencing and locations of salvageable items.
  - 3. Design Data: Submit calculations for bracing and shoring, signed and sealed by professional engineer registered in the State of Rhode Island.
  - 4. Permits: Submit copy of permits required by regulatory agencies for demolition.
  - 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.

**1.8 REGULATORY REQUIREMENTS**

- A. Conform to applicable codes for demolition work, safety of structure, dust control, and disposal of debris.
- B. Obtain and pay for required permits and licenses required from authorities 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.
- D. Do not close or obstruct egress width to exits. Do not disable or disrupt building fire or life safety systems without 3 days prior written notification to the Owner.

**1.9 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. Shoring and bracing design: Design shoring, and bracing, under direct supervision of Professional Engineer experienced in design of this Work and licensed at Project location.

**1.10 SITE CONDITIONS**

- A. Comply with wind and weather conditions established at pre-demolition meeting.

**PART 2 - PRODUCTS (Not Used)****PART 3 - EXECUTION****3.1 EXAMINATION**

- A. Condition of Structures: Owner assumes no responsibility nor makes any claim as to the actual condition or structural adequacy of any existing construction to be demolished. The Contractor shall investigate and assure himself of the condition of the work to be demolished and shall take all precautions to ensure safety of persons and property.
  - 1. 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.
- B. The Contractor shall have examined the existing conditions per requirements of the Conditions of the Contract and Division 1 - General Requirements, and reviewed

Contract Documents prior to commencement of demolition. Coordinate and verify scope of selective demolition with other portions of work specified in other sections, and under separate Contract. Change orders will not be issued for the removal of any exposed to view materials or equipment, which are either indicated on the Drawings for removal, or not indicated, but necessary to remove for the Work of this Project.

- C. Layout of demolition in masonry construction. After Contractor identifies areas requiring demolition and subsequent patching of masonry. Masonry Filed Subcontractor shall indicate on walls the extent of masonry cutting and demolition work which will be performed by the General Contractor. Necessary finished patching of openings will be performed by the Masonry Subcontractor.

### 3.2 PREPARATION

- A. General: Provide necessary protection of non-work areas during demolition operations. Provide, erect and maintain temporary barriers as required to protect non-construction related pedestrian and vehicular traffic using the adjacent portions of the site and building.
  - 1. Erect and maintain temporary partitions to prevent spread of dust, odors, and noise to permit continued Owner occupancy of adjacent facility.
- B. Protect existing structures which are not to be demolished. Protect designated materials and equipment to be removed and retained by Owner.
  - 1. Cover or otherwise protect as necessary existing equipment, furniture and furnishing located beyond the immediate demolition work.
  - 2. Protect existing landscaping materials, structures, and appurtenances which are not to be demolished.
- C. Prevent movement of structure; provide required bracing and shoring.
  - 1. Protect existing active utility services and structures from damage during selective demolition work including during installation of bracing and removal of same. Repair or replace damages to satisfaction of Owner.
- D. Dangerous Materials: Drain, purge, or otherwise remove, collect, and dispose of chemicals, gases, explosives, acids, flammables, or other dangerous materials before proceeding with demolition operations.

### 3.3 GENERAL REQUIREMENTS FOR SELECTIVE DEMOLITION

- A. Conduct demolition to minimize interference with adjacent 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.
  - 1. Maintain protected egress and access to the Work at all times.
- B. Perform selective demolition in an orderly and careful manner. Carefully cut materials to be removed to eliminate damage to portions to remain. Protect existing structure designated to remain.
  - 1. Do not demolish building elements beyond what is indicated on Drawings without Architect's approval.
  - 2. Except as otherwise required by Project phasing requirements, proceed with selective demolition systematically, from higher to lower level. Complete

- selective demolition operations above each floor or tier before disturbing supporting members on the next lower level.
3. Locate equipment and remove debris and materials so as not to impose excessive loads on supporting walls, floors, or framing.
  4. Remove debris from elevated portions of building by chute, hoist, or other device that will convey debris to grade level in a controlled descent. Do not throw trash from windows or from roof.
  5. Remove decayed, vermin-infested, or otherwise dangerous or unsuitable materials and promptly dispose of off-site.
  6. Remove structural framing members and lower to ground by method suitable to avoid free fall and to prevent ground impact or dust generation.
  7. Pull nails and fasteners which remain after removal of attached material. Remove lath, strapping and other substructures associated with finishes to be removed.
  8. Where existing finishes are indicated to be removed, remove down to bare subsurface without causing damage to the subsurface.
    - a. After removal of non-asbestos finish flooring materials, remove underlying mastic and prepare substrate to receive new flooring materials by Shot Blasting method. Create a uniform 20 mil profile. Mechanically scarify areas which cannot be profiled by shot blast method. Thoroughly wash all flooring substrate and leave clean and dry ready for application of new flooring materials.
- C. Remove foundation walls and footings as indicated on Drawings, and where indicated, to a minimum of two feet beyond area of new construction.
- D. Cutting openings and holes: Neatly cut openings and holes plumb, square, and true to dimensions required. Cut or drill from the exposed or finished side into concealed surfaces to avoid marring existing finished surfaces. Use cutting methods least likely to damage construction to remain or adjoining construction. Use hand tools or small power tools designed for sawing or grinding, not hammering and chopping, to minimize disturbance of adjacent surfaces.
1. All penetrations in floors and roof shall be framed with miscellaneous metal work prior to cutting and demolition of deck and concrete.
  2. Repair damage done to existing elements of building to remain, except repairs specified to be provided under other Sections. Repairs shall be done in such manner as to closely match construction, appearance and quality of original work.
- E. Use of cutting torches:
1. Do not use cutting torches until work area is cleared of flammable materials.
  2. Maintain adequate ventilation when using cutting torches.
  3. At concealed spaces, such as duct and pipe interiors, verify condition and contents of hidden space before starting flame-cutting operations.
  4. Maintain fire watch and portable fire-suppression devices during flame-cutting operations. Comply with fire prevention measures specified under Section 01 50 00 - TEMPORARY FACILITIES AND CONTROLS.

- F. Carefully observe existing structure during demolition operations, cease operations immediately if structure appears to be in danger. Immediately notify both Architect and Owner's Project Representative. Do not resume demolition operations until directed.
- G. Disconnect, cap and clearly 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 pipe sections by saw-cutting, removing a complete pipe section to an existing joint, or other adequate means which results in a clean joint.
  - 2. Protect and maintain conduits, drains, sewers, pipes, and similar utilities that are not to be demolished
- H. Disconnect existing equipment and fixtures to be removed, or services abandoned, and piping, wiring, and conduit which would otherwise be exposed in the finished work. Remove from site disconnected equipment and fixtures and piping not to be reused.
  - 1. Contractor to remove and dispose of all equipment not tagged or scheduled for reuse.
- I. Abandoned Equipment, Utilities, Systems: Remove in their entirety. Abandonment in place is not acceptable, except where an item is specifically indicated to be abandoned in place.
  - 1. "Abandoned" means the item is not operational in the completed Contract.
  - 2. Without limitation, remove abandoned pipes, tubing, conduits, wires, cables, ducts, equipment, machines, and all elements and items related to abandoned work including, without limitation, hangers, connectors, anchors, valves, drains, strainers, sumps, panels, mounting boards, grounding rods, ground connectors, boxes, dampers, plenums, insulation, escutcheons, trims, and all other related items.
  - 3. Where an existing element is indicated to be abandoned in place, the abandoned item shall be cut off and, if hollow, capped.
    - a. Cut off sufficiently below the finished plane to permit space for patching over the abandoned element. The General Contractor shall provide all cutting and chipping required to recess the cut element, and to coordinate depth of cut-offs required for finishing.

#### 3.4 BRACING

- A. Locate bracing to clear columns, floor framing construction, and other permanent work. If necessary to move a brace, install new bracing prior to removal of original brace. Provide suitable bracing materials which will support loads imposed
- B. Do not place bracing where it will be cast into or included in permanent concrete work, except as otherwise acceptable to Architect.
- C. Install internal bracing, if required, to prevent spreading or distortion to braced frames.

- D. Maintain bracing until structural elements are rebraced by other bracing or until permanent construction is able to withstand designed live and dead loads.
- E. Remove bracing in stages to avoid disturbance or damage to existing structure.
- F. Repair or replace adjacent work damaged or displaced through installation or removal of bracing work.

### 3.5 GENERAL DUST CONTROL

- A. Contractor shall employ dust and pollution prevention procedures at all times.
  - 1. Clean up loose debris daily, or more frequently as required, to prevent the wind spreading debris. Keep dumpsters covered when not in use.
  - 2. Wet down debris (as appropriate) to prevent air pollution by dust rising from demolition work. Wet down dumpsters to prevent fires caused by vandals.
  - 3. Employ tarpaulins on all trucks carrying debris.

### 3.6 SALVAGE MATERIALS AND PRODUCTS

- A. Carefully salvage and provide safe storage for products designated for salvage, 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.
  - 1. Remove items indicated to be salvaged with extreme care to prevent damage.
  - 2. All components and parts of salvaged items shall be saved and packaged.
- B. Removed and Salvaged Items:
  - 1. Clean salvaged items.
  - 2. Pack or crate items after cleaning. Identify contents of containers.
  - 3. Store items in a secure area until delivery to Owner.
  - 4. Transport items to Owner's storage area as designated by Owner.
  - 5. Protect items from damage during transport and storage.
- C. Removed and Reinstalled Items:
  - 1. Clean and repair items to functional condition adequate for intended reuse. Paint equipment to match new equipment.
  - 2. Pack or crate items after cleaning and repairing. Identify contents of containers.
  - 3. Protect items from damage during transport and storage.
  - 4. Reinstall items in locations indicated. Comply with installation requirements for new materials and equipment. Provide connections, supports, and miscellaneous materials necessary to make item functional for use indicated.
- D. Existing Items to Remain: Protect construction indicated to remain against damage and soiling during selective demolition. When permitted by Architect, items may be removed to a suitable, protected storage location during selective demolition and cleaned and reinstalled in their original locations after selective demolition operations are complete.

- 3.7 SELECTIVE DEMOLITION REQUIREMENTS FOR MATERIALS AND SURFACES.
- A. 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. Comply with requirements of Division 31 – EARTHWORK.
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.
- B. Floors, General:
1. Completely remove existing flooring located in areas scheduled to receive new flooring surfaces and as additionally indicated. Remove all finish flooring layers of flooring down to the existing substrate.
    - a. Completely remove flooring systems to substrate, including full removal of all setting beds and adhesives.
  2. Remove resilient flooring and adhesive in strict accordance with the technical bulletin entitled " Recommended Work Practices for the Removal of Resilient Floor Covering", as issued by Resilient Floor Covering Institute (RFCI).
  3. Patching: The Contractor is responsible for patching of flooring substrates and subfloors. Respective finish flooring trades are responsible for patching of finish flooring systems matching abutting surface.
- C. Walls, General:
1. Remove interior walls and partitions as indicated and as needed to accommodate new work.
  2. Where existing walls-to-remain are indicated to receive new finishes, completely remove trim and fasteners.
  3. Patching: The Contractor is responsible for patching of substrates and back-up systems. Finishes work shall be provided under individual product specification sections.
- D. Ceilings, General:
1. Patching: The Contractor shall provide patching of substrates and back-up systems. Ceiling work is specified under individual product specification sections.
    - a. Ceilings which must be temporarily removed for mechanical, plumbing or fire protection work shall be carefully removed and stored for reinstallation when work has been completed under Section 09 51 00 - Acoustical Ceilings.
- E. Doors and Frames: Where doors and frames are indicated to be removed from walls or partitions which are to remain, remove doors and frames carefully so as to minimize damage to wall. Repair and patch wall as necessary to accommodate new door frame or other new work.
- F. Roofing: Remove no more existing roofing than can be covered in one day by new roofing and so that building interior remains watertight and weathertight. Refer to Section \_\_\_\_\_ for roofing requirements.
1. Remove existing roof membrane, flashings, copings, and roof accessories.



2. Remove existing roofing system down to substrate.
- G. Concrete, General: Demolish in small sections. Cut concrete to a depth of at least 3/4 inch (19 mm) at junctures with construction to remain, using power-driven saw. Dislodge concrete from reinforcement at perimeter of areas being demolished, cut reinforcement, and then remove remainder of concrete indicated for selective demolition. Neatly trim openings to dimensions indicated.
  - H. Concrete Slabs (suspended and slabs-on-grade): Demolish in sections. Cut concrete full depth at junctures with construction to remain and at regular intervals, using power-driven saw, then remove concrete between saw cuts.
  - I. Masonry: Demolish in small sections. Except where toothing is required, cut masonry using power-driven saw at junctures with construction to remain. Remove masonry between saw cuts.
  - J. Fire Suppression and Sprinkler Equipment: Fire Protection subcontractor is responsible to disconnect, cap and lower to floor items required to be removed, including but not limited to piping, hangers, valves, and insulation.
  - K. Plumbing Equipment: Plumbing subcontractor is responsible to disconnect, cap and lower to floor items required to be removed, including but not limited to fixtures, equipment, water heaters, piping, hangers, valves, and insulation.
  - L. Heating, Ventilation, Air Conditioning, and Refrigeration (HVAC) Equipment:
    1. Drain system components designated for disposal of all lubricants, hydraulics, and refrigerants without releasing into atmosphere.
    2. HVAC subcontractor(s) shall disconnect, cap and lower to floor items required to be removed, including but not limited to, ductwork, piping, fans, VAV boxes, unit ventilators, and all similar system equipment. Contractor is responsible for removal from site and proper disposal.
  - M. Electrical Equipment and Lighting Fixtures:
    1. Electrical subcontractor(s) shall disconnect, cap and lower to floor items required to be removed, including but not limited to, panelboards, light fixtures, and overhead devices including, fire alarm, intercom, bus ducts. Contractor is responsible for removal from site.

### 3.8 REPAIRS

- A. Repair all damage done to elements of buildings and structures to remain, except repairs specified to be provided under other Sections, or as indicated for removal in subsequent project phase(s). Repairs shall be done in such manner as to closely match construction, appearance and quality of original work.

### 3.9 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. 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 to comply to the State of Rhode Island regulations on specific banned materials prohibited from incineration or landfill disposal.
  4. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.
  5. 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.
- 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. Comply with requirements of Section 01 74 19 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL.
  2. Comply with waste management reporting requirements on forms acceptable to the Owner.
  3. 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

### 3.10 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

## Section 03 01 37

## REHABILITATION OF CAST-IN-PLACE CONCRETE

**PART 1 - GENERAL**

## 1.1 GENERAL PROVISIONS

- A. The BIDDING REQUIREMENTS, CONTRACT FORMS, and CONTRACT CONDITIONS as listed in the Table of Contents, and applicable parts of Division 1 - GENERAL REQUIREMENTS, shall be included in and made a part of this Section.
- B. Examine all Drawings and all other Sections of the Specifications for requirements therein affecting the work of this Section.

## 1.2 SUMMARY

- A. Repair existing exterior concrete surfaces including the preparation of concrete and application of patching materials to:
  - 1. Repair existing exterior concrete ramp and stairs.

## 1.3 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 02 41 19 - SELECTIVE DEMOLITION: Removal of existing handrails.

## 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. ACI 302.2R-06: Guide for Concrete Slabs that Receive Moisture-Sensitive Flooring Materials.
  - 2. ACI 304 – Guide for Measuring, Mixing, Transporting and Placing Concrete.
  - 3. ACI 305.1-06: Specification for Hot Weather Concreting.
  - 4. ACI 305.1-06: Specification for Hot Weather Concreting.
  - 5. ACI 308.1 - Specification for Curing Concrete.
  - 6. ASTM A615/A615M - Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement.
  - 7. ASTM C33/C33M - Standard Specification for Concrete Aggregates.
  - 8. ASTM C94/C94M – Standard Specification for Ready-Mixed Concrete.
  - 9. ASTM C109/C109M – Standard Test Method for Compressive Strength of Hydraulic Cement Mortars (Using 2-in. or [50 mm] Cube Specimens).
  - 10. ASTM C150/C150M - Standard Specification for Portland Cement.

11. ASTM C330/C330M - Standard Specification for Lightweight Aggregates for Structural Concrete.
  12. ASTM C494/C494M - Standard Specification for Chemical Admixtures for Concrete.
  13. ASTM C881/C881M – Standard Specification for Epoxy-Resin Base Bonding Systems for Concrete.
  14. ASTM C882/C882M - Standard Test Method for Bond Strength of Epoxy-Resin Systems Used With Concrete By Slant Shear.
  15. ASTM D543 - Standard Practices for Evaluating the Resistance of Plastics to Chemical Reagents.
  16. ASTM D562 - Standard Test Method for Consistency of Paints Measuring Krebs Unit (KU) Viscosity Using a Stormer-Type Viscometer.
  17. ASTM D638 - Standard Test Method for Tensile Properties of Plastics.
  18. ASTM D695 - Standard Test Method for Compressive Properties of Rigid Plastics.
  19. ASTM D790 - Standard Test Methods for Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials.
  20. ASTM D1752 - Standard Specification for Preformed Sponge Rubber, Cork and Recycled PVC Expansion Joint Fillers for Concrete Paving and Structural Construction.
  21. ASTM D1894 - Standard Test Method for Static and Kinetic Coefficients of Friction of Plastic Film and Sheeting.
  22. ASTM D2240 - Standard Test Method for Rubber Property—Durometer Hardness.
  23. ASTM D2485 - Standard Test Methods for Evaluating Coatings For High Temperature Service.
  24. ASTM D3363 - Standard Test Method for Film Hardness by Pencil Test.
  25. ASTM D4060 - Standard Test Method for Abrasion Resistance of Organic Coatings by the Taber Abraser.
  26. ASTM D4226 - Standard Test Methods for Impact Resistance of Rigid Poly(Vinyl Chloride) (PVC) Building Products.
  27. ASTM D4541 - Standard Test Method for Pull-Off Strength of Coatings Using Portable Adhesion Testers.
  28. AWS D1.4 - Structural Welding Code for Reinforcing Steel.
- B. Inclusionary References: The following reference materials are hereby made a part of this Section by reference thereto:
1. ACI 301 - Specifications for Structural Concrete.
  2. ACI 302.1R - Specifications for Structural Concrete.
  3. ACI 318 - Building Code Requirements for Structural Concrete and Commentary.
  4. ACI 503.7 – Specification for Crack Repair by Epoxy Injection.
  5. CRSI - Manual of Practice.

## 1.5 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. Immediately notify the Architect in writing of project 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 substrate specified. Perform all corrective measures, at no cost to the Owner, for any defects in the work, resulting from the use of such materials.

## 1.6 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 patching mixes, bonding agents, primers, attachment accessories, and admixtures.
2. Shop drawings:
  - a. Repair scope drawings: 1/4 inch scale elevations and plans of areas covered by the Work of this Section.
  - b. Reinforcement shop drawings: Plans and details showing bar sizes, spacing, locations, depth of doweling, and quantities of reinforcing steel. Include schedules and diagrams to indicate beds, sizes and lengths of reinforcing members.
3. Review statement: Written statement, signed by the concrete restoration applicator, stating that the Contract Drawings have been reviewed and that the proposed repair methods are proper, compatible, and adequate for the application shown.
4. Manufacturer's instructions: Manufacturer's preparation, mixing and installation instructions.

### B. Closeout Submittals: Submit the following under provisions of Section 01 78 00 - CLOSEOUT SUBMITTALS.

1. Record Documentation: Accurately record actual locations of repair work, structural reinforcement repairs, and type of repair methods used.

## 1.7 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 gypsum board.
- C. Qualifications:
  - 1. Materials manufacturer: Company specializing in manufacturing the products specified in this Section with minimum 3 years documented experience.
  - 2. Installer/Applicator: Minimum of 3 years documented experience demonstrating previously successful work of the type specified herein, and approved by product manufacturer.
    - a. Contractor shall submit a list of five (5) projects in which epoxy injection was successfully completed.
- D. Perform work to provide homogeneous concrete with required strength, durability and weathering resistance, without planes of weakness, and other structural defects, and free of pronounced honeycombing, air pockets, voids, projections, off sets of plane, and other defacements on exposed surfaces.

## 1.8 FIELD SAMPLES

- A. Provide on-site samples, minimum 1 square foot, illustrating each type of proposed repair to vertical, horizontal, and overhead surfaces.
- B. Accepted samples may remain as part of the work.

## 1.9 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 and store epoxy repair materials in original, sealed, containers showing manufacturer's identification, year of production, net weight, date of packaging, location of packaging and instructions for mixing components and application.
  - 1. Comply with all instructions for storage, shelf life limitations and handling.
- 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 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 SITE CONDITIONS

- A. Maintain minimum ambient substrate surface temperature of 50 degrees Fahrenheit for 24 hours before, during, and 48 hours after installation of patching materials, unless otherwise recommended by product manufacturer.

#### 1.11 WARRANTY

- A. General: Submit warranties under provisions of Section 01 78 00 - CLOSEOUT SUBMITTALS, and in compliance with Section 01 78 36 – WARRANTIES.
- 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 SINGLE COMPONENT CEMENTITIOUS PATCHING MATERIALS

- A. Basis of Design (Specified Manufacturer): To establish a standard of quality, design and function desired, Drawings and specifications have been based on Sika USA., Inc., Lyndhurst, NJ., product "Sikacryl Ready-Mix Concrete Patch".
  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. Sika USA., Inc., Lyndhurst, NJ., product "Sikacryl Ready-Mix Concrete Patch"
    - b. WR. Meadows, Hampshire IL., product "Meadow-Patch 20".
    - c. H&C Products, Cleveland, OH. product "Concreteready."

#### 2.2 EPOXY CRACK REPAIR MATERIALS

- A. Basis of Design (Specified Manufacturer): To establish a standard of quality, design and function desired, Drawings and specifications have been based on Abatron, Inc. Gilberts IL., product: "Best Bond".
  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. Abatron, Inc. Gilberts IL., product: "Best Bond".
    - b. The Quikrete Companies, LLC, Atlanta, GA., product "Quikrete Epoxy Concrete Repair 8620-49".

- c. Sika USA, Lyndhurst, NJ., product "Sikadur Crack Fix".
- B. Epoxy flowable crack repair: compatible with the in-place concrete, impervious to moisture, chemical resistant and abrasive resistant, having the following characteristics:
- 1. Color: Light Gray.
  - 2. Viscosity (cps; ASTM D562): 19,000.
  - 3. Tensile Strength (ASTM D638): 930 psi.
  - 4. Elongation (ASTM D638): 97%.
  - 5. Flexural Strength (ASTM D790): 620 psi.
  - 6. Compressive Strength (ASTM D695): 5,800 psi.
  - 7. Hardness - Shore A (D): 90 (59).
  - 8. VOC (EPA method #24): 0%.
- 2.3 ACCESSORIES:
- A. Cleaning Agent: Commercial Muriatic acid.
- 2.4 MIXING EPOXY MATERIALS
- A. Mix epoxy materials in strict accordance with manufacturer's instructions for purpose intended.
  - B. Mix components in clean equipment or containers. Conform to pot life and workability limits.

### **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. Beginning of installation means acceptance of existing conditions.
- 3.2 PREPARATION - GENERAL
- A. Clean concrete surfaces of dirt, laitance, corrosion, or other contamination; wire brush using acid; rinse surface with clean water and allow to dry.
  - B. Flush out cracks and voids with Muriatic acid to remove laitance and dirt. Chemically neutralize by rinsing with water.
  - C. For areas requiring repairs to existing reinforcing steel: Sandblast clean the exposed reinforcement steel surfaces. Mechanically cut away damaged portions of bar.
- 3.3 PREPARATION - MORTAR PATCHES
- A. General: Perform preparation required in accordance with the specifications herein described and in accordance with the epoxy manufacturer's recommendations.
  - B. Areas of deteriorating and unsound concrete, as determined during the inspection, shall be removed as follows:



1. Unsound concrete in these areas shall be removed by jackhammers, high pressure water blasting or other mechanical equipment.
  2. Where possible, the areas removed shall be rectangular shaped in plan view.
  3. The edges of the patch area shall be perpendicular or slightly undercut minimum 1/4 and 1/2 inch deep. This shall be accomplished by saw cutting or by using chipping hammers not in excess of a 15 pound rating.
    - a. Jackhammers in general removal of deteriorated and unsound concrete shall not exceed a 30 pound rating.
  4. During the removal process, care should be taken to avoid cracking and otherwise damaging the surrounding sound concrete.
- C. Following the removal of the deteriorated and unsound concrete and prior to cleaning the patch area, the contractor shall remove all loose concrete from the work area and leave said area broom clean.
- D. The patch area shall be thoroughly cleaned by sandblasting or high pressure waterblasting (8000 psi minimum) to accomplish all of the following:
1. Removal of all remaining loose and unsound concrete and all dirt, debris and other contaminants which may impair adhesion of the epoxy mortar.
  2. Remove all loose rust, scale and unsound concrete from exposed reinforcing steel.
- 3.4 REPAIR WORK - GENERAL
- A. Repair exposed structural, shrinking and settlement cracks on concrete by epoxy injection or bonding agent and cementitious paste method.
- B. Prepare previously placed concrete by cleaning with steel brush and applying bonding agent in accordance with manufacturer's instructions.
- C. For spalling slab areas: Saw-cut around spalled areas to a depth of 1/2 to 3/4 inch. Angle bottom of saw cut away from spalled areas to provide keying. Chip out spalled area to saw cuts, chip area flat and level. Fill voids flush with surface with cementitious grout, apply surface finish.
- D. In locations where concrete edges are loose, chipped or missing to a depth of more than 3 inches; dowel stainless steel reinforcing into existing concrete. Drill holes in existing concrete equal to depth of repair, insert 1/4 inch diameter stainless steel dowels and pack solid with high-strength non-shrink grout.
- E. Fill cracks with epoxy with injected epoxy resin adhesive as directed by manufacturer's instructions and as specified herein.
- F. Repair honeycomb areas with troweled epoxy mortar as directed by manufacturer's instructions and as specified herein.
- 3.5 DEFECTIVE REPAIRS
- A. Allow Architect/Engineer to inspect concrete surfaces after completion of repairs. Do not patch, fill, touch-up, repair, or replace concrete restoration work except upon express direction of Architect/Engineer for each individual area.

## 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 materials installed under this Section.
1. Clean surface areas of excess epoxy materials and remove injection ports by grinding or other appropriate methods. No epoxy materials or injection ports shall extend beyond the plane of the surfaces of the existing in-place concrete.
- B. 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).

End of Section

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CAST IN PLACE CONCRETE**PART 1 - GENERAL**

## 1.1 SUMMARY

- A. Drawings and General Provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
- B. Rhode Island Department of Transportation (RIDOT), Standard Specifications for Highways and Bridges, latest Edition with amendments, hereinafter referred to as the "Standard Specifications".
- C. Rhode Island Department of Transportation (RIDOT), Construction Standards, latest Edition with amendments hereinafter referred to as the "Construction Standards".
- D. Related Sections: The following Sections contain requirements that relate to this Section:
  - 1. Section 31 00 00 - Earthwork
  - 2. Section 32 13 13 – Concrete Paving
  - 3. Section 32 13 14 – Exposed Aggregate Concrete Paving

## 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. Cast-in Place Concrete

## 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) or coarse aggregate C136 Sieve Analysis of Fine and Coarse Aggregate
6. C138 Unit Weight, Yield, and Air Content of Concrete
7. C143 Test for Slump of Portland Cement Concrete
8. C150 Specification for Portland Cement
9. C171 Sheet Materials for Curing Concrete
10. C172 Sampling Fresh Concrete
11. C173 Standard test Method for Air Content of Freshly Mixed Concrete by the Volumetric Method
12. C595 Standard Specifications for Portland Blast Furnace Slag Cement
13. C231 Test for Air Content of Freshly Mixed Concrete by the Pressure Method
14. C260 Specification for Air-Entraining Admixtures for Concrete
15. C309 Specification for Liquid Membrane Forming Compounds for Curing Concrete
16. C340 Standard Specifications for Portland-Pozzolan Cement
17. C494 Specification for Chemical Admixtures for Concrete
18. C618 Standard Specifications for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete
19. C827 "Test Method for Change in Height at Early Ages of Cylindrical Specimens from Cementitious Mixtures
20. C845 Standard Specifications for Expansive Hydraulic Cement

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21. C989 Specification for Ground Iron Blast-Furnace Slag for Use in Concrete and Mortars
  22. C1017 Standard Specifications for Chemical Admixtures for Use in Producing flowing Concrete
  23. C1064 Test Method for Temperature of Freshly Mixed Portland-Cement Concrete
  24. C1107: Specification for Packaged Dry, hydraulic Cement Grout (Non-Shrink)
  25. C1157 Standard Performance Specifications for Silica Fume in Cementitious Mixtures
  26. C1240 Standard Specification for Silica Fume for Use in Hydraulic-Cement Concrete
  27. D1751: Specification for Preformed Expansion Joint Fillers for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types).
  28. 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 Massachusetts State Building Code.
- B. Coordinate use of curing compounds with the floor coatings, sealers, and hardeners.
- C. Air-entrain all exterior exposed 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

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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.
- H. Contractor shall provide a 4'x4' mock up of a smooth formed concrete wall with a smooth rubbed finish. If accepted wall may become a part of the finished work.

## 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 corrected 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

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- 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 reduced 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.

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- 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  $\frac{3}{4}$ " maximum size for all concrete. Provide aggregates from a single source for exposed concrete.
- D. 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.
- E. 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.
- F. 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 Pozzoloth" Master Builders
  4. "Sikament 686"; Sika Chemical Corp.
  5. Or equal.
- G. 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:

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- 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.
- H. 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.
- I. 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.
- J. Prohibited Admixtures: Calcium chloride thiocyanates 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.

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- 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.

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## 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:
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: Concrete on composite metal deck (only).
  4. Class 5000 – 3/4" normal weight concrete: Exterior site concrete (only).
    - a. 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:

<b>Minimum Design Compressive Strength</b>	<b>Minimum Strength fc 7 days</b>	<b>Laboratory Testing Age 28 day</b>	<b>Minimum ** Cement Content/cu.yd.</b>	<b>Maximum* W/C Ratio</b>
4,000 (3/4") psi	2,400 psi	4,000 psi	565	0.45
4,000 (3/8") psi	2,400 psi	4,000 psi	611	0.45
3,000 (3/4") psi	1,800 psi	3,000 psi	505	0.48
5,000 (3/4") psi	3,500 psi	5,000 psi	705	0.40

\*Maximum: Decrease if possible

\*\*Minimum: Increase as necessary to meet all other stated requirements.

- D. Adjustment to Concrete Mixes: Mix design adjustments may be requested by 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.
- E. 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

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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 except interior slabs, unless otherwise indicated. 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%

F. 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.
4. Reinforced foundation systems: Not less than 1-1/2" inch nor more than 4 inches.

## 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

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### 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

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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. Concrete shall be placed and consolidated free of rock pockets, honeycombs, and voids.
  - b. 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.
  - c. 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.
  - d. 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:

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- 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.

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- 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  $\frac{3}{4}$ " 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  $\frac{1}{8}$ " 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  $\frac{1}{4}$  inch in

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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, dampproofing, 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. All concrete walls shall have a smoothed rubbed finish.
  - 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 unformed 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 unformed surfaces unless otherwise indicated.

#### E. Monolithic Slab Finishes

- 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.

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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 float 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 troweling when surface produces a ringing sound as trowel is moved over surface. Consolidate concrete surface by final hand-troweling operation, free of trowel marks, uniform in texture and appearance, and finish surfaces to tolerances of F(F) 25 (floor flatness) and F(L) 20 (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

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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

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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  $\frac{3}{4}$ " 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.

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## 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 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 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. 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:

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- 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  $0.1 \times f'c$  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.

**END OF SECTION 03 30 00**

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PRECAST CONCRETE SITE FURNISHINGS**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 03 30 00 – Cast-In-Place Concrete
  - 2. Section 06 20 13 – Exterior Finish Carpentry
  - 3. Section 31 00 00 - Earthwork
  - 4. Section 32 13 13 –Concrete Paving
  - 5. Section 01 60 00 – Sustainable Design Requirements if applicable

## 1.2 DESCRIPTION OF WORK

- A. Provide 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. Precast Concrete Site Furnishings

## 1.3 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, reinforcement, connection details and methods, relationship to adjacent material, 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. Samples: Nominal size 6" sq. by appropriate thickness, of each type of unit and finished facing shown and specified for approval of quality, color, and texture of surface finish. Submit prior to fabrication.
- D. Mix Design(s): Propose concrete mix design for each type and color of concrete mix utilizing **21% recycled material**.
- E. Test Reports: Compressive Strength. Supply 12 test results from the last year showing the required results of 5000 PSI.
- F. Sustainability Submittals: if applicable

#### 1.4 QUALITY ASSURANCE

- A. Fabricator's Qualifications: Firm shall have a minimum of twenty (20) years experience in producing units similar to those required for this Project, with sufficient production capacity to produce and deliver required units without causing delay in Work.

#### 1.5 GUARANTEE

- A. Fabricator to provide a one-year guarantee against manufacturer's defect

#### 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. Protect materials from weather upon delivery to job site.
- C. Store materials on raised supports. Cover materials with waterproof covering. Provide adequate air circulation and ventilation.
- E. Do not store materials in wet or damp areas.
- F. 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.

### **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

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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 MATERIALS

### A. Acceptable manufacturers include the following:

1. Approved Fabricators:  
Quick Crete Products Corp. P.O. Box 639 Norco, CA 92860.  
Tel. (951)737-6240  
Web. [www.quickcrete.com](http://www.quickcrete.com)
2. Or Approved Equivalent

### B. Concrete Materials

1. Portland Cement: ASTM C 150, Type III (gray), to achieve desired finish colors. Use only one brand, type, and color from the same mill.
2. Aggregates: ASTM C 33, gradation may differ to achieve desired finish characteristics. Select coarse and fine aggregate colors and screen sizes to match approved sample(s). Verify that adequate supply, from one pit or quarry, for each type of aggregate is available for the entire Project. If possible obtain entire aggregate supply prior to starting Work, or have aggregate supply held in reserve by aggregate supplier.
3. Water: Potable. Clean, clear, and free from deleterious amounts of salts, acids, alkali's, organic materials, oils, detergents, or other matter that may interfere with color, curing, or strength of concrete.
4. Admixtures: Select to be compatible in specified mix.
  - a) Air Entraining: ASTM C 260.
  - b) Water Reducing: ASTM C 494, Type A,B,C,F. or G.
  - c) Coloring Agent: ASTM C 979, compatible with other concrete materials.

### C. Formwork

1. Provide forms with acceptable form facing materials that are non-reactive with concrete or form release agents and will produce required finish surfaces.
2. Construct and maintain forms to produce precast concrete units of shapes, lines, and dimensions indicated, within specified tolerances.

### D. Reinforcing Materials

1. Reinforcing Bars: ASTM A 615, Grade 40

## E. Connection Materials

1. Bolts, washers, nuts to be zinc plated.

## 2.3 MIXES

- A. Design mixes for each type of concrete specified may be prepared by an independent testing agency or by architectural precast manufacturing plant personnel at precast fabricator's option.
- B. Proportion mixes by either testing agency trial batch or field test data methods in accordance with ACI 211.1, using materials to be used on the project, to provide normal weight concrete with properties as follows:
  1. Compressive Strength: 5,000 psi when tested in accordance with ASTM C 39.
  2. Maximum water cement ratio 0.47 at point of placement.
  3. Add air-entrainment admixture to result in air content at point of placement complying with ACI 533 requirements.

## 2.4 FABRICATION

- A. General:
  1. Fabricate precast concrete units with manufacturing and testing procedures, quality control recommendations, and dimensional tolerances as specified in ACI 533, unless more stringent requirements are shown or specified.
  2. Fabricate units straight, smooth and true to size and shape, with exposed edges and corners precise and square, unless otherwise indicated.
  3. Benches must be made without any visible lift points.
- B. Reinforcement: Comply with CRSI "Manual of Standard Practice" and ACI 318 recommendations. Reinforce architectural precast concrete units to resist handling, transportation stresses, and to comply with specified performance criteria.
- C. Comply with ACI-533 requirements for measuring, mixing, transporting, and placing concrete.
- D. Consolidate concrete using equipment and procedures complying with ACI 533.
- E. Discard units that are warped, cracked, broken, spalled, stained, or otherwise defective unless repairs are approved by the Owner and meet specified requirements.
- F. Fabrication Tolerances: Fabricate to tolerances listed in ACI-533.

## 2.5 FINISHES

- A. Finish texture shall be Craftman's Etch. Color shall be Mission White. Sealer shall be Standard Gloss Sealer.

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1. Surface finish free from pockets, sand streaks, honeycomb, with uniform color and texture. Bug holes larger than 1/4 inch in diameter are not acceptable and must be filled.
- B. Seam lines to be stoned neatly to minimize appearance. Products with wide or uneven seam lines could be subject to rejection.

## 2.6 SEALERS

- A. All surfaces to be sealed with three coats of a water based gloss acrylic sealer, which has graffiti-resistant qualities. Must be non-sacrificial so most graffiti can be cleaned with lacquer thinner and not require resealing. Sealer shall be per fabricator's specifications.

## 2.7 SOURCE QUALITY CONTROL

- A. Inspect and test architectural precast concrete in accordance with ACI 533.
- B. Defective Work: Discard units that do not conform to requirements as shown or specified. Replace with units which meet requirements.

## **PART 3 - EXECUTION**

### 3.1 GENERAL

- A. Any precast site furnishings damaged during delivery, storage or installation shall not be accepted.
- B. 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.

### 3.2 PLACEMENT

- A. Pattern and placement shall be as shown on construction drawings.

### 3.4 CLEANING

- A. Remove debris from project site associated with precast product. Clean precast product of dirt, dust and debris and per fabricator's specifications.

### 3.5 PROTECTION

- A. During the installation of the precast, 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 03 48 14

Section 04 01 25  
CLEANING UNIT MASONRY**PART 1 - GENERAL**

## 1.1 GENERAL PROVISIONS

- A. The BIDDING REQUIREMENTS, CONTRACT FORMS, and CONTRACT CONDITIONS as listed in the Table of Contents, and applicable parts of Division 1 - GENERAL REQUIREMENTS, shall be included in and made a part of this Section.
- B. Examine all Drawings and all other Sections of the Specifications for requirements therein affecting the work of this Section.

## 1.2 SUMMARY

- A. Clean exterior masonry scheduled to receive lime wash coating, removing all dirt, grime, stains, encrustations and inappropriate coatings from existing masonry without damaging underlying materials and give masonry a clean, uniform appearance without blotches, streaks, runs, or any other kind of spotty appearance. Work includes, but is not limited to:
  - 1. Clean exterior brick by use of chemical cleaners and low-pressure water rinses.
  - 2. Remove efflorescence.
  - 3. Remove metallic stains from masonry by use of chemical stain removers, poultices and low-pressure water rinses.
  - 4. Protect pedestrian and vehicular traffic, adjacent materials and buildings, and building occupants and contents.
  - 5. Prepare and implement a program for the collection, neutralization and disposal of all effluent from cleaning operations in accordance with federal, state, and local authorities.
  - 6. Clear all drains prior to commencing work, and prevent solids from entering drains throughout the work.
- B. Cleaning Methods: The exact cleaning procedures shall be reviewed in the field, based on identifications in the Drawings, and the cleaning guidelines and materials specified herein. Review all cleaning procedures with the Architect and obtain acceptance prior to commencing the work. Cleaning methods selected shall take into account the total construction system of the building to be cleaned; this includes different masonry, stone, and mortar materials as well as non-masonry elements which may be affected by the Work.

## 1.3 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 09 97 25 – LIME COATINGS: Application of lime-based white wash.

#### 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. ACGIH (American Conference of Governmental Industrial Hygienists) - Threshold Limit Values for Chemical Substances and Physical Agents and Biological Exposure Indices
  2. USDI (United States Department of The Interior) - United States Secretary of the Interior Standards for Rehabilitation Guidelines for Rehabilitating Historic Buildings.

#### 1.5 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
- B. Pre-Installation Conference: At least two weeks prior to commencing the work of this Section, conduct a pre-installation conference at the Project site. Coordinate time of meeting to occur prior to installation of work under the related sections named below.
1. Required attendees: Owner, Architect, Contractor, Masonry cleaning Subcontractor's Project Superintendent, and representatives of other related trades as directed by the Architect or Contractor, and representatives for installers of related work.
  2. Agenda:
    - a. Review removal of existing decorative materials to prevent possible damage due to cleaning operations.
    - b. Protection of existing surfaces not scheduled for cleaning.
    - c. Review of staging and material storage locations.
    - d. Methods of Effluent Control.
    - e. Scheduling of cleaning operations and methods to be employed.
    - f. Coordination of work by other trades.
    - g. Installation procedures for ancillary equipment.
    - h. Establish weather and working temperature conditions to which Architect and Contractor must agree.
    - i. Emergency rain protection procedure.
    - j. Discuss process for manufacturer's inspection and acceptance of completed Work of this Section.

#### 1.6 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, chemical, functional, and environmental characteristics. Include manufacturer's test data demonstrating compliance with specifications, and shall include shelf life, mixing instructions, application instructions and storage requirements.
    - a. Provide Safety Data Sheets (SDS).
  2. Work Description: Prior to commencing the cleaning operations, the Contractor shall submit a written description of the entire methods and procedures proposed for cleaning the masonry including, but not limited to: method of application, dilution of application, temperature of application, length of time of surface contact, method of rinsing surface (temperature, pressure, and duration), repetition of procedure.
  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. Special Procedure Submittals:
    - a. Methods of Protection: Prior to commencing the cleaning operations, the Contractor shall submit a written description of proposed materials and methods of protection for preventing damage to any material not being cleaned, for review.
    - b. Methods of Effluent Control: Prior to commencing the cleaning operations, the Contractor shall submit a written description of proposed materials and methods for the containment, neutralization and disposal of all effluent.
    - c. Manufacturer's use instructions for filtration equipment and cleaning equipment.
  5. Qualification Submittals.
- B. Closeout Submittals: Submit the following under provisions of Section 01 78 00 - CLOSEOUT SUBMITTALS.
1. Record Documentation: Record cleaners and chemicals used for masonry cleaning work. Include description of cleaning process and methods used.

## 1.7 QUALITY ASSURANCE

- A. Restoration Specialist: Work must be performed by a firm with not less than 5 years successful experience in comparable cleaning projects.

## 1.8 MOCK-UPS

- A. Provide mock-up under provisions of Section 01 45 00 - QUALITY CONTROL.
- B. Provide test panel mock-ups for cleaning to demonstrate standards for work of this Section. Provide panels for each of the condition specified below, having minimum sizes as noted. Prepare the mockup panels in locations selected by the Architect.
1. Chemical cleaning of brick: 20 square feet.
  2. Removal of ferrous stains from masonry: 1 square foot.
- C. Mockup panels shall be prepared using the same workmen, methods and materials that shall be employed for the remainder of the Work At the discretion of the Architect, mockups shall be prepared in the presence of the Architect.

- D. Repeat using different cleaning methods for each type of surface. Prepare as many demonstration panels as required, until acceptable by Architect.
- 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.

#### 1.9 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 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, 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 ENVIRONMENTAL REQUIREMENTS

- A. Do not wash down or wet surfaces when temperature may drop below 40 degrees Fahrenheit within 24 hours.
- B. Do not perform work of this Section when winds are greater than 10 miles per hour.

#### 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. Provide 5 year warranty under provisions of Section 01 78 00 - CLOSEOUT SUBMITTALS. Warranty shall include certification that the proper cleaning methods and materials were employed for the surface cleaned and that no further damage has been done to the structure by the restoration methods employed



**PART 2 - PRODUCTS****2.1 MANUFACTURERS**

- A. Manufacturer: To establish a standard of quality, and function desired, specifications have been based on ProSoCo, Inc., Kansas City KS. Other manufacturers offering similar products which may be considered as equal, include the following, or equal:
1. Diedrich Chemicals, Restoration Technologies Inc., Oak Creek WI
  2. K & E Chemical Company Inc., Cleveland OH.

**2.2 CLEANING MATERIALS**

- A. General: All chemical materials shall be safe in use and shall comply with city, state, or federal environmental and safety regulations. All effluents shall be contained, neutralized and disposed of as recommended by the manufacturer in compliance with federal, state and local authorities having jurisdiction.
- B. Water for Cleaning: Clean, potable, non-staining and free of oils, acids, alkalis, salts and organic matter.
- C. Masonry Afterwash: Acidic afterwash to neutralize the alkaline cleaners - Sure Klean T929, ProSoCo, Inc., Kansas City, KS.
- D. Masonry Cleaner: The brick masonry cleaner shall be a commercially available chemical formulated specifically for the removal of general soil and stains from masonry surfaces, composed of hydrofluoric acid blended with other acids and combined with special wetting systems and inhibitors, and shall be "Restoration Cleaner" manufactured by ProSoCo, Inc., Kansas City, KS, "Heavy Duty Restoration Cleaner" manufactured by ProSoCo, Inc., Kansas City, KS, or approved equal.
- E. Biocide: 5% solution of Sodium hypochlorite in water.
- F. Iron Stain Remover: The stain remover shall be a commercially available chemical formulated specifically for the removal of iron stains from masonry surfaces, and shall be "Ferrous Stain Remover" manufactured by ProSoCo, Inc., Kansas City, KS, or approved equal.
- G. Clay Poultice: Inert mixture of atapulgitic clay, such as Fuller's Earth, available from ProSoCo, Inc., Kansas City, KS, or approved equal.
- H. Liquid-Strippable Masking Agent: Manufacturer's standard product for protecting glass, metal and polished stone surfaces from effects of masonry cleaners: "Sure Klean Acid Stop"; ProSoCo, Inc., Kansas City, KS, or equal as provided by cleaner manufacturer.

**2.3 CLEANING EQUIPMENT**

- A. Brushes: Natural or nylon fiber bristle only. Wire brushes shall not be used
- B. Hand Tools: Scrapers and application paddles shall be made of wood or plastic with rounded edges. Metallic tools shall not be used.

- C. Spray Equipment for Chemical Cleaners: Low-pressure tank or chemical pump with stainless steel, cone shaped spray tip.
- D. Spray Equipment for Water: Equipment capable of controlled spray application of water at pressures, volume, and temperature required, with not less than 15 degrees. fan shaped spray tip.

### **PART 3 - EXECUTION**

#### **3.1 EXAMINATION**

- A. Test all drains and other water removal systems to assure that drains and systems are functioning properly prior to performing any cleaning operations. Notify Architect immediately of any and all drains or systems that are found to be stopped or blocked. Contractor shall repair drains if so directed by the Architect. Do not begin work of this Section until the drains are in working order.

#### **3.2 PREPARATION**

- A. Protection of existing surfaces: Exercise reasonable care and precautions during the operation of work of this Section to protect existing non-masonry finishes against damage. Repair all existing materials which are damaged by Work of this Section, to match original profiles and finishes. Existing materials and finishes which cannot be repaired shall be removed and replaced with new work to match existing at no additional cost to the Owner.
  - 1. Provide protection from water damage to building, structure, or building contents as required.
    - a. Install temporary sealant and backer materials to all open joints to prevent intrusion of water into the interior of the structure from pressure spraying.
  - 2. Protect trees and plants around the building from contamination or damage.
  - 3. Provide protection for window glass during chemical cleaning of masonry, and during metallic stain removal of masonry.
  - 4. Protect the abutting finished surfaces from contact with chemical cleaners of type indicated by use of liquid strippable masking agent or polyethylene film and waterproof masking tape.
    - a. In particular, take special care protecting all decorative metal finishes, fixtures, hardware, plaques, statuary. Review site and identify with Owner those items which may removed for storage prior to masonry cleaning.
  - 5. Protect all masonry surfaces no receiving cleaning treatment with polyethylene covers or other approved means.
  - 6. Take particular care in when working near masonry showing severe decay. Protect existing materials from further damage.
- B. Protect existing drainage systems: Provide a method to prevent solids such as masonry residue from entering the drains or drain lines. Contractor shall be responsible for cleaning out drains and drain lines that become blocked or filled by sand or other solids because of work performed under this Contract.

- C. Protect Owner's staff and public: Take all necessary precautions to protect people, whether engaged in the work of this project or not, from all materials and operations of the masonry cleaning operation.
- D. Preparation of surfaces.
  - 1. Carefully remove surface debris, bird droppings, excess tar, and similar disfigurement by scraping or brushing methods prior to washing.
  - 2. Remove all dry powdery deposits by brushing with dry bristle brushes. Do not use wire brushes.
  - 3. Remove lichens and other biological growths by scraping with wood or plastic implements. Do not use metal scrapers for this operation.

### 3.3 CLEANING METHODS - GENERAL

- A. The cleaning specifications which follow only briefly describe the work, no attempt is made in this Section to specify the precise procedures of cleaning required on this project, or to describe how each cleaner will be applied. It is the responsibility of the Contractor to determine for itself the nature of the work required and to perform the restoration cleaning in an acceptable manner recommended by the cleaner manufacturer.
  - 1. Should the Contractor wish to modify any cleaning method specified, he shall resubmit his proposal in writing for acceptance by the Architect. The Architect will require the Contractor to complete test samples in locations selected by the Architect. Any such modifications or changes shall be at no additional cost to the Owner.
- B. No cleaning shall commence until Architect's acceptance of mock-ups obtained.

### 3.4 CLEANING - GENERAL REQUIREMENTS

- A. Cleaning shall commence at the top of the building progressively down the face of the building to the lowest grade level covering the entire area in one stretch before shifting to the next stretch unless otherwise approved. Each adjacent stretch shall be repeated in a continuous manner. The process shall be repeated until all dirt or other defacements are completely removed from the facades. The finished surface shall present a uniformly clean appearance.
- B. Inspect interior of building throughout each rinsing period. Report all interior leaks immediately to the Architect, and immediately clean up interior and repair all resulting damage to the full satisfaction of the Architect at no additional cost to the Owner.
- C. Cleaning shall include the removal of surface dirt, stains and discolorations of every intensity and nature encountered.
  - 1. Employ scrubbing methods, using natural fiber bristle brushes, for cleaning deeply embedded dirt from areas which prove hard to clean by other means.
- D. Finished work shall show no signs of stains, scratches, streaks or runs of discoloration from use of cleaners. Leave all exposed surfaces neat and clean. The appearance of the stone after cleaning and after adequate drying time shall be uniformly clean.

### 3.5 LOW PRESSURE WATER RINSING

- A. The cleaning method shall employ hosing and piping with appropriate nozzles to deliver a spray stream of water to the building surface via a hand held wand. Rinsing shall be accomplished with pressure pump and nozzle equipment which shall deliver no greater nozzle pressure than 300 PSI. In locations where stubborn stains and carbon deposits exist, re-rinsing shall be required until stone color is uniform.
- B. Sources of water shall be obtained prior to installation of any equipment, and shall be provided at no additional cost to the Owner. The water shall be filtered with a 5 micron particulate filter placed in line with the water supply. The filter shall be replaced as needed during the work.

### 3.6 BRICK MASONRY CLEANING METHOD

- A. Cleaning of brick masonry shall consist of application of chemical cleaners and pressurized cold water rinsing. Chemical cleaners shall be diluted with at least 3 parts water (to be verified or modified by the testing program).
- B. Cleaning shall consist of crust removal, dirt removal, paint removal and stain removal. Metallic stain removal shall be as specified above.
- C. The work shall proceed from the top of the wall downward. Work shall not be considered complete until the Architect has so notified the Contractor in writing.
- D. The Contractor shall protect pedestrian and vehicular traffic, and adjacent masonry, glass, paint, metals from overspray.
- E. Work shall proceed in sections without excessive dwell time. Pre-wet wall to be cleaned and the areas directly beneath with pressurized cold water. Apply dilute solution of chemical cleaner by brushing or spraying. Dwell time shall be in accordance with approved test procedures. Rinse all traces of chemical and residue with pressurized cold water. Repeat procedure if necessary. Rinse water pressure shall not exceed 300 (three hundred) pounds per square inch, and shall be sprayed through nozzles fitted with 15-20 degree wide nozzle tips. All pressure pumps shall be equipped with working pressure gauges.

### 3.7 EFFLORESCENCE REMOVAL METHOD

- A. Remove efflorescence from masonry by brushing with dry, soft, natural bristle brushes. Do not wet wall before brushing.
- B. Apply inert poultice composed of fuller's earth and potable water. Cover poultice with plastic membrane to retard drying.
- C. Allow poultice to dry thoroughly and scrape all remaining poultice material from masonry with wooden spatulas and discard. Rinse all traces of poultice residue with pressurized cold water. Repeat procedure if necessary. Rinse water pressure shall not exceed 300 (three hundred) pounds per square inch, and shall be sprayed through nozzles fitted with 15-20 degree wide nozzle tips. All pressure pumps shall be equipped with working pressure gauges.
  - 1. The water shall be filtered with a 5 micron particulate filter placed in line with the water supply. The filter shall be replaced as needed during the work.

- D. Repeat procedure if necessary to remove all traces of efflorescence.
- E. Efflorescence removal shall take place after general cleaning.

### 3.8 FERROUS STAIN REMOVAL

- A. Ferrous stains shall be removed from masonry in the following manner:
  - 1. Apply ferrous stain remover. Dwell time shall be in accordance with approved test procedures and manufacturer's written instructions. Prewet wall immediately before applying Ferrous Stain Remover.
  - 2. Rinse all traces of chemical and residue with pressurized cold water. Repeat procedure if necessary. Rinse water pressure shall not exceed 300 (three hundred) pounds per square inch, and shall be sprayed through nozzles fitted with 15-20 degree wide nozzle tips. All pressure pumps shall be equipped with working pressure gauges.
  - 3. Repeat procedure if necessary to remove all traces of ferrous stain.
  - 4. The water shall be filtered with a 5 micron particulate filter placed in line with the water supply. The filter shall be replaced as needed during the work.
- B. Ferrous stain removal shall take place immediately after cleaning of masonry.
- C. The work shall proceed from the top of the wall downward. Work shall not be considered complete until the Architect has so notified the Contractor in writing.
- D. The surfaces below the sections of masonry to be cleaned of ferrous stains shall be protected from run-off.
- E. The Contractor shall protect pedestrian and vehicular traffic, and adjacent masonry, glass, paint, metals from overspray.

End of Section

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Section 05 40 00  
COLD-FORMED METAL FRAMING**PART 1 - GENERAL**

## 1.1 GENERAL PROVISIONS

- A. The BIDDING REQUIREMENTS, CONTRACT FORMS, and CONTRACT CONDITIONS as listed in the Table of Contents, and applicable parts of Division 1 - GENERAL REQUIREMENTS, shall be included in and made a part of this Section.
- B. Examine all Drawings and all other Sections of the Specifications for requirements therein affecting the work of this Section.

## 1.2 SUMMARY

- A. Design, engineer, furnish and install metal framing and support system for the following applications:
  - 1. Framing for exterior soffits.
  - 2. Framing for filled-in exterior wall patches at removed unit ventilators.
  - 3. Include all connections, bracing, bridging and accessories.

## 1.3 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 06 10 00 - ROUGH CARPENTRY: Wood blocking and curbing.
- C. Section 06 16 00 - SHEATHING: Exterior wall sheathing.

## 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. 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.

## 1.5 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.

## 1.6 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. Qualification Submittals:

## 1.7 QUALITY ASSURANCE

### A. General:

1. Calculate structural properties of framing members in accordance with AWCI, MF/SLA and AWS D 1.3 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.

## 1.8 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.

## 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.
  - 1. Deflection limits
    - a. Exterior Wall and Soffit Framing: Horizontal deflection of 1/360 of the wall height except as specified otherwise herein below, or as indicated otherwise on Structural Drawings.
- B. Design Loading: Refer to Structural Drawings.
  - 1. Design Wind Speed: 137 miles per hour (three second gust).

- 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 Rhode Island State Building Code.

## 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 G60 (Z180) 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: G60 (Z180) 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, G60 (Z180) 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. 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).
- C. Joists: Manufacturer's standard C-shaped steel joists, of web depths indicated, complying with ASTM C955. Formed of ASTM A653/653M steel, G60 (Z180) galvanized, channel shaped with lipped flanges, solid web, size as shown on Drawings, thickness and grade as required by structural design calculations.

## 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. 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 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.

### 3.3 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 GENERAL PROVISIONS

- A. The BIDDING REQUIREMENTS, CONTRACT FORMS, and CONTRACT CONDITIONS as listed in the Table of Contents, and applicable parts of Division 1 - GENERAL REQUIREMENTS, shall be included in and made a part of this Section.
- B. Examine all Drawings and all other Sections of the Specifications for requirements therein affecting the work of this Section.

## 1.2 SUMMARY

- A. Furnish and install:
  - 1. Custom fabricated exterior metal panel systems; all components shop finished. Panels types include custom perforation patterns for Graphic Images.
    - a. Freestanding shop finished aluminum panel system with galvanized steel structural supports, coordinated with concrete foundations provided by Section 03 30 00.
    - b. Shop finished aluminum panel system with anodized aluminum stand-offs mounted over exterior walls.
  - 2. Exterior railings (galvanized and with high performance shop-applied finish).
  - 3. Modifications of existing stair railings at Stair B.
  - 4. Stainless steel plant holder shelving with supports at exterior windows in Science Classroom.
  - 5. Supplemental framing and resilient channels at exterior wall patches for removed unit ventilators.
  - 6. Miscellaneous metal fabrications supporting brackets for folding panel operable partitions and connection to structural steel framing.
- 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.
  - 2. Loose steel lintels at door, window, ductwork and similar openings in interior masonry partitions; installed under Section 04 20 00 - UNIT MASONRY.
- C. Perform all drilling and cutting in miscellaneous metal items required for the attachment of other items.
- D. Perform all shop-painting for all surfaces of exposed to view galvanized and non-galvanized metals, and post-erection touch-up of shop prime coat, using the same material as shop-prime coating.
- E. Perform application of liquid zinc touch-up to all welds of galvanized steel items furnished hereunder.

### 1.3 RELATED REQUIREMENTS

- A. Section 01 74 19 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL: Procedural and administrative requirements for construction and demolition recycling.
- B. Section 06 10 00 - ROUGH CARPENTRY:
  - 1. Wood framing at exterior wall patches at removed unit ventilators.
  - 2. Wood blocking.
- C. Section 09 22 16 - NON-STRUCTURAL METAL FRAMING: Non-loadbearing metal framing systems for gypsum board construction.
- D. Section 09 91 00 - PAINTING: Applied finish coatings other than those specified herein.

### 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. 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 A36 - Standard Specification for Carbon Structural Steel.
  - 4. ASTM A53 – Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless.
  - 5. ASTM A108 - Standard Specification for Steel Bar, Carbon and Alloy, Cold Finished.
  - 6. ASTM A123 - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
  - 7. ASTM A153 – Standard Specification for Zinc-Coating (Hot-Dip) on Iron and Steel Hardware.
  - 8. ASTM A240/A240M – Standard Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications.
  - 9. ASTM A283 - Standard Specification for Low and Intermediate Tensile Strength Carbon Steel Plates.
  - 10. ASTM A307 - Standard Specification for Carbon Steel Bolts, Studs, and Threaded Rod 60 000 PSI Tensile Strength.
  - 11. ASTM A312/A312M - Standard Specification for Seamless, Welded, and Heavily Cold Worked Austenitic Stainless Steel Pipes.
  - 12. ASTM A361 (Withdrawn Standard) - Specification for Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process for Roofing and Siding.

13. ASTM A380 – Standard Practice for Cleaning, Descaling and Passivation of Stainless Steel Parts, Equipment and Systems.
14. ASTM A385 – Standard Practice for Providing High-Quality Zinc Coatings (Hot-Dip).
15. ASTM A386 (Withdrawn Standard) – Specification for Zinc Coating (Hot-Dip) on Assembled Steel Products.
16. ASTM A446 - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) By The Hot-Dip Process, Structural (Physical) Quality.
17. ASTM A480/A480M – Standard Specification for General Requirements for Flat-Rolled Stainless and Heat-Resisting Steel Plate, Sheet, and Strip.
18. ASTM A501 - Standard Specification for Hot-Formed Welded and Seamless Carbon Steel Structural Tubing.
19. ASTM A554 – Standard Specification for Welded Stainless Steel Mechanical Tubing.
20. ASTM A575 - Standard Specification for Steel Bars, Carbon, Merchant Quality, M-Grades.
21. ASTM A576 - Standard Specification for Steel Bars, Carbon, Hot-Wrought, Special Quality.
22. ASTM A653 - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
23. ASTM A743/A743M – Standard Specification for Castings, Iron-Chromium, Iron-Chromium-Nickel, Corrosion Resistant, for General Application.
24. ASTM A780 – Standard Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings.
25. ASTM A947M – Standard Specification for Textured Stainless Steel Sheet [Metric].
26. ASTM A967 – Standard Specification for Chemical Passivation Treatments for Stainless Steel Parts.
27. ASTM A999 – Standard Specification for General Requirements for Alloy and Stainless Steel Pipe.
28. 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.
29. ASTM A1016/A1016M – Standard Specification for General Requirements for Ferritic Alloy Steel, Austenitic Alloy Steel, and Stainless Steel Tubes.
30. ASTM B117 - Standard Practice for Operating Salt Spray (Fog) Apparatus.
31. ASTM B209 – Standard Specification for Aluminum and Aluminum Alloy Sheet and Plate.
32. ASTM B221 – Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.
33. ASTM B506 – Standard Specification for Copper-Clad Stainless Steel Sheet and Strip for Building Construction.
34. ASTM F593 - Standard Specification for Stainless Steel Bolts, Hex Cap Screws, and Studs.
35. ASTM F594 – Standard Specification for Stainless Steel Nuts.

36. ASTM F3125 - 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.
37. AGAI - Inspection Manual for Hot-Dipped Galvanized Products.
38. AISC - Code of Standard Practice for Steel Buildings and Bridges.
39. AISC - Specifications for the Design, Fabrication and Erection of Structural Steel for Buildings.
40. AISI. referenced standards.
41. AWS - Standard Code for Arc and Gas Welding in Building Construction.
42. FS QQ-A-250d - Aluminum and Aluminum Alloy, Plate and Sheet.
43. IPA (Industrial Perforators Association) - Voluntary Standard Tolerances.
44. MIL-P-21035B - Paint High Zinc Dust Content, Galvanizing Repair (Metric) (superseding DOD-P-21035A)
45. NAAMM, applicable publications.
46. SSPC referenced standards.

## 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 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/ICBO 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. Include large scale details of items of all metal fabrications to be furnished hereunder, showing proposed methods of anchorage to surrounding structure and conditions.
      - 1) Shop drawings for metal panels to include all prototypical conditions, anchors, head, jamb sill and corner conditions, transitions in plane, top and bottom of metal panels, supporting steel, and aluminum clips
    - 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.
      - 1) Indicate shop built components, and field-built components.
      - 2) Indicate and detail all field installation connections.
      - 3) Indicate weld types and length.
      - 4) Indicate blocking locations.
  3. Selection samples:
    - a. Sample card indicating Manufacturer's full range of colors of shop applied finishes available for selection by Architect.

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 railing fabrication and workmanship.
  5. 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. Sample of perforated panel showing partial image, minimum size 24 by 24 inches, having specified finish and color.
    - c. Sample of
  6. 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".
  7. 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 2018 edition, *RHODE ISLAND BUILDING CODE*, Regulation RISBC-1 have been satisfied.
    - a. Work scope requiring loading and stress calculations includes, but is not limited to the following:
      - 1) Metal panel systems and supporting structure and stand-offs.
      - 2) Exterior railings.
      - 3) Stainless steel plant holder shelving with supports.
      - 4) Supplemental framing and resilient channels at exterior wall patches for removed unit ventilators.
- B. Submit prior to request for Certificate of Occupancy, to both Architect and local Building Official having jurisdiction, under provisions of Section 01 78 00 - CLOSEOUT SUBMITTALS, the following
1. All certifications, reports and programs required by 2018 edition, *RHODE ISLAND BUILDING CODE*, Regulation RISBC-1 for work engineered by Filed subcontractor's Professional Engineer under the requirements of this Section.

## 1.6 QUALIFICATIONS

- 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 edition, *RHODE ISLAND BUILDING CODE*, Regulation RISBC-1.

## 1.7 QUALITY ASSURANCE

- A. Electronic imaging: Electronic files for perforated panel images will be provided by the Architect to the fabricator. Fabricator is responsible for field verifying dimensions and references points. The density of the perforation patterns shall be determined by the perforated panel fabricator and approved by the Architect and Owner, prior to fabrication.
1. General Contractor is responsible for the coordination of electronic files furnished by the Architect. File compatibility with fabricator's software is the sole responsibility of the General Contractor.
- B. Galvanizer's tagging: The galvanizer shall mark all lots of material with a clearly visible stamp or tag indicating the name of the galvanizer, the weight of the zinc coating, and the applicable ASTM Specification Numbers.
- C. Exposed Fabricated Steel Elements which are exposed to view fabrications shall be fabricated and finished as Architectural Exposed Structural Steel (AESS) Level 3, per AISC Code of Practice, Latest Edition, meeting tolerances and fabrication requirements as specified herein.
- D. 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. Installer Qualifications: A qualified installer who participates in the AISC Quality Certification Program and is designated an AISC-Certified Erector, Category CSE is preferred, but not required.
  3. 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.
  4. Shop-Painting Applicators: Qualified according to AISC's Sophisticated Paint Endorsement P1 or SSPC-QP 3, "Standard Procedure for Evaluating Qualifications of Shop Painting Applicators."
  5. 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 edition, *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.

## 1.8 MOCK-UP

- A. Provide elements for mock-up field panel in accordance with Section 01 45 00 – QUALITY CONTROL at exterior location where directed by Architect. Mock-up will demonstrate quality of work, construction methods, relationship to other work.
1. Minimum size panel: 48 by 48 inches, and include both perforated and solid metal panels.

## 1.9 COORDINATION

- A. Coordinate work of this Filed-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. 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.

## 1.10 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.

## 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. Fabricator'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.)
  - 4. Anodized aluminum standoffs: Class 1 anodized finish warranty, 5 years assigned specifically to project, covering cracking, crazing, flaking, blistering, chalk resistance and color change.

- a. Color retention (ASTM D2244): 5 delta E.
  - b. Chalk resistance (ASTM D4214): greater than or equal to #8 rating.
5. Aluminum Panels (perforated and solid): AAMA 2605 polyvinylidene fluoride enamel finish 10 year coating warranty assigned specifically to project, covering film integrity (including chipping, crazing, pitting, and delamination), chalk resistance and color fading, color change.
- a. Deterioration of finish to an extent visible to the unaided eye, at a distance of 10 feet.
  - b. Film integrity: 10 years.
  - c. Color retention (ASTM D2244): 5 delta E.
  - d. Chalk resistance (ASTM D4214): greater than or equal to #8 rating.
  - e. Erosion Resistance (10 years): 10 percent or less.

## **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 B221, alloy 6063-T6 or alloy 6463-T52.
    - b. Extruded pipe and tube: ASTM B429, alloy 6063-T6.
    - c. Drawn Seamless tube: ASTM B483, alloy 6063-T832.
    - d. Plate and sheet: ASTM B209, alloy 6063--T6 or Alloy 3003-H14
  2. Carbon Steel:
    - a. Steel shapes, plates and bars: ASTM A36.
    - b. Steel pipe: ASTM A53, grade A, seamless pipe, black finish unless otherwise noted.
    - c. Structural steel tubing, square and rectangular shapes: ASTM A500, Grade B.
    - d. Steel tubular shapes: ASTM A501.
    - e. Steel plates to be bent or cold-formed: ASTM A283, grade C.
    - f. Steel bars and bar-size shapes: ASTM A36.
    - g. Cold-finished steel bars: ASTM A108.
    - h. Galvanized carbon steel sheets: ASTM A526, with G90 zinc coating in accordance with ASTM A525.
  3. Stainless Steel (Type 304):
    - a. Stainless steel pipe: ASTM A312/A312M, Grade TP304, and in compliance with ASTM A999.
    - b. Stainless steel tubing: ASTM A554, Grade MT304, and in compliance with ASTM A1016.
    - c. Stainless steel plate, sheet and strip: ASTM A240/A240M, Type 304,



- 1) Sheet having thickness less than 0.187 inch (4.67mm) thick, provide panels Stretcher Leveled Standard of Flatness in accordance with ASTM A480/A480M Table A2.8.
  - 2) Sulfur content not to exceed 0.005%.
  - 3) Sulfur content not to exceed 0.002% for stainless scheduled to receive #8 polished finish.
  - 4) Provide certificates demonstrating compliance with specified requirements.
- 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 PERFORMANCE REQUIREMENTS – METAL PANEL SYSTEMS AND SUPPORTS

- A. 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 the Building Code.
- B. Performance: The corrugated panels, including required supports, shall meet all regulatory requirements for wind loading:
1. Wind loading: Entrance/storefront system shall conform to the International Building Code, 2018 edition, as published by the International Code Council, Inc. (I.C.C.), as revised by RISBC-1 Rhode Island Building Code:
    - a. Design Wind Speed (v): 137 miles per hour (3 second gust), both positive (acting inward) and negative (acting outward) wind pressure loading.
    - b. Occupancy Risk Factor: III.
    - c. Exposure: "B".
    - d. Wind Loads in accordance with ASCE-7-10.
    - e. Panels shall have a deflection limit of  $l/180$  for positive loading.

- f. 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.
- C. Fire Resistance Ratings: Determined by testing identical products and assemblies according to UL 263 and ASTM E 84 by a testing agency acceptable to authorities having jurisdiction.
- D. Design wall system to withstand thermal expansion and contraction movements of component materials, without buckling, failure of any joint seals, undue stress on members or fasteners, or other detrimental effects.

### 2.3 CORRUGATED ARCHITECTURAL WALL PANELS

- A. Basis of Design (Specified Manufacturer): To establish a standard of quality, design and function desired, Drawings and specifications have been based on Hendrick Architectural, Carbondale, PA., Product: "BWC374."
  1. Acceptable Manufacturers: Subject to compliance with the requirements specified herein (including matching of basis of design product profiles), manufacturers offering products which may be considered for incorporation in the work include the following, or approved equal:
    - a. Hendrick Architectural, Carbondale, PA. (Basis of Design).
    - b. Atas International, Inc., Allentown PA.
    - c. Centria Architectural Systems, Moon Township, PA.
    - d. IMSA Building Products, Inc., Los Angeles CA.
    - e. Metal Sales Manufacturing Corporation (MSMC), Rancho Cucamonga CA.
    - f. Morin (a Kingspan Group Company), Bristol, CT.
- B. Description: Exposed-fasteners, smooth texture non-perforated metal wall panels, of manufacturer's standard width (nominally 34 to 38 inches), 7/8 inch height, and formed with alternating symmetrical curved ribs spaced at nominally 2.67 inches on center across width of panel.
- C. Panel system:
  1. Panel coverage: 37-1/4 inches.
  2. Rib height: 7/8 inches.
  3. Flame-Spread Index: 25 Class A or less.
  4. Material: Alloy 3003-H14 aluminum, 0.050 inch thick.
  5. Fabricate to sizes and arrangements shown.

### 2.4 PERFORATED "IMAGE" ARCHITECTURAL METALS

- A. Basis of Design (Specified Manufacturer): To establish a standard of quality, design and function desired, Drawings and specifications have been based on Hendrick Architectural, Carbondale, PA., product "Image-Clad".
  1. Acceptable Manufacturers: Subject to compliance with the requirements specified herein (including matching of basis of design product profiles), manufacturers offering products which may be considered for incorporation in the work include the following, or approved equal:

- a. Hendrick Architectural, Carbondale, PA. (Basis of Design).
  - b. IMark, Edmonton, Alberta, Canada.
  - c. Poma Architectural Metals, Palm City, FL.
  - d. Zahner, Kansas City, MO.
- B. Material:
1. Aluminum: ASTM B209, type and strength as recommended by fabricator.
  2. Thickness: 3/16 inch, thick 5052-H32
  3. Shapes: As indicated on Drawings.
  4. Perforations: Laser cut image patterns, as indicated on Drawings.
  5. Panel Margins: 1.25 inches minimum margins all 4 sides
  6. Fasteners: Per design details and fastener schedule.

## 2.5 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. Wall stand-offs for metal panel system:
- C. Steel Bolts, Nuts and Washers: ASTM A307, galvanized to ASTM A153 for galvanized components.
- D. Stainless-Steel Bolts and Nuts: Regular hexagon-head annealed stainless-steel type 304 bolts, nuts and, where indicated, flat washers; ASTM F593 for bolts and ASTM F594 for nuts, Alloy Group 1.
- E. Anchor Bolts: ASTM F1554, Grade 36.
1. Provide hot-dip or mechanically deposited, zinc-coated anchor bolts where item being fastened is indicated to be galvanized.
- F. Eyebolts: ASTM A489.
- G. Machine Screws: ASME B18.6.3.
- H. Lag Bolts: ASME B18.2.1.
- I. Wood Screws: Flat head, ASME B18.6.1.
- J. Plain Washers: Round, ASME B18.22.1.
- K. Lock Washers: Helical, spring type, ASME B18.21.1

## 2.6 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 C881.
1. Minimum performance properties (as cured at 70 degrees F. and 50 percent relative humidity):
    - a. Minimum Compressive Strength, tested per ASTM D695:
      - 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 D732 at 14 days: 6200 psi (43 MPa)
    - c. Minimum Flexural Strength tested per ASTM D790 at 14 days: 10700 psi (74 MPa).
    - d. Minimum Bond Strength tested per ASTM C882 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 D570: 24 hour 0.27%
    - f. Minimum Tensile properties tested per ASTM D638: 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 C1107 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., East Rutherford, NJ, 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.

## 2.7 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.

## 2.8 FABRICATION - ALUMINUM

- A. Fabricate aluminum members in accordance with the approved Shop Drawings. Where practical, fabricate and assemble in the shop. Comply with NAAMM publication AMP 555 – *Code of Standard Practice for The Architectural Metal Industry*, as requirements specified herein.
- B. Shop fabricate aluminum assemblies to maximum extent possible. Railings and guardrails shall be shop fabricated up to 20'-0" lengths.
  - 1. Where milling is indicated on approved shop drawings, machine the contact surfaces true to obtain full and complete contact.
  - 2. Remove burrs and roughness from exposed cut edges of fabricated elements.
- C. Reinforce joints and splices with tight fitting internal sleeve connectors.
- D. Continuously weld components all around in accordance with AWS standards to fuse materials without undercut, overlap or distortion of rail material.
  - 1. Grind exposed welds smooth and flush, matching and blending adjacent contours and surfaces without weakening base metal.
  - 2. Discoloration of anodized aluminum assemblies due to welding is not acceptable.
- E. Fabricate joints which will be exposed to weather so as to exclude water, or provide weeps where water may accumulate.
- F. Form bends to uniform radius, free of buckles, twists, cracks, grain separation or distortion of cross section or surface.
- G. Where aluminum will contact dissimilar metals, protect against galvanic action.
  - 1. Where aluminum members are in contact with porous materials, masonry or concrete, apply to the contact surfaces of the aluminum members a heavy coat of alkali resistant bituminous paint.

2. Where aluminum members are embedded in concrete containing admixtures which are corrosive to aluminum, or in concrete subjected to highly corrosive environments, prime the aluminum with one coat of paint.

## 2.9 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.

## 2.10 FABRICATION - RAILINGS (HANDRAILS/GUARDRAILS)

- A. Refer to the Drawings for location and details of steel railings to be furnished and installed hereunder.
  1. Verify heights shown in Drawings comply with referenced codes and regulations.
- B. Railing performance requirements; conform to all requirements of those codes and regulations referenced under Section 01 41 00 - REGULATORY REQUIREMENTS.
  1. Design, fabricate and install all railings in a manner which will ensure the railings will be capable of withstanding loads as follows, required by the International Building Code, Section 1607.
    - 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.
          - 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 (.093m<sup>2</sup>), including openings and space between rails.
  2. Design, fabricate and install all railings in a manner which will ensure the railings will be capable of withstanding loads required under the State Building Code.
- C. Fabrication, Railings: Fabricate to comply with requirements indicated for design, dimensions, details, finish, and member sizes, including wall thickness of tube, post spacings, and anchorage, but not less than that needed to withstand indicated loads and deflection criteria. Indicate on shop drawings sizes of all members, gages and configurations of handrails, and guardrails.
1. Fabricate railings with welded connections. Cope components at connections to provide close fit, or use fittings designed for this purpose. Weld all around at connections, including at fittings.
    - a. Finish welds to comply with NOMMA's "Voluntary Joint Finish Standards" for Type 1 welds: no evidence of a welded joint.
  2. Form changes in direction of railings as indicated on drawings, with radius bends of radius indicated. Form simple and compound curves by bending members in jigs to produce uniform curvature for each repetitive configuration required; maintain cross section of member throughout entire bend without buckling, twisting, cracking, or otherwise deforming exposed surfaces of components.
  3. Close exposed ends of railing members with prefabricated end fittings.
  4. Provide wall returns at ends of wall-mounted handrails unless otherwise indicated. Close ends of returns unless clearance between end of rail and wall is 1/4 inch (6 mm) or less.
  5. Brackets, Flanges, Fittings, and Anchors: Provide wall brackets, end closures, flanges, miscellaneous fittings, and anchors for interconnecting components and for attaching to other work. Furnish inserts and other anchorage devices for connecting to concrete or masonry work.
    - a. Connect posts to stair framing by direct welding unless otherwise indicated.

## 2.11 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: Provide coating for iron and steel fabrications applied by the hot-dip process "Deltagalv" by Duncan Galvanizing, or approved equal meeting all requirements of this specification. 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.
  1. Wherever possible, perform galvanizing after assembly of items.



2. Galvanized items shall be straightened to remove all warpage and distortion caused by the galvanization process.
3. 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.
4. Touch-up of galvanized surfaces with aerosol spray, silver paint, bright paint, brite paint, or aluminum paints is not acceptable.

## 2.12 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 shop applied coating (includes structural supports for freestanding metal panel systems):
  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.
- D. Aluminum stand-offs and supports: Color anodic coatings conforming to AAMA 611-12, Class I, and performance criteria required in AAMA 612-02.
1. Exposed Aluminum Surfaces: (AA designation M12C22A44) Architectural Class I anodic coating, 18 microns (0.7 mil thickness or greater), prepared with a mechanical M12, chemical C22 pre-treatment, and A44 electro-deposited finish. Color as specified and matching Architect's control sample.
    - a. Color: Black.
- E. Aluminum Panels (perforated and solid panels): Shop-applied, fully oven cured, multi-coat Polyvinylidene Fluoride (PVDF) resin based, high performance thermoplastic organic coating applied to all exposed surfaces, including all exposed

screws, fastenings. Conform to AAMA 2605, NAAMM - Metal Finishes Manual, and the following:

1. Resin base of 70 percent PVDF by weight, Arkema, Inc., product "Kynar 500" or Solvay Solexis, Inc. product "Hylar 5000".
  2. Finish Coating shall be manufactured as one of the following products:
    - a. Akzo Nobel; product: "Trinar Ultra TEC."
    - b. PPG. Industries Ohio Inc.; product "Duranar XL."
    - c. Valspar Corp., product: "Fluoropon Classic."
  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. Primer: Corrosion resistant, epoxy or urethane based primer compatible with finish coating, averaging 0.2 to 0.3 mils dry film thickness.
  5. Finish Coat (Color Coat): Polyvinylidene fluoride enamel averaging 1.0 to 1.2 mils dry film thickness.
  6. Top Coat: Polyvinylidene fluoride enamel clear top coat averaging 0.4 to 0.6 mils dry film thickness
  7. Total system dry film thickness: 1.6 to 2.2 mils.
  8. Custom Color: Match Sherwin Williams color SW 6682 "June Day".
- 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, 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, and leave in perfect condition. Grind all exposed to view welds smooth to the touch.
- B. Steel stairs: 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.
- C. 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.
  - D. Miscellaneous framing and supports: Install framing and supports 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 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. 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.
  - 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 A 325 bolts.
- 3.4 TOUCH-UP
- A. Touch-up all welds, burned areas, scratches, abrasions, on galvanized metals, using specified liquid zinc coating.
  - B. 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.

End of Section

Section 06 10 00  
ROUGH CARPENTRY**PART 1 - GENERAL**

## 1.1 GENERAL PROVISIONS

- A. The BIDDING REQUIREMENTS, CONTRACT FORMS, and CONTRACT CONDITIONS as listed in the Table of Contents, and applicable parts of Division 1 - GENERAL REQUIREMENTS, shall be included in and made a part of this Section.
- B. Examine all Drawings and all other Sections of the Specifications for requirements therein affecting the work of this Section.

## 1.2 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. 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
  - 3. Rough installation hardware, including bolts, screws, spikes, nails, clips, and connection assemblies, as needed for installation of the rough carpentry work.
  - 4. Concealed anchorage devices for handicap handrails in toilet rooms: Section 10 28 13 - TOILET ACCESSORIES and all Owner Furnished and Installed toilet accessories.
- C. 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.
- D. 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.

### 1.3 RELATED REQUIREMENTS

- A. Section 01 45 00 – QUALITY CONTROL: 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 for construction and demolition recycling.
- D. Section 06 20 00 - FINISH CARPENTRY: Wood interior and exterior trim.
- E. Section 08 11 13 - HOLLOW METAL DOORS AND FRAMES.
- F. Section 09 91 00 - PAINTING: Applied primer and finish coatings to exposed to view rough carpentry work.
- G. Division 26 - ELECTRICAL: Providing and mounting electrical panels and equipment.

### 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. 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. AWWA Standards and references for preservative treated wood including Standards UC1, UC2, UC3A, UC3B, UC4A, and P5
  - 5. AWWA Standard UCFA – Fire Protection Required by Codes Above Ground Interior Construction.
  - 6. AWWA Standard UCFB – Fire Protection Required by Codes Above Ground Exterior Construction.
  - 7. AWWA M4 – Care Of Preservative Treated Wood Products.
  - 8. NER-643: ACQ Preserve® and ACQ Preserve Plus® Wood Preservative Treatment, ICBO Evaluation Service.
  - 9. SDI 122 - Installation and Troubleshooting Guide for Standard Steel Doors and Frames.
  - 10. SPIB Grading Rules, current edition.
  - 11. UL - Building Materials Directory.
  - 12. US. Department of Commerce Voluntary Product Standard PS1 for Construction and Industrial Plywood.
  - 13. US. Department of Commerce Voluntary Product Standard PS2 for Wood-Based Structural-Use Panels.

14. US. Department of Commerce Voluntary Product Standard PS-20 - American Softwood Lumber Standard.
15. U.S. Department of Commerce Simplified Practice Recommendation R-16, for sizes and use classifications of lumber.
16. 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.

#### 1.5 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.

#### 1.6 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.
  - a. 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.
  - b. 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.

## 1.7 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".

## 1.8 MOCK-UP

- A. Provide mock-up elements for field panel in accordance with Section 01 45 00 – QUALITY CONTROL at exterior location where directed by Architect. Mock-up will demonstrate quality of work, construction methods, relationship to other work.

## 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. 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.



- B. Furring: Nominal 1 by 3 inches or 1 by 4 inches Douglas Fir, Eastern Spruce, Eastern Hemlock, or Southern Pine, surfaced dried construction grade.
- C. 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. Behind gypsum board walls, sheathing type blocking where indicated: Square edge APA graded CDX EXT, touch-sanded, 5/8 inch thick, except as otherwise indicated on the Drawings
  - 6. 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.
  - 7. For unspecified interior concealed from view locations: APA graded C-D PLUGGED INT, Group 2 species, thickness as indicated on the Drawings.
  - 8. 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: "Yellowood."
      - 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 AWWA 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 – 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.

### 3.4 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

Section 06 16 00  
SHEATHING**PART 1 - GENERAL**

## 1.1 GENERAL PROVISIONS

- A. The BIDDING REQUIREMENTS, CONTRACT FORMS, and CONTRACT CONDITIONS as listed in the Table of Contents, and applicable parts of Division 1 - GENERAL REQUIREMENTS, shall be included in and made a part of this Section.
- B. Examine all Drawings and all other Sections of the Specifications for requirements therein affecting the work of this Section.

## 1.2 SUMMARY

- A. Furnish and install exterior sheathing board:
  - 1. At patching of removed unit ventilators.
  - 2. At new soffits.

## 1.3 RELATED REQUIREMENTS

- A. Section 01 45 00 – QUALITY CONTROL: 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 for construction and demolition recycling.
- D. Division 23 - HEATING, VENTILATING AND AIR CONDITIONING: Supply, and return air registers.

## 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 C646 - Steel Drill Screws for the Application of Gypsum Sheet Material to Light Gage Steel Studs.
  - 2. ASTM C1177 – Standard Specification for Glass Mat Gypsum Substrate for Use as Sheathing.
  - 3. GA 201 - Gypsum Board for Walls and Ceilings.
  - 4. All applicable federal, state and municipal codes, laws and regulations for fire rated assemblies.

## 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. Shop drawings: Details of any special conditions associated with fireproofing.

## 1.6 QUALITY ASSURANCE

- A. Applicator, with a minimum of 3 years documented experience demonstrating previously successful work of the type specified herein.

## 1.7 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.

## 1.8 DELIVER, STORAGE AND HANDLING

- A. Deliver materials in original packages, containers or bundles bearing brand name and identification of manufacturer or supplier.
- B. 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. Neatly stack board materials flat to prevent sagging.
- C. Handle board materials so to prevent damage to edges, ends and surfaces.

## 1.9 ENVIRONMENTAL 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.

## 1.10 SEQUENCING AND SCHEDULING

- A. 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.
- 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.

## 1.11 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. Sheathing manufacturer's 6 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: 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".
  2. Georgia Pacific Corporation, Gypsum Division, Atlanta GA., product "DensGlass Gold".
  3. National Gypsum Company, Gold Bond Products Division, Charlotte NC. (Gold Bond), product "e<sup>2</sup>XP Sheathing".

**2.2 SHEATHING BOARD**

- A. Recycled content of sheathing: Use maximum available percentage of recycled material. Sheathing products incorporated into the work shall contain not less than 10 percent recycled content.
- B. Sheathing Board: 1/2 inch or 5/8 inch thick gypsum sheathing board (thickness to match existing sheathing), complying with ASTM C 1177 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 C 473	80 pounds
Humidity Deflection, (inches):	ASTM C 473	0.25 inch, maximum
Linear Expansion with Change Moisture (in/in % RH):	ASTM C 518	6.25 x 10 <sup>-6</sup> , maximum
Thermal resistance "R" (in/ft <sup>2</sup> °F/Btu):	ASTM C 518	0.40, minimum
Weight (per 1,000 sq ft):	ASTM C 1177	1,900 pounds minimum
Bending Radius	ASTM C 1177	6 feet, minimum
Mold growth:	ASTM D 3273	Score 10 with no mold detected
Racking Strength, lbs/ft, dry (ultimate):	ASTM E 72	>540 pounds per foot
Surface burning characteristics:	ASTM E 84	Flame spread: 10, maximum
Permeance (ng/Pa•s•m <sup>2</sup> ):	ASTM E 96 (dry cup method)	23 perms, maximum
Combustibility:	ASTM E 136	Noncombustible

Coefficient of Thermal Expansion (in/in/°F):     ASTM E 228 modified     8.5 x 10<sup>-6</sup>, maximum

### 2.3 ACCESSORIES

- A. Fasteners: Type S-12 fine thread rust resistant 1 inch long self-drilling screws, for applying single layer sheathing board to light gage metal framing.

## 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.
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.
- C. Beginning of installation means acceptance of existing substrate and site conditions.

### 3.2 INSTALLATION SHEATHING

- A. Install sheathing in strict compliance with manufacturer's recommended installation instructions and as specified herein, 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. 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.
  2. Drive fasteners tight and flush with surface of sheathing, do not countersink.
  3. Locate fasteners minimum 1/2 inch from edges and ends of sheathing panels
  4. Drive fasteners tight and flush with surface of sheathing, do not countersink.

### 3.3 CLEANING

- A. Daily clean work areas by sweeping and disposing of debris and scraps.

End of Section

Section 06 20 00  
FINISH CARPENTRY

**PART 1 - GENERAL**

## 1.1 GENERAL PROVISIONS

- A. The BIDDING REQUIREMENTS, CONTRACT FORMS, and CONTRACT CONDITIONS as listed in the Table of Contents, and applicable parts of Division 1 - GENERAL REQUIREMENTS, shall be included in and made a part of this Section.
- B. Examine all Drawings and all other Sections of the Specifications for requirements therein affecting the work of this Section.

## 1.2 SUMMARY

- A. Furnish and install:
  - 1. Hardwood window stools and aprons.
- B. No attempt is made in this Section to list all elements of finish 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.

## 1.3 RELATED REQUIREMENTS

- A. Section 01 74 19 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL: Procedural and administrative requirements for construction and demolition recycling.
- B. Section 06 10 00 - ROUGH CARPENTRY: Wood blocking, curbs, nailers, and backer boards.
- C. Section 07 92 00 - JOINT SEALANTS: Sealant and backing materials, for joints between casework, countertops and abutting surfaces.
- D. Section 09 91 00 - PAINTING: Field applied primer (excluding backpriming) and finish coatings.

## 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. 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. FS MM-L-736 - Lumber; Hardwood

4. PS-1 - Construction and Industrial Plywood.
5. PS-20 - American Softwood Lumber Standard.
6. SPIB Grading Rules, current edition.
7. U.S. Department of Commerce Simplified Practice Recommendation R-16, for sizes and use classifications of lumber
8. 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.

## 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. 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 showing all profiles and dimensions.
  - c. Provide shop drawings bearing dimensions of actual measurements taken at the project.
3. Samples: Provide samples requested by Architect for selection of colors and finishes.

## 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 field-applied painted (opaque) finishes: Custom Grade.

B. 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 interior finish carpentry materials to the project until all concrete, masonry, plaster, and other wet work has been completed and dry.
- 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 maintaining 60 degrees Fahrenheit and a maximum relative humidity of 55 percent.
- C. Deliver to site glue laminated timbers individually wrapped with a water-resistant covering.

**1.8 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 WOOD MATERIALS, GENERAL**

- 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. 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. Interior trim to receive paint (opaque finish): Wood shall be clear without knots or surface defects. and conform NHLA Number 1 Common grade, and in compliance with AWI/AWMAC/WI "Architectural Woodwork Standards," latest edition for specified quality grade, (as installed).
  - 1. Acceptable wood species are limited to the following:
    - a. Yellow Poplar (*Liriodendron tulipifera*), Plain Sawn, clear straight-grained, C-Select or better.
    - b. Natural Birch" Yellow Birch (*Betula alleghaniensis*), Plain Sawn.
    - c. Natural Maple (*Acer saccharum*), Plain Sawn.
- B. Interior trim (window stools and aprons) scheduled to receive transparent finish: Select White Maple (*Acer saccharum*) {sapwood}, Plain Sliced.
- C. 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.

## 2.3 ACCESSORIES

- A. Glue for lamination and fabrication of wood, plywood and particle board items: Exterior Grade, phenolic resin glue.
- B. Nails for interior trim items: 6d and 8d coated or galvanized finish nails, except as otherwise specified herein.
- C. 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.
- D. Bolts, nuts, washers, blind fasteners, lags: Galvanized, of size and type to suite application as indicated in the drawings.
- E. Sealant, for joints between window stools and dissimilar materials: USDA approved one component acetoxysilicone 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  $\pm 25$  percent, and a Shore A hardness of 20, equal to the following, 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, product "786".
    - b. GE Silicones, product "Sanitary 1700".
    - c. Tremco, product "Tremsil 200 Sanitary".
    - d. Pecora, product "898NST".
- F. Paint for back-priming:
  - 1. California: "Troubleshooter Universal Wood Primer", N°. 21700.
  - 2. Moore: "Exterior Wood Primer 094".
  - 3. PPG: "Speedhide Exterior Alkyd Wood Primer", 6-9 Series.
  - 4. Sherwin-Williams: "A-100 Alkyd Exterior Wood Primer", Y24 W8020.

## 2.4 SHOP APPLIED FINISHING

- A. Transparent exposed-to-view finish for casework: AWI/AWMAC/WI "Architectural Woodwork Standards," Premium Grade Factory Finish System "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: None - natural finish.
  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. Beginning of installation means acceptance of site conditions.

#### **3.2 PREPARATION**

- A. 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. Comply with installation requirements of AWI (Architectural Woodwork Institute) Quality Standards, Eighth edition for Premium Grade quality work.
- 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 nailpunch 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 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 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.
- B. Maximum variation for doors and frames: Maximum diagonal distortion 1/16 inch measured with straight edge, corner to corner.

#### 3.6 ADJUSTING

- A. Adjust doors for smooth and balanced movement.

#### 3.7 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. 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

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Section 07 26 00  
VAPOR RETARDERS

**PART 1 – GENERAL**

## 1.1 GENERAL PROVISIONS

- A. The BIDDING REQUIREMENTS, CONTRACT FORMS, and CONTRACT CONDITIONS as listed in the Table of Contents, and applicable parts of Division 1 - GENERAL REQUIREMENTS, shall be included in and made a part of this Section.
- B. Examine all Drawings and all other Sections of the Specifications for requirements therein affecting the work of this Section.

## 1.2 SUMMARY

- A. The work of this Section consists of vapor retarders (vapor barriers) 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 the following:
  - 1. Interior vapor barriers at soffit assemblies.
  - 2. Interior vapor barriers at patched walls where unit ventilators have been removed.
  - 3. 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.

## 1.3 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 06 10 00 - ROUGH CARPENTRY: Wood framing, nailers.
- C. Section 07 27 13 – MODIFIED SHEET AIR BARRIER: Self-adhesive elastomeric permeable sheet membrane air barrier system.

## 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 D570 – Standard Test Method for Water Absorption of Plastics.
  - 2. ASTM D1004 - Standard Test Method for Tear Resistance (Graves Tear) of Plastic Film and Sheeting.

3. ASTM D1622 - Standard Test Method for Apparent Density of Rigid Cellular Plastics.
4. ASTM D1876 – Standard Test Method for Peel Resistance of Adhesives (T-Peel Test).
5. ASTM D1938 - Standard Test Method for Tear-Propagation Resistance (Trouser Tear) of Plastic Film and Thin Sheeting by a Single-Tear Method.
6. ASTM D2842 - Standard Test Method for Water Absorption of Rigid Cellular Plastics.
7. ASTM D2582 - Standard Test Method for Puncture-Propagation Tear Resistance of Plastic Film and Thin Sheeting.
8. ASTM D6226 - Standard Test Method for Open Cell Content of Rigid Cellular Plastics.
9. ASTM E136 - .
10. ASTM E84 – Standard Test Method for Surface Burning Characteristics of Building Materials.
11. ASTM E96/E96M/E96/E96MM – Standard Test Methods for Gravimetric Determination of Water Vapor Transmission Rate of Materials.

B. General References The following reference materials are hereby made a part of this Section by reference thereto:

1. NFPA 701 - Fire Tests for Flame Resistant Textiles and Films
2. All applicable federal, state and municipal codes, laws and regulations for thermal insulation and vapor barriers.

## 1.5 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: Coordinate work of this section with related work.

1. Coordinate third party inspection to occur following installation of below-grade vapor retarders and reinforcement steel, but prior to concrete placement.

## 1.6 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. Manufacturer's Instructions: Manufacturer's installation instructions for placement, seaming and pipe boot installation.
3. Samples:
  - a. 12 by 12 inch sample of vapor barrier.

**1.7 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 for each type of vapor retarder shall be from a single manufacturer, and the related accessories as recommended by the prime manufacturer of the vapor retarder.

**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 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.
  - 2. Store materials under cover and in manner to keep them dry, protected from weather, direct sunlight and damage from construction traffic 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 VAPOR BARRIERS WITHIN BUILDING ASSEMBLIES**

- A. Sheet plastic vapor barrier: Clear polyethylene film, 0.006 inches (6 mil) thick provided in full-wall length and width pieces, without joints, wherever possible.

**2.2 FOAMED-IN-PLACE INSULATION**

- A. 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 Regulations, effective 1/1/2022, foam polyurethanes used for this project are prohibited from having HFC blowing agents used in for Rigid PU low pressure two-component spray foam, and one component foam sealants.
    - 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"

## 2.3 ACCESSORIES

- A. General: 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 type of vapor barrier.
  1. Double-stick tape for attachment of vapor barrier: Double coated acrylic closed-cell foam tape, as manufactured by 3M Industrial Specialties Division, St. Paul MN, , product "Scotch VHB - 4952" or approved equal, having a thickness of 0.045 inches and a width of 1 inch.
- B. Air seal boot: PVC or EDPM premolded pipe and seal for penetrations at ceiling vapor barrier.

## PART 3 - EXECUTION

### 3.1 INSTALLATION - VAPOR BARRIERS WITHIN BUILDING ASSEMBLIES

- A. Place vapor and air barrier on warm side of all thermal insulation. Attach using commercial grade double stick tape. Lap and seal all sheet joints.
- B. Extend vapor and air barrier tight to full perimeter of adjacent window and door frames and other items interrupting the plane of membrane. Tape seal in place.

### 3.2 INSTALLATION - FOAMED-IN-PLACE AIR BARRIER

- A. Foamed-in-place air barrier: Apply foam 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.

End of Section

Section 07 27 13  
MODIFIED SHEET AIR BARRIER**PART 1 – GENERAL**

## 1.1 GENERAL PROVISIONS

- A. The BIDDING REQUIREMENTS, CONTRACT FORMS, and CONTRACT CONDITIONS as listed in the Table of Contents, and applicable parts of Division 1 - GENERAL REQUIREMENTS, shall be included in and made a part of this Section.
- B. Examine all Drawings and all other Sections of the Specifications for requirements therein affecting the work of this Section.

## 1.2 SUMMARY

- A. The work of this Section consists of air and vapor membrane system 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.
- B. Furnish and install the following:
  - 1. Self-adhesive elastomeric sheet membrane air and vapor barrier system, including specified sheet membrane, required primers and adhesives.
  - 2. Self-adhesive membrane flashing.
  - 3. Prefinished stainless steel sheet metal flashing.

## 1.3 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 for construction and demolition recycling.
- C. Section 03 30 00 - CAST-IN-PLACE CONCRETE: Concrete walls.
- D. Section 07 92 00 - JOINT SEALANTS: Requirements for joint sealant and backing materials.

## 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. 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. ABAA Quality Assurance Program; maintain copy on-site.
2. U.S. Army Corps of Engineers Air Leakage Test Protocol for Measure Air Leakage In Buildings.

C. Definitions:

1. “Dry weather”: Less than 20 percent change of rain per local weather forecasts.

## 1.5 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: Installer of the Work of this Section is required to attend pre-installation conference specified under Section 05 40 00 – COLD FORMED METAL FRAMING.

## 1.6 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:
    - 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.
  - 3. Verification Samples:
    - a. Self-adhered air and vapor barrier membrane.
    - b. Through-wall flashing membrane.
    - c. Transition membrane.
  - 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 E 2176 Standard for Air Barrier Materials.
  - 5. 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.

6. Manufacturer's Instructions:
  - a. Manufacturer's application instructions including data for surface conditioners, joint and crack treatment and application temperature range.
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. 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.

#### 1.7 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 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.
  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.

#### 1.8 MOCK-UPS

- A. Provide mock-up under provisions of Section 01 45 00 – QUALITY CONTROL.
- B. Provide mock-up areas using air and vapor membrane system, minimum 200 square feet, demonstrating the minimum standard for the Work.
  1. Mock ups shall include all typical flashing details, transitions, corners, typical conditions at openings in exterior walls and transitions to framing assemblies at exterior doors, storefront and curtain wall.

- 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.

## 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 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. 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.

**1.10 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.

**1.11 WARRANTY**

- A. General: Submit warranties under provisions of Section 01 78 00 - CLOSEOUT SUBMITTALS, and in compliance with Section 01 78 36 – WARRANTIES.
- 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 waterproofing installation to resist water or moisture penetration.

**PART 2 - PRODUCTS****2.1 LEED REQUIREMENTS**

- A. For field applications that are inside the weatherproofing membrane: Adhesives/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.
- B. All adhesives/sealants 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 and sealants subject to state or federal consumer product VOC regulations.
  - 1. [List all that apply.]
- C. Provide products with Third Party Environmental Product Declaration (EPD) whenever available.
- D. Provide products with publicly available material inventories whenever available.
- E. Provide products manufactured and extracted within 100 miles of the project site whenever possible.

**2.2 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. GCP Applied Technologies Inc., Cambridge MA. ("GCPAT")
2. Henry Company, Inc., Huntington Park, CA. (Henry)
3. Carlisle Coatings & Waterproofing Inc., Wylie, TX. ("CCW")
4. W.R. Meadows, Hampshire, IL., ("Meadows").
5. Tremco, Inc., Beachwood OH. ("Tremco")

## 2.3 DESCRIPTION

- A. Regulatory Requirements: Comply 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.

## 2.4 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<sup>2</sup> under a pressure differential of 0.3 in. water. (1.57 psf.) (equal to 0.02 L/s/m<sup>2</sup> @ 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.

## 2.5 MATERIALS

- 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<sup>2</sup>/ 24 hours, (29 perms).
    - b. Water Vapor Permeability: 1658 ng/Pa.m<sup>2</sup> 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. Henry Product: "Blueskin VP160".
  - b. GCPAT Product: "Perm-A-Barrier VPS 30".
  - c. CCW Product: "Fire Resist 705 VP".
  - d. Meadows Product "Air-Shield SMP"
  - e. Tremco: No equivalent sheet membrane air barrier product.
- 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.
- 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. Acceptable Products:
    - a. GCPAT product: "Perm-a-Barrier Primer Plus".
    - b. Henry product: "Blueskin Primer", "Aquaprime" or "Aquatek" as recommended by manufacturer.

## 2.6 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/m<sup>2</sup>sPa (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 -4°C (25°F), ASTM D 1876: 880 N/m (5.0 lbs./in.) of width
  6. Low Temperature Flexibility, ASTM D 1970: Unaffected to -43°C (-45°F)
  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.

## 2.7 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.

## 2.8 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.

## 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. Verify items which penetrate surfaces to receive air barrier and vapor barrier are rigidly installed.
  3. Verify surfaces are free of cracks, depressions, waves, or projections which may be detrimental to successful installation.
  4. Concrete Substrates: Notify the Contractor in writing if concrete substrate requires patching of holes over 1/2 inch in diameter or length and over 1/4 inch deep, by Section 03 30 00 - CAST-IN-PLACE CONCRETE. Do not proceed until patching is completed.
  5. Do not apply air barrier and vapor barrier system to damp, frozen, dirty, dusty or surfaces unacceptable to membrane manufacturer.



### 3.2 PREPARATION

- A. Perform all preparation work on receiving surfaces, 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 AIR BARRIER INSTALLATION

- 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 50 mm (2") 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 50 mm (2"). 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 FLASHING INSTALLATION

- A. 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 drip edge with hemmed 45 degree edge extending beyond face of wall. Ensure through wall flashing is in proper position without forming pockets. Lap through wall flashing over top of drip edge 1/2 to 3/4 inch behind face of wall; mastic between flashings.
  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 inch of interior face of wall, turning back 1 inch on itself.
    - c. Metal stud and gypsum sheathing - terminate at sheathing, securing top of air barrier with termination bar screwed into studs with type S-12 screws. Seal top of flashing, termination bar and screw heads with specified Type PE sealant.
  3. Form end dams at horizontal terminations; turn flashing, fold and seal (not cut) at corners, bends and interruptions. Seal watertight using flashing manufacturer's recommended adhesive and sealer.
  4. Carry head flashing 6 inches beyond both ends of lintels. At steel lintels, apply a heavy bed coat of compatible adhesive mastic and embed thru-wall flashing in the mastic.
  5. Seal all punctures with elastic cement mastic recommended by flashing manufacturer.

### 3.5 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.

## 3.6 FIELD QUALITY CONTROL

- A. 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.

### 3.7 CLEANING

- A. Daily clean work areas by sweeping and disposing of debris, and scraps.

### 3.8 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.

End of Section

Section 07 42 43  
COMPOSITE WALL PANELS**PART 1 – GENERAL**

## 1.1 GENERAL PROVISIONS

- A. The BIDDING REQUIREMENTS, CONTRACT FORMS, and CONTRACT CONDITIONS as listed in the Table of Contents, and applicable parts of Division 1 - GENERAL REQUIREMENTS, shall be included in and made a part of this Section.
- B. Examine all Drawings and all other Sections of the Specifications for requirements therein affecting the work of this Section.

## 1.2 SUMMARY

- A. Furnish and install the following:
  - 1. Rout and return metal composite faced panel system cladding and soffits over entrance canopies including vertical walls, fasciae and horizontal soffits.
  - 2. Related flashing adapters, copings, trim and filler components indicated as integral parts of the panel system or as designed.
  - 3. Extruded aluminum framing, retention assemblies, anchorages, shims, furring, fasteners, gaskets, and sealant associated with the work of this Section.

## 1.3 RELATED REQUIREMENTS

- A. Section 01 74 19 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL: Procedural and administrative requirements for construction and demolition recycling.
- B. Section 05 40 00 - COLD-FORMED METAL FRAMING: Structural wall framing.
- C. Section 10 73 16 – CANOPIES.
- D. Section 07 92 00 - JOINT SEALANTS: Requirements for sealants and backing materials.

## 1.4 REFERENCES

- A. Reference 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. 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. AAMA 603.8 - Performance Requirements and Test Procedures for Pigmented Organic Coatings on Extruded Aluminum.
  - 3. ASTM E 283 - Rate of Air Leakage through Exterior Entrance and storefront, Curtain Walls and Doors.
  - 4. ASTM E 330 Structural Performance of Exterior Entrance and storefront, Curtain Walls, and Doors by Uniform Static Air Pressure Difference.
  - 5. ASTM E 331 - Test method for Water Penetration of Exterior Windows, Curtain Walls, and Doors by Uniform Static Air Pressure Difference.

## 1.5 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 preparing shop drawings for 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, Installer's Project Superintendent, manufacturer's technical representative and representatives of other related trades as directed by the Architect or Contractor.
  2. Agenda:
    - a. Scheduling of wall panel system operations.
    - b. Review of staging and material storage locations.
    - c. Coordination of work by other trades,
      - 1) Review of building framing relationship with wall panel system framing.
      - 2) Review building air and vapor barrier system relationship with wall panel system framing.
      - 3) Review window, door, louver and other openings and penetrations in wall panel system.
    - 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.

## 1.6 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 each item furnished hereunder.

2. Shop Drawings:
    - a. 1/4 inch scale elevations indicating panel jointing.
    - b. Large scale design details of wall 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 wall systems manufacturer; details may vary from those indicated on the Contract Drawings.
  3. 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.
  4. 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 aluminum sheet used for trim components, prefinished in the specified finish system in selected colors.
  5. Certificates: Indicate how design requirements for loading and other performance criteria have been satisfied.
  6. Manufacturer's Instructions: Manufacturer's installation instructions indicating special procedures, and perimeter conditions requiring special attention.
- 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.

## 1.7 QUALITY ASSURANCE

- A. General: Notify the Architect where conflicts apply between referenced standards and existing materials, and existing methods of construction.
- B. Qualifications:
  1. Manufacturers: Minimum of 10 years' experience in manufacturing of composite wall panel systems.
  2. Installer/Applicator: Minimum of 7 years documented experience demonstrating previously successful work of the type specified herein, and approved by product manufacturer.
  3. Professional Engineer Qualifications: Design structural elements under direct supervision of Professional Engineer experienced in design of this Work and licensed in the Commonwealth of Massachusetts

## 1.8 MOCK-UPS

- A. Provide mock-up under provisions of Section 01 43 39 – MOCK-UPS.
- B. Provide mock-up panels, using accepted colors, minimum 160 square feet, illustrating color, texture and finish, 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.
- E. Accepted mock-ups may remain as part of the work; the number of mock-ups shall not be restricted.

## 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 original packages, containers or bundles bearing brand name and identification of manufacturer.
- 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.

## 1.10 WARRANTY

- A. General: Submit warranties under provisions of Section 01 78 00 - CLOSEOUT SUBMITTALS.
- B. Extended Correction Period: Project specific Manufacturer's written warranty for composite panel system, covering repair or replacement of any system which leaks, or exhibits defects in materials, finish, design, within 2 years from date of Project Substantial Completion. Failure due to defective materials or workmanship is deemed to include, but not to be limited to:
  - 1. Failures in operation of operating component or components.
  - 2. Leakage or air infiltration in excess of the specified standard.
  - 3. Deterioration of finish to an extent visible to the unaided eye.
  - 4. 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.



- C. Special Finish Warranty: Provide 20 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 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. Alcoa Architectural Products, Eastman GA.
  - 2. Alpolic Materials, Chesapeake, VA.
  - 3. Alucoil North America, Manning, SC.
  - 4. 3A Composites, Mooresville, NC.

### **2.2 DESCRIPTION**

- A. System General Description: Rout and Return panel system with attachment system which will allow for exterior removal of any individual panel within the erected system for damage replacement or access of structure behind the panel, without disturbing adjacent panels.
  - 1. System shall be a cavity rain screen design and provide a reveal joint as detailed on Drawings.
- B. System shall comply with the applicable provisions of the "Metal Curtain Wall, Window, Storefront, and Entrance Guide Specifications Manual" published by AAMA, and ANSI/AAMA 302.9 requirements for aluminum windows.
- C. System shall not have visible fasteners, telegraphing or fastening on the panel faces or any other compromise of a neat and flat appearance.

### **2.3 PERFORMANCE/DESIGN CRITERIA**

- 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.
  - 1. Engineering criteria: The manufacturer for canopy systems 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.
    - a. Wind Loading: Canopy design and its installation shall be to conformance with the International Building Code, 2018 edition, as published by the International Code Council, Inc. (I.C.C.), as revised by RISBC-1 Rhode Island Building Code:
      - 1) Design Wind Speed (v): 137 miles per hour (3 second gust), both positive (acting inward) and negative (acting outward) wind pressure loading.
      - 2) Occupancy Risk Factor: III.

- 3) Fatigue testing: Panels shall show no evidence of facing/core interface delamination when panel is tested by simulating wind loads of 20 psf (positive and negative) for two million alternate cycles. Test results shall be verified by independent laboratory.
  2. Water infiltration: Static Water Infiltration (ASTM E331-83) at 15.0 psf (77.5 mph wind and 2.88" H<sub>2</sub>O) with a water spray rate of five (5) gallons per hour per square foot minimum for 15 minutes, no uncontrolled water infiltration on room side.
  3. Static Air Infiltration: Air/moisture barrier air infiltration shall not exceed 0.06 cfm per square foot at a pressure differential of 1.57 psf when tested in accordance with ASTM E 283.
  4. 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.
- B. Fire Performance Characteristics: Provide metal composite wall systems with the following fire test characteristics determined by indicated test standard as applied by UL or other testing and inspection agency acceptable to authorities having jurisdiction.
1. Surface-Burning Characteristics: Provide metal composite wall system panels with the following characteristics when tested per ASTM E 84:
    - a. Flame spread index: 25 or less.
    - b. Smoke developed index: 450 or less.

## 2.4 COMPOSITE PANELS

- A. Materials
1. Aluminum Sheet: Smooth surface coil-coated sheet, ASTM B209, 3005 T5 Aluminum alloy.
  2. Aluminum Extrusions: ASTM B 221, 6063 T5 Aluminum.
  3. Panel Core: Thermo-set polymeric core (PE), fire-retardant per ASTM E 84, with flame-spread index of 25 or less and smoke-developed index of 450 or less."
- B. Composite aluminum panels, as manufactured by one of the following, or approved equal. Panels shall be two sheets of 0.020 aluminum sandwiching a core of extruded thermoplastic formed in a continuous process with no glues or adhesives between dissimilar materials.
1. Panel Thickness: 4mm (nominal 0.157 inch).
  2. Surface Texture: Smooth.
  3. Bond Integrity: No failure of bond between core and faces and no cohesive failure of core when tested in accordance with ASTM D 1781 at minimum of 22.5 in-lb per inch."
- C. Acceptable panels:
1. Alcoa Architectural Products, Eastman GA, product "Reynobond ACM.
  2. Alpolc Materials, Chesapeake, VA, product "Alpolc PE".
  3. Alucoil North America, Manning, SC, product "Larson Composite Panels".
  4. 3A Composites, Mooresville, NC, product "Alucobond".

### 3.2 TRACK SYSTEM

- A. Aluminum Track System: Extruded aluminum ASTM B221, alloy 6063-T6 or alloy 6061-T6 track system designed for joint width indicated on the Drawings with an extruded aluminum retainer. Metal to metal sliding joints are not permitted.

### 2.5 FABRICATION

- A. General: Do not fabricate materials until all specified submittals have been submitted to, and approved by, the Architect.
- B. All panels shall be formed to specified dimension with tolerances to accommodate expansion and contraction between panels and structure members. Maintain indicated 3/4 inch deep reveal at all horizontal and vertical joints.
- C. Accessory and trim components shall be factory fabricated and ready for installation.
- D. Fabricate panels in a manner that will eliminate condensation on the interior side. Design joints between panels to form weathertight seals.
  - 1. Provide factory-assembled, wall panel units fabricated to dimensions and joint configurations indicated on Drawings.
  - 2. Form panel lines, breaks and angles sharp and true with surfaces that are free from warp or buckle.
  - 3. Fabricate from sharply cut edges, with no displacement of aluminum sheet or protrusion of core.
  - 4. Tolerances shall accommodate expansion and contraction between panels and structural members. Maintain the indicated reveal depth for both horizontal and vertical joints as indicated.
- E. Panel Tolerances:
  - 1. Flatness: Maximum allowable distortion: 1/32 inch in 24 inches (0.794 mm in 600mm) in any direction.
  - 2. Thickness:  $\pm 1/32$  inch.
  - 3. Length and Width: +0, -1/8 inch.
  - 4. Squareness: 1/64 inch per lineal foot.

### 2.6 FINISHES

- A. Composite Panels: Shop-applied, fully oven cured Polyvinylidene Fluoride (PVDF) resin based, high performance thermoplastic organic coating applied to all exposed surfaces, including all exposed screws, fastenings, having a minimum total film thickness of 2 mils and conforming to AAMA 605.2 (latest edition), 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 "Duramar XL."

- d. Valspar Corp., product: "Flurothane."
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. Primer: Corrosion resistant, epoxy or urethane-based primer compatible with finish coating, averaging 0.2 to 0.3 mils dry film thickness.
5. Barrier Coat: Epoxy-based primer compatible with finish coating, averaging 0.70 to 0.80 mils dry film thickness.
6. Finish Coat (Color Coat): Polyvinylidene flouride enamel averaging 0.70 to 0.80 mil dry film thickness.
7. Top Coat: Polyvinylidene flouride enamel clear top coat averaging 0.45 to 0.55 mils dry film thickness
8. Color: PPG "Duranar", color "West Pewter Mica, PVDF2, Gloss Level 2" or approved equal.

## 2.7 ACCESSORIES

- A. Fasteners: As recommended by manufacturer, concealed stainless steel.
- B. Fittings for Attaching Panels to Sub-Structure: Proprietary, custom made aluminum extrusions and clips in fabricator's standard profiles as required for complete installation; provide continuous extrusions full length around panel perimeter for panel reinforcement and alignment; intermittent clips not acceptable.
- C. Sub-girts: Steel, hot-dipped galvanized to G90 coating, designed to accommodate expansion and contraction, dynamic movements and design load requirements; provide plastic shims as thermal separator between extrusions and sub-girts.
- D. Shims: Rigid plastic.
- E. Flashing and miscellaneous related sheet metal fabrications: Aluminum sheet, minimum 0.040 inch (1 mm) thick, finished to match adjacent panels.
- F. Flashing Tape: 4 inch (102 mm) wide self-adhering butyl flashing tape.
- G. Reticulated foam (at weeps): Medium porosity polyurethane or polymetric foam having 30 to 45 pores per inch, of sufficient size to fit tight in recesses.
- H. Sealants and backing materials: Sealant type "SE" as specified under Section 07 92 00 - JOINT SEALANTS, or as otherwise recommended by manufacturer.
  1. For perimeter joints between system and abutting materials, excluding exterior metal-to-metal weather seals: Sealant type "SE" as specified under Section 07 92 00 - JOINT SEALANTS.

## 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. Maximum deviation from vertical and horizontal alignment of substrate shall be no more than 1/4 inch in 20'-0".

2. Beginning of installation means acceptance of existing substrate and project conditions.
- B. Evaluation and Assessment: At least two weeks prior to commencing the work of this Section, conduct a pre-installation inspection by a representative of the metal wall manufacturer at the Project site. Coordinate time of inspection to occur prior to installation of metal wall panels.
1. Any additional work resulting from pre-installation or completed installation inspections shall be provided at no additional cost to the Owner.

### 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. Verify that substrate layout complies with shop drawing layout.
- C. Report any variations and potential problems to the architect.
- D. Do not start work until unsatisfactory conditions have been corrected.

### 3.3 INSTALLATION

- A. General: Comply with manufacturer's product data including product technical bulletins, product catalog installation instructions, and product carton instructions.
- B. Furring and framing: Accurately align and attach furring and framing in strict compliance with framing manufacturer's recommendations and approved shop drawings.
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 of aluminum track for panel system.
- C. Bracing: Provide 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 as needed to comply with specified performance requirements.
- D. Install aluminum track system as recommended by manufacturer. Installed track to receive panels shall be even, smooth, sound, clean, and free from defects detrimental to panel installation.
- E. Erect panels plumb, level, and true.

- F. Anchor panels securely in place accordance with manufacturer's approved shop drawings.
- G. Conform to panel manufacturer's instructions for installation of concealed fasteners.
- H. Provide reticulated foam at weeps. Fasten directly behind weep holes in manner to keep in place during installation and prevent wind uplift from forcing the material to migrate away from the weep holes.
- I. Install sealant and backing material at all joints within panel system and perimeter of system.
  - 1. Do not block weep holes with sealant.
  - 2. Install joint bead back-up in all joints.
    - 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.
  - 3. Apply masking tape or other precautions to prevent migration or spillage of materials onto adjoining surfaces.
  - 4. Apply specified sealant 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.
    - 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.
    - b. 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.
    - c. 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.
    - d. 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.
    - e. Remove the temporary masking tape immediately after tooling, and before the sealant or caulking material has taken initial set.

#### 3.4 TOLERANCES

- A. Attach to structure to permit sufficient adjustment to accommodate construction tolerances and other irregularities.
- B. Erect the composite metal panel systems plumb and level, free of warp or twist.
  - 1. Maximum misalignment of two adjoining members abutting in plane: 1/32 inch
  - 2. Maximum variation from plumb or level: 1/16 inch per 10 feet, non cumulative
  - 3. Maximum offset from true dimensional alignment: 1/8 inch.

### 3.5 FIELD QUALITY CONTROL

- A. Field inspection will be performed under the provisions of Section 01 45 00 - QUALITY CONTROL.
- B. Non-Conforming Work: Damaged and unapproved work shall be removed and replaced.
- C. Manufacturer Services: Field inspection of completed installation to be performed by a representative of the composite panel manufacturer and submit a written report.
  - 1. Installer shall correct deficiencies noted in report and additional deficiencies identified by Architect's observations.
  - 2. Replace damaged panels and accessories which cannot be repaired in field.

### 3.6 CLEANING

- A. General: Clean work under provisions of Section 01 70 00 – EXECUTION.
  - 1. Refer to AAMA 601.1 for cleaning and maintenance of panels.
- B. After completion of the work of this Section:
  - 1. Remove equipment rubbish, and debris from the work area.
  - 2. Remove temporary protective films.
  - 3. Clean exposed panel surfaces promptly after completion of installation in accordance with recommendations of panel and coating manufacturer.
  - 4. Clear weep holes and drainage channels of obstructions, dirt, and sealant.
  - 5. Leave immediate site area in rake-clean condition.
  - 6. Protect and maintain wall system in clean condition during construction.

### 3.7 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 81 00  
APPLIED FIREPROOFING**PART 1 - GENERAL**

## 1.1 GENERAL PROVISIONS

- A. The BIDDING REQUIREMENTS, CONTRACT FORMS, and CONTRACT CONDITIONS as listed in the Table of Contents, and applicable parts of Division 1 - GENERAL REQUIREMENTS, shall be included in and made a part of this Section.
- B. Examine all Drawings and all other Sections of the Specifications for requirements therein affecting the work of this Section.

## 1.2 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. Patch existing fireproofing disturbed or otherwise damaged by the Work.

## 1.3 RELATED REQUIREMENTS

- A. Section 01 73 29 - CUTTING AND PATCHING: Procedural and administrative requirements for cutting and patching.
- B. Section 01 74 19 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL: Procedural and administrative requirements for construction and demolition recycling.

## 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 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 International Building Code, 2018 edition, as published by the International Code Council, Inc. (I.C.C.), as revised by RISBC-1 Rhode Island Building Code.
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.

## 1.5 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. 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.

## 1.6 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.
- 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.

## 1.7 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, Mastic and Intumescent Fire Resistant Coatings:
    - 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.

## 1.8 MOCK-UPS

- A. Provide mock-up under provisions of Section 01 45 00 - QUALITY CONTROL.
- B. Construct mockup as follows, conform to project requirements for fire ratings, thickness and density of application.
- C. Locate fireproofing patch mock-up 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.

## 1.9 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, 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.

## 1.10 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.

## 1.11 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").
  - 5. Vellrath Engineering, Pequabuck, CT.

## 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<sup>2</sup> and a maximum 125 kw/m<sup>22</sup> 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<sup>2</sup> 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 ratings matching original building fire resistant requirements.

## 2.4 HAND-PATCH FIREPROOFING

- A. Basis of Design (Specified Manufacturer): To establish a standard of quality, design and function desired, Drawings and specifications have been based on Vellrath Engineering, Pequabuck, CT., product "Universal Fireproofing Patch".
  1. Acceptable Alternative 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. Vellrath: product "Universal Fireproofing Patch".
      - 1) Maximum patch area limit: 432 square inches.
    - b. Southwest: product: Same as spray-fireproofing used, batch mixed for hand-patching application.
      - 1) Maximum patch area limit: 144 square inches.
    - c. GCP: product: "Monokote MK"
      - 1) Maximum patch area limit: 144 square inches.
    - d. CAFCO: product: "Cafco Fiber-Patch"
      - 1) Maximum patch area limit: 432 square inches.
    - e. Southwest: product: Same as spray-fireproofing used, batch mixed for hand-patching application.
      - 1) Maximum patch area limit: 144 square inches.

## B. Performance Criteria:

## 1. Performance Criteria:

Property	Test Method	Test value/results
Dry Density	ASTM E605	38 lb/ft, minimum
Adhesion Strength	ASTM E736	2745 lb/ft <sup>2</sup> , minimum

## 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. 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. 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.

## C. 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 manufacturer's 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. After completion of fireproofing work, equipment shall be removed and all surrounding wall and floor areas cleaned of deposits of fireproofing materials.

### 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. 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.
- B. 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.
- C. 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.
- D. 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

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Section 07 84 00  
FIRESTOPPING**PART 1 - GENERAL**

## 1.1 GENERAL PROVISIONS

- A. The BIDDING REQUIREMENTS, CONTRACT FORMS, and CONTRACT CONDITIONS as listed in the Table of Contents, and applicable parts of Division 1 - GENERAL REQUIREMENTS, shall be included in and made a part of this Section.
- B. Examine all Drawings and all other Sections of the Specifications for requirements therein affecting the work of this Section.

## 1.2 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 plumbing, fire suppression, heating, ventilating and air conditioning, electrical systems, technology 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 to maintain fire integrity prior to Owner's final acceptance, to permit installation of electrical, telephone, data, technology, 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.

## 1.3 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 for construction and demolition recycling.

- C. Division 21 - FIRE SUPPRESSION: Fire protection system penetrations through fire resistance rated construction.
- D. Division 22 - PLUMBING: Plumbing system penetrations through fire resistance rated construction.
- E. Division 23 - HEATING, VENTILATING AND AIR CONDITIONING: Heating, ventilating and air conditioning system penetrations through fire resistance rated construction.
- F. Division 26 - ELECTRICAL: Electrical penetrations through fire resistance rated construction.

#### 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 E84 - Test Method for Surface Burning Characteristics of Building Materials.
  - 2. ASTM E119 - Method for Fire Tests of Building Construction and Materials.
  - 3. ASTM E814 - Test Method of Fire Tests of Through-Penetration Firestops.
  - 4. ASTM E2174 - Standard Practice for On-site Inspection of Installed Fire Stops.
  - 5. ASTM E2393 - Standard Practice for On-site Inspection of Installed Fire Resistive Joint Systems and Perimeter Fire Barriers.
  - 6. NFPA 70 - National Electrical Code.
  - 7. UL - Fire Resistance Directory.
  - 8. UL 1479 - Fire Tests of Through Penetration Firestops.

#### 1.5 PERFORMANCE REQUIREMENTS

- A. Provide materials and work to conform to Building Code Requirements in fire resistant wall and floor assemblies.
- B. 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.
- C. 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.
- D. 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.

E. Combustible damming materials, if used, must be removed after proper curing.

## 1.6 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.
  - 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. Certification: 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 E-814.
5. On-site sample installation to be included in Work: Minimum thirty days prior to application in any area, provide samples of firestop and smoke seal materials and installation in accordance with the following requirements.
  - a. Apply one sample of appropriate firestop and smoke seal 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 smoke seal 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.

## 1.7 QUALITY ASSURANCE

- A. Obtain firestop and smoke seal products from a single manufacturer, except as otherwise approved by Architect.
- B. Notify the Architect where conflicts apply between referenced standards, specified materials, and methods of construction.

- C. Special Inspections: Allow for 3 percent of each type of firestopping system to be removed and inspected for conformance with approved submittals.
  - 1. All firestopping shall be inspected prior to installation of suspended ceilings or concealed by other materials.

## 1.8 QUALIFICATIONS

- A. Installer, a specialized subcontractor having not less than 3 years documented experience demonstrating previously successful work of the type specified herein.
  - 1. 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.

## 1.9 REGULATORY REQUIREMENTS

- A. Conform to applicable code for fire resistance ratings and surface burning characteristics.
- B. Obtain certificate of compliance from authority having jurisdiction indicating approval of combustibility.

## 1.10 MOCK-UPS

- A. Provide mock-ups under provisions of Section 01 45 00 – QUALITY CONTROL for purpose of verifying quality of firestop installation
- B. Provide firestop samples and locate as directed. Accepted samples may remain as part of the work.

## 1.11 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.

## 1.12 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.

## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

- A. Acceptable Manufacturers: Subject to compliance with the requirements specified herein, manufacturers offering similar products include the following:
  - 1. Bio Fireshield, Inc., Concord, MA.
  - 2. Dow Corning Corporation, Midland, MI.
  - 3. Hilti Corporation, Tulsa, OK.
  - 4. 3M Company, Saint Paul, MN.
  - 5. Specified Technologies, Inc., Somerville, NJ.

6. Metacaulk, (The Rectorseal Corporation), Houston, TX.
7. Tremco, Inc., Cumberland, RI.
8. Thermafiber, Inc., Wabash, IN.
9. John Manville Corp (A Berkshire Hathaway Co.), Denver, CO.

## 2.2 MATERIALS

- A. Mineral fiber / ceramic wool non-combustible fire safing: Provide Thermafiber, Inc. product "Thermafiber" having a minimum density of 4 pounds per cubic foot, Tremco, Inc., product "FBX Safing Insulation", having a minimum density of 4 pounds per cubic foot, or provide John Manville Corp product "Ceramic Fiber Insulation" having a minimum density of 6 pounds per cubic foot, or approved equal product to suit conditions and complying with firestop manufacturer's requirements.
  1. Provide galvanized steel safing clips for installation of insulation.
  2. Material shall be classified non-combustible per ASTM E-814.
- B. Intumescent firestop sealant and caulks: Acrylic based, water resistant sealant, which will not re-emulsify after drying.
  1. Acceptable products:
    - a. Bio Fireshield, Inc., product "Biostop 500".
    - b. Specified Technologies, Inc., product "Spec Seal Triple-S Sealant".
    - c. 3M Company, product "Fire Barrier Caulk CP25WB+".
    - d. Tremco Inc., product "Tremstop 1A".
- C. Firestop putty: Sticks or pads.
  1. Acceptable products:
    - a. Bio Fireshield, Inc., product "Moldable Putty",
    - b. Specified Technologies, Inc., product "Spec Seal Putty Bars and Pads".
    - c. 3M Company, product "Fire Barrier Moldable Putty".
    - d. Tremco Inc., product "Flowable Putty"
- D. Silicone Firestop sealant: Single component, non-combustible silicone elastomer firestop sealant, U.L. classified as a "fill, void, or cavity material" for through penetration firestop system when tested in accordance with ASTM E-814/UL1479.
  1. Acceptable products:
    - a. Bio Fireshield, Inc., product product "Biotherm 100" (Gun Grade) or "Biotherm 200" (Self Leveling).
    - b. Specified Technologies, Inc., product "Spec Seal Pensil 300 Sealant (gun grade)" or "Spec Seal Pensil 300SL" (Self Leveling).
    - c. 3M Company, product "Fire Barrier Silicone Sealants".
    - d. Tremco Inc., product product "Tremsil" (Gun Grade) or "Tremsil S/L" (Self Leveling).
  2. Sealants will not dissolve in water.
- E. 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/UL1479.

1. Acceptable products:
  - a. Bio Fireshield, Inc., product "Novasit K-10".
  - b. Specified Technologies, Inc., product "Spec Seal Mortar".
  - c. Tremco Inc., product "Tremstop M".
- F. Firestop pillows: UL Classified as "fill, void, or cavity material" for through penetration firestop system when tested in accordance with ASTM E-814/UL1479.
  1. Acceptable products:
    - a. Bio Fireshield, Inc., product "Fireshield Firestop Pillows"
    - b. Specified Technologies, Inc., product "Spec Seal Pillows".
    - c. Tremco Inc., product "Tremstop P.S".
- G. Wrap strips:
  1. Acceptable products:
    - a. Bio Fireshield, Inc., product "FS-195"
    - b. Specified Technologies, Inc., product "Spec Seal Wrap Strip".
    - c. 3M Company, product "Fire Barrier FS195 Wrap Strip".
    - d. Tremco Inc., product "Tremco W.S".
- H. 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 E-814/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:
    - a. 3M Company, Inc., product "Fireshield Firestop Sleeve"
    - b. Specified Technologies, Inc., product "Spec Seal Collars".
    - c. 3M Company, product "Fire Barrier PPD's".
    - d. Tremco Inc., product "Fyrecan sleeve"
- I. Elastomeric Firestopping: Non halogenated latex based elastomeric coating applied by airless spray, Specified Technologies, Inc., product "Spec Seal Elastomeric Firestop Spray".

### 2.3 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 INSPECTION

- A. Examine the 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.

## 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 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 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 a average mixing time is 3 minutes and provide a 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 FIELD QUALITY CONTROL

- A. Inspecting Agency: Subcontractor 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.

## 3.5 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 15.
  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. 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).
- R. Smoke barrier sealant for dampers, fire door frames:
1. Silicone Firestop sealant.
- S. Temporary sealing of openings and penetrations:
1. Firestop putty, sticks or pads.
  2. Firestop pillows.
  3. Floor slab to exterior wall.

End of Section

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Section 07 92 00  
JOINT SEALANTS

**PART 1 - GENERAL**

## 1.1 GENERAL PROVISIONS

- A. The BIDDING REQUIREMENTS, CONTRACT FORMS, and CONTRACT CONDITIONS as listed in the Table of Contents, and applicable parts of Division 1 - GENERAL REQUIREMENTS, shall be included in and made a part of this Section.
- B. Examine all Drawings and all other Sections of the Specifications for requirements therein affecting the work of this Section.

## 1.2 SUMMARY

- A. General: The work of this Section consists of sealants and backing materials where shown on the Drawings, as specified herein, and 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.

## 1.3 RELATED REQUIREMENTS

- A. Section 01 45 00 – QUALITY CONTROL: 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 for construction and demolition recycling.
- D. Section 07 84 00 - FIRESTOPPING: Firestopping Sealants and related backing materials.
- E. Section 09 29 00 - GYPSUM BOARD: Installation of wall board construction.
- F. Section 09 91 00 - PAINTING: Caulks used in preparation of applied finish coatings.

## 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 C717 - Standard Terminology of Building Seals and Sealants.
  2. ASTM C790 – Guide for Use of Latex Sealants.
  3. ASTM C804 - Use of Solvent-Release Type Sealants.
  4. ASTM C834 - Latex Sealing Compounds.
  5. ASTM C919 - Use of Sealants in Acoustical Applications.
  6. ASTM C920 - Elastomeric Joint Sealants.
  7. ASTM C962 - Use of Elastomeric Joint Sealants.
  8. ASTM C1085 - Butyl Rubber Based Solvent Release Sealants.
  9. ASTM C1193 - Guide for Use of Joint Sealants.
  10. ASTM C1247 - Standard Test Method for Durability of Sealants Exposed to Continuous Immersion in Liquids.
  11. ASTM C1521 - Standard Practice for Evaluating Adhesion of Installed Weatherproofing Sealant Joints.
  12. ASTM D1056 - Flexible Cellular Materials - Sponge or Expanded Rubber.
  13. ASTM D3960 - Standard Practice for Determining Volatile Organic Compound (VOC) Content of Paints and Related Coatings.
- B. The following reference materials are hereby made a part of this Section by reference thereto:
1. SWRI – Sealant and Caulking Guide Specification.

#### 1.5 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 07 24 00 - Exterior Insulation and Finish System
    - b. Section 07 27 26 - Fluid-Applied Membrane Air Barriers
    - c. Section 07 62 00 - Sheet Metal Flashing and Trim: Sealant integral with flashing.
    - d. Section 07 62 00 - Sheet Metal Flashing and Trim
    - e. Section 08 43 13 - Aluminum-Framed Storefronts: Perimeter sealant at exterior of storefront framing.
    - f. Section 08 44 13 - Glazed Aluminum Curtain Walls: Perimeter sealant at exterior of curtain wall framing.
    - g. 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.

## 1.6 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, chemical and physical properties and installation instructions for each item furnished hereunder.
  2. Manufacturer's certification that the Products supplied meet or exceed specified requirements.
  3. Selection samples: Sample card indicating Manufacturer's full range of colors available for selection by Architect
  4. Verification samples: 12 inch long samples of sealant for verification of color, installed where directed by Architect.
  5. 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.

## 1.7 QUALITY ASSURANCE

- A. Applicator specializing in applying the work of this Section with a minimum of 3 years documented experience approved by sealant manufacturer.
- B. Obtain joint sealers from a single manufacturer for each type specified. Conform to SWRI requirements for installation.
- 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. 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.
- E. 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.
- F. 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-foot 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.

#### 1.8 MOCK-UP

- A. Provide mock-up elements for field panel in accordance with Section 01 45 00 – QUALITY CONTROL at exterior location where directed by Architect. Mock-up will demonstrate quality of work, construction methods, relationship to other work.
- 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.

#### 1.9 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.

#### 1.10 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.

#### 1.11 PROJECT 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 contaminants capable of interfering with their adhesion are removed from substrates.

#### 1.12 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. Emseal Joint Systems Ltd., Westborough MA.
  2. Bostik, Inc., Wauwatosa, WI.
  3. Chem Link Inc., Schoolcraft, MI.
  4. Dow Corning Corporation, Auburn MI.
  5. Euclid Chemical, Cleveland OH.
  6. GE Construction Sealants, Huntersville, NC. (GE)
  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. 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".
- B. Joint Sealer Type AP (Acrylic Painters caulk): One component acrylic latex caulking compound, conforming to ASTM C 834 Type P, Grade NF, paintable within 24 hours after application, with a minimum movement capability of  $\pm 12.5$  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".
- C. 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  $\pm 25$  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".
- D. 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 C 920, Type S, NS, Class 50, use NT, G, A, M, O with a minimum movement capability of  $\pm 50$  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".
- E. Joint Sealer Type SM (Silicone, Mildew-resistant): USDA approved one component acetoxysilicone 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  $\pm 25$  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".
- F. 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, 1/3 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. BASF Sonneborn Building Products Inc., Minneapolis, MN, product "Sonolastic Closed Cell Backer Rod".
  - 3. W.R. Meadows Inc., Hampshire, IL, product "Sealtight Kool-Rod".
  - 4. Industrial Thermo Polymers Ltd., Brampton, Ontario, CN, product "ITP Standard Backer 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.

## 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. 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.
- B. 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.
- C. Apply masking tape or other precautions to prevent migration or spillage of materials onto adjoining surfaces.
- D. Apply urethane sealant 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.
- E. Take care not to block-off weep tubes or any through wall opening constructed to allow weeping of accumulated water.

### 3.4 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.



3.5 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.

3.6 SCHEDULE

- A. General: Seal joints indicated and all interior and exterior joints, seams, and intersections between dissimilar materials.
- B. Sealant Colors:
  - 1. Colors for Sealant (typical): As selected by the Architect from manufacturer's standard colors, except as specified otherwise herein below.
  - 2. Color for Sealant Types "AA" and "AP": White.
  - 3. In concealed installation, and in partially or fully exposed installation where so approved by the Architect, standard gray or black sealant may be used.
- C. Exterior joints (Listed by primary building material abutting sealant joints):

1. Concrete:

Joint Condition	Sealant Type
a. Concrete to concrete, vertical control joints:	SX
b. Concrete foundation walls to abutting concrete, and other non-bituminous pavements, steps, platforms, and ends of ramp, (horizontal joints):	HLM
c. 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

2. Exterior Masonry:

Joint Condition	Sealant Type
a. Masonry to masonry, expansion and control joints, 1 inch and less:	SX
b. Masonry to abutting masonry, or concrete:	SX
c. Masonry to abutting non-porous materials (painted metals, anodized aluminum, mill finished aluminum, PVC, glass, and similar materials):	SX
d. Masonry to all items which penetrate exterior masonry walls, including, but not necessarily limited to, door frames, louver frames, pipes, vents, and similar items:	SX

3. 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,	SX

louver frames, pipes, vents, and similar items:

D. Interior joints (Listed by primary building material abutting sealant joints):

1. Interior Masonry:

\* Includes interior side of exterior masonry walls.

Joint Condition	Sealant Type
a. Masonry to masonry control joints*:	SX or SC
b. Masonry to gypsum panels	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:	SX or SC
d. Masonry to all pipes, conduit and vents which penetrate non-rated masonry walls*:	SC

2. 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. Gypsum board to interior door and window frames, penetrating conduits and piping, light-fixtures, electrical cover plates, building specialty items, ductwork, grilles, supply diffusers, faucets, piping, escutcheon plates and similar items:	AP
e. Gypsum board to plumbing fixtures:	SM

3. Casework

Joint Condition	Sealant Type
a. Casework to abutting materials.	SM
b. Countertops to abutting wall surfaces and to abutting casework:	SM
c. Countertops to plumbing fixtures and fittings:	SM

4. Interior metal:

Joint Condition	Sealant Type
a. Metal to metal:	SC

5. Interior Wood:

Joint Condition	Sealant Type
a. Wood to wood (natural or stained finishes)	SM
b. Wood to wood (painted opaque finishes)	AP

End of Section

## Section 08 05 13

## COMMON WORK RESULTS – DOOR AND HARDWARE INSTALLATION

**PART 1 – GENERAL**

## 1.1 GENERAL PROVISIONS

- A. The BIDDING REQUIREMENTS, CONTRACT FORMS, and CONTRACT CONDITIONS as listed in the Table of Contents, and applicable parts of Division 1 - GENERAL REQUIREMENTS, shall be included in and made a part of this Section.
- B. Examine all Drawings and all other Sections of the Specifications for requirements therein affecting the work of this Section.

## 1.2 SUMMARY

- A. This Section includes general requirements for preparation, installation and temporary protection, for door frames, doors and door hardware provided under the General Construction Contract. Work additionally includes:
  - 1. Fitting and preparation of hardware for unfinished wood doors.
  - 2. Installation of lock cylinders into special doors.
- B. Install door frames, hang doors, and install finish hardware, which are furnished under the following designated Sections:
  - 1. Section 08 11 13 - HOLLOW METAL DOORS AND FRAMES
  - 2. Section 08 14 16 - FLUSH WOOD DOORS
  - 3. Section 08 71 00 - DOOR HARDWARE

## 1.3 RELATED REQUIREMENTS

- A. Section 01 74 19 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL: Procedural and administrative requirements for construction and demolition recycling.
- B. Section 06 10 00 - ROUGH CARPENTRY: Wood Blocking.
- C. Section 08 11 13 - HOLLOW METAL DOORS AND FRAMES
- D. Section 08 14 16 - FLUSH WOOD DOORS
- E. Section 08 71 00 - DOOR HARDWARE
- F. Section 08 80 00 – GLAZING: Installation of field-installed glazing, with final installation of loosely-attached glazing stops.

## 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. 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 View Scope
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 E152 - Methods of Fire Tests of Door Assemblies.
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.

#### 1.5 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 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.

## 1.6 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. 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.
- 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.

## 1.7 QUALITY ASURANCE

- A. General: Notify the Architect where conflicts apply between referenced standards, specified materials, and methods of construction.

## 1.8 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.

**1.9 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.
- 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 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 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. Install hardware (except hinges) after field painting of doors and frames, or field sealing of doors has been completed.
- D. Drill and tap screw holes in steel frames and doors for surface mounted hardware.
- E. Install hardware at the location (heights) indicated on Drawings, or as otherwise required by regulatory requirements.
- F. Carefully fit and securely attach hardware items to doors and 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 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. Maximum clearance under bottom of door to floor: 3/4 inch.
    - b. Maximum clearance under bottom of door to saddle or threshold: 1/4 inch, plus or minus 1/8 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.
  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 GENERAL PROVISIONS

- A. The BIDDING REQUIREMENTS, CONTRACT FORMS, and CONTRACT CONDITIONS as listed in the Table of Contents, and applicable parts of Division 1 - GENERAL REQUIREMENTS, shall be included in and made a part of this Section.
- B. Examine all Drawings and all other Sections of the Specifications for requirements therein affecting the work of this Section.

## 1.2 SUMMARY

- A. Furnish the following products to be installed under the designated Sections:
  - 1. Flush UL-Labeled and non-labeled steel doors, complete with internal reinforcing, hardware cut-outs; and provided with glazing openings, where so indicated; installed by Section 06 20 00 - FINISH CARPENTRY.
  - 2. Hollow metal frames for doors, UL-Labeled and non-labeled, complete with internal reinforcing; installed under Section 06 10 00 - ROUGH CARPENTRY.
    - a. All door frames shall come prepared with a back box installed at the hinge. Door shall be prepared with through hole cut in the frame at the hinge to the back box.
  - 3. Hollow metal frames for fixed-glazed window conditions, complete with internal reinforcing; installed by: Section 06 10 00 - ROUGH CARPENTRY.
  - 4. Glazing beads, loosely attached to hollow metal frames and doors, where so indicated, for removal and permanent installation during glazing operations; installed by: Section 08 80 00 - GLAZING.

## 1.3 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 for construction and demolition recycling.
- C. Section 06 10 00 - ROUGH CARPENTRY:
  - 1. Wood blocking, and nailers.
  - 2. Installation of hollow metal frames.
  - 3. Placement and temporary bracing of hollow metal frames built-into masonry.
- D. Section 06 20 00 - FINISH CARPENTRY: Installation of doors and hardware.
- E. Section 08 14 16 - FLUSH WOOD DOORS: Furnishing wood doors to be installed in hollow metal frames.
- F. Section 08 71 00 - DOOR HARDWARE: Furnishing finish hardware, and installation templates for hardware cut outs and reinforcing.

- G. Section 08 80 00 - GLAZING: Furnishing and installing glass located in doors and frames.
- H. Building-in of frame anchors to wall and partition construction: By trade responsible for wall and partition erection.

#### 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. 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 A250.8 (formerly SDI 100) - Recommended Specifications for Standard Steel Doors and Frames.
  - 4. ASTM A109 / A109M - Standard Specification for Steel, Strip, Carbon (0.25 Maximum Percent), Cold-Rolled.
  - 5. ASTM A568 / A568M - Standard Specification for Steel, Sheet, Carbon, Structural, and High-Strength, Low-Alloy, Hot-Rolled and Cold-Rolled, General Requirements for.
  - 6. ASTM A653 / A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
  - 7. ASTM A924 / A924M - Standard Specification for General Requirements for Steel Sheet, Metallic-Coated by the Hot-Dip Process.
  - 8. 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.
  - 9. 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.
  - 10. ASTM C1363 - Standard Test Method for Thermal Performance of Building Materials and Envelope Assemblies by Means of a Hot Box Apparatus.
  - 11. ASTM E283 – Standard Test Method for Determining Rate of Air Leakage Through Exterior Windows, Skylights, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen.
  - 12. 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.
  - 13. ASTM E1996 - Standard Specification for Performance of Exterior Windows, Curtain Walls, Doors, and Impact Protective Systems Impacted by Windborne Debris in Hurricanes.

14. SDI 111 Series (111A-111F): Recommended Details, Steel Doors and Frames.
15. SDI 117-93: Manufacturing Tolerances for Standard Steel Doors and Frames.
16. NFPA publication 80 - Fire Doors and Windows.
17. NFPA publication 105 – Standard for the Installation of Smoke Door Assemblies.
18. UL publication 10B - Fire Tests of Door Assemblies.
19. UL 1784 – Air Leakage Tests of Door Assemblies.
20. All applicable federal, state and municipal codes, laws and regulations for exits.

#### 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, for doors, frames and shop applied finishes.
  2. Certification: 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 UL fire-resistive requirements for the indicated Labels have been met.
  3. 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 all gages, cut-outs for glazing in doors, reinforcing, and anchorage.

#### 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 SEQUENCING AND SCHEDULING

- A. Coordinate the work of this Section with the respective trades responsible for furnishing hardware and installing doors and frames.
- B. Ensure that the work performed hereunder is coordinated with issued templates authorized by the hardware supplier.
- C. 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.

**1.8 DELIVERY, STORAGE, AND HANDLING**

- A. 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.
- B. Deliver doors and frames boxed or crated to provide protection during transit and job storage.
- C. 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.
- D. 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. Republic Doors and Frames, McKenzie, TN.
  - 5. Steelcraft (A Division of Ingersoll-Rand Company), Cincinnati, OH.
- B. Unless otherwise specifically accepted by Architect, all doors and frames shall be of one manufacturer.

**2.2 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.

### 2.3 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 (all frames in new construction): Shop welded frames with mitered joints arc-welded, reinforced and ground smooth.
  - 2. Frame type (frames in existing construction), non rated frames and fire-resistance rated frames: Knock-down slip-on type frames with hairline mitered joints and concealed clip reinforcement.
  - 3. 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 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 subcontractor shall furnish and install  $\frac{3}{4}$  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: 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. Anchors for frames in 'new' masonry: 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.

3. Anchors for frames in existing masonry walls: Counter-sunk bolts of minimum 3/8 inch diameter, set into masonry expansion shields.
  - a. Installed countersunk bolts to be filled with auto-body compound, and sanded smooth ready for field-applied touch-up primer and paint finish.
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.

#### 2.4 FABRICATION TOLERANCES

- A. Maximum variation for doors and frames: Maximum diagonal distortion 1/16 inch measured with straight edge, corner to corner.

#### 2.5 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.

### 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 06 10 00 - ROUGH CARPENTRY, and Section 06 20 00 - FINISH CARPENTRY.
  1. Section 06 10 00 - ROUGH CARPENTRY shall place frames in correct position within specified tolerances, and provide temporary bracing 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

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Section 08 14 16  
FLUSH WOOD DOORS**PART 1 - GENERAL**

## 1.1 GENERAL PROVISIONS

- A. The BIDDING REQUIREMENTS, CONTRACT FORMS, and CONTRACT CONDITIONS as listed in the Table of Contents, and applicable parts of Division 1 - GENERAL REQUIREMENTS, shall be included in and made a part of this Section.
- B. Examine all Drawings and all other Sections of the Specifications for requirements therein affecting the work of this Section.

## 1.2 SUMMARY

- A. Furnish the following products to be installed under the designated Sections:
  - 1. Flush solid core wood doors, complete with necessary blocking, hardware cutouts; and provided with openings for glazing and louvers, where so indicated, for installation under: Section 06 20 00 - FINISH CARPENTRY.
    - a. Provide "Dutch" door configuration where scheduled.
  - 2. Wood glazing beads, loosely attached to glazing cutouts in doors for removal and permanent installation under: Section 08 80 00 - GLAZING.

## 1.3 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 for construction and demolition recycling.
- C. Section 06 10 00 - ROUGH CARPENTRY: Wood blocking, and nailers; installation of steel door frames.
- D. Section 06 20 00 - FINISH CARPENTRY: Installation of doors and hardware.
- E. Section 08 11 13 - HOLLOW METAL DOORS AND FRAMES: Hollow metal frames scheduled to receive wood doors.
- F. Section 08 71 00 - DOOR HARDWARE: Furnishing finish hardware, and installation templates for hardware cutouts.
- G. Section 08 80 00 - GLAZING: Installation of glazing in doors.

## 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. 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. ANSI Z97.1 - Safety Performance Specifications and Methods of Test for Safety Glazing Used in Buildings.
  10. Federal Safety Standards for Architectural Glazing Materials 16CFR1201.
  11. NFPA publication 80 - Fire Doors and Windows.
  12. NFPA publication 252 – Standard Methods of Fire Tests of Door Assemblies.
  13. UBC 43.2 – Fire Tests of Door Assemblies.
  14. UL 10B - Fire Tests of Door Assemblies.
  15. UL 10C – Positive Pressure Fire Door Test Method.
  16. Warnock-Hersey - Certification Listings for fire doors.
  17. 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-13.
- C. Definitions:
1. NAUF: No added Urea Formaldehyde.

## 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. Certificates: 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. 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.
3. Door schedule: All doors specified under this Section, coordinated with the schedule 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 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. Selection samples: Plastic laminate sample chain.
  6. 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. Frames for light openings, 6 inches (150 mm) long, for each material, type, and finish required.
    - d. Louver blade and frame sections, 6 inches (150 mm) long, for each material and finish specified.

#### 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 1-A-97, except as modified herein.

#### 1.7 REGULATORY REQUIREMENTS

- A. Fire rated door construction shall conform to UL 10B and 10C as applicable.
- B. Install doors in compliance with NFPA publication 80.

#### 1.8 SEQUENCING AND SCHEDULING

- A. Coordinate the work of this Section with the respective trades responsible for furnishing hardware and installing wood doors.
- B. Ensure that the work performed hereunder is coordinated with issued templates authorized by the hardware supplier.

- C. 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.

#### 1.9 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. Deliver wood doors in resilient non-staining moisture proof packaging, provide protection during transit and job storage. Clearly identify doors with door opening number, matching those indicated on the approved Door Schedule.
- C. 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.
- D. 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.

#### 1.10 FIELD MEASUREMENTS

- A. Verify that field measurements are as indicated on shop drawings.

#### 1.11 WARRANTY

- A. Provide the following warranties under provisions of Section 01 78 00 - CLOSEOUT SUBMITTALS, and in compliance with Section 01 78 36 – WARRANTIES. Warranties shall include delamination of veneer, warping beyond specified installation tolerances, defective materials, and telegraphing core construction, all as defined by AWI Quality Standards.
  - 1. Warranty length:
    - a. Interior doors: Manufacturer's lifetime warranty.
  - 2. 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 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. Lambton Doors, Lambton Quebec Canada.
  - 2. Masonite Architectural, Tampa FL..
  - 3. VT Industries Inc., Holstein IA.
  - 4. Oshkosh Door Company, Oshkosh WI.



## 2.2 DESCRIPTION

- A. General Description: Flush wood doors conforming to the requirements set forth in the designated Sections of the (WDMA) Industry Standard IS 1A-13, 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 cut-outs in doors, and other characteristics of doors to be furnished hereunder.
1. Door Grade: Premium.
  2. 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.
    - b. Crossbanding: Hardwood veneer or composite product at least 1/16 inch thick.
- 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.

## 2.3 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. Door facing: As specified herein above under Article 2.2 – DESCRIPTION.
- C. 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 1/16 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: Provide blocking as required to meet WDMA Extra Heavy Duty performance for securing surface applied hardware without the use of through bolts.
    - 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.
- D. Adhesives: Type 1 (waterproof) for both face and core assembly.
- 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 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 2.2 - DESCRIPTION.
- 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 no added urea-formaldehyde particleboard. Furnish certification of formaldehyde free products.
  - 2. Stiles: Stile construction that meets or exceeds WDMA Extra Heavy Duty performance. Structural composite lumber with minimum 1/2" hardwood outer stile of same specie as face veneer, minimum overall 1 inch after trimming
  - 3. Top and bottom rails: Maple, Birch, Structural Composite Lumber (SCL) or UL approved composite material to meet label requirements, minimum 7/8 inch width, after trimming.
  - 4. Blocking: Provide blocking as required to meet WDMA Extra Heavy Duty performance for securing surface applied hardware without the use of through bolts.
    - 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.
- D. Adhesives: Type 1 (waterproof) for both face and core assembly.
- 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.

#### 2.5 NON-RATED SOLID-CORE DOORS

- A. General Construction: WDMA Industry Standard, 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 2.2 – DESCRIPTION.
- C. Core construction:
1. Core: Particleboard complying with ANSI A208.1 Type 1, Grade 1-LD-2 High density particleboard, minimum 37 pounds per cubic foot, which meets or exceeds WDMA Extra Heavy Duty performance requirement for face screw holding.
    - a. Provide only no added urea-formaldehyde particleboard. Furnish certification of formaldehyde free products.
  2. Stiles: Stile construction that meets or exceeds WDMA Extra Heavy Duty performance. Structural composite lumber with minimum 1/2" hardwood outer stile of same specie as face veneer, minimum overall 1 inch after trimming.
  3. Top and bottom rails: Maple, Birch, Structural Composite Lumber (SCL) or UL approved composite material to meet label requirements, minimum 7/8 inch width.
  4. Blocking: Provide blocking for securing surface applied hardware without the use of through bolts.
    - a. For doors scheduled to receive screw-mounted surface closers, provide top rail blocking.
    - b. Provide additional blocking for all other surface mounted hardware.
- D. Adhesives: Type 1 (waterproof) for both face and core assembly.

## 2.6 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.

## 2.7 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 N°. "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.

## 2.8 FABRICATION

- A. Fabricate doors in accordance with specified manufacturer's requirements. Fabricated rated doors in compliance with WHI, or UL requirements.
- 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 all openings in doors as scheduled. Field cutting of openings is prohibited.
- G. 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.

## 2.9 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: AWI Premium Grade Factory Finish System 9, 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

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Section 08 31 00  
ACCESS DOORS AND PANELS**PART 1 - GENERAL**

## 1.1 GENERAL PROVISIONS

- A. The BIDDING REQUIREMENTS, CONTRACT FORMS, and CONTRACT CONDITIONS as listed in the Table of Contents, and applicable parts of Division 1 - GENERAL REQUIREMENTS, shall be included in and made a part of this Section.
- B. Examine all Drawings and all other Sections of the Specifications for requirements therein affecting the work of this Section.

## 1.2 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 09 29 00 - GYPSUM BOARD: Installation of access panels into drywall assemblies.

## 1.3 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 for construction and demolition recycling.
- C. Section 09 29 00 - GYPSUM BOARD: Installation of access panels into drywall assemblies.
- D. Division 21 - FIRE SUPPRESSION: Furnishing access panels required for fire protection systems.
- E. Division 22 - PLUMBING: Furnishing access panels required for plumbing systems.
- F. Division 23 - HEATING, VENTILATING AND AIR CONDITIONING: Furnishing access panels required for heating/cooling systems.
- G. Division 26 - ELECTRICAL: Furnishing access panels required for electrical systems.

## 1.4 REFERENCED STANDARDS:

- 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 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 E282 (Withdrawn Standard) - Method for Spectrographic Analysis of Carbon and Low-Alloy Steel by the Point-To-Plane Technique.
2. ASTM E331 – Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference.
3. All applicable federal, state and municipal codes, laws and regulations for exits.

#### 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 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.

#### 1.6 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 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.
    - b. 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.
  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 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.
    - b. 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: 14 gage galvanized bonderized 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.

## 2.5 FACTORY FINISHING

- A. Panel assemblies fabricated from stainless steel: N°. 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

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## Section 08 43 13

## ALUMINUM-FRAMED STOREFRONTS

**PART 1 - GENERAL**

## 1.1 GENERAL PROVISIONS

- A. The BIDDING REQUIREMENTS, CONTRACT FORMS, and CONTRACT CONDITIONS as listed in the Table of Contents, and applicable parts of Division 1 - GENERAL REQUIREMENTS, shall be included in and made a part of this Section.
- B. Examine all Drawings and all other Sections of the Specifications for requirements therein affecting the work of this Section.

## 1.2 SUMMARY

- A. Furnish and install the following:
  - 1. Prefinished aluminum exterior entrance and interior screw spline 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.
    - a. All door frames shall come prepared with a back box installed at the hinge. Door shall be prepared with through hole cut in the frame at the hinge to the back box.
  - 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. Modified bituminous air barrier transition membrane furnished by Section 07 27 13 – Modified Sheet Air Barriers. Transition membrane shall be installed to lap from the air barrier over and seal to the vertical receptor flange.

## 1.3 RELATED REQUIREMENTS

- A. Section 01 45 00 – QUALITY CONTROL: 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 73 00 - EXECUTION: Waste Management and Recycling during Final Cleaning.

- D. Section 01 74 19 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL: Procedural and administrative requirements for construction and demolition recycling.
- E. Section 06 10 00 - ROUGH CARPENTRY: Wood blockings, nailers.
- F. Section 07 92 00 - JOINT SEALERS: Requirements for sealant and back-up materials.
- G. Section 08 71 00 - DOOR HARDWARE: Furnishing finish hardware for the work of this Section.
- H. Section 08 80 00 - GLAZING: Requirements for glass and specification of glass types used for aluminum storefront systems.

#### 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. AAMA 501 - Methods of Test for Metal Curtain Walls.
  - 2. AAMA 2605 - Specification for High Performance Organic Coatings on Architectural Extrusions and Panels.
  - 3. ASCA 96 - Voluntary Specification for Performance of Organic Coatings on Architectural Aluminum Curtainwall, Extrusions and Miscellaneous Aluminum Components.
  - 4. AAMA 1503.1 – Voluntary Test Method for Thermal Transmittance and Condensation Resistance of Windows, Doors, and Glazed Wall Sections
  - 5. AAMA SFM-1 - Aluminum Storefront and Entrance Manual.
  - 6. ANSI A 117.1 - Safety Standards for the Handicapped.
  - 7. ANSI Z 97.1 - Safety Performance Specifications and Methods of Test for Safety Glazing Used in Buildings.
  - 8. ASTM A123 – Standard Specification for Zinc (Hot-Dip Galvanized) Coating on Iron and Steel Products.
  - 9. ASTM A386 (Withdrawn Standard) - Specification for Zinc Coating (Hot-Dip) on Assembled Steel Products.
  - 10. ASTM B209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate.
  - 11. ASTM B221 – Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.
  - 12. ASTM C509 –Standard Specification for Elastomeric Cellular Preformed Gaskets and Sealing Materials.
  - 13. ASTM C719 – Standard Test Method for Adhesion and Cohesion of Elastomeric Joint Sealants Under Cyclic Movement (Hockman Cycle).
  - 14. ASTM C794 - Standard Test Method for Adhesion-in-Peel of Elastomeric Joint Sealants.

15. ASTM C864 - Standard Specification for Dense Elastomeric Compression Seal Gaskets, Setting Blocks, and Spacers.
16. ASTM C920 – Standard Specification for Elastomeric Joint Sealants.
17. ASTM C1248 - Standard Test Method for Staining of Porous Substrate by Joint Sealants.
18. ASTM D412 - Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers—Tension.
19. ASTM D523 – Standard Test Method for Specular Gloss.
20. ASTM D2240 - Standard Test Method for Rubber Property - Durometer Hardness.
21. ASTM E283 - 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 E330 - Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference.
23. ASTM E331 - Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference.
24. All applicable federal, state and municipal codes, laws and regulations for exits.

## 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, fabrication methods, finishes, performance data, and installation instructions for each item furnished hereunder.
    - a. Provide additional information for glazing and sealant products; including chemical, functional, and environmental characteristics, size limitations, special application requirements. Identify available colors.
  2. Testing Requirements: Provide manufacturer's test data demonstrating compliance with specified requirements for test specimens of similar size and type to those required for the project.
  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 of each entrance and storefront system condition, indicate all hardware mounting heights.
      - 1) Indicate all types and thickness of glass.
    - b. Large scale design details; indicating sizes, types, and gauges of all metal components; expansion provisions, and glazing details.
      - 1) Provide details of perimeter conditions and typical joinery. Indicate which framing members run through and how joints are sealed.
      - 2) Provide details of transition areas and modifications to standard system components.

- 3) Provide details of bracing and stabilizing members; attachment clips and brackets; and complete installation details.
      - 4) Provide details of weep system for draining moisture occurring within the system to the exterior.
      - 5) Indicate building column line reference dimensions.
    - c. Design engineering shall be the responsibility of the framing systems manufacturer, and may vary from those indicated on the Contract Drawings, but basic sight lines shall be retained.
  5. Selection samples:
    - a. Sample card indicating Manufacturer's full range of coating colors available for selection by Architect.
    - b. Provide physical samples 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 aluminum sheet used for brake metal components, prefinished in the specified finish system in selected colors.
- 1.6 MOCK-UP
  - A. Provide mock-up elements for field panel in accordance with Section 01 45 00 – QUALITY CONTROL 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 05 40 00 – COLD-FORMED METAL FRAMING.
- 1.8 DELIVERY, STORAGE AND HANDLING
  - A. Protect pre-finished aluminum surfaces with wrapping. Do not use adhesive papers or sprayed coatings which bond when exposed to sunlight or weather.
  - B. Store framing and glazing materials in manner to keep them dry, protected from weather, direct sunlight, surface contamination, corrosion and damage from construction traffic and other causes.
- 1.9 ENVIRONMENTAL REQUIREMENTS
  - A. Do not install sealant when ambient temperature is less than 40 degrees Fahrenheit.
  - B. Maintain this minimum temperature during and 48 hours after installation of sealant.



**1.10 FIELD MEASUREMENTS**

- A. Verify that field measurements are as indicated on shop drawings.

**1.11 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.
- B. Do not order or deliver any materials until all submittals, required hereunder, have been received and approved by the Architect.
- C. Arrange keying, and schedule delivery of keys, with Owner.

**1.12 WARRANTY**

- A. 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 written warranty for entrance and storefront 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.

**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 403T".
- 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.
- C. Sole Source: Manufacturer for the work of this Section shall be same as providing glazed curtainwall systems specified under Section 08 44 13.

## 2.2 DESCRIPTION

- A. General Description: Storefront framing systems: Integrated flush-glazed, outside glazed, stick fabricated system. Vertical and horizontal framing members shall be of shear block construction.
1. System shall provide flush glazing on all sides for the indicated thickness of glass, with no projected glazing stops.

## 2.3 FRAMING SYSTEM

- A. Exterior storefront framing systems: Nominal dimension of 2 inch face width (sight-line) by 4-1/2 inch total depth, thermally broken system, suitable to receive insulating glass.
1. Glazing: Center Glazed.
  2. Utilize shear block type construction throughout. No visible raw edges are permitted at joints.
  3. Acceptable products include the following, or approved equal:
    - a. EFCO "403 (T)" system.
    - b. Kawneer "Trifab VersaGlaze 451T" system.
    - c. Oldcastle "3000 Thermal MultiPlane – Center Set" system.
    - d. Wausau "14000 thermally-broken" Series.
    - e. YKK: "YES 45 TU" system.
- B. Interior framing systems: Nominal dimension of 2 inch face width (sight-line) by 4-1/2 inch total depth (non-thermally broken) system.
1. Glazing: Center Glazed.
  2. Utilize screw spline fabrication.
  3. Acceptable products include the following, or approved equal:
    - a. EFCO "402 (NT)" system.
    - b. Kawneer "Trifab VersaGlaze 450 (optional 2 inch)" system.
    - c. Oldcastle "FG3000" system.
    - d. Wausau "14000 non-thermal" Series.
    - e. YKK: "YES 45 CI" system.

## 2.4 PERFORMANCE REQUIREMENTS

- A. General: Design, fabricate, assemble and erect storefront system, and interfacing conditions with contiguous work, to ensure continuity of building enclosure vapor and air barriers and that all segments of the assemblies will be free from leakage under every condition of weather and exposure. In addition to the specified performance requirements, storefront system shall conform to, or exceed the requirements of the applicable building code and referenced industry standards for air infiltration, water infiltration, operating forces, deflection and deformation under load.
- B. Engineering criteria: The manufacturer for storefront 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: Entrance/storefront system shall conform to the International Building Code, 2018 edition, as published by the International Code Council, Inc. (I.C.C.), as revised by RISBC-1 Rhode Island Building Code:
  - a. Design Wind Speed (v): 137 miles per hour (3 second gust), both positive (acting inward) and negative (acting outward) wind pressure loading.
  - b. Occupancy Risk Factor: III.
  - c. Exposure: "B".
  - a. Wind Loads in accordance with ASCE-7-10.
- C. Testing Requirements: Provide manufacturer's testing and submit test data. Demonstrate compliance with specified requirements.
  1. Test Sequence: Air infiltration testing shall precede water resistance testing.
- D. Test samples:
  1. Frame Sample(s) for air infiltration, water penetration and structural tests: Minimum sample size: 12'-0" high by 4'-0" wide.
  2. Door Samples for air infiltration tests:
    - a. For single doors: Minimum size 3'-0" x 7'-0".
    - b. For double doors: Minimum size 6'-0" x 7'-0".
- E. Frame:
  1. Air infiltration through assembly: tested specimen in accordance with ASTM E 283, with a static pressure difference of 6.24 psf, shall not exceed 0.06 cfm per square foot of unit surface area.
  2. Water resistance: Test specimen in accordance with ASTM E 331. There shall be no leakage at a minimum static air pressure differential of 8 psf as defined in AAMA 501.
    - a. Water leakage for laboratory and field testing shall be defined as no uncontrolled water penetrating system or appearing on normally exposed interior surfaces
  3. Deflection: test in accordance with ASTM E330 at a static air pressure difference of 31 psf (positive and negative).
    - a. Deflection of framing members perpendicular to the plane of the wall shall not exceed L/175 of its clear span.
    - b. At a structural test load equal to 1.5 times the specified design load, no glass breakage or permanent set in the framing members in excess of 0.2 percent of their clear spans shall occur.
  4. Uniform structural loading: test in accordance with ASTM E330 at a static air pressure difference of 1.5 times the design wind pressure prescribed by the Rhode Island State Building Code. Test will result of no water leakage glass breakage, permanent damage to fasteners, permanent deflection in framing, or other damage which would cause the storefront be defective.

5. Condensation resistance tests (CRF): conform to AAMA 1503.1 for a minimum CRF of 56, and a maximum conductive thermal transmittance "U-Value" of  $U_c$  0.35.

F. Entrance doors:

1. Air infiltration through assembly, tested in accordance with ASTM E283 with a static pressure difference of 1.57 psf.
  - a. For single doors, air infiltration shall not exceed 0.50 cfm per linear foot of perimeter crack.
  - b. For double doors, air infiltration shall not exceed 0.10 cfm per linear foot of perimeter crack.

## 2.5 FRAMING MATERIALS

- A. Framing and door members shall be of extruded aluminum 6063-T5, 6063-T6, or 6061-T6 alloy and temper, as recommended by manufacturer for strength, corrosion resistance and specified finish, complying with ASTM B 221.
  1. Wall thickness of frame extrusions: not less than 0.080 inch
- B. Sill track shall be of special purposed high strength extruded aluminum in either 6351-T5 or 6061-T5 alloy and temper as recommended by manufacturer for strength, corrosion resistance and specified finish, complying with ASTM B 221.
- C. Formed flashings and closures shall be of aluminum Alloy/temper 5005-H34, minimum of 0.083 inch thick, complying with ASTM B 209.
  1. Provide and install all miscellaneous formed aluminum work in conjunction with the aluminum frame work as detailed and required to complete the work including but not limited to sills, mullion covers, closures, flashings.
- D. Aluminum sections shall be of sizes and profiles indicated on the approved shop drawing details; shall present straight, sharply defined lines and arises; and shall be free from defects impairing strength, durability, or appearance.
- E. System shall provide flush glazing on all sides for the indicated thickness of glass, with no projected glazing stops.
- F. 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, compatible with the aluminum frame members. All such devices shall be of suitable type and adequate capacity for each intended purpose. The aluminum work shall generally be constructed and erected without use of exposed fasteners. However, where exposed, the fasteners shall be finished to match the finish of surrounding aluminum.
  1. Exposed fasteners: countersunk, flat head type, flush with surrounding surface.

## 2.6 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.

## 2.7 BUILDING ENTRY - EXTERIOR ENTRANCE DOORS

A. 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".

B. 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.

C. Door frame: Nominal 2 inch width by 4-1/2 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.

## 2.8 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 under Section 08 71 00 – DOOR HARDWARE.

## 2.9 ALUMINUM "BREAK-METAL" AND "PANNING WORK"

- A. Fabricate and install all extruded aluminum and formed sheet aluminum "brake-metal" work in conjunction with the aluminum window, curtain wall 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.
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 not more than 16 inches on center.
  4. Provide manufacturer's standard aluminum receptor (subframe) as shown on the Drawings.
- 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.

## 2.10 GLASS AND GLAZING MATERIALS

- A. Glazing materials, including all sealant, tapes and gaskets, shall be as recommended by the storefront/entrance system manufacturer, and shall be in strict accordance with the manufacturer's printed instructions. It shall be the responsibility of the aluminum system manufacturer to provide glazing materials which are appropriate for the various uses and conditions, compatible with each other and also compatible with the materials with which in contact.
1. Continuous cushions beneath all glazing materials: Extruded dense EPDM rubber gaskets (60 +/- Shore A durometer), complying with ASTM C 864.
  2. Continuous and recessed spacers: Extruded, closed-cell sponge neoprene or EPDM gaskets (40 +/- 5 Shore A durometer) complying with ASTM C 509.
- B. Glass types identified in this Section are specified under Section 08 80 00 - GLAZING.

1. 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.
2. Glass type A - Insulated "Low-E" glass at typical locations, except where Type B is required.
3. Glass type B - Insulated "Low-E" safety glass with tempered glass:
  - a. Provide at all aluminum entrance systems for aluminum framing at sidelights and where bottom of glass is less than 18 inches to either finished floor or grade (whichever is less).
4. Glass type C - Clear tempered glass:
  - a. Provide at aluminum entrance doors where indicated.

## 2.11 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.
- B. Shims: "U" shaped structural shims complying with the following:
  1. Material: High impact polystyrene, interlocking or non-interlocking to achieve necessary thicknesses.
  2. Sizes: 1-1/2 by 2 inch by 1/16 inch thick, Part No. WS 1060 (blue); 1-1/2 by 2 inch by 1/8 inch thick, Part No. WS 1125 (red); 1/2 by 2 inch by 1/4 inch thick, Part No. WS 1250 (black).
  3. 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. AccuTrex Products, Inc. Canonsburg, PA.
    - b. Accushim, Lyons, IL.
    - c. Mr. Shims, Villa Park, IL.
- C. Sealant and backing materials.
  1. Sealant used within system: As recommended by manufacturer.
  2. Perimeter Sealant: Multi-component gun-grade polyurethane sealant Low modulus type, non-sagging, conforming to FS TT-S-000227E, Type II, Class A, and ASTM C 920, Type M, Class 25, Grade NS, use NT, M, A and O with a minimum movement capability of  $\pm 50$  percent, equal to the following:
    - a. Tremco, Beachwood OH.; product "Dymeric 240 / Dymeric 240FC".
    - b. BASF Sonneborn Building Products Inc., Minneapolis MN.; product, "Sonolastic NP2".
    - c. Pecora Corporation, Harleysville PA.; product "Dynatrol II".
    - d. Sika Corp, Lyndhurst NJ.; product, "Sikaflex 2CNS".

3. Compressible joint bead back-up: Compressible closed cell polyethylene, extruded polyolefin foam or polyurethane foam rod, 1/3 greater in diameter than width of joint. Provide one of the following, or equal
  - a. Chargar Corp. Hamden, CT., product "Green Rod".
  - b. Industrial Thermo Polymers Ltd., Brampton, Ontario, CN, product "ITP Standard Backer Rod".
  - c. BASF Sonneborn Building Products Inc., Minneapolis, MN, product "Sonolastic Closed Cell Backer Rod".
  - d. W.R. Meadows Inc., Hampshire, IL, product "Sealtight Kool-Rod".
4. 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.
5. 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.

## 2.12 FABRICATION

- A. 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. This work on all door frames will include through holes 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  $\frac{3}{4}$  inch conduit from the hinge frame back box to the accessible ceiling space above each door frame where this preparation work is completed.
- B. Check dimensions of openings for entrance and storefront systems in the actual construction by accurate field measurement before fabrication. When necessary to proceed with the fabrication without field measurements, coordinate and control installation tolerances to ensure proper fit of the aluminum entrance and storefront systems.
- C. Except for application of hardware, do not use exposed fasteners. For hardware, use Phillips flat-head machine screws; match finish of member or hardware being fastened.
- D. Before shipment, complete fabrication, assembly, finishing, hardware application, and other work to the greatest extent possible. Disassemble only for shipment and installation.
- E. Do not drill and tap for surface-mounted hardware until installation.
- F. Perform fabrication, including cutting, fitting, forming, drilling and grinding to prevent damage to exposed finish surfaces. For hardware, perform prior to application of finishes.
- G. Welding: Comply with AWS recommendations; grind exposed welds smooth and restore mechanical finish.
- H. Dissimilar Metals: Separate dissimilar metals with zinc chromate primer, bituminous paint, or other separator.



- I. Continuity: Maintain accurate relation of planes and angles, with hairline fit of contacting members.

## 2.13 FACTORY FINISHING

- A. Aluminum finish: Shop-applied, fully oven cured Polyvinylidene Fluoride (PVDF) resin based, high performance thermoplastic organic coating applied to all exposed surfaces, including all exposed screws, fastenings having a minimum total film thickness of 2 mils and conforming to AAMA 605.2 (latest edition), 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. PPG Industries Inc.; product "Duranar XL."
    - b. Valspar Corp., product: "Flurothane."
  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. Primer: Corrosion resistant, epoxy or urethane based primer compatible with finish coating, averaging 0.2 to 0.3 mils dry film thickness.
  5. Barrier Coat: Epoxy-based primer compatible with finish coating, averaging 0.70 to 0.80 mils dry film thickness.
  6. Finish Coat (Color Coat): Polyvinylidene fluoride enamel averaging 0.70 to 0.80 mil dry film thickness.
  7. Top Coat: Polyvinylidene fluoride enamel clear top coat averaging 0.45 to 0.55 mils dry film thickness
  8. Color and Appearance: Provide one custom color to match architects sample without additional cost to the owner. Color will NOT be considered "exotic" or "metallic" by the coatings manufacturer.
    - a. Gloss: Medium, measured by ASTM D523, 35±5 at 60 degrees Fahrenheit.
- B. Concealed Steel Items: Galvanized in accordance with ASTM A 386 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.
- B. Beginning of installation means acceptance of existing project conditions.
- C. Verify wall openings and adjoining air and vapor seal materials are ready to receive work of this Section

- D. 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.

### 3.2 ERECTION

- A. Coordinate the installation of the entrance and storefront systems, and related items to be furnished hereunder with the work of the other trades responsible for providing receiving and interfacing materials, and ensure that all receiving and supporting surfaces have been completed and ready to receive the work of this Section.
- B. Perform the installation work in strict accordance with the approved shop drawings, and the manufacturers' installation instructions, and the herein-referenced standards. Erect the various systems and items plumb and true, in proper alignment and relation to established lines and grades.
- C. All shims shall be aluminum. Wood shims will not be acceptable.
- D. Provide sheet aluminum closures as indicated or required to complete the Work.
- E. Provide thermal isolation where components penetrate or disrupt building insulation.
- F. Install flashings and set thresholds in bed of mastic and secure.
- G. Perform all glazing work in accordance with FGMA Glazing Manual SIGMA and LSGA standards, and with the entrance and storefronts framing system manufacturers' recommended glazing procedures.
  - 1. All glass at entrance and storefront frames shall be set by use of resilient glazing gaskets between both interior and exterior stops and glass, weathertight, in strict accordance with the printed glazing instructions of the manufacturers of aluminum work and glazing materials.
  - 2. All glass at aluminum doors shall be set by the use of resilient glazing gaskets provided on the glazing stops, in weathertight, in strict accordance with the printed glazing instructions of the manufacturer.
- H. Ensure that all metal-to-metal and metal-to-glass joints are completely weathertight, and that adequate provisions have been made to permit expansion and contraction in the metal.
- I. Except required by code, no permanent exposed to view labels of any kind will be permitted to remain on the doors, frames or glass.
- J. Install components to drain water passing joints, condensation occurring within framing members, and moisture migrating within the system to exterior.
- K. Provide thermal isolation where components penetrate or disrupt building insulation. Spray foam insulation in shim spaces at perimeter of assembly to maintain continuity of thermal barrier.

### 3.3 TOLERANCES

- A. Attach to structure to permit sufficient adjustment to accommodate construction tolerances and other irregularities. Erect the aluminum entrance and storefront systems 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 doors and hardware for smooth operation and tight fit.
- B. Lubricate hardware and other moving parts.

### 3.5 PROTECTION AND CLEANING OF ENTRANCE SYSTEM

- A. Clean all entrance system promptly after installation, exercising care to avoid damage. Thoroughly clean all metal and glass surfaces free from dirt, handling marks, packing tapes, and foreign matter; remove excess sealant. Remove labels from glass surfaces, and clean and polish same.
- B. The manufacturer shall advise the Contractor of protective treatment and other precautions required by him through the remainder of construction to ensure that the work of this Section will be without damage or deterioration at the time of Substantial Completion of the Contract.

### 3.6 CLEANING OF GLASS

- A. Clean glass surfaces promptly after installation, exercising care to avoid damage to the same. Remove excess sealing compounds, mortar, paint, dirt, and other contaminants.
- B. All exposed edges of sealant and gaskets shall be left smooth, uniform in line, and with edges neatly struck.

### 3.7 GLASS BREAKAGE

- A. Replace in kind and thickness all glass breakage caused by the work performed under this Section, and bear all costs therefor.
- B. Replace in kind and thickness all glass breakage, caused by other trades, because of negligence or any other reasons, with the costs being borne by the trade at fault, or the Contractor, as applicable.

### 3.8 PROTECTION

- A. Protect finished metal surfaces from damage during fabrication, shipping, storage, and erection; advise the Contractor of protective treatment and other precautions required through the remainder of construction.

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, 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 & Finishes.
  - 16. ANSI/BHMA A156.21 Thresholds.
  - 17. ANSI/BHMA A156.22 Door Gasketing and Edge Seal Systems.
  - 18. ANSI/BHMA A156.23 Electromagnetic Locks.
  - 19. ANSI/BHMA A156.24 Delayed Egress Locks.
  - 20. ANSI/BHMA A156.25 Electrified Locking Devices.
  - 21. ANSI/BHMA A156.26 Continuous Hinges.
  - 22. ANSI/BHMA A156.28 Recommended Practices for Mechanical Keying Systems.
  - 23. ANSI/BHMA A156.29 Exit Locks, Exit Locks with Exit Alarms, Exit Alarms, Alarms for Exit.
  - 24. ANSI/BHMA A156.30 High Security Cylinders.
  - 25. ANSI/BHMA A156.31 Electrified Strikes and Frame Mounted Activators.
  - 26. ANSI/BHMA A156.115 Hardware Preparation in Steel Doors with Steel Frames.

27. 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 Geared Hinges: Architectural Builders Hardware, Hager, Ives, National Guard Products, Pemko, Select.
  3. Locksets and Latchsets: Corbin Russwin, Sargent, Schlage.
  4. Exit Devices: Corbin Russwin, Sargent, Von Duprin.
  5. Electric Strikes: Hanchett Entry Systems (HES), SDC, Von Duprin.
  6. Flush Bolts and Door Coordinators: Architectural Builders Hardware, Ives, Rockwood.
  7. Surface Door Closers: Dorma 8900 Series, LCN 4000 Series, Norton 7500 Series.
  8. Architectural Door Trim: Architectural Builders Hardware, Ives, Rockwood.
  9. Auxiliary Hardware: ABH, Ives, Rockwood.
  10. Door Bottoms, Metal Thresholds, Weatherstripping and Gaskets: National Guard Products, Pemko, Reese, Zero.

### 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 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.

## 2.6 CYLINDERS, KEYING AND KEY STORAGE

- A. Match Existing System.

## 2.7 LOCKSETS AND LATCHSETS

- A. Auxiliary Locks shall meet ANSI/BHMA A156.5 requirements.
- B. Electrified Locks shall also meet ANSI/BHMA A156.25 requirements.
- C. Operating trim shall be lever type: Refer to hardware sets.
- D. Lock functions which include thumb turn trim shall be provided with thumb turns compliant with accessibility code requirements.
- E. Lock Throw: Comply with requirements for length of latch bolts to comply with labeled fire door requirements.
- F. Lock backset shall be 2-3/4 inches unless otherwise indicated.
- G. 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.
- H. 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.

## 2.8 EXIT DEVICES

- A. Exit devices and exit device accessories shall meet ANSI/BHMA A156.3, Grade 1 requirements.
- B. Electromechanical exit devices shall also meet ANSI/BHMA A156.25 requirements.
- C. 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.
- D. 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.

- E. Outside Trim: Design, material and finish to match locksets, unless otherwise indicated.
- F. Adjustable strikes shall be provided for rim type and vertical rod devices.
- G. 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.
- H. 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.

## 2.9 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.

## 2.10 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.

## 2.11 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.

#### 2.12 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.

#### 2.13 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.

#### 2.14 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 projecting bolts of latching hardware.

- D. Thresholds at floor closers shall have mitered returns.
- 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.

#### 2.15 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.

#### 2.16 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.
- B. Wood doors shall be factory prepared for hardware per ANSI/BHMA A156.115W.
- C. Installation shall be in accordance with DHI A115.IG.
- D. Hardware for fire door assemblies shall be installed conforming with NFPA 80, and all other applicable building codes and regulations.
- E. Hardware for smoke door assemblies shall be installed conforming with NFPA 105, and all other applicable building codes and regulations.
- F. Install each door hardware item according to manufacturer's printed instructions, utilizing templates and proper fasteners provided by manufacturer.
- G. Set units level, plumb, and true to line and location. Adjust and reinforce attachment substrates as necessary for proper installation and operation.

- H. 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.

### 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: 32 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 knurling at electrical, mechanical rooms.

### Hardware Sets

#### Set: 1.0

Description: Single Opening - Exterior Entry

1 Continuous Hinge	DFM83SLF	10BE	Pemko
1 Rim Exit Device, Storeroom	16 43 8804 ETL	US10BE	Sargent
1 Electric Strike	9600	613E	HES
1 Surface Closer	UNI7500	613E	Norton
1 Threshold	172-10BE	10BE	Pemko
1 Gasketing	S88D x Head and Jambs	Dark Brown	Pemko
1 Sweep	315DN	10BE	Pemko
1 Gasketing	303DS x Head and Jambs	10BE	Pemko

Notes: Coordinate all gasketing with opening manufacturer  
Existing cylinder/core to be re-used

**Set: 2.0**

Description: Paired Opening - Exterior Entry

2 Continuous Hinge	DFM83SLF	10BE	Pemko
1 Mullion	L980	PC	Sargent
2 Rim Exit Device, Storeroom	16 43 8804 ETL	US10BE	Sargent
2 Surface Closer	UNI7500	613E	Norton
1 Threshold	172-10BE	10BE	Pemko
1 Gasketing	S88D x Head and Jambs	Dark Brown	Pemko
1 Mullion Gasketing	5110	Black	Pemko
2 Sweep	315DN	10BE	Pemko
1 Gasketing	303DS x Head and Jambs	10BE	Pemko
1 Astragal	303DST x Door Height		Pemko

Notes: Coordinate all gasketing with opening manufacturer  
Existing cylinder/core to be re-used

**Set: 3.0**

Description: Single Opening - Stairwell

1 Continuous Hinge	GFM83HDI	Gold	Pemko
1 Rim Exit Device, Passage	[12] 43 8815 ETL	US10	Sargent
1 Surface Closer	UNI7500	691	Norton
1 Kick Plate	K1050 10" High x CSK	US10	Rockwood
1 Gasketing	S88D x Head and Jambs	Dark Brown	Pemko

**Set: 4.0**

Description: Paired Opening - Stairwell

2 Continuous Hinge	GFM83HDI	Gold	Pemko
1 Mullion	L980	PC	Sargent
2 Rim Exit Device, Passage	[12] 43 8815 ETL	US10	Sargent
2 Surface Closer	UNI7500	691	Norton
2 Kick Plate	K1050 10" High x CSK	US10	Rockwood

1 Gasketing	S88D x Head and Jambs	Dark Brown	Pemko
1 Mullion Gasketing	5110	Black	Pemko

**Set: 5.0**

Description: Paired Opening - Media Center

Hinges	Hinges to match existing prep size	US10	McKinney
1 Surface Vert Rod Exit	[12] 43 NB8743 ETL	US10	Sargent
1 Surface Vert Rod Exit, Exit Only	[12] 43 NB8710 EO	US10	Sargent
2 Surface Closer x Hold Open	UNI7500H	691	Norton
2 Kick Plate	K1050 10" High x CSK	US10	Rockwood
1 Gasketing	S88D x Head and Jambs	Dark Brown	Pemko
1 Astragal	S771D		Pemko

**Set: 6.0**

Description: Single Opening - Maker Space, small group

Hinge, Full Mortise	TA2714	US10	McKinney
1 Classroom Lock	10G37 LL	US10	Sargent
1 Wall Stop	404	US10	Rockwood
Silencers	608		Rockwood

**Set: 7.0**

Description: Single Opening - Storeroom

Hinges	Hinges to match existing prep size	US10	McKinney
1 Storeroom/Closet Lock	10G04 LL	US10	Sargent
1 Kick Plate	K1050 10" High x CSK	US10	Rockwood
1 Wall Stop	404	US10	Rockwood

**Set: 8.0**

Description: Single Opening - Maker Room to Stairwell

Hinges	Hinges to match existing prep size	US10	McKinney
1 Storeroom/Closet Lock	10G04 LL	US10	Sargent
1 Surface Closer	UNI7500	691	Norton
1 Kick Plate	K1050 10" High x CSK	US10	Rockwood
1 Gasketing	S88D x Head and Jambs	Dark Brown	Pemko
1 Sweep	315		Pemko

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Section 08 80 00  
GLAZING**PART 1 - GENERAL**

## 1.1 GENERAL PROVISIONS

- A. The BIDDING REQUIREMENTS, CONTRACT FORMS, and CONTRACT CONDITIONS as listed in the Table of Contents, and applicable parts of Division 1 - GENERAL REQUIREMENTS, shall be included in and made a part of this Section.
- B. Examine all Drawings and all other Sections of the Specifications for requirements therein affecting the work of this Section.

## 1.2 SUMMARY

- A. General requirements and definition of glass types for glazing work specified under other individual specifications.
- B. Furnish and install:
  - 1. Tempered glass in wood and hollow metal doors and frames.
  - 2. Laminated glass in wood and hollow metal doors and frames.
  - 3. Insulated glass in aluminum entrance and storefront.
  - 4. Fire protective glazing in designated rated doors and frames.
  - 5. All materials required to properly install glass furnished hereunder, including sealant, tapes, setting blocks, and spacers.
- C. Work of this section includes installation of glazing beads furnished under related sections.
  - 1. Work of this Section includes application of wood putty to fill all nail or screw holes in wood glazing beads and refinishing of glazing beads to provide a consistent appearance matching the original finish as supplied.
- D. Pre-Bid Conference: Bidders are strongly encouraged to attend the Pre-Bid conference; refer to ADVERTISEMENT FOR BIDS for time and date.

## 1.3 RELATED REQUIREMENTS

- A. Section 01 74 19 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL: Procedural and administrative requirements for construction and demolition recycling.
- B. Section 07 92 00 - JOINT SEALANTS: Requirements for sealants and backing materials.
- C. 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.
- D. Section 08 14 16 - FLUSH WOOD DOORS: Wood doors, and related glazing stops.

## 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. 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 C1629/C1629M - Standard Classification for Abuse-Resistant Nondecorated Interior Gypsum Panel Products and Fiber-Reinforced Cement Panels.
  12. ASTM D638 - Standard Test Method for Tensile Properties of Plastics.
  13. ASTM D714 - Standard Test Method for Evaluating Degree of Blistering of Paints.
  14. ASTM D790 - Standard Test Methods for Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials.
  15. ASTM D1003 - Standard Test Method for Haze and Luminous Transmittance of Transparent Plastics.
  16. ASTM D1044 - Standard Test Method for Resistance of Transparent Plastics to Surface Abrasion by the Taber Abraser.
  17. ASTM D1308 - Standard Test Method for Effect of Household Chemicals on Clear and Pigmented Coating Systems.
  18. ASTM D3359 - Standard Test Methods for Rating Adhesion by Tape Test.
  19. ASTM D3363 - Standard Test Method for Film Hardness by Pencil Test.
  20. ASTM D4541 - Standard Test Method for Pull-Off Strength of Coatings Using Portable Adhesion Testers.
  21. ASTM D4585/D4585M - Standard Practice for Testing Water Resistance of Coatings Using Controlled Condensation.



22. ASTM D4977/D4977M - Standard Test Method for Granule Adhesion to Mineral-Surfaced Roofing by Abrasion.
  23. ASTM E119 – Standard Test Methods for Fire Tests of Building Construction and Materials.
  24. ASTM E546 – Standard Test Method For Frost/Dew Point of Sealed Insulating Glass Units.
  25. ASTM E576 – Standard Test Method for Frost/Dew Point of Sealed Insulating Glass Units in the Vertical Position.
  26. ASTM E695 - Standard Test Method of Measuring Relative Resistance of Wall, Floor, and Roof Construction to Impact Loading.
  27. ASTM E1300 – Standard Practice for Determining Load Resistance of Glass in Buildings.
  28. 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.
  29. ASTM E1996 - Standard Specification for Performance of Exterior Windows, Curtain Walls, Doors, and Impact Protective Systems Impacted by Windborne Debris in Hurricanes.
  30. ASTM E2010 – Standard Test Method for Positive Pressure Fire Tests of Window Assemblies.
  31. ASTM E2074 - Standard Test Method for Fire Tests of Door Assemblies, Including Positive Pressure Testing of Side-Hinged and Pivoted Swinging Door Assemblies.
  32. ASTM E2188 - Standard Test Method for Insulating Glass Unit Performance.
  33. ASTM E2189 - Standard Test Method for Testing Resistance to Fogging in Insulating Glass Units.
  34. ASTM E2190 - Standard Specification for Insulating Glass Unit Performance and Evaluation.
  35. Federal Safety Standards for Architectural Glazing Materials 16CFR1201.
  36. GANA Sealant Manual (2008 edition).
  37. IGCC: Certified Products Directory, and Certification Guidelines.
  38. NFPA Publication 80 - Fire Doors and Windows.
  39. NFPA 252 – Standard Methods of Fire Tests of Door Assemblies.
  40. NFPA 257 – Standard on Fire Test for Window and Glass Block Assemblies
  41. SGCC: Certified Products Directory, and Certification Guidelines.
- B. 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 (50<sup>th</sup> Anniversary edition).
  3. SIGMA - Vertical Glazing Guidelines, Number A3000-87.
  4. Consumer Product Safety Commission-Safety Standard for Architectural Glazing Materials.

## 1.5 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. 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.
- 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. 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.

## 1.6 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: Show sufficient detail to show fabrication, installation, anchorage, and interface of the work of this Section with the work of adjacent trades.
    - a. 1/4 inch scale elevations and plans of each type of glazing assembly, and mirror assembly; indicate dimensions, and reference details. Verify dimensions with field measurements.
    - b. Large scale design details of glazing conditions; indicating sizes, types, and gauges of all metal components; glazing details, indicating types and thickness of glass; bracing and stabilizing members; attachment clips and brackets; and complete installation details.
  - 3. Samples:
    - a. 12 x 12 inch pieces of each specified type and thickness of glass, bearing labels indicating locations where each type of glass will be used.
    - b. Glazing tape: 12 inch length of specified type and size.

4. Certificates: Manufacturer's written certification stating that the materials installed, meet or exceed the requirements specified under this Section.
- 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.
- 1.7 QUALITY ASSURANCE
- A. General: Perform glazing work in accordance with GANA Glazing Manual, and GANA Laminated Glazing Reference Manual and SIGMA standards for glazing and installations methods.
1. Notify the Architect where conflicts apply between referenced standards, specified materials, and methods of construction.
- B. Glass Labeling:
1. General: Manufacturer's Label shall be, acid-etched, sandblasted, ceramic-fired, laser-etched, embossed, or other similar type which, once applied, cannot be removed without being destroyed.
  2. Safety glass: Label tempered and laminated safety glass with permanent manufacturer's label on each light with the mark visible after installation.
    - a. Furnish SGCC certification for safety glass in compliance with CPSC 16 CFR 1201 Cat 1 or Cat 11, or ANSI Z-97.1.
  3. Fire-rated glass: Label each individual glazing unit with appropriate UL, Warnock Hersey, or other approval labeled markings with the listing mark visible after installation.
- C. Qualifications:
1. Fabricators: Glazier specializing in applying the work of this Section with a minimum of 5 years experience.
  2. Installer/Applicator: Minimum of 3 years documented experience demonstrating previously successful work of the type specified herein.
- 1.8 MOCK-UPS
- A. Provide glazing for mock-ups under provisions of Section 01 45 00 – QUALITY CONTROL.
- 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 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.
2. 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 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 5 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.

## PART 2 - PRODUCTS

### 2.1 PERFORMANCE/DESIGN CRITERIA

- A. Exterior Glass:
  1. Glass Strength: Analysis shall comply with ASTM E1300 Determining Load Resistance of Glass in Buildings. Provide glass products in the thickness and

strengths (annealed or heat-treated) required to meet or exceed the following criteria based on project loads and in-service conditions.

- a. Minimum thickness of annealed or heat-treated glass products to be selected so the worst case probability of failure does not exceed the following:
    - 1) 8 breaks per 1000 for glass installed vertically or not 15 degrees or more from the vertical plane and under wind action.
    - 2) 1 break per 1000 for glass installed 15 degrees or more from the vertical plane and under action of wind and/or snow.
  - b. Deflection must be limited to prevent disengagement from the frame and be less than or equal to 1" (25mm).
2. Thermal and Optical Performance: Provide glass products with specified performance properties. Performance properties to be manufacturer's published data as determined according to the following procedures:
    - a. Center of glass U-Value: ANSI/NFRC 100 methodology.
    - b. Center of glass solar heat gain coefficient: ANSI/NFRC 200 methodology.
    - c. Solar optical properties: ANSI/NFRC 300
  3. High Velocity Hurricane Zone Glazing: Provide glazing systems tested and certified to meet ASTM E1996 and ASTM E1886 windborne debris protection provisions for applicable wind-zone and missile protection level based on Project location.

## 2.2 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. Clear float, heat strengthened and tempered glass:
    - a. Guardian Industries Corporation, Lewiston, PA.
    - b. Hordis Brothers Inc., Pennsauken, NJ.
    - c. Rochester Insulated Glass Inc., Manchester, NY.
    - d. Viracon, Owatonna, MN.
  2. Fire rated glass:
    - a. Nippon Electric Glass America, Inc., Itasca, IL.
    - b. Vetrotech Saint-Gobain, Auburn, WA.
    - c. SAFTI First, San Francisco, CA.
  3. Laminated glass:
    - a. Guardian Industries Corporation, Lewiston, PA.
    - b. PPG Industries Inc, Glass Group, Pittsburgh, PA.
    - c. Viracon, Owatonna, MN.
  4. Glass mirrors:
    - a. Guardian Industries Corporation, Lewiston, PA.
    - b. Libby-Owens Ford Company, Toledo, OH.
    - c. Viracon, Owatonna, MN.

5. Glazing Sealant:
  - a. Dow Corning Corporation, Midland, MI.
  - b. General Electric Company (GE Silicones) Waterford, NY.
  - c. Tremco, Beachwood, OH.

## 2.3 GLASS - GENERAL

- A. General requirements for glass: Of domestic and foreign manufacture, conforming to the referenced standards and with the additional requirements specified herein; factory labeled on each pane stating the strength, type, thickness and quality; with all labels remaining on glass until final cleaning.
  1. Glass thickness shown and heat treatment specified are minimum requirements. Provide glass thickness and heat treatment required to meet specified performance criteria, State and local codes and ordinances.
- B. Float Glass: Comply with ASTM C 1036, Class 1 clear, quality q3 glazing select.
- C. Heat Strengthened Glass: Comply with ASTM C 1048 HS, heat strengthened, Class 1 clear, quality q3 glazing select.
- D. Tempered Glass: Comply with ASTM C 1048 FT, fully tempered, Class 1 clear, quality q3 glazing select, conforming to ANSI Z97.1.
- E. Laminated glass: consisting of an outer face and inner face of specified glass, factory laminated to polyvinyl butyl (PVB) interlayer, structural PVB, Ethylene Vinyl Acetate (EVA), or iconplast interlayer (SGP) as specified. Laminated glass shall be free from foreign substances and air pockets, and certified by Safety Glazing Certification Council.
  1. No substitutions will be considered for specified interlayers which are required for:
    - a. Specific visual design characteristics.
    - b. Compliance with tested glazed assemblies in High-Velocity Hurricane Zones (HVHZ)
  2. Acceptable Interlayer Manufacturers: Subject to compliance with the requirements specified herein, manufacturers offering products which may be incorporated in the work include the following:
    - a. Kuraray America, Inc., Wilmington DE.
    - b. Eastman Chemical Company, Kingsport TN.
    - c. Schweitzer-Mauduit International, Inc. (SWM), Alpharetta GA.
- F. Insulated Glass Units: Conform to Class CBA of Insulating Glass Certification Council (IGCC), with a hermetically sealed dehydrated sealed air space, and tested in accordance with ASTM E2190.
  1. Unit overall thickness tolerance:  $-1/16"$  (1.59mm) /  $+1/32"$  (0.79mm). Unit constructed with patterned or laminated glass shall be  $\pm 1/16"$  (1.59mm).
  2. Comply with ASTM E546 Standard Test Method for Frost Point of Sealed Insulating Glass Units
  3. Comply with ASTM E576 Standard Test Method for Frost Point of Sealed Insulating Glass Units in the Vertical Position

4. Sealed Insulating Glass Units to be double sealed with a primary seal of polyisobutylene and a secondary seal of silicone.
  - a. The minimum thickness of the secondary seal shall be 1/16" (1.59mm).
  - b. The target width of the primary seal shall be 5/32" (3.97mm).
  - c. There shall be no voids or skips in the primary seal.
  - d. Gaps or skips between primary and secondary sealant are permitted to a maximum width of 1/16" (1.59mm) by maximum length of 2" (51mm) with gaps separated by at least 18" (457mm). Continuous contact between the primary seal and the secondary seal is desired.
  - e. Both primary and secondary sealant adhesion shall exhibit continuous, tenacious adhesion to both glass and spacer contact areas.
5. To provide a hermetically sealed and dehydrated space, lites shall be separated by an aluminum spacer with three bent corners and one keyed-soldered corner or four bent corners and one straight butyl injected zinc plated steel straight key joint.

## 2.4 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.

## 2.5 EXTERIOR GLASS TYPES

- A. Glass Type A: Insulated "Low-E," clear glass 1 inch thick units:
  1. Components
    - a. Outer layer: 1/4 inch (6 mm) thick fully tempered glass with Low-E sputter coating on number 2 surface equal to PPG "Solarban 60".
    - b. Inner layer: 1/4 inch (6 mm) thick clear fully tempered glass.
    - c. Air space: 1/2 inch (13 mm) thick.
      - 1) Gas Fill: 90% Argon, 10% Air.
      - 2) Spacer: Stainless Steel, mill finish or black, as selected by Architect.
  2. Performance Requirements: Insulated glass units shall meet the following performance characteristics.
    - a. Visible Transmittance: 72 percent

- b. Solar Heat Gain Coefficient: 0.41
  - 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
3. Comply with ASTM C 1048 FT, fully tempered, Class 1 clear, quality q3 glazing select, conforming to ANSI Z97.1 and CSPC 16 CFR 1201.

## 2.6 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, "Fire Protective Glass": 5/16 inch transparent wire-less fire rated laminated 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. Technical Glass Products (TGP), product "Firelite PLUS".
    - b. Vetrotech Saint-Gobain, "Keralite L".
    - c. SAFTI First, "Pyran Platinum L".
  2. Conform with latest edition of ASTM E2074, ASTM E2010, NFPA-80, NFPA 252, NFPA 257, and glass to be labeled "D" or "O", as appropriate to condition.
  3. Conform with latest edition of NFPA 257 for Hose Stream Testing, and glass shall be labeled "H" designation.
  4. Conforms to ANSI Z97.1 - Safety Performance Specifications and Methods of Test for Safety Glazing Used in Buildings.
  5. In accordance with manufacturer's specifications, fire protective glass must be glazed into frames with a similar rating, using silicone glazing compound which shall be supplied with the fire protective glass material.



- a. Permanently identify each individual glazing unit with a listing mark visible after installation.

## 2.7 FABRICATION

- A. General: Do not fabricate materials until all specified submittals have been submitted to, and approved by, the Architect.
- B. Fabricate glass 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.

## 2.8 ACCESSORIES

- A. 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.
- B. 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.
- C. Spacers: Neoprene, 60-80 shore A durometer hardness; size required.
- D. Cleaners, Primers, and Sealers: Type recommended by manufacturer of glass and gaskets.

## 2.9 ACCESSORIES FOR WIRE-LESS FIRE-RATED 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 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 795 - Dow Corning Corp.
  2. Silglaze-II 2800 - General Electric Co.

3. Spectrem 2 - Tremco Inc.

C. Setting Blocks: Neoprene, EPDM, or silicone; tested for compatibility with glazing compound; of 70 to 90 Shore A hardness.

## 2.10 FABRICATION

- A. General: Do not fabricate materials until all specified submittals have been submitted to, and approved by, the Architect.
- B. Fabricate glass 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. Mirrors: All mirrors shall be cut to size by fabricator prior to delivery to site. Carefully coordinate and provide notches and holes for mirror installations which are indicated to receive ballet barres, handrails and other products specified in individual Specification Sections, which protrude through mirror installation.

## 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 FGMA 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 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.
  - 2. Install so that appropriate UL, Warnock Hersey, fire rated glazing or other approval labeled markings remain permanently visible.
- 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.

### 3.3 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. Cover glass To protect it from activities that might abrade the glass surface.

### 3.4 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.

End of Section

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## Section 09 05 06

## COMMON WORK RESULTS FOR FLOORING

**PART 1 - GENERAL**

## 1.1 GENERAL PROVISIONS

- A. The BIDDING REQUIREMENTS, CONTRACT FORMS, and CONTRACT CONDITIONS as listed in the Table of Contents, and applicable parts of Division 1 - GENERAL REQUIREMENTS, shall be included in and made a part of this Section.
- B. Examine all Drawings and all other Sections of the Specifications for requirements therein affecting the work of this Section.

## 1.2 SUMMARY

- A. This Section includes general requirements for flooring preparation, installation and temporary protection.
  - 1. Prepare substrates to receive flooring required to ensure specified tolerance level for finish surface of all work required by this Section. Preparation work includes patching, smoothing and leveling substrate, including:
    - a. Grinding down high spots of substrate.
    - b. Providing Portland cement-based latex underlayment (filler).
  - 2. Provide independent testing laboratory services to perform moisture vapor emission, and pH tests on in situ concrete slabs, which shall be in addition to testing as may be performed by Owner.

## 1.3 RELATED REQUIREMENTS

- A. Section 01 74 19 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL: Procedural and administrative requirements for construction and demolition recycling.
- B. Section 09 65 13 – RESILIENT BASE AND ACCESSORIES.
- C. Section 09 65 23 - RUBBER FLOORING.
- D. Section 09 65 43 - LINOLEUM FLOORING.
- E. Section 09 68 13 – TILE CARPETING.

## 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 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 F1482 - Standard Practice for Installation and Preparation of Panel Type Underlayments to Receive Resilient Flooring.
6. ASTM F1869 – Standard Test Method for Measuring Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride.
7. ASTM F2170 – Standard Test Method for Determining Relative Humidity in Concrete Floor Slabs Using In-Situ Probes
8. ASTM F3010 - Standard Practice for Two-Component Resin Based Membrane-Forming Moisture Mitigation Systems for Use Under Resilient Floor Coverings.
9. All applicable federal, state and municipal codes, laws and regulations regarding flammability and smoke generation of interior finishes.

## 1.5 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. Architect.
- b. General Contractor.
- c. Project Superintendents representing each floor system installer.
- d. Manufacturer's technical representative(s) for flooring products as designated by Architect or Contractor.
- e. 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 09 65 23 - Rubber Flooring.
  - 2) Section 09 65 43 - Linoleum Flooring.
  - 3) Section 09 68 13 – Tile Carpeting.

#### 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 Construction Manager must agree.
  - h. Discuss process for inspection and acceptance of completed Work of this Section.
- C. Sequencing:
- 1. Phasing: Refer to Section 01 14 00 – WORK RESTRICTIONS, and Drawings for phasing and milestone completion requirements which affect the Construction Manager's Work.
  - 2. Coordinate work of this Section 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.
  - 3. Do not order or deliver any materials until all submittals, required in the listed Specification Sections included as part of this Section have been received and approved by the Architect.
  - 4. 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.
  - 5. 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.
  - 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.
  - 7. Ensure that installation of flooring and accessories occurs after other finishing operations, including painting.

## 1.6 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 the Demolition Parameters for moisture vapor emission (MVER) testing: The start and finish date and time of removing existing non-asbestos flooring and adhesives, prior to MVER testing.
  - e. Report all test results in chart form listing the following:
    - 1) Test locations (also mark test locations on floor plan)
    - 2) Type(s) of Existing Floor Coverings
    - 3) Visual Distress Level of existing Floor Coverings
    - 4) Surface Temperature of Concrete
    - 5) pH Paper/ Pencil Reading (ASTM F 710)
    - 6) Visual Appearance of Concrete
    - 7) Concrete Slab Age
    - 8) Relative Humidity in Concrete, % (ASTM F 2170):
      - a) Depth of hole from top of Slab, in.
      - b) RH in concrete, %
      - c) Temp. in concrete, °F
    - 9) Surface Moisture Meter Test (ASTM E 1907):
      - a) 1. Electrical Impedance Test Values or
      - b) 2. Electrical Resistance Test Values
    - 10) x. Moisture Vapor Emission (MVER) - CaC12 Test (ASTM F 1869):
      - a) Weight Gain in grams
      - b) Exposure Time/hrs
      - c) MVER Lbs/1000 Sq. Ft./24 hours
  - f. Report all unacceptable substrate and field conditions observed during testing.
- B. Submit 1 copy of test data to the installers of all flooring materials or floor surface coating materials scheduled to be installed.

## 1.7 QUALITY ASSURANCE

- A. General: perform relative humidity, moisture vapor emission (MVER) and acidity/alkalinity (pH) Testing for concrete slabs and floors.
  - 1. Construction Manager 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 Construction Manager, and Owner's Project Representative.
    - a. Relative Humidity, Moisture Vapor Emission and pH Testing on all concrete slabs over-which a finished floor provided under this Section is to be installed.
  - 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 Construction Manager to reduce moisture content to ratings acceptable to the various flooring and floor-coating manufacturers. Construction Manager's procedures to reduce moisture content may consist of project dehumidification and temporary heating,



environmental controls, or moisture mitigation treatment to concrete.

3. 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. Additional testing shall comply with requirements and in quantities as initial tested, and be included as Work of this Trade Contract.
    - 1) Perform additional testing after procedures have been performed by the Construction Manager to reduce moisture content to ratings acceptable to the various flooring and floor-coating manufacturers. Construction Manager'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. Filler for patching, smoothing and leveling subfloors and underlayments: Portland cement-based latex underlayment acceptable to flooring manufacturer, equal to the following:
  1. Silpro Masonry Systems Inc., Ayer MA., product "Profinish".
  2. Ardex Americas, Aliquippa, PA. products "Feather Flash" and "Ardex SD-P".
  3. Quikrete Companies., Atlanta, GA., product "Fast-Set Underlayment 1248".
- B. 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 90% 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 manufacturers, or approved equal:
    - a. Advanced Adhesive Technology, Inc, Dalton GA.
    - b. DAP Incorporated, Dayton OH.
    - c. W.W. Henry Company, Aliquippa PA.
    - d. Roberts Consolidated Industries, Inc., City of Industry, CA.
    - e. Or adhesive recommended by flooring manufacturer for performance and compliance with warranty requirements.

## 2.2 TESTING EQUIPMENT

- A. For relative humidity testing: Digital Meter and Calibrated Humidity and Temperature probe kit in Compliance with ASTM F 2170.
  - a. 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 resilient flooring Specification Sections included as part of this Trade Contract.
  - 4. Temperature of resilient flooring and substrate shall be within specified tolerances.
  - 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 adhesive residue, 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.
- 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 Construction Manager.
- 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 criterion 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 criterion 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 1 per each additional 1,000 square feet.
  3. Test 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, adhesive residue, 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 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.
- 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 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.

### 3.6 ADHESIVE BOND TESTING

- A. 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.

### 3.7 PROTECTION

- A. Provide protection of completed flooring areas from construction traffic until Substantial Completion. Cover all floor surfaces with heavyweight kraft paper and overlay with red-rosin paper, taping the edges to maintain position of the protection paper. Reapply papers required to maintain floor protection.

End of Section

## Section 09 22 16

## NON-STRUCTURAL METAL FRAMING

**PART 1 - GENERAL**

## 1.1 GENERAL PROVISIONS

- A. The BIDDING REQUIREMENTS, CONTRACT FORMS, and CONTRACT CONDITIONS as listed in the Table of Contents, and applicable parts of Division 1 - GENERAL REQUIREMENTS, shall be included in and made a part of this Section.
- B. Examine all Drawings and all other Sections of the Specifications for requirements therein affecting the work of this Section.

## 1.2 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. Universal grid system for support of overhead work required as part of this Section 09 22 16.

## 1.3 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 for construction and demolition recycling.
- C. Section 06 10 00 - ROUGH CARPENTRY:
  - 1. Wood blocking.
  - 2. Installation of metal door frames in veneer plaster work.
- D. Section 08 11 13 - HOLLOW METAL DOORS AND FRAMES: Furnishing steel door frames.
- E. Section 08 31 00 - ACCESS DOORS AND PANELS: Shop primed access panels, occurring in partitions and walls.
- F. Section 09 29 00 - GYPSUM BOARD: Gypsum board system, applied over metal framing installed by this Section 09 22 16, including: wall board and related trim components.
- G. Section 09 51 00 - ACOUSTICAL CEILINGS: Suspended acoustical tile ceiling, including metal suspension system.

- H. Division 23 - HEATING, VENTILATING AND AIR CONDITIONING: Supply and return air registers.
- I. Division 26 - ELECTRICAL: Independent hangers for suspended lighting fixtures.

#### 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 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.

#### 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.

#### 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.

#### 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.
- 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.

#### 1.8 SEQUENCING AND SCHEDULING

- A. Work of this Section shall be closely coordinated with the work of Section 09 26 13 - GYPSUM VENEER PLASTERING 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.
- 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 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. 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. Armstrong Word Industries product "Drywall Furring System".
  2. Chicago Metallic product "system 640 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 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. N<sup>o</sup>.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 exceed 16 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



Section 09 29 00  
GYPSUM BOARD**PART 1 - GENERAL**

## 1.1 GENERAL PROVISIONS

- A. The BIDDING REQUIREMENTS, CONTRACT FORMS, and CONTRACT CONDITIONS as listed in the Table of Contents, and applicable parts of Division 1 - GENERAL REQUIREMENTS, shall be included in and made a part of this Section.
- B. Examine all Drawings and all other Sections of the Specifications for requirements therein affecting the work of this Section.

## 1.2 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. Acoustical joint sealant and backing at perimeter of gypsum board partitions.
  - 6. Impact resistant gypsum board at Gymnasium.
- 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.

## 1.3 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 for construction and demolition recycling.
- C. Section 06 10 00 - ROUGH CARPENTRY:
  - 1. Supplemental wood blocking supporting gypsum board.
  - 2. Installation of metal door frames in gypsum board work.
- D. Section 07 92 00 – JOINT SEALANTS: Furnishing and installing perimeter sealant and backing at gypsum drywall partitions.
- E. Section 08 11 13 - HOLLOW METAL DOORS AND FRAMES: Furnishing steel door frames.
- 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 09 22 16 - NON-STRUCTURAL METAL FRAMING: Non-load bearing partition and ceiling framing and furring.
- H. Section 09 51 00 - ACOUSTICAL CEILINGS: Suspended acoustical tile ceilings.
- I. Section 09 91 00 - PAINTING: Applied finish coatings.
- J. Division 21 - FIRE SUPPRESSION: Sprinkler heads in ceiling system.
- K. Division 23 - HEATING, VENTILATING AND AIR CONDITIONING: Supply and return air registers.
- L. Division 26 - ELECTRICAL: Independent hangers for suspended lighting fixtures.

#### 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 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.

## 1.5 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.

## 1.6 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.

#### 1.7 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.

#### 1.8 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 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.

#### 1.9 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. CertainTeed Corporation, Valley Forge, PA.
  2. 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.
  3. 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.
  4. Joint Sealants:
    - a. Tremco, Beachwood OH.
    - b. Pecora Corporation, Harleysville PA.
    - c. Owens Corning, Toledo OH.
    - d. Specified Technologies, Inc. (STI), Somerville NJ.
- 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. 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".
- D. 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".
- 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 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. Reveal trim: extruded aluminum trim with 1 inch wide recess by nominally 1/2 inch deep reveal channel with punched tapered fins.
  1. Fry Reglet Corporation, model number: DRM 50-100.
  2. Gordon Inc., model number: 510-5/8.
  3. Pittcon Industries, Inc., model number: SWR-100-050.
- D. 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.
  2. Gordon Inc., model number: 510-1/2.
  3. Pittcon Industries, Inc., model number: SWR-100-063.
- E. Reveal trim: extruded aluminum trim with 1 inch wide recess by nominally 3/4 inch deep reveal channel with punched tapered fins.
  1. Fry Reglet Corporation, model number: DRM 625-000.
  2. Gordon Inc., model number: 510-0/0.
  3. Pittcon Industries, Inc., model number: SWR-100-000.
- F. 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".

- G. 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,
- H. Ceiling buttons, perforated type, 1 inch diameter, for use at multiple layered gypsum board ceiling systems.
- I. Laminating adhesive: USG Durabond Joint Compound 90, USG Ready-mixed All Purpose Compound, or equal.
- J. 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".
- K. 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.

## 2.5 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 tile: Level 2.
  - 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 GENERAL PROVISIONS

- A. The BIDDING REQUIREMENTS, CONTRACT FORMS, and CONTRACT CONDITIONS as listed in the Table of Contents, and applicable parts of Division 1 - GENERAL REQUIREMENTS, shall be included in and made a part of this Section.
- B. Examine all Drawings and all other Sections of the Specifications for requirements therein affecting the work of this Section.

## 1.2 SUMMARY

- A. Furnish and install suspended acoustical ceilings including suspension system and associated edge moldings.
  - 1. Provide edge moldings to fit penetrations exactly, including circular penetrations
  - 2. Furnish and install joint sealant at ceiling edge angles where abutting walls and edge moldings at all sides of radiant panels.
  - 3. Universal grid system for support of overhead work required as part of this Section 09 51 00.
- B. Patching acoustical tile ceilings to match existing ceilings where disturbed by demolition and Work of this Contract. This Section includes both concealed and exposed spline ceilings, suspension systems and associated edge moldings.
  - 1. In rooms where existing partitions have been removed, instead of patching, the Contractor shall replace the entire ceiling and suspension system in the room with new.

## 1.3 RELATED REQUIREMENTS

- A. Section 01 74 19 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL: Procedural and administrative requirements for construction and demolition recycling.
- B. Section 02 41 19 - SELECTIVE DEMOLITION: Demolition of work abutting existing ceilings and demolition of existing ceilings for new construction.
- C. Section 09 29 00 - GYPSUM BOARD: Suspended drywall ceilings and soffits.
- D. Division 21 - FIRE SUPPRESSION: Sprinkler heads in ceiling system.
- E. Division 23 - HEATING, VENTILATING AND AIR CONDITIONING: Air diffusion devices in ceiling.
- F. Division 26 - ELECTRICAL:
  - 1. Fire alarm and smoke detection equipment mounted in ceiling system.
  - 2. Light fixtures and independent hangers for suspended fixtures.

#### 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 A641 - Zinc- Coated (Galvanized) Carbon Steel Wire
  2. ASTM C423 Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method "UL Classified".
  3. ASTM C523 - Light reflectance of Acoustical Material by the Integrating Sphere Reflectometer.
  4. ASTM C635 - Metal Suspension Systems for Acoustical Tile and Lay-in Panel Ceilings.
  5. ASTM C636 - Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-In Panels.
  6. ASTM E84 - Surface Burning Characteristics of Building Material "UL Classified"
  7. ASTM E119 - Fire Tests of Building Construction and Materials "UL Classified".
  8. ASTM E413 - Classification for Rating Sound Insulation.
  9. ASTM E580 - Practice for Application of Ceiling Suspension Systems for Acoustical Tile and Lay-in Panels in Areas Requiring Seismic Restraint.
  10. ASTM E1264 - Classification of Acoustical Ceiling Products.
  11. ASTM E1414 - Airborne Sound Attenuation Between Rooms Sharing a Common Ceiling Plenum. "UL Classified".
  12. UL Fire Resistance Directory and Building Material Directory.
  13. 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.

#### 1.5 PERFORMANCE REQUIREMENTS

- 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 E 119 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 E 84 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.

## 1.6 SEQUENCING

- A. Coordinate work of this Filed 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. Do not order or deliver any materials until all submittals, required in the listed Specification Sections included as part of this Filed Subcontract, have been received and approved by the Architect.
- C. 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.

## 1.7 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. 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. Large scale installation details of special conditions.
    - c. All drawings bearing dimensions of actual measurements taken at the project.
  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.
- B. 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. Provide to the Owner, all extra salvaged ceiling panel and suspension components which have not been utilized in the Work.

#### 1.8 QUALIFICATIONS

- A. Applicator specializing in applying the work of this Section with a minimum of 3 years' experience.

#### 1.9 DELIVERY, STORAGE AND HANDLING

- A. Deliver acoustical ceiling panel in original, unopened packages and store protected in a fully enclosed space.

#### 1.10 PROJECT CONDITIONS

- A. Maintain uniform temperature of minimum of 60 degrees Fahrenheit and humidity of 20 to 40 percent prior to, during, and after installation.

#### 1.11 SEQUENCING AND SCHEDULING

- A. 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.
- B. Sequence 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.
- C. Install acoustical units after interior wet work is dry.

#### 1.12 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. 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 manufacture'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.

#### 1.13 EXTRA MATERIALS

- A. Provide to the Owner, extra ceiling panel and suspension components, 3 percent of each type installed.



**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. Acoustical ceiling panel:
    - a. Armstrong World Industries, Inc., Lancaster, PA.
    - b. USG Interiors Inc., Chicago, IL.
    - c. The Celotex Corporation, Architectural Ceilings Division, Tampa, FL.
  2. Suspension system:
    - a. Armstrong World Industries, Inc., Lancaster, PA
    - b. Donn Corp., Westlake, OH.
    - c. Chicago Metallic Corp., Chicago, IL.

## 2.2 ACOUSTICAL CEILINGS

- A. Type ACT-1 ceiling system:
1. Panel, Basis of Design: Armstrong product: "Ultima" product number 1941.
  2. Panel size: 24 inches by 24 inches by 3/4 inch thick.
  3. Panel edge: Beveled Tegralar.
  4. Description: ASTM E1264 Type IV, Form 2, Pattern E, Class A flame spread, wet formed mineral fiber with acoustically transparent membrane, non-combustible, vinyl latex paint finish.
  5. Color: White.
  6. Minimum light reflectance range: LR 0.87
  7. Acoustical characteristics:
    - a. NRC: 0.75.
    - b. CAC range: 35.
  8. Type ACT-1 Ceiling Grid: 15/16 inch exposed tee grid in matching WHITE color ceiling panels except as otherwise indicated.
    - a. Basis of Design: Armstrong; 15/16" Prelude Exposed Tee System.
- B. Type ACT-2 ceiling panels:
1. Basis of Design: Armstrong product: "Lyra PB" product number 8360PBBK.
  2. Panel size: 24 inches by 24 inches by 1 inch thick.
  3. Panel edge: Square Tegralar edge.
  4. Description: ASTM E1264 Type XII, Form 2, Pattern E, Class A flame spread, fiberglass with acoustically transparent membrane, non-combustible, vinyl latex paint finish.
  5. Color: BLACK.
  6. Acoustical characteristics:
    - a. NRC range: 0.95.

7. Type ACT-2 Ceiling grid: 15/16 inch exposed tee grid in matching BLACK color ceiling panel except as otherwise indicated.
  - a. Basis of Design: Armstrong; 15/16" Prelude Exposed Tee System.
- C. Type ACT-3 open grid ceiling system:
  1. Open suspension grid (without ceiling tile): 15/16 inch exposed grid, hot-dipped galvanized 360 degree prefinished tee grid suspension system, with exposed face covered with factory finished 3.0 mil powder-coated painted surfaces. Provide with matching galvanized hemmed edge wall moldings with painted finish. Manufacturer: To establish a standard of quality, design and function desired, Drawings and specifications have been based on USG Interiors, product: "Grid Ware" painted grid exposed tee system with nominal 2 inch perimeter trim. Acceptable products include the following, or approved equal:
  2. Basis of Design: Armstrong product; "Prelude XL 360 degree Painted Grid Exposed Tee System".
  3. Grid color shall be as selected by Architect from manufacturer's full range of standard colors.
- D. Type ACT-4 ceiling clouds: Suspended ("floating") ceiling clouds, with ACT-1 ceiling panels and grid, with edge trim system.
  1. Extruded aluminum perimeter edge trim system at "Floating" suspended ceiling areas. Edge trim shall be nominal 4 inch 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.
    - a. Basis of Design: Armstrong: Axiom Perimeter Trim.
  2. Ceiling panels, grid and perimeter trim in colors selected by Architect from manufacturer's full range of colors. Up to two colors may be required.
- E. Type ACT-5 suspended acoustical panels:
  1. Panel size: 48 inches by 48 inches by 7/8 inch thick.
  2. Panel edge: Square edge.
  3. Surface texture: Smooth.
  4. Description: Pre-formed mineral fiber canopy with DuraBrite scrim on all sides with factory finished square edges complying with ASTM E84 Class A per IBC.
  5. Color: White
  6. Suspension system: As recommended by the manufacturer for individual or group suspension as indicated on the Drawings.
  7. Basis of Design: Armstrong product "SoundScape Hexagon" product number 5444 or approved equal.
- F. Ceiling Tile to match existing (for repairs where disturbed or damaged by Work): Conforming to ASTM E1264 Class A ceiling panel with texture, finish and color to

closely match existing, Submit full size samples to Architect for verification of match

### 2.3 CEILING GRIDS

- A. ACT-1 Ceiling Grid: 15/16 inch exposed tee grid in matching WHITE color ceiling panels except as otherwise indicated.
  - 1. Basis of Design: Armstrong; 15/16" Prelude Exposed Tee System.
- B. Type ACT-2 Ceiling grid: 15/16 inch exposed tee grid in matching BLACK color ceiling panel except as otherwise indicated.
  - 1. Basis of Design: Armstrong; 15/16" Prelude Exposed Tee System.

### 2.4 ACCESSORIES

- A. Universal Grid Support 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. Edge/wall moldings for tegular edge acoustical tile ceilings where ceiling abuts walls and drop down soffits: Stepped profile "shadow" molding compatible with

exposed grid system and color matched. Acceptable products include the following, or approved equal:

1. Armstrong model 7820.
2. Chicago Metallic model 1460.
3. USG/Donn 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. Joint Sealer: 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 CEILING GRID PERIMETER EDGE TRIM SYSTEM

- A. Perimeter edge trim system at "floating" suspended ceiling areas: Edge trim shall be 4 inch 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.
1. Armstrong: Axiom Interlude Trim 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.
- B. Beginning of installation means acceptance of site conditions.

### 3.2 PREPARATION

- A. Protection of In-situ Conditions: 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. 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.
- C. Existing Acoustical Ceilings to be Salvaged or Patched:
1. Where existing ceilings are disturbed by the work of this Contract and are not scheduled to be replaced with new ceilings; remove ceilings including suspension system, as required. Remove only that portion of the acoustical materials and suspension system as is necessary for the required work. Coordinate with all trades to determine the extent of area to be removed.
  2. Store materials in a neat manner and protect from damage and after all related work has been completed, reinstall the existing ceiling materials.
  3. Where acoustical panels, acoustical tiles and suspension system have been removed because of new construction and cannot be reinstalled, install new material to match existing. All materials to be used for patching and matching shall be approved by the Architect in advance of work.

### 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 C-636 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. Where ducts or other equipment prevent the regular spacing of hangers, reinforce the nearest affected hangers to span the extra distance.
  2. 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. Comply with requirements of Section 01 74 19 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL for handling and disposition of all construction and demolition waste.
- B. 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.

End of Section

## Section 09 65 13

## RESILIENT BASE AND ACCESSORIES

**PART 1 - GENERAL**

## 1.1 GENERAL PROVISIONS

- A. The BIDDING REQUIREMENTS, CONTRACT FORMS, and CONTRACT CONDITIONS as listed in the Table of Contents, and applicable parts of Division 1 - GENERAL REQUIREMENTS, shall be included in and made a part of this Section.
- B. Examine all Drawings and all other Sections of the Specifications for requirements therein affecting the work of this Section.

## 1.2 SUMMARY

- A. Preparation of substrate.
- B. Furnish and install the following:
  - 1. Coved resilient base at resilient flooring.
  - 2. Straight resilient base at carpeted areas.

## 1.3 RELATED REQUIREMENTS

- A. Section 01 50 00 - TEMPORARY FACILITIES AND 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 for construction and demolition recycling.
- D. Section 09 65 23 - RUBBER FLOORING: Rubber sheet flooring, rubber stair treads and risers.
- E. Section 09 65 43 - LINOLEUM FLOORING.
- F. Section 09 68 13 – TILE CARPETING: Carpet and transition strips.

## 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 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.

#### 1.5 REGULATORY REQUIREMENTS

- A. 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.

#### 1.6 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. 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.

#### 1.7 QUALITY ASSURANCE

- A. Avoid color and pattern differential; provide base from one production run in any single room or contiguous areas.

#### 1.8 DELIVERY, STORAGE AND HANDLING

- A. Deliver resilient 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.

#### 1.9 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.

#### 1.10 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.



**1.11 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 resilient base materials installed under this Section.

**1.12 EXTRA MATERIALS**

- A. Upon completion of the Work of this Section, deliver to the Owner extra base materials for future repairs and maintenance, from the same manufacturing runs as those installed, in the following amounts.
  - 1. Resilient base: 24 linear feet of each type and color installed.

**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., Parsippany, NH, Product: "Type TP, Duracove" in color #29 "Moon Rock WG."
- 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. Johnsonite, Middlefield, OH.
  - 2. Burke-Mercer Products Company, San Jose, CA.
  - 3. Roppe Corporation, Fostoria, OH.
  - 4. Vinyl Products Inc., Floor Products Division, Sheboygan, WI.
  - 5. Tarkett, Inc., Parsippany, NH.

**2.2 RESILIENT BASE**

- A. Rubber Base: 2 inches or 4 inches high as indicated on the Drawings, coved or straight, ribbed back, 1/8 inch thick, rounded top, complying with ASTM F-1861, Type TP, Thermoplastic Rubber (TBR). To greatest extent possible, rubber base shall be furnished in continuous lengths, approximately 100 feet long.
- 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.

**2.3 ACCESSORIES**

- A. Adhesives
  - 1. General: Water resistant, low VOC, acceptable to the resilient flooring manufacturer, for substrate conditions.
  - 2. Acceptable 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. Roberts Consolidated Industries, Inc., City of Industry, CA, product: "Premium Solvent-Free Cove 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 - GENERAL**

- 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.

#### **3.3 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.

#### **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. Post-installation Cleaning: As installation progresses, continually remove excess adhesive from floor, base and wall surfaces without damage.

End of Section

Section 09 65 23  
RUBBER FLOORING**PART 1 - GENERAL**

## 1.1 GENERAL PROVISIONS

- A. The BIDDING REQUIREMENTS, CONTRACT FORMS, and CONTRACT CONDITIONS as listed in the Table of Contents, and applicable parts of Division 1 - GENERAL REQUIREMENTS, shall be included in and made a part of this Section.
- B. Examine all Drawings and all other Sections of the Specifications for requirements therein affecting the work of this Section.

## 1.2 SUMMARY

- A. Prepare substrates to receive rubber flooring to ensure specified tolerance level for finish surface of carpeting. Preparation work includes patching, smoothing and leveling substrate, including:
  - 1. Grinding down high spots of substrate.
  - 2. Providing Portland cement-based latex underlayment (filler).
- B. Furnish and install the following:
  - 1. Hammered sheet rubber stair treads/risers.
  - 2. Hammered rubber flooring tile at stair landings.
  - 3. Rubber base relating to the work of this Section.
  - 4. Transition strips wherever edges of resilient rubber flooring materials abut dissimilar flooring, where no thresholds occur.

## 1.3 RELATED REQUIREMENTS

- A. Section 01 74 19 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL: Procedural and administrative requirements for construction and demolition recycling.
- B. Section 09 65 13 - RESILIENT BASE AND ACCESSORIES.
- C. Section 09 65 43 - LINOLEUM FLOORING.
- D. Section 09 68 13 - TILE CARPETING.

## 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 C501 - Standard Test Method for Relative Resistance to Wear of Unglazed Ceramic Tile by the Taber Abraser.

2. ASTM D297 - Standard Test Methods for Rubber Products—Chemical Analysis.
3. ASTM D395 - Standard Test Methods for Rubber Property—Compression Set.
4. ASTM D412 - Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers—Tension.
5. ASTM D2047 - Standard Test Method for Static Coefficient of Friction of Polish-Coated Flooring Surfaces as Measured by the James Machine.
6. ASTM D2240 - Standard Test Method for Rubber Property—Durometer Hardness.
7. ASTM D3389 - Standard Test Method for Coated Fabrics Abrasion Resistance (Rotary Platform Abrader).
8. ASTM D3676 - Standard Specification for Rubber Cellular Cushion Used for Carpet or Rug Underlay.
9. ASTM E84 – Standard Test Method for Surface Burning Characteristics of Building Materials.
10. ASTM E492 - Standard Test Method for Laboratory Measurement of Impact Sound Transmission Through Floor-Ceiling Assemblies Using the Tapping Machine.
11. ASTM E648 - Standard Test Method for Critical Radiant Flux of Floor-Covering Systems Using a Radiant Heat Energy Source.
12. ASTM E662 - Standard Test Method for Specific Optical Density of Smoke Generated by Solid Materials.
13. ASTM E2129 - Standard Practice for Data Collection for Sustainability Assessment of Building Products.
14. ASTM E2180 - Standard Test Method for Determining the Activity of Incorporated Antimicrobial Agent(s) In Polymeric or Hydrophobic Materials.
15. ASTM F710 - Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring.
16. ASTM F970 – Standard Test Method for Static Load Limit.
17. ASTM F1344 – Standard Specification for Rubber Floor Tile.
18. ASTM F1482 - Standard Practice for Installation and Preparation of Panel Type Underlayments to Receive Resilient Flooring.
19. ASTM F1514 - Standard Test Method for Measuring Heat Stability of Resilient Flooring by Color Change.
20. ASTM F1515 - Standard Test Method for Measuring Light Stability of Resilient Flooring by Color Change.
21. ASTM F1859 - Standard Specification for Rubber Sheet Floor Covering Without Backing.
22. ASTM G21 - Standard Practice for Determining Resistance of Synthetic Polymeric Materials to Fungi.
23. All applicable federal, state and municipal codes, laws and regulations regarding flammability and smoke generation of interior finishes.

## 1.5 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.

## 1.6 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.
- 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.

## 1.7 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.

#### 1.8 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.

#### 1.9 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.

#### 1.10 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.

#### 1.11 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.

**1.12 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 Johnsonite, Chagrin Falls, OH.
- 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. Johnsonite, Chagrin Falls, OH.
  2. Nora Systems, Inc., Salem, NH. .
  3. Mannington Burke Rubber, Calhoun, CA.
  4. Roppe Corporation, Fostoria OH.

**2.2 RUBBER STAIR TREADS/RISERS AND LANDINGS**

- A. Floor and stair treads: One piece nosing-tread-riser combination, Johnsonite, Chagrin Falls, OH, product "Stairwell Management" 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.

### 2.3 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

### 2.4 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 "Profinish".
- B. Adhesives: Moisture vapor, relative humidity and alkali resistant adhesive, Class A rated, VOC compliant, and capable of withstanding the following in continuous service:
  - 1. 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.
  - 2. 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.
  - 3. VOC content: Less than 50 g/L.
  - 4. 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:
    - a. Nora Systems, Inc., Salem, NH, product "385" or "485".
    - b. Burke Flooring, San Jose, CA, product "BR-711"
    - c. 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 Filed subcontractor. Final Drawings indicating patterns of equal complexity will be provided by the Architect once approved samples have been processed. The Resilient Flooring Filed 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 Filed subcontractor's bid was submitted.
  - 1. The Resilient Flooring Filed 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. 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 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 treads/risers 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.

### 3.5 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.

### 3.6 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

Section 09 65 43  
LINOLEUM FLOORING**PART 1 – GENERAL**

## 1.1 GENERAL PROVISIONS

- A. The BIDDING REQUIREMENTS, CONTRACT FORMS, and CONTRACT CONDITIONS as listed in the Table of Contents, and applicable parts of Division 1 - GENERAL REQUIREMENTS, shall be included in and made a part of this Section.
- B. Examine all Drawings and all other Sections of the Specifications for requirements therein affecting the work of this Section.

## 1.2 SUMMARY

- A. General: The work of this Section consists of linoleum 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 flooring, and temporary protection until Owner's acceptance.
- B. Furnish and install the following:
  - 1. Linoleum sheet flooring.
  - 2. Vinyl transition strips wherever edges of resilient flooring materials abut dissimilar flooring, where no thresholds occur.

## 1.3 RELATED REQUIREMENTS

- A. Section 01 74 19 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL: Procedural and administrative requirements for construction and demolition recycling.
- B. Section 02 41 19 - SELECTIVE DEMOLITION: Removal of existing finishes.
- C. Section 09 05 06 - COMMON WORK RESULTS FOR FLOORING: General requirements for flooring preparation, substrate testing requirements, installation and temporary protection.
- D. Section 09 65 13 - RESILIENT BASE AND ACCESSORIES: Resilient base.
- E. Section 09 65 23 - RUBBER FLOORING: rubber stair treads and risers.
- F. Section 09 68 13 – TILE CARPETING: Carpet tile and transition strips.

## 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 E84 – Standard Test Method for Surface Burning Characteristics of Building Materials.
2. ASTM E648 – Standard Test Method for Critical Radiant Flux of Floor-Covering Systems Using a Radiant Heat Energy Source.
3. ASTM E662 - Standard Test Method for Specific Optical Density of Smoke Generated by Solid Materials.
4. ASTM F710 - Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring.
5. ASTM F1516 - Standard Practice for Sealing Seams of Resilient Flooring Products by the Heat Weld Method.
6. ASTM F1869 – Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride.
7. ASTM F2034 – Standard Specification for Sheet Linoleum Floor Covering
8. NFPA 253 - Critical Radiant Flux of Floor Covering Systems Using a Radiant Heat Energy Source.
9. All applicable federal, state and municipal codes, laws and regulations regarding flammability and smoke generation of interior finishes.

#### 1.5 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. Ensure that installation of flooring and accessories occurs after other finishing operations, including painting.

#### 1.6 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 each item furnished hereunder.
    - a. Furnish manufacturer's product literature on flooring adhesive, highlight adhesive properties, including VOC's and maximum moisture pressure limits for substrates.
  2. 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 selected colors and patterns.
    - b. Show location of welded seams, and joints with abutting materials.
    - c. Show locations and types of reducer and edge strips.
    - d. Where more than one adhesive type is specified or otherwise required by flooring manufacturer, identify on shop drawings areas for each adhesive type.

3. Selection samples: Manufacturers' sample chain of colors and patterns available for selection by Architect.
  4. Verification samples:
    - a. Sheet flooring: 12 by 12 inch illustrating color, and pattern for each color and type of flooring selected.
    - b. Edging: 12 inches long demonstrating profile, thickness, size and color.
  5. Certificates:
    - a. Submit the manufacturer's certification that the resilient flooring has been tested by an independent laboratory and complies with the required fire tests.
  6. Qualification Submittals: Installer/Applicator's work experience documentation.
- B. Closeout Submittals: Submit the following under provisions of Section 01 78 00 - CLOSEOUT SUBMITTALS.
1. Operation and Maintenance Data: Furnish cleaning 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. Extra Stock Materials: 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.
    - a. Linoleum flooring: 3 percent of each material in each color, and pattern installed.
    - b. Furnish a quantity of adhesive of each type used in sealed cans or containers sufficient to apply the above materials.

## 1.7 QUALITY ASSURANCE

- A. General: Notify the Architect where conflicts apply between referenced standards and existing materials, and existing methods of construction.
1. Provide types of resilient tile and accessories supplied by one manufacturer, including leveling and patching compounds, and adhesives.
  2. Avoid color and pattern differential; provide flooring from one production run in any single room or contiguous areas.
- B. Qualifications:
1. Installer/Applicator: Minimum of 3 years documented experience demonstrating previously successful work of the type specified herein.

## 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. Do not deliver flooring materials to the project until all concrete, masonry, plaster and other wet work has been completed and dry.
  3. 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. Storage and Handling Requirements:
1. Store and handle materials following manufacturer's recommended procedures, and in accordance with material safety data sheets. Store materials in a clean dry, enclosed space off the ground and protected from the weather
  2. Protect materials from damage due to moisture, direct sunlight, excessive temperatures, surface contamination, corrosion and damage from construction operations and other causes.
  3. Protect adhesives from freezing.
- 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.

## 1.9 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.

## 1.10 WARRANTY

- A. General: Submit warranties under provisions of Section 01 78 00 - CLOSEOUT SUBMITTALS, and in compliance with Section 01 78 36 – WARRANTIES.
1. Manufacturer Warranty: provide manufacturer's standard wear warranties for all flooring and stair tread materials installed under this Section.

## 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 Forbo Industries Inc., Hazleton PA, product "Marmoleum".
1. Colors: Refer to Drawings for color distribution and patterns. Five colors are required, Basis of design colors are listed as follows:
    - a. Designated "Lin-Color 1" (Media Center and Science Lab): Marmoleum number 3146, "Serene Grey".



- b. Designated "Lin-Color 2" (Media Center): Marmoleum number 3224, "Charteuse".
  - c. Designated "Lin-Color 3" (Media Center): Marmoleum number 3218, "Deep Ocean."
  - d. Designated "Lin-Color 4" (Science Lab): Marmoleum number 3247. "Media Center."
  - e. Designated "Lin-Color 5" (Media Center): Marmoleum number 3048, "Graphite".
- 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. Linoleum Flooring:
    - a. Armstrong World Industries, Inc., Flooring Division, Lancaster PA
    - b. Forbo Industries Inc., Hazleton PA.
    - c. Johnsonite Inc., Chagrin Falls OH.
  2. Adhesives:
    - a. Advanced Adhesive Technology, Inc, Dalton GA.
    - b. DAP Incorporated, Dayton OH.
    - c. W.W. Henry Company, Aliquippa PA.
    - d. Roberts Consolidated Industries, Inc., City of Industry, CA.

## 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 flooring in accordance with ASTM E84.
  2. Provide flooring material to meet the following fire test performance criteria as tested by a recognized independent testing laboratory:
    - a. ASTM E648 ( Critical Radiant Flux ) of 0.45 watts per sq. cm. or greater, Class 1.
    - b. ASTM E662 ( Smoke Generation ) Maximum Specified Optical Density of 450 or less.
- B. Sustainability Requirements:
1. Biobased Material: Consisting of oxidized linseed or other vegetable drying oil and rosin, mixed with ground cork or wood flour, mineral filler, and natural pigments. Mixture shall be bonded and keyed to a burlap (jute) or other suitable fibrous backing so that backing is partially embedded in mixture.
  2. Product shall be completely biodegradable.

## 2.3 LINOLEUM SHEET FLOORING

- A. Sheet linoleum flooring: Marbleized sheet linoleum, all natural resilient, self-sanitizing, bactericidal flooring of primarily natural materials consisting of linseed oil, wood flour, and rosin binders, mixed and calendared onto a polyester backing. Total construction non-asbestos. Pattern and color shall extend throughout total

thickness of wear surface. Products which may be incorporated in the work include the following in style(s) and color(s) as selected by Architect:

1. Forbo Industries Inc., Hazleton PA, product "Marmoleum".
  2. Armstrong World Industries, Lancaster PA, product "Marmorette" and "LinoArt Colorette".
  3. Johnsonite Inc., Chagrin Falls OH, product "Harmonium xf," in style(s) as selected by Architect.
- B. Linoleum sheet flooring characteristics
1. Sheet width: 200 cm (6'-6").
  2. Nominal Thickness: 2.5 mm (1/10 inch).
  3. Backing: Jute.
- C. Color(s) and patterns are as indicated on Drawings.

## 2.4 ACCESSORIES

- A. Adhesives
1. General: Water resistant, acceptable to the resilient flooring manufacturer, for substrate conditions.
- B. Adhesive for sheet linoleum flooring:
1. Armstrong:
    - a. Typical: Armstrong product S-235.
    - b. Flash cove areas: Armstrong product S-580.
  2. Forbo: product 660 Polyurethane Adhesive, a solvent free two component adhesive.
  3. Henry: product 582 LINO-LOCK.
- C. Heat Welds Rods: Manufacturer's standard solidified thermo-plastic adhesive welding rod. Rods may be matching solid color, multi-color welding rod or contrasting color welding rod as selected by Architect, at no additional cost to Owner.
- D. Metal edge strips: Extruded aluminum, mill finish, of width shown on the drawings and of required thickness to protect exposed edges of the resilient flooring. Provide units of maximum available length to minimize the number of joints.
- 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. 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 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. Pre-installation off-gassing ventilation: Ventilate flooring products prior to installation. Open packaging, or remove from packaging, and ventilate flooring in a secure, dry, well-ventilated space free from contaminant sources and residues. Provide a temperature range of 60 degrees F minimum to 90 degree F maximum continuously for not less than 72 hours.
  - 1. Do not ventilate within limits of Work unless otherwise approved by Architect.

### 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.
- C. Maintain reference markers, holes and openings that are in place or have been marked for future cutting; repeat markers on flooring as marked on substrate. Use non-permanent marking devices which may be cleaning washed off when no longer required.

### 3.4 INSTALLATION - SHEET LINOLEUM FLOORING

- A. Install linoleum using conventional full-spread method and heat welded seams. Application shall be performed by factory trained mechanics franchised by the manufacturer in accordance with the manufacturer's instructions, and using tools and techniques recommended by the flooring manufacturer. Do not reverse roll sheets.
- B. Cut sheet material into required lengths and sizes. Layout and cut to achieve minimum number of seams and for pattern match between abutting edges, Reverse every other sheet.
  - 1. Locate seams not less than 6 inches (150mm) away from parallel joints in flooring substrate.
  - 2. Seams in corridors shall run perpendicular to corridor.
  - 3. Avoid cross and but seams.
- C. Lay cut sheets flat and allow to come to room temperature prior to installation.
- D. Lay flooring so as to ensure full uniform contact with adhesive and substrate and to produce finished surfaces which are smooth, even and in true planes, free of buckles, waves, and other imperfections.

1. Match edges of sheet flooring for color shading and pattern at seams, in accordance with manufacturer's written recommendations.
2. Wet install flooring with adhesive. Adhesive spread rate shall be as recommended by manufacturer, at approximately 125 to 175 square feet per gallon.
3. Install the sheets and roll the floor surface to work wrinkles and air pockets out past the outer edges.
4. Terminate flooring at centerline of door in closed position where adjacent floor finish is of different material or color. Where flooring pattern continues through door openings, continue established pattern with no interruption.

E. Heat welded seams:

1. General: Prepare seams and weld in strict accordance with flooring manufacturer's written installation instructions and in compliance with ASTM F1516.
2. Groove and clean seams, apply welding rod and ensure rod melts fully into prepared groove. Remove excess weld materials while rod is still warm.
3. Patch all areas where welding rod has not properly bonded.
4. Protect welded joints from damage during curing, for a minimum period of 24 hours.

### 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.
  - a. Secure metal edge strips to the substrate with countersunk stainless steel anchors, complying with the edge strip manufacturer's recommendations.
2. Place resilient edge strips tightly butted to flooring and secure with adhesive recommended by the edge strip manufacturer.

### 3.6 CLEANING

A. General: Comply with requirements of Section 01 73 00 – EXECUTION for periodic and final cleaning, and as additionally specified herein. Comply with requirements of Section 01 74 19 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL for handling and disposition of all construction and demolition waste.

1. Control accumulation of waste materials and trash. Daily clean work areas by sweeping and disposing of debris, and scraps.

B. Post-installation Cleaning:

1. As installation progresses, continually remove excess adhesive from floor, and wall surfaces without damage.
  - a. Protect installed flooring as recommended by the flooring manufacturer against damage from rolling loads, other trades, or the placement of fixtures and furnishings.
2. Sweep floors to remove all loose dirt and debris.

3. 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.
  - a. Linoleum floors: Wait at least 5 full days following completion of installation before commencing with cleaning.

C. Final Cleaning:

1. General: Perform final cleaning not before 4 days prior to Owner's intended occupancy date.
2. Linoleum floors:
  - a. Scrub floors using a one disc scrubbing machine with green nylon pad and water to which a neutral cleaning agent (less than pH9) has been added.
  - b. Rinse thoroughly and let dry
  - c. Apply manufacturer's recommended spray cleaning fluid containing 5 percent natural wax and no polymers. Dust wipe or dry mop.

3.7 PROTECTION

- A. General: Protect finished work under provisions Section 09 05 06 – COMMON WORK RESULTS FOR FLOORING.
- B. Prohibit traffic on finished floor areas until flooring adhesive has fully set.
- 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.

End of Section

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Section 09 68 13  
TILE CARPETING**PART 1 - GENERAL**

## 1.1 GENERAL PROVISIONS

- A. The BIDDING REQUIREMENTS, CONTRACT FORMS, and CONTRACT CONDITIONS as listed in the Table of Contents, and applicable parts of Division 1 - GENERAL REQUIREMENTS, shall be included in and made a part of this Section.
- B. Examine all Drawings and all other Sections of the Specifications for requirements therein affecting the work of this Section.

## 1.2 SUMMARY

- A. General: The work of this Section consists of tile carpeting where shown on the Drawings, as specified herein, and 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. Furnish and install carpet tile directly adhered over floors, where indicated on the Drawings, including all accessories necessary to complete the work

## 1.3 RELATED REQUIREMENTS

- A. Section 01 74 19 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL: Procedural and administrative requirements for construction and demolition recycling.
- B. Section 09 05 06 - 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 68 13.
- C. Section 09 65 13 - RESILIENT BASE AND ACCESSORIES: Straight resilient bases, where indicated in conjunction with carpeting.
- D. Section 09 65 23 - RUBBER FLOORING: rubber stair treads and risers.

## 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 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.

#### 1.5 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.

#### 1.6 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 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.
- 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 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.

## 1.7 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, and approved by carpet tile manufacturer.

## 1.8 MOCK-UPS

- A. Provide mock-up under provisions of Section 01 45 00 – QUALITY CONTROL.
- B. Provide mock-up sample of 25 square feet in 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.
- E. Accepted mock-ups may remain as part of the work; the number of mock-ups shall not be restricted.

#### 1.9 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 required to for venting operations

#### 1.10 DELIVERY, STORAGE, AND HANDLING

- A. Store all carpeting material under cover in dry, well-ventilated spaces as soon as delivered. Protect carpeting from damage, dirt, stain, moisture, and mildew.
- B. Waste Reduction: Collect polyethylene roll wrap at site and recycle into more roll wrap. Redirect small pieces of waste carpet to be appropriately recycled.

#### 1.11 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. 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.
  - 2. Furnish carpet manufacturer's warranty which shall contain the following:
    - a. Commencement date for warranty: Date of Project Substantial Completion.
    - b. Wear Warranty - Lifetime of Carpet. No more than 10% face yarn loss by weight in normal use.
    - c. Static Warranty - Lifetime of Carpet.
    - d. Edge Ravel Warranty - Lifetime of Carpet. Guaranteed no edge ravel in normal use (no seam sealers required).
    - e. Delamination Warranty - Lifetime of Carpet. Guaranteed no delamination in normal use (no chair pads required).

- f. 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. Mannington Carpets Inc., Calhoun, GA.
  2. Tarkett USA, Inc., Aurora, OH.
  3. Interface Americas, Inc., Atlanta, GA.
  4. Milliken Design, Inc., Spartanburg, SC.
- B. General requirements: Carpet tiles, shall conform with or pass tests of the following Standards:
  1. ASTM D2859 (Methenamine Reagent Pill Test).
  2. ASTM E648 (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.
  5. The Carpet and Rug Institute (CRI) "Green Label Plus Certification" Program.
- C. Carpet tile CPT-1: To establish a standard of quality, design and function desired, specifications have been based on Mannington Carpets Inc., Calhoun, GA, "Divergent Collection –EBB", modular carpet, nominal size 18 inches by 36 inches.
  1. Construction – Textured Patterned loop.
  2. Face Yarn – Type 6 nylon.
  3. Dye System – Solution dyed.
  4. Gauge: 5/64.
  5. Stitches per inch: 11.8
  6. Pile thickness: 0.102 inches.
  7. Weight: 18 ounces per square yard.
  8. Backing: Infinity 2 Modular.
  9. Colors/Patterns: CPT-1 modular tile 50 percent distribution of total carpet. Multiple Colors are required, and colors/patterns shall be as indicated on Drawings
- D. Carpet tile CPT-2: To establish a standard of quality, design and function desired, specifications have been based on Mannington Carpets Inc., Calhoun, GA, "Divergent Collection –CURRENT", modular carpet, nominal size 18 inches by 36 inches.
  1. Construction – Textured Patterned loop.
  2. Face Yarn – Type 6 nylon.
  3. Dye System – Solution dyed.

4. Gauge: 5/64.
5. Stitches per inch: 11.8
6. Pile thickness: 0.102 inches.
7. Weight: 18 ounces per square yard.
8. Backing: Infinity 2 Modular.
9. Colors/Patterns: CPT-2 modular tile 50 percent distribution of total carpet. Multiple Colors are required, and colors/patterns shall be as indicated on Drawings

- E. 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 E84 Tunnel Test, as recommended by Carpet manufacturer for application and intended use.
1. Provide low VOC adhesives that comply with the following limits for VOC content:
    - a. Indoor carpet adhesive: 50 g/L.
    - b. Additionally; comply with emission requirements of The Carpet and Rug Institute (CRI) “Green Label Plus Certification” Program.
  2. Acceptable manufacturers include the following or approved equal:
    - a. Advanced Adhesive Technology, Inc, Dalton GA.
    - b. DAP Incorporated, Dayton OH.
    - c. W.W. Henry Company, Aliquippa PA.
    - d. Macklanburg-Duncan Company, Oklahoma City, OK.
    - e. 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. Burke Industries, San Jose, CA.
    - c. Roppe Corporation, Fostoria OH.
    - d. American Billtrite (Canada) Ltd., Sherbrooke, Quebec.
  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 1/4 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 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 in Ashlar pattern, with pattern grain running in single direction. Confirm direction of carpet pattern with Architect prior to installation.
- 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

Section 09 81 00  
ACOUSTICAL INSULATION**PART 1 - GENERAL**

## 1.1 GENERAL PROVISIONS

- A. The BIDDING REQUIREMENTS, CONTRACT FORMS, and CONTRACT CONDITIONS as listed in the Table of Contents, and applicable parts of Division 1 - GENERAL REQUIREMENTS, shall be included in and made a part of this Section.
- B. Examine all Drawings and all other Sections of the Specifications for requirements therein affecting the work of this Section.

## 1.2 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.

## 1.3 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 02 41 19 - SELECTIVE DEMOLITION: Removal of existing partitions, walls and related insulation.
- C. Section 06 10 00 - ROUGH CARPENTRY: Wood framing, blocking, nailers.
- D. Section 09 22 16 - NON-STRUCTURAL METAL FRAMING.
- E. Section 09 29 00 - GYPSUM BOARD: Installation of wall board over acoustical insulation.
- F. Division 23 - HEATING, VENTILATING AND AIR CONDITIONING: Ductwork and piping insulation.

## 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 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 - Standard Test Methods for Water Vapor Transmission 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.

#### 1.5 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.

#### 1.6 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.

#### 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 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 91 00  
PAINTING**PART 1 - GENERAL**

## 1.1 GENERAL PROVISIONS

- A. The BIDDING REQUIREMENTS, CONTRACT FORMS, and CONTRACT CONDITIONS as listed in the Table of Contents, and applicable parts of Division 1 - GENERAL REQUIREMENTS, shall be included in and made a part of this Section.
- B. Examine all Drawings and all other Sections of the Specifications for requirements therein affecting the work of this Section.

## 1.2 SUMMARY

- A. Summary: This Section consists of painting work where shown on the Drawings, as specified herein, 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. Electrical raceways at Athletic Building.
  - 2. Gypsum board partition and wall surfaces.
  - 3. Gypsum board ceilings and soffits.
  - 4. Concrete masonry unit partitions and walls.
  - 5. Metal doors and frames.
  - 6. Interior and exterior handrails and guardrails.
  - 7. Interior wood trim and paneling.
  - 8. Stage flooring.
  - 9. Exposed to view sprinkler piping.
  - 10. Exposed to view electrical conduit and raceways.
  - 11. Exposed to view exterior gas piping.
  - 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. Exterior stairs.
  - 14. Access panels and frames.
  - 15. Exterior site bollards.
  - 16. Exposed concrete floors where indicated on the Drawings.

- 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. Ceramic tile, 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.

### 1.3 RELATED REQUIREMENTS

- A. Section 01 74 19 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL: Procedural and administrative requirements for construction and demolition recycling.
- B. Section 05 50 00 - METAL FABRICATIONS: Shop priming of designated miscellaneous metals.
- C. Section 06 20 00 - FINISH CARPENTRY: Wood trim items, setting and filling of nails, sanding of wood trim.
- D. Section 08 11 13 - HOLLOW METAL DOORS AND FRAMES: Shop priming of metal frames and steel doors.
- E. Section 08 31 00 - ACCESS DOORS AND PANELS, and by trades requiring the same: Shop primed access panels, occurring in partitions and walls.
- F. Document 09 91 13 - EXTERIOR PAINTING SCHEDULE: Painting schedule for exterior surfaces and materials:
- G. Document 09 91 23 - INTERIOR PAINTING SCHEDULE:
1. Painting schedule for interior surfaces and materials.
  2. Painting schedule for Mechanical and Electrical Equipment.
- H. Section 09 97 25 – LIME COATINGS: "Lime wash" over existing exterior brick where indicated.
- I. Division 22 - PLUMBING: Prefinished items such as plumbing fixtures, sprinkler heads, convectors, anemostates and similar surfaces and materials.
- J. Division 26 - ELECTRICAL: Prefinished items such as light fixtures, switch gear, electrical distribution cabinets and similar surfaces and materials.
- K. Respective sections: Factory-finishing of mechanical, plumbing, fire protection and electrical equipment.

## 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. 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.

## 1.5 DEFINITIONS

- A. "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.
- B. Sheen: Specular gloss readings in accordance with ASTM D52
1. Flat: less than 5 (measured at 85 degrees)
  2. Eggshell: 5 – 20 (measured at 60 degrees)
  3. Satin: 15-35 (measured at 60 degrees)
  4. Low Luster: 25 – 35 (measured at 60 degrees)
  5. Semi-Gloss: 30 -65 (measured at 60 degrees)
  6. Gloss: 65 or more (measured at 60 degrees)

## 1.6 SUBMITTALS

- A. Information and Review Submittals: Submit the following under provisions of Section 01 33 00 - SUBMITTAL PROCEDURES:
1. Literature:
  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.
- 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.

## 1.7 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:
  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.
  2. 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.
  3. 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).
  4. 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.
  5. Restricted Components: Paints used on this Project shall not contain any of the following:
    - 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. Triphenyltins (TPT) and tributyltins (TBT)

#### 1.8 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 remain as part of the work.

#### 1.9 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.

#### 1.10 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 paints and finishes above minimum temperature conditions in strict accordance with manufacturer's instructions.

- D. Provide sufficient lighting to maintain 80 foot-candles measured mid-height at substrate surface.

#### 1.11 SEQUENCING AND SCHEDULING

- A. 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.
- B. 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.
- C. 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.

### 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. California Paints, Cambridge MA.
    - b. Benjamin Moore & Company, Montvale, NJ.
    - c. Akzo Nobel Paints, LLC, Devoe High Performance Coatings, Strongsville, OH.
    - d. Pittsburgh Paints / PPG Industries, Inc., Pittsburgh PA.
    - e. Pratt & Lambert Inc., Buffalo, NY.
    - f. Sherwin Williams, Cleveland OH.
  - 2. Cold galvanizing touch-up paint:
    - a. ZRC Worldwide Inc., Marshfield MA.
    - b. Duncan Galvanizing, Malden Ma.
    - c. Rustoleum Corp., Vernon Hills IL.
  - 3. Caulking
    - a. Pecora Corporation, Harleysville PA.
    - b. Sonneborn Building Products Inc., Minneapolis MN.
    - c. Tremco, Beachwood 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".
- C. Joint sealant for fill of minor cracks prior to painting: One component acrylic latex caulking compound, conforming to FS 19-TP-21M and ASTM C 834, paintable within 24 hours after application, with a minimum movement capability of  $\pm 12.5$  percent, equal to one of the following:
  - 1. Pecora, product "AC-20+".
  - 2. Sonneborn Building Products Inc., product, "Sonolac".
  - 3. Tremco, product, "Trimflex 834".

### 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:
  - 1. Tri-Sodium Phosphate (TSP) substitute products:
    - a. Savogran, Norwood MA, products "TSP-PF", or "Liquid TSP Substitute".
    - b. Custom Building Products, Seal Beach, CA., product "Custom T.S.P. Substitute".
    - c. 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: 12 percent.
  - 2. Masonry or concrete: 12 percent.
  - 3. Interior wood: 15 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 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 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. 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.
- G. 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 alkyd base metal primer product of the finish coating manufacturer. Seal top and bottom edges of metals doors with primer.
- H. New galvanized surfaces: Remove surface contamination and oils and wash with solvent. Apply coat of etching primer.
- I. New interior wood items scheduled to receive paint 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.

### 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.

### 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 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.

### 3.6 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.
  - 1. Colors of priming coats (and body coats where specified) shall be lighter in tint than those of finish coat.
  - 2. 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.
- B. Paint Schedule for exterior surfaces and materials: Refer to Document 09 91 13.
- C. Paint Schedule for interior surfaces and materials: Refer to Document 09 91 23.
- D. Painting Schedule for mechanical and electrical equipment: Refer to Document 09 91 23.

End of Section

## 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.
- B. The BIDDING REQUIREMENTS, CONTRACT FORMS, and CONTRACT CONDITIONS as listed in the Table of Contents, and applicable parts of Division 1 - GENERAL REQUIREMENTS, shall be included in and made a part of this Section.
- C. Examine all Drawings and all other Sections of the Specifications for requirements therein affecting the work of this Section.

## 1.2 PAINTING SCHEDULE FOR EXTERIOR SURFACES AND MATERIALS

- A. Exterior METAL, FERROUS, new, shop primed and existing (includes gas piping):
  - 1. One coat rust inhibitive primer. (touch up bare metal at existing and shop primed surfaces).
    - a. California: "Everlife Oil-based Metal Primer, N°. 21150.
    - b. Devoe Coatings: Devguard 4160 Multi-Purpose Tank & Structural Primer.
    - c. Moore: "Corotech Universal Metal Primer" N°. V131
    - d. Pittsburgh: "Speedhide Industrial Rust Inhibitive Primers", 6-208/6-212 Series.
    - e. Sherwin-Williams: "Kembond HS Universal Metal Primer", B50 Series.
  - 2. Two coats acrylic gloss enamel:
    - a. California: "Everlife 100% Acrylic Waterborne High Gloss ", N°. 521..
    - b. Devoe Coatings: Devflex 4208QD Waterborne Gloss Enamel.
    - c. Moore: "Acrylic Gloss Enamel", N°. HP28
    - d. Pittsburgh: "Pitt-Tech DTM Exterior Waterborne High Gloss Enamel", 90-300 Series.
    - e. Sherwin-Williams: "DTM Acrylic Gloss", B66 Series
- B. Exterior METAL, GALVANIZED (excluding handrails):
  - 1. Wash primer apply if recommended by individual paint manufacturer.
  - 2. Touch-up galvanizing primer.
    - a. Devoe Coatings: Devflex 4020PF Direct To Metal Primer and Flat Finish.
    - b. Moore: "Acrylic Metal Primer", N°. M04
    - c. Pittsburgh: "Speedhide Galvanized Exterior Steel Primer", 6-209 Series
    - d. Sherwin-Williams: " Galvite Paint" B50 WZ30 @ 2.5 mils DFT.
  - 3. Two coats of gloss finish alkyd enamel paint.

- a. Devoe Coatings: Devflex 659 Gloss DTM Waterborne Acrylic Enamel.
- b. Moore: "Gloss Enamel", N°. M22.
- c. Pittsburgh: "Speedhide Industrial Gloss Oil Enamel", 7-814 Series
- d. Sherwin-Williams: "Industrial Enamel", B54 Z Series.

End of Document

## 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.
- B. The BIDDING REQUIREMENTS, CONTRACT FORMS, and CONTRACT CONDITIONS as listed in the Table of Contents, and applicable parts of Division 1 - GENERAL REQUIREMENTS, shall be included in and made a part of this Section.
- C. Examine all Drawings and all other Sections of the Specifications for requirements therein affecting the work of this Section.

## 1.2 PAINTING SCHEDULE FOR INTERIOR SURFACES AND MATERIALS

- A. Interior CONCRETE MASONRY walls and partitions:
  - 1. One coat block filler:
    - a. California: "Mason-Cote 100% Acrylic Latex Block Filler", N°. 3751.
    - b. Glidden Professional: Concrete Coatings Block Filler Interior/Exterior N°. 3010.
    - c. Moore: "Latex Block Filler" N°. M88
    - d. Pittsburgh: "Speedhide Interior Masonry Latex Block Filler", 6-7 Series
    - e. Sherwin-Williams: "ProMar Int. Ext Block Filler" B25-W25.
  - 2. Two coats semi-gloss paint:
    - a. California: "Fres-Coat 100% Acrylic Latex Semi-Gloss", N°. 563XX.
    - b. Glidden Professional: Ultra-Hide 250 Semi-Gloss No 1406.
    - c. Moore: "EcoSpec Interior Latex Semi-Gloss" N°. 224.
    - d. Pittsburgh: "Speedhide Interior Low Odor Latex Semi-Gloss Enamel", N°. UC 80023.
    - e. Sherwin-Williams: Harmony Interior Low Odor Latex Semi-Gloss B10 Series
- B. Interior GYPSUM BOARD (drywall) partitions, previously painted:
  - 1. Two coats latex eggshell paint:
    - a. California: "CalPro2000 Series Acrylic Eggshell", N°. 557.
    - b. Glidden: "Ultra-Hide 250 Eggshell" N°. 1402.
    - c. Moore: "Ultra Spec 500 Low Sheen Eggshell N537.
    - d. PPG: "Speedhide Latex Eggshell Enamel", 6-411 Series.
    - e. Sherwin-Williams: " ProMar 200 Zero VOC Interior Latex Eg-Shel", B20-2600 Series.
- C. Interior GYPSUM BOARD (drywall) partitions:

1. One coat latex primer.
    - a. California: "Prime Touch Primer Sealer" N<sup>o</sup>s. 545.
    - b. Glidden Professional: PVA Wall Primer Sealer N<sup>o</sup>. 1030.
    - c. Moore: "Ultra Spec 500 Primer N534.
    - d. PPG: "Speedhide Interior Quick Drying Latex Sealer", 6-2 Series.
    - e. Sherwin-Williams: "ProMar 200 Zero VOC Interior Latex Primer", B28w2600 Series.
  2. Two coats latex eggshell paint:
    - a. California: "CalPro2000 Series Acrylic Eggshell", N<sup>o</sup>. 557.
    - b. Glidden Professional: Ultra-Hide 250 Eggshell N<sup>o</sup>. 1402.
    - c. Moore: "Ultra Spec 500 Low Sheen Eggshell N537.
    - d. PPG: "Speedhide Latex Eggshell Enamel", 6-411 Series.
    - e. Sherwin-Williams: " ProMar 200 Zero VOC Interior Latex Eg-Shel", B20-2600 Series.
- D. Interior underside of OVERHEAD DECKING, exposed to view joists, overhead steel, sprinkler piping, conduits, ducts and similar items:
1. Two coats waterborne acrylic dry fall finish:
    - a. California: "Economy Latex Dry Fall Spray Flat", N<sup>o</sup>. 3701.
    - b. Moore: "Coronado Late Dry Fall Flat N110.
    - c. PPG: "Speedhide Latex Dry Fog Spray Paint", 6-714/715 Series.
    - d. Sherwin-Williams: "Pro Industrial Waterboarne Acrylic Dryfall, Flat", B42 Series.
- E. 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 surfaces:
    - a. California: "Rust-Stop DTM Primer/Finish", N<sup>o</sup>. 1061.
    - b. Devoe Coatings: Devflex 4020PF DTM Primer and Flat Finish.
    - c. Moore: "Acrylic Metal Primer", N<sup>o</sup>. P04.
    - d. Pittsburgh: "Pitt-Tech DTM Primer/Finish 100% Acrylic", 90-709/712 Series
    - e. Sherwin-Williams: "DTM Acrylic Primer Finish", B66 W1 Series.
  2. Two coats latex semi-gloss enamel:
    - a. California: "Rust-Stop DTM Primer/Finish", N<sup>o</sup>. 1061.
    - b. Devoe Coatings: Devflex 4216HP High Performance Waterborne Acrylic Semi-Gloss Enamel.
    - c. Moore: "Super Spec HP DTM Semi-Gloss Enamel", N<sup>o</sup>. P29.
    - d. Pittsburgh: "Pitt-Tech Plus High Performance, Semi -Gloss DTM Industrial Enamel", 90-1210 Series.
    - e. Sherwin-Williams: "Sher-Cryl HPA Semi-Gloss", B66 Series.



- F. 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. Devoe Coatings: "Tru-Glaze-WB" 4030 Waterborne Epoxy Primer
    - d. Moore: "Superspec HP Epoxy Metal Primer", P33 Series.
    - e. Pittsburgh: "PPG All Weather DTR" 97 Series @ 5 mils DFT, 18 Month Recoat
    - f. 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. Glidden Professional: Devthane 359H DTM High Build Gloss Enamel @ 4.0-6.0 mils DFT.
    - d. Moore: "Superspec HP Aliphatic Urethane", P74 Series.
    - e. Pittsburgh: "Pitt-Thane Ultra" 95-800 Series @ 4 mils DFT.
    - f. Sherwin-Williams: "Acrolon 218 HS Acrylic Polyurethane" @ 3.0-6.0 mils DFT.
- G. Interior metal, galvanized, (includes exposed ductwork):
1. Touch-up with metal primer.
    - a. California: "Rust-Stop DTM Primer/Finish", N°. 1061.
    - b. Devoe Coatings: Devflex 4020PF DTM Primer and Flat Finish.
    - c. Moore: "Acrylic Metal Primer", N°. P04.
    - d. Pittsburgh: "Pitt-Tech DTM Primer/Finish 100% Acrylic", 90-709/712 Series.
    - e. Sherwin-Williams: "DTM Acrylic Primer Finish" B66 W1 Series.
  2. Two coats acrylic semi-gloss enamel:
    - a. California: "Rust-Stop DTM Primer/Finish", N°. 1061.
    - b. Devoe Coatings: Devflex 4216HP High Performance Waterborne Acrylic Semi-Gloss Enamel.
    - c. Moore: "Super Spec HP DTM Semi-Gloss Enamel", N°. P29.
    - d. Pittsburgh: "Pitt-Tech Plus High Performance, Semi -Gloss DTM Industrial Enamel", 90-1210 Series.
    - e. Sherwin-Williams: "Sher-Cryl HPA Semi-Gloss", B66 Series.
- H. Interior exposed METAL, PIPING: Same as specified for ferrous metal.
- 1.3 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. ICI Paints: "Prep & Prime Odor-Less Interior Water-Based Primer-Sealer" LM 9116.
    - b. Moore: "EcoSpec Interior Latex Primer Sealer" 231.
    - c. Pittsburgh: "Pure Performance Interior Latex Primer".
    - d. Sherwin-Williams: "Harmony Interior Latex Primer" B11W900.
  - 2. Two coats latex semi-gloss paint:
    - a. ICI Paints: "Lifemaster 2000 Interior Semi-gloss" LM9200.
    - b. Moore: "EcoSpec Interior Latex Semi-gloss" N°. 224.
    - c. Pittsburgh: "Pure Performance Interior Semi-gloss", 9-500 Series.
    - d. Sherwin-Williams: "Harmony Interior Latex Semi-gloss" B10 Series.
- D. Interior water piping system ('recycled water', '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 Rhode Island State Building Code and Section 23 00 00 - PLUMBING.
  - 2. Sequencing: All recycled water piping must be painted prior to being concealed by work of other trades.
  - 3. 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.
  - 4. 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 penetrates 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 'Green' at intervals of not more than 10 feet and at all points where piping penetrates through walls, floors and roofs.
    - c. Recycled water (Gray water): Paint in 'Purple' color, completely covered throughout its entire length.
      - 1) Paint piping at the start and end of all piping branches.
      - 2) Apply paint on both sides of penetrations at walls, above and below floor penetrations, and at roof penetrations.
      - 3) Paint piping at all termination points other than at actual fixtures.

- 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 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 97 25  
LIME COATINGS**PART 1 - GENERAL**

## 1.1 GENERAL PROVISIONS

- A. The BIDDING REQUIREMENTS, CONTRACT FORMS, and CONTRACT CONDITIONS as listed in the Table of Contents, and applicable parts of Division 1 - GENERAL REQUIREMENTS, shall be included in and made a part of this Section.
- B. Examine all Drawings and all other Sections of the Specifications for requirements therein affecting the work of this Section.

## 1.2 SUMMARY

- A. Prepare exterior brick surfaces scheduled to receive lime coating.
- B. Furnish and install white colored "lime-wash" exterior coating at indicated exposed brick surfaces.

## 1.3 RELATED REQUIREMENTS

- A. Section 04 01 25 – CLEANING UNIT MASONRY.
- B. Section 07 92 00 - JOINT SEALANTS: Sealant materials, for control joints.

## 1.4 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 E96 - Standard Test Methods for Water Vapor Transmission of Materials.
  - 2. ASTM E514 - Standard Test Method for Water Penetration and Leakage Through Masonry.
  - 3. ASTM G154 - Standard Practice for Operating Fluorescent Light Apparatus for UV Exposure of Nonmetallic Materials.
  - 4. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.

## 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 and physical properties.
  - 2. Certification: Manufacturer's written certification stating that coating and all related items to be furnished hereunder, meet or exceed the requirements specified under this Section.

3. Manufacturer's instructions: Manufacturer's installation instructions indicating special procedures, and perimeter conditions requiring special attention.

#### 1.6 FIELD SAMPLES

- A. Provide field samples under provisions of Section 01 45 00 - QUALITY CONTROL for purpose of verifying selected color, texture and workmanship.
- B. Apply in place, on-site one sample, minimum, minimum 20 square feet over exterior brick substrate located as directed by the Architect.
- C. Remove from substrate all rejected samples, and replace as required unit Architect's approval has been obtained.
- D. Maintain sample on job site for duration of project for comparison purposes.
- E. Accepted samples may remain as part of the work.

#### 1.7 QUALITY ASSURANCE

- A. Coating applicator, with a minimum of 5 years documented experience demonstrating previously successful work of the type specified herein, and approved by product manufacturer.
  1. Submit subcontractor's experience qualifications as specified under the Article entitled "Submittals."
- B. Make all necessary arrangements with the respective coating 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 coating materials. Perform all preparation, mixing, and application procedures as recommended by each manufacturer's representative. Bear all costs in conjunction with such supervision.

#### 1.8 DELIVERY, STORAGE AND HANDLING

- A. Deliver and store coating materials in new, sealed, containers showing manufacturer's identification.
- B. Store all materials in an elevated, dry location, protected by waterproof coverings. Follow manufacturer's recommended storage procedures for humidity and temperature conditions, protect materials from freezing.
  1. Store liquid materials at temperatures not less than 45 degrees Fahrenheit.

#### 1.9 PROJECT CONDITIONS

- A. Cold weather requirements: Maintain ambient temperatures above 50 degrees Fahrenheit for 24 hours before and during application and maintain until coating has cured, not less than 48 hours after application of coating.
- B. Hot weather requirements: Protect finish from uneven and excessive evaporation during hot, dry weather.
- C. Wet substrates: Water saturated substrates scheduled to receive coating must be fully dried (cured), prior to application of coating.

**PART 2 - PRODUCTS**

- A. Basis of Design (Specified Manufacturer): To establish a standard of quality, design and function desired, Drawings and specifications have been based on KEIM Mineral Coatings of America, Inc., Charlotte, NC., Product: "KEIM Romanit-Farbe".
- B. Manufacturer: 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. KEIM Mineral Coatings of America, Inc., Charlotte, NC.
  - 2. Lancaster Lime Works, Willow Street, PA.
  - 3. Romabio Paints, Atlanta GA.
- C. Repair patch cleaner / sinter layer remover meeting or conforming to:
  - 1. Premeasured ready-to-mix dry sacked mortar.
  - 2. Single component, polymer modified, fiber reinforced, hydraulically setting.
  - 3. Compatible to concrete exposed to both static and dynamic loads.
  - 4. Low shrinkage and crack-free hardening even under dynamic loads during application and setting period.

**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 coating system.
  - 2. Verify that substrate surfaces are smooth, free of pitting, and not detrimental to full contact bond of coating materials.
  - 3. Verify that items which penetrate surfaces to receive coating are securely installed.
  - 4. Verify that sand moulding material has been thoroughly removed from brick surfaces.
- B. Beginning of installation means acceptance of existing substrate and site conditions.

## 3.2 PREPARATION

- A. Clean walls by high pressure wash or sand blast, and prepare surfaces to receive coating in accordance with manufacturer's instructions.
- B. New concrete surfaces to receive coating must cure for a minimum of 14 days prior to application of coating materials.
- C. Do not apply coating 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.

### 3.3 APPLICATION

#### A. General:

1. Conform to manufacturer's written instructions, and provisions of the Contract Documents.
2. Maintain temperature during and after application. Substrate and ambient air temperature must be between 41 °F (5 °C) and 86 °F (30 °C). Work ahead of the sun on shaded façades.
3. Work to logical stopping points (corners, seams, architectural features, etc.).
4. Apply coatings maintaining a wet edge to desired finish as indicated.
5. Protect from wind and rain prior to, during, and for a minimum 24 hours after application.

#### B. Apply Silicate Coating:

1. General: Apply silicate coats in minimum 3 mil layers to a smooth mineral matte finish without lap lines, voids, "holidays", or drips. Compare manufacturer-verified mock up consumption data with application consumption data to ensure enough product is applied.
2. Base Coat:
  - a. Dilute silicate coating with maximum 10 percent dilution (2 gallons with 3 liters dilution). Stir well by hand or 600-800 RPM mixing equipment.
  - b. Apply base coat of diluted silicate coating by brush or roller to concrete structure.
  - c. Allow minimum 12 hours drying time.
3. Top coat:
  - a. Do not dilute. Stir well by hand or 600-800 RPM mixing equipment.
  - b. Apply top coat of undiluted silicate coating by brush or roller.

### 3.4 TOUCH UP

- A. Some colors touch up well, some do not. Always perform a test and allow the touch up to cure minimum 12 hours before evaluation. Colors become lighter upon drying.
- B. For colors that do not touch up well, expect corner to corner recoating for acceptable results.
- C. When touching up or recoating, use the same tools and techniques for best results.
- D. Articulate the application confining the recoating to the borders of the repair.

### 3.5 CLEANING

- A. Remove smears from adjacent surface immediately as the work progresses. Exercise particular care to prevent staining or smearing of surrounding surfaces which will be exposed in the finish work, and repair any damage done to same as a result of this work without additional cost to Owner.



- B. After completion of the work of this Section, remove equipment, and clean all interfacing wall areas, free from excess deposits of coating, and other materials installed under this Section.

End of Section

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Section 10 11 16  
MARKERBOARDS**PART 1 - GENERAL**

## 1.1 GENERAL PROVISIONS

- A. The BIDDING REQUIREMENTS, CONTRACT FORMS, and CONTRACT CONDITIONS as listed in the Table of Contents, and applicable parts of Division 1 - GENERAL REQUIREMENTS, shall be included in and made a part of this Section.
- B. Examine all Drawings and all other Sections of the Specifications for requirements therein affecting the work of this Section.

## 1.2 SUMMARY

- A. Furnish and install the following:
  - 1. Wall mounted fixed markerboards.
  - 2. Markerboard accessories

## 1.3 RELATED REQUIREMENTS

- A. Section 01 74 19 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL: Procedural and administrative requirements for construction and demolition recycling.
- B. Section 06 10 00 - ROUGH CARPENTRY: Wood blocking.
- C. Section 09 29 00 - GYPSUM BOARD: Gypsum board substrate.

## 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 A424 - Standard Specification for Steel, Sheet, for Porcelain Enameling.
  - 2. PEI - Performance Specifications for Porcelain Enamel Chalkboards.

## 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 for each item furnished hereunder.
  - 2. Selection samples: Manufacturer's sample chain showing finishes and colors available, for both dry-marker boards and chalkboards, for selection by Architect.

3. Provide maintenance information on regular cleaning and stain removal for slate chalkboards.

## 1.6 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 standard 5 year warranty which shall include coverage of dry-marker board and porcelain enamel chalkboard surfaces from discoloration due to cleaning.

## 1.7 MAINTENANCE

- A. Provide maintenance information on regular cleaning, stain removal for both dry-marker boards and chalkboards.

## PART 2 – PRODUCTS

### 2.1 MANUFACTURER

- A. Manufacturer: 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. Claridge Products & Equipment Inc., Harrison AR.
  2. AARCO Products, Inc., Yaphank NY.
  3. Aywon Chalkboard & Corkboard, Inc., Hazleton, PA.
  4. EverWhite Corp. Menomonee Falls, WI.
  5. Ghent Corporation, Lebanon OH.
  6. Marsh Industries, Inc., New Philadelphia, OH.

### 2.2 DRY MARKER BOARD

- A. Fixed unframed markerboards: To establish a standard of quality, design and function desired, Drawings and specifications have been based on Claridge Products & Equipment Inc., Harrison AR, Product: "LCS<sup>3</sup>" surface of sizes indicated on Drawings.
- B. Markerboard surfaces:
  1. Face sheet: 24 gage cold rolled enameling steel.
  2. Porcelain enamel writing surface:
    - a. Bottom ground coat: 1.5 to 2.2 mils.
    - b. Top ground coat: 2.0 to 2.8 mils.
    - c. Color coat: 3.0 to 4.0 mils.
  3. Face sheet color: As selected by Architect from at least five standard colors.
  4. Backing sheet: steel sheet or aluminum, minimum 0.015 inch thick.

**2.3 ACCESSORIES**

- A. Marker tray (Markerboard Type MB-5): Manufacturer's standard continuous box type aluminum marker tray with slanted front and cast plastic end closures for each markerboard. Extend marker tray full width of markerboard or markerboard/tackboard combination.
- B. Provide instructions for dry-marker board cleaning on metal plate attached to perimeter frame near chalk-trough for each room.

**PART 3 - EXECUTION****3.1 EXAMINATION**

- A. Verify that surfaces and internal wall blocking are ready to receive work of this Section.
- B. Beginning of installation means acceptance of existing substrate.

**3.2 INSTALLATION**

- A. Install markerboards in accordance with manufacturer's instructions. Protect porcelain enamel facing from chipping and damage during handling and installation. Install units' level and plumb utilizing concealed continuous hangers wherever possible and where fasteners must be exposed, use tamperproof-type fasteners.
- B. Install dry-marker boards in accordance with manufacturer's instructions. Protect edges and porcelain enamel writing surface from chipping and damage during handling and installation.
- C. Establish top of units at indicated on Drawings, refer to Drawing A3.04.

**3.3 CLEANING**

- A. Clean board surfaces in accordance with manufacturer's instructions.
- B. Cover boards with protective cover taped to frame. Remove cover on Date of Substantial Completion.

End of Section

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Section 10 14 00  
SIGNAGE**PART 1 - GENERAL**

## 1.1 GENERAL PROVISIONS

- A. The BIDDING REQUIREMENTS, CONTRACT FORMS, and CONTRACT CONDITIONS as listed in the Table of Contents, and applicable parts of Division 1 - GENERAL REQUIREMENTS, shall be included in and made a part of this Section.
- B. Examine all Drawings and all other Sections of the Specifications for requirements therein affecting the work of this Section.

## 1.2 SUMMARY

- A. Furnish and install the following informational and directional signage:
  - 1. Exterior individual back-lighted three-dimensional metal letter signage for School Name at Main Entry.
  - 2. Exterior three-dimensional metal letter school logo at Bus Entry.
  - 3. Interior acrylic plate signage, including, but not limited to:
    - a. Wayfinding (directional) signage.
    - b. Environmental awareness signage
  - 4. Electronically-cut, adhered, vinyl signage and graphics.

## 1.3 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 50 00 - TEMPORARY FACILITIES AND CONTROLS: Temporary project sign and safety signage.
- C. Section 09 91 00 – PAINTING: Painted graphics.
- D. Division 26 – ELECTRICAL:
  - 1. Illuminated exit signs.
  - 2. General requirements for electrical fixtures and lighting.
  - 3. Power supply to illuminated signage provided under this Section 10 14 00.

## 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. NEC: National Electric Code - Latest Edition.
2. UL: Underwriters Laboratories Inc.
3. ASTM A108 - Standard Specification for Steel Bar, Carbon and Alloy, Cold-Finished.
4. ASTM A36/A36M - Standard Specification for Carbon Structural Steel.
5. ASTM A53/A53M - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless.
6. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
7. ASTM A126 - Standard Specification for Gray Iron Castings for Valves, Flanges, and Pipe Fittings.
8. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
9. ASTM A283/A283M - Standard Specification for Low and Intermediate Tensile Strength Carbon Steel Plates.
10. ASTM A312/A312M - Standard Specification for Seamless, Welded, and Heavily Cold Worked Austenitic Stainless Steel Pipes.
11. ASTM A320/A320M - Standard Specification for Alloy-Steel and Stainless Steel Bolting for Low-Temperature Service.
12. ASTM A499 - Standard Specification for Steel Bars and Shapes, Carbon Rolled from "T" Rails.
13. ASTM A501/A501M - Standard Specification for Hot-Formed Welded and Seamless Carbon Steel Structural Tubing.
14. ASTM A554 - Standard Specification for Welded Stainless Steel Mechanical Tubing.
15. ASTM A563/A563M - Standard Specification for Carbon and Alloy Steel Nuts (Inch and Metric).
16. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
17. ASTM A666 - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar.
18. ASTM A743/A743M - Standard Specification for Castings, Iron-Chromium, Iron-Chromium-Nickel, Corrosion Resistant, for General Application.
19. ASTM B209/B209M - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate.
20. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.
21. ASTM B316/B316M - Standard Specification for Aluminum and Aluminum-Alloy Rivet and Cold-Heading Wire and Rods.
22. ASTM B483/B483M - Standard Specification for Aluminum and Aluminum-Alloy Drawn Tube and Drawn Pipe for General Purpose Applications.
23. ASTM B429/B429M - Standard Specification for Aluminum-Alloy Extruded Structural Pipe and Tube.



24. ASTM C1048 - Standard Specification for Heat-Strengthened and Fully Tempered Flat Glass.
25. ASTM D638 - Standard Test Method for Tensile Properties of Plastics.
26. ASTM D790 - Standard Test Methods for Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials.
27. ASTM F593 - Standard Specification for Stainless Steel Bolts, Hex Cap Screws, and Studs.
28. ASTM D1003 – Standard Test Method for Haze and Luminous Transmittance of Transparent Plastics.
29. ASTM D1044 – Standard Test Method for Resistance of Transparent Plastics to Surface Abrasion by the Taber Abraser.
30. ASTM F594 - Standard Specification for Stainless Steel Nuts.
31. ASTM F1554 - Standard Specification for Anchor Bolts, Steel, 36, 55, and 105-ksi Yield Strength.
32. 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.
33. ASTM G90 - Standard Practice for Performing Accelerated Outdoor Weathering of Materials Using Concentrated Natural Sunlight.
34. All applicable federal, state and municipal codes, laws and regulations regarding accessibility requirements.

B. Inclusionary References: The following reference materials are hereby made a part of this Section by reference thereto:

1. ANSI A 117.1 - Specifications for Making Buildings and Facilities Accessible to and Usable by Physically Handicapped People.
2. ADAAG: Americans with Disabilities Act Accessibility Guidelines.
3. NFPA 170 – Standard for Fire Safety and Emergency Symbols.

## 1.5 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, Signage Installer's Project Superintendent, and representatives of other related trades as directed by the Architect or Contractor.
2. Agenda:
  - a. Scheduling of signage proofing and fabrication.

- b. Schedule of signage installation.
- c. Review of staging and material storage locations.
- d. Coordination of work by other trades.
- e. Installation procedures for ancillary equipment.
- 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.

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.

1.6 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, physical properties for each item furnished hereunder.
2. Schedule: The Architect will prepare and issue a schedule for all identification devices to be furnished hereunder, including character types, and colors. After receipt of the Architect's schedule, prepare and submit shop drawings and verification schedule.
  - a. Proofs: All text must be reviewed and approved by Architect prior to production of signage. Signage fabricator is responsible for providing corrected copies of text, and to recommend proper letter and word spacing. Text will be reset until approved by the Architect, and the approved proofs shall serve as the standard for all further typesetting and approvals.
    - 1) Each proof shall clearly identify the individual number assigned to each plate, panel, mural, or sign.
3. Shop drawings:
  - a. Plan drawing showing location of each sign. Coordinate plan with schedule.
  - b. Elevation drawings showing full size elevations of each sign. Indicate for each sign: sign styles, lettering and locations, and overall dimensions.
  - c. Large scale design details of signs, showing attachment clips and brackets; and complete installation details.
4. Selection samples:
  - a. Sample plastic chips indicating Manufacturer's full range of colors available for initial selection by Architect.
5. Verification samples:

- a. For individual letter signage: Full size sample method of attachment.
- b. Full size sample sign, of type, style and color specified including method of attachment.
- c. Full size cast letter in specified size, finish and typeface, with mounting collar and stud.
- d. Full size sign in specified finish and typeface. Approved sample may be used in finished Project.

#### 1.7 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 signage fabricator, or from manufacturers recommended by the prime signage fabricator of plastic plate signage.
- C. Qualifications:
  1. Signage Fabricator: Minimum of 5 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.

#### 1.8 DELIVERY, STORAGE AND HANDLING

- A. Delivery and Acceptance Requirements:
  1. Do not deliver items to the site, until all specified submittals and proofs 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. Delivered packaged sign, clearly labeled in name groups organized for installation.
- 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 all damaged signage materials from job site and replace with new.

## 1.9 ENVIRONMENTAL CONDITIONS

- A. Do not install adhesive applied signs when ambient temperature is below 70 degrees Fahrenheit. Maintain this minimum during and after installation of signs.

## 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. Interior acrylic signs:
    - a. Apco New England, East Providence, RI.
    - b. Design Communications, LTD., Boston, MA.
    - c. Sunshine Sign, North Grafton, MA.
  - 2. Individual letter signage:
    - a. A.R.K. Ramos, Oklahoma City OK.
    - b. Gemini Inc., Cannon Falls MN
    - c. Matthews International Corporation, Pittsburgh PA
    - d. Metal Arts, Mandan ND.
  - 3. Vinyl film signage:
    - a. 3M Corporation, St. Paul, MN.
    - b. Orafol Americas, Black Creek, GA.
    - c. Avery Dennison Graphics Solutions, Mentor OH.

### 2.2 SIGNAGE - GENERAL

- A. General: Provide sign copy to comply with the requirements indicated in the Drawings, for sizes, styles, spacing, content, positions, materials, finishes and colors of letters.
  - 1. All Signs shall conform to United States "*Americans with Disabilities Act*" and 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)..
  - 2. Final placing and sizing of lettering shall be done as part of the shop drawing approval process, at which time the manufacturer shall make recommendations for Architect's review. Lettering shall have stroke width to height ratio and width to height ratio in accordance with the Americans with Disabilities Act.
  - 3. Tactile Signage:
    - a. Raised Lettering: raised minimum 0.793 mm (1/32 in). and be in compliance with Americans with Disabilities Act.

- b. Braille: Accurate Grade 2 translations, and conforming to the provisions of ADAAG and ICC/ANSI A117.1 with regard to size, position, spacing, and profile characteristics.
- B. Installation of all signs shall be done by vandal-proof method, fully described on the approved shop drawings.
- C. Regulatory Requirements
  - 1. Provide all signage as required by accessibility regulations and requirements of authorities having jurisdiction.
    - a. Comply with all applicable federal, state and municipal codes, laws and regulations regarding signage for exits and handicapped barriers.
  - 2. Products requiring electrical connections: Listed and classified by UL, as suitable for the purpose specified and indicated.

## 2.3 MATERIALS

- A. Aluminum:
  - 1. Provide alloy and temper recommended by aluminum producer or finisher for the type of use and finish indicated. Provide thicknesses indicated on approved shop drawings.
    - a. Extruded bar and shapes: ASTM B221, alloy 6063--T6 or alloy 6463--T52.
    - b. Extruded pipe and tube: ASTM B429, alloy 6063-T6.
    - c. Drawn Seamless tube: ASTM B483, alloy 6063-T832.
    - d. Plate and sheet: ASTM B209/B209M, alloy 6063--T6 or Alloy 3003-H14
  - 2. Aluminum in contact with dissimilar metals shall have bituminous or other protective coating to prevent electrolytic action.'
  - 3. Finish aluminum as indicated on approved shop drawings. Exposed to view aluminum shall be free from scratches and other blemishes. Finish shall be uniform without waves or imperfections of any kind.
  - 4. Recycled content of Aluminum: Use maximum available percentage of recycled aluminum. Aluminum incorporated into the work shall contain not less than 16 percent of recycled aluminum.
- B. Acrylic:
  - 1. Acrylic Sheet: 3/8 inch thick Cyro Industries "Acrylite AR" cast acrylic, or approved equal, having the following characteristics:
    - a. Manufacturer, equal to:  
Cyro Industries  
100 Valley Road  
Mt. Arlington, NJ 07856 USA
    - b. Properties:
      - 1) Tensile Strength: 68.9 MPa tested per ASTM D638.
      - 2) Flexural Strength: 117.2 MPa tested per ASTM D790.
      - 3) Modulus of Elasticity: 3309 MPa tested per ASTM D790.
      - 4) Light transmission: 92 percent tested per ASTM D1003.
      - 5) Abrasion resistance of the coating:

- a) Tabor Abrasion: 1.5 percent change in haze tested per ASTM D1044.
  - b) Mar Resistance: 8.8 percent change in haze tested per DIN 52 348 (with 3kg of sand).
- C. Vinyl Film (for electronically-cut graphics): Opaque non-reflective cast vinyl film, with pressure sensitive adhesive backing, suitable for permanent interior and exterior applications.
1. Basis of Design: 3M Corporation, St. Paul, MN., Product: "Scotchcal ElectroCut Graphic Film Series 7125." having the following characteristics:
    - a. Film type: Cast.
    - b. Thickness: 2 mil thickness.
    - c. Print Compatibility: Thermal Transfer, solvent screen print, UV screen print.
    - d. Gloss: Matte.
    - e. Tensile Strength: 8 pounds per inch.
    - f. Rated for exterior durability of 10 years.
    - g. Manufacturer's warranty: 7 years.
  2. Color(s): As Selected.

## 2.4 ELECTRICAL SIGNS - GENERAL

- A. General: Furnish and install all lighting, electrical components, fixtures and lamps ready for use in accordance with the sign type drawings, details and specifications.
1. Refer to Division 26 - ELECTRICAL for specifications, and Electrical Drawings, to verify line voltages for sign locations that require electrical signs.
  2. Ballast and Lighting Fixtures: Refer to Division 26 - ELECTRICAL.
- B. Quality Control: Installed electrical components and sign installations are to bear the label and certification of Underwriter's Laboratories, Inc., and are to comply with National Electrical Code as well as applicable federal, state and local codes for installation techniques, fabrication methods and general product safety.
- C. Lamp-holders: ETL or UL listed; installation shall conform to requirements of local authorities having jurisdiction and bear UL inspection label.
1. Each individual item containing internal electrical components shall be inspected in woodwork manufacturer's shop by UL inspector and bear Inspection label, dated and signed.
- D. Light Emitting Diode (LED) Lighting:
1. LED lighting fixtures shall be constructed and installed into signage in manner permitting replacement, or repair, of LED modules by access panels, and without removal and reinstallation of entire sign itself.
    - a. Individual LEDs shall be constructed such that a catastrophic loss or the failure of one LED will not result in the loss of the entire LED lighting fixture.
  2. Each LED lighting fixture shall consist of an assembly that utilizes LEDs as the light source. In addition, a complete LED lighting fixture shall consist of a housing, LED array, and electronic driver (power supply).

- a. The LED lighting fixture shall not consume power in the off state.
  - b. LED lighting fixtures shall be Underwriters Laboratory, Inc. listed under UL1598, or an approved equivalent standard from a nationally recognized testing laboratory.
3. Performance requirements:
- a. LED lighting fixtures shall be rated for a minimum operational life of 50,000 hours at an average operating time of 11.5 hours per night at 40°C (104°F).
  - b. Reported lumen maintenance shall be greater than 90% per TM-21-11 after 60,000 hours of LED lighting fixture operation in an ambient environment from 15°C (59°F) to 40°C (104°F).
  - c. The rated operating temperature range shall be -40°C (-40°F) to +40°C (104°F).
  - d. Each LED lighting fixture is capable of operating above 104°F (40°C), but not expected to comply with photometric requirements at elevated temperatures.
  - e. Photometry must be compliant with IESNA LM-79.
4. Operation Voltage: The LED lighting fixture shall operate from a 60 HZ ±3 HZ AC line over a voltage ranging from 108 VAC to 305 VAC. The fluctuations of line voltage shall have no visible effect on the luminous output.
5. Surge Suppression: LED lighting circuitry shall include surge protection devices. The surge suppression device shall be field replaceable, by access panels, and without removal and reinstallation of entire sign itself.
- E. Light fixture housings shall meet the requirements for NEMA/UL wet location, be UL listed and, of color selected by Architect.

## 2.5 INTERIOR PLAQUE SIGNAGE

- A. Photopolymer plaque signage (general requirements): Identification signs with raised tactile graphics, text, and Grade 2 Braille. Signs shall consist of 1/32 inch thick synthetic light sensitive photo emulsion permanently bonded to a rigid phenolic substrate, aluminum or acrylic plaque.
1. Raised lettering: Bond photopolymer permanently to sign plaque, with appropriate laminating film, as recommend by the photopolymer manufacturer.
  2. Lettering height: As indicated on Drawings.
  3. Lettering font: As shown on Drawings.
  4. Screen-printing: All screen printing graphics, including raised areas of tactile plaques except Braille, shall be screen printed in a contrasting color so as to meet the color contrast requirements of Americans with Disabilities Act.
    - a. All non-tactile text shall be screen printed with catalyzed epoxy ink. Applied vinyl lettering and graphics is not acceptable.
    - b. Apply screen printing inks evenly without pinholes, scratches or orange-peeling.
  5. Graphics: All text, symbols and graphics shall be reproduced utilizing computer generated digital art. All screen printed graphics shall utilize

photographically prepared screens and shall be printed in accordance with industry standards. Hand-cut screens are not acceptable.

- a. All edges and corners and letter forms shall be true and clean. Letterforms, color areas, or lines with rounded positive or negative corners, built-up edges, bleeding, spattering, shall not be accepted.
  - b. Prepare artwork from typesetters reproduction of the test specified, minimum 1200 dpi resolution, camera ready artwork. All camera ready artwork and typesetting shall be no less than 75 percent of actual finished size.
6. Mounting: Surface applied by means of silastic adhesive mounting.
  7. Sign colors: As selected by Architect from manufacturer's standard and standard special colors.
    - a. All signs shall be two color signs.
  8. Allow one room identification sign for every room entry door on the plans.
- B. Window plaque signage: Two ply sign, 4 inches high by 8 inches wide comprised of 1/4 inch thick white self-extinguishing acrylic baseplate, with 2 milled out slots to accept removable 3/4 inch high name cards, with 1/16 inch thick clear acrylic window.

## 2.6 VINYL ELECTRONICALLY-CUT SIGNAGE – EXTERIOR/INTERIOR

- A. Die-cut letters: Fabricate electronically (CNC) cut characters, from specified opaque non-reflective cast vinyl film, with pressure sensitive adhesive backing, suitable for interior and exterior applications.

## 2.7 CUT AND FABRICATED METAL LETTERS

- A. Cut metal letters: Cut with a CNC controlled abrasive Waterjet cutting system. All letter and graphic forms shall have sharp inside and outside corners.
1. Letterforms to conform to vector artwork to be supplied by Architect.
  2. Letters to be Aluminum Alloy 6061 in 1/2 thickness as indicated on Drawings.
  3. Letters to have a uniform, painted finish. Specific direction will be provided by Architect when color of substrate has been determined so as to provide sufficient visual contrast.
    - a. Coordinate mounting with architectural substrate
    - b. Letterforms will be drilled and tapped for stud mount with spacers.
    - c. Provide mounting template designating stud locations for review and approval prior to installation.
- B. Provide internal LED backlighting at Main Entry signage, for a halo effect. Lettering mounted on projected studs at manufacturer recommended distance
- C. Mounting studs: Stud mounted, over existing masonry.

## 2.8 ACCESSORIES

- A. Fasteners and Installation Hardware:
1. General: Except as otherwise indicated, use concealed fasteners fabricated from metals not corrosive to sign material and mounting surface.



2. Bolts, nylon insert lock nuts: ASTM A320, Grade B stainless steel.
3. Anchors and Inserts: Use nonferrous metal or hot dipped galvanized anchors and inserts for exterior installations and elsewhere as required for corrosion resistance. Use toothed steel or lead expansion bolt devices for drilled in place anchors. Furnish inserts, as required, to be set into concrete or masonry work.
4. Adhesives, where used for wall mounted signs, shall be per the sign material.
5. Adhesive tape (Interior conditioned spaces only): Double sided tape, permanent adhesive.
6. Anchor Bolts: ASTM F1554, Grade 36.
  - a. Provide hot-dip or mechanically deposited, zinc-coated anchor bolts where item being fastened is indicated to be galvanized.
7. Anchors and inserts for individual lettering signage:
  - a. Aluminum collars, matte finished to match letter edges.
  - b. Mounting studs: Threaded type 304 stainless steel studs.

## 2.9 FABRICATION - GENERAL

- A. Design components to allow for expansion and contraction for a minimum material temperature range of 56 °C (100 °F), without causing buckling, excessive opening of joints or over stressing of adhesives, welds and fasteners.
- B. Form work to required shapes and sizes, with true curve lines and angles. Provide necessary rebates, lugs and brackets for assembly of units. Use concealed fasteners whenever and wherever possible.
- C. Shop fabricate so far as practicable. Joints fastened flush to conceal reinforcement, or welded where thickness or section permits.
- D. Contact surfaces of connected members be true. Assembled so joints will be tight and practically unnoticeable, without use of filling compound.
- E. Signs shall have fine, even texture and be flat and sound. Lines and miters sharp, arises unbroken, profiles accurate and ornament true to pattern. Plane surfaces be smooth flat and without oil-canning, free of rack and twist. Maximum variation from plane of surface plus or minus 0.3 mm (0.015 inches). Restore texture to filed or cut areas.
- F. Level or straighten wrought work. Members shall have sharp lines and angles and smooth surfaces.
- G. Extruded members to be free from extrusion marks. Square turns and corners sharp, curves true.
- H. Drill holes for bolts and screws. Conceal fastenings where possible. Exposed ends and edges mill smooth, with corners slightly rounded. Form joints exposed to weather to exclude water.
- I. Finish hollow signs with matching material on all faces, tops, bottoms and ends. Edge joints tightly mitered to give appearance of solid material.

- J. Fabricate acrylic glazing sheets as required to openings with edge clearances and bite as recommended by the manufacturer with clean-cut edges where concealed, and smooth-ground, and polished where exposed to view.
- K. All painted surfaces properly primed. Finish coating of paint to have complete coverage with no light or thin applications allowing substrate or primer to show. Finished surface smooth, free of scratches, gouges, drips, bubbles, thickness variations, foreign matter and other imperfections.
- L. Movable parts, including hardware, are to be cleaned and adjusted to operate as designed without binding or deformation of members. Doors and covers centered in opening or frame. All contact surfaces fit tight and even without forcing or warping components.
- M. Pre-assemble items in shop to greatest extent possible to minimize field splicing and assembly. Disassemble units only as necessary for shipping and handling limitations. Clearly mark units for re-assembly and coordinated installation.
- N. No signs are to be manufactured until final sign message schedule and location review has been completed by the Architect and Owner.

#### 2.10 FABRICATION – CUSTOM SHAPES

- 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.

## 2.11 FINISHES

- A. Colors and Surface Textures: For exposed sign material that requires selection of materials with integral or applied colors, surface textures or other characteristics related to appearance, provide color matches indicated.
- B. Paints: Paint for signs is acrylic polyurethane enamel, eggshell finish. Paint for background of tactile photo-polymer signs is eggshell finish automotive grade lacquer. All surfaces shall be cleaned, primed and pre-treated according to the manufacturer's specifications and noted in Shop Drawings as part of the finished surface work.
- C. Inks:
  - 1. Inks for metal signs, glass and wall surfaces are Alkyd enamel based inks.
  - 2. Inks for plastic signs are lacquer based inks.
  - 3. Inks for tactile graphics on photo-polymer signs are eggshell finish Low Odor Vinyl Ink.
  - 4. All inks and paints are evenly applied without pin-holes, scratches or application marks. Prime coats or other surface pre-treatments, where recommended by the manufacturers are included in the work and noted in the shop drawings as part of the finished surface work.

## PART 3 - EXECUTION

### 3.1 INSTALLATION - GENERAL

- A. Locate sign units and accessories where indicated, locations in accordance with the approved shop drawings. Use mounting methods of the type described and in compliance with manufacturer's instructions.
- B. Install signs plumb, level and true to height indicated, with sign surfaces free from distortion or other defects in appearance.
  - 1. Installation of signs shall conform to requirements of Americans with Disabilities Act (ADA) and/or state or local accessibility standards.
- C. Shop fabricate signs where practical and deliver to site completely assembled. All joints of such fabricated work are completely smooth without apparent marks showing throughout the finish. All work "broken down" is erected so that all parts fit accurately with hairline joints, with all joints flush. Joints in lighted signs shall be light-proof.
- D. For drilled anchors in concrete, verify location of embedded reinforcing steel, posttensioning, or pre-stressing cables prior to installation.
- E. Wall Mounted Panel Signs: Attach to wall surfaces with Hilti "Hit" anchors or ITW Ramset/Red Head Hammer Set anchors into concrete or masonry surfaces as shown on Drawings. DO NOT OVERDRIVE anchors, as overdriven anchors will damage sign faces and spall concrete.
- F. Bracket Mounted Units: Provide manufacturer's standard brackets, fittings, and hardware as appropriate for mounting signs which project at right angles from walls or ceilings. Attach brackets securely to walls or ceilings with concealed fasteners and anchors per manufacturer's directions.

- G. Interior Wall and door mounted signs: Attach to surfaces as follows:
1. Vinyl Tape Mounting: Use very high bond, double sided foam tape, of thickness indicated, to mount signs to smooth nonporous surface. Use construction adhesive in conjunction with foam tape.
  2. Silicone Adhesive Mounting: Use appropriate liquid silicone adhesive to attach sign units to irregular, porous, or vinyl-covered surfaces. Use double-sided vinyl tape to hold the sign in place until the adhesive has fully cured.

### 3.2 INSTALLATION DIMENSIONAL LETTERS, NUMBERS AND GRAPHICS

- A. Dimensional Letters and Numbers: Mount letters and numbers using threaded studs, foam tape and construction adhesive as indicated in the detail drawings. Provide heavy paper template to establish letter spacing and to locate holes for fasteners.

### 3.3 INSTALLATION – ELECTRIFIED SIGNAGE

- A. Examination:
1. Verify service voltage, phase and connections.
  2. Verify clearances and structure to ensure correct installation conditions.
  3. Ensure ballast compartments are properly ventilated.
- B. Installation:
1. Install fixtures in accordance manufacturer's recommended instructions.
    - a. Install fixtures and devices and provide any required reflecting materials and finishes at lamps to provide constant even illumination, free from hot spots and E shadows. Visible light intensity shall be of uniform level in all components within the same exhibit section
  2. Provide housings for discharge lamps (fluorescent, H.I.D. and similar) fixtures that make electrical components easily accessible and replaceable, without removing the fixture body from its mountings.
  3. Provide wiring between lamp holders and associated operating and starting equipment of similar or heavier gauge than the leads furnished with the approved types of ballasts and having equal or better insulating and heat resisting characteristics.
  4. Rigidly mount ballasts, unless specifically indicated to the contrary, to the inside of the top of the fixture housing, with ballast surfaces and housing in complete contact for efficient conduction of ballast heat. Permanently affix ballast mounting screws to the fixture housing. provide only fixtures whose design, fabrication, and assembly prevent overheating or cycling of lamps and ballasts under any condition of use.
- C. Grounding:
1. Perform grounding of wiring systems in accordance with the National Board of Fire Underwriters, State and local requirements.
  2. No ground wire shall be spliced, except as approved; where necessary to tap or splice a ground wire cable or loop.
  3. All exposed non-current carrying conductive material enclosing electrical equipment or forming a part of such equipment shall be bonded together in a positive continuous raceway and equipment ground. A bonding jumper may

be provided where continuity of equipment ground maybe doubtful because of the oversize locknuts or loose jointed connections, or in the instance where, in the opinion of the Architect, the continuity of the ground is doubtful.

- D. Field Quality Control:
1. The signage installer shall test all electric items for required operation in the presence of the Architect. Operation of electric items shall be adjusted as may be required until the Architect's approval has been granted.
    - a. The Contractor shall insure that the graphic area of each illuminated sign is illuminated evenly, with no hot spots, light leaks or drop-off of light intensity at the borders of each graphic area. Provide additional lighting wherever directed by the Architect to obtain approval of operation, and light levels.
  2. Test wiring, receptacles, switches, etc., and all electrical components wired under this Section. Leave same free from grounds, crosses, shorts, etc., and leave materials and apparatus in proper and satisfactory working condition.

### 3.4 CLEANING

- A. Clean and polish installed signs.
- B. Upon completion of the work of this Section in any given area, remove tools and all rubbish and debris from the work area; leave area in broom-clean condition.
- C. Remove all names, stamps and decals of sign manufacturers, and installers. No visible advertising of any kind is permitted.

End of Section

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Section 10 22 26  
OPERABLE GLASS PARTITIONS**PART 1 - GENERAL**

## 1.1 GENERAL PROVISIONS

- A. The BIDDING REQUIREMENTS, CONTRACT FORMS, and CONTRACT CONDITIONS as listed in the Table of Contents, and applicable parts of Division 1 - GENERAL REQUIREMENTS, shall be included in and made a part of this Section.
- B. Examine all Drawings and all other Sections of the Specifications for requirements therein affecting the work of this Section.

## 1.2 SUMMARY

- A. Section Includes:
  - 1. Interior operable partitions with glass panels.

## 1.3 RELATED REQUIREMENTS

- A. Section 01 74 19 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL: Procedural and administrative requirements for construction and demolition recycling.
- B. Section 05 50 00 – Metal Fabrications: Overhead support for operable glass partitions.
- C. Section 07 92 00 - JOINT SEALANTS.
- D. Section 08 80 00 - GLAZING: Requirements for glass in operable partitions.

## 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. ANSI A 117.1 - Specifications for Making Buildings and Facilities Accessible to and Usable by Physically Handicapped People.
  - 2. AAMA 607.1 – Voluntary Guide Specification and Inspection Methods for Clear Anodic Finishes for Architectural Aluminum.
  - 3. AAMA 611 – Voluntary Standards for Anodized Architectural Aluminum.
  - 4. ASTM B209 – Standard Specification for Aluminum and Aluminum Alloy, Sheet and Plate.
  - 5. ASTM B221 - Standard Specification for Aluminum-Alloy Extruded Bars, Rods, Wire, Shapes, and Tubes.
  - 6. ASTM C1036 – Standard Specification for Flat Glass.

7. ASTM C1048 – Standard Specification for Heat-Strengthened and Fully Tempered Flat Glass.
8. ASTM E557 – Standard Guide For Architectural Design And Installation Practices For Sound Isolation Between Spaces Separated By Operable Partitions.
9. All applicable federal, state and municipal codes, laws and regulations for exits.

#### 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.

#### 1.6 SEQUENCING AND SCHEDULING

- A. Coordinate the work of this Section with the respective trades responsible for furnishing hardware and installing doors and frames.

#### 1.7 SITE CONDITIONS

- A. Do not begin installation until permanent HVAC systems are properly operating and building and temperature and humidity have stabilized.

#### 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.
  2. Provide manufacturer's written warranty agreeing to repair or replace components with manufacturing defects for a period of two years.

### **PART 2 - PRODUCTS**

#### 2.1 MANUFACTURERS

- A. Interior partitions: To establish a standard of quality, design and function desired, Drawings and specifications have been based on Hufcor Inc., Janesville WI, product: "Series GL-1" (single, omnidirectional panels). Manufacturers offering similar products which may be considered as equal, include, but are not limited to, the following:
  1. Hufcor Inc., Janesville WI, product: "Series GL-1".
  2. Nana Wall Systems, Inc., Corte Madera, CA, product: "HSW-75 NanaGlass Frameless Glass Walls".
  3. Modernfold Inc., New Castle IN, product "GSW-100SR-G Moveable Glass Walls".
- B. Partitions shall consist of a series of manually operated, top-supported, individual glass panels using two-piece, clamp-on top and bottom rail that fastens together from alternating sides.



## 2.2 SYSTEM DESCRIPTION

- A. Partitions shall consist of a series of manually operated, top-supported, individual glass panels using two-piece, clamp-on top and bottom rail that fastens together from alternating sides.

## 2.3 WALL PANELS

- A. Materials:
1. Aluminum: Alloy and temper recommended by aluminum producer and finisher for type of use, corrosion resistance, and finish indicated; ASTM B221 for extrusions; manufacturer's standard strengths and thicknesses for type of use.
  2. Glass: ½ inch thick laminated glass compliant with safety standards specified in ANSI Z97.1 CPSC16, CFR1201, ASTM C1036 and ASTM C1048.
    - a. Outer face: 1/4 inch (6 mm) thick heat strengthened clear glass
    - b. Interlayer: 0.060 inch thick translucent clear polyvinyl butyl innerlayer.
    - c. Inner face: 1/4 inch (6 mm) thick heat strengthened clear glass.
    - d. Color: Clear.
    - e. STC rating: 45, minimum.
  3. Suspension system: Extruded aluminum with a minimum wall thickness of 0.235 inches. Incorporate cast aluminum or mitered intersections, switches, and curves in stacking area. Provide alignment pins for track, intersections, switches and curves insuring both fit and roller surface integrity.
    - a. Exposed track soffit: Factory-finished aluminum with white powder coat.
    - b. Carriers: Two stainless steel trolleys with vinyl roller surfaces. Trolley design incorporates eight (8) wheels of varying dimensions. Automatic indexing of panels into stack area is provided by pre-programmed switches and trolleys without electrical, pneumatic, or mechanical activation.

## 2.4 FABRICATION

- A. Provide top reinforcement required to support panel from suspension components and provide reinforcement for hardware attachment. Finished in-place partition shall be rigid, level, plumb, aligned with uniform joints and appearance; free of bow, warp, twist, deformation, and surface and finish irregularities.
- B. Dimensions: Fabricate operable glass panel partitions with manufacturer's standard panel sizes to form an assembled system of dimensions indicated on Drawings, and verified by field measurements.
- C. Top and Bottom Flush Mount Attachments: All glass panels are secured into a standard track rail with flush-mounted high-grade stainless steel attachments. Bottom rail pivots and locks are of similar flush-mounted design.
- D. Bottom Rail Locking System: Engage adjacent panels by use of interlocking floor bolts to stabilize panels from movement in all directions.
  1. Equip a minimum of one end panel with a brass, mortised lock allowing for cylinder and/or thumb turn operation. Round bolts engage dust-proof floor strikes for security.

2. Pivot panels to have mortised cylinder with key and thumb turn.
3. Intermediate panels to have interconnecting floor bolts.
4. Lead panels to have mortised cylinder with thumb turn.

### **PART 3 - EXECUTION**

#### **3.1 EXAMINATION**

- A. Examine flooring, structural support, and opening, for compliance with requirements for installation tolerances and other conditions affecting performance of operable partitions.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

#### **3.2 INSTALLATION**

- A. General: Comply with ASTM E557, manufacturer's written installation instructions, Drawings and approved shop drawings.
- B. When practical, install panels after other finishing operations, including painting have been completed to protect against damage.
- C. Match operable partitions by installing panels from marked packages in numbered sequence indicated on Shop Drawings.
- D. Broken, cracked, chipped, deformed or unmatched panels are not acceptable.

#### **3.3 ADJUSTMENT**

- A. Adjust operable partitions to operate smoothly, easily, and quietly, free from binding, warp, excessive deflection, distortion, nonalignment, misplacement, disruption, or malfunction, throughout entire operational range. Lubricate hardware and other moving parts.

#### **3.4 CLEANING AND PROTECTION**

- A. Clean partition surfaces upon completing installation of operable partitions to remove dust, dirt, adhesives, and other foreign materials according to manufacturer's written instructions.
- B. Provide protection and maintain conditions in manner acceptable to manufacturer and installer to insure operable partitions are without damage or deterioration at time of Substantial Completion.

End of Section

Section 10 73 16  
CANOPIES**PART 1 - GENERAL**

## 1.1 GENERAL PROVISIONS

- A. The BIDDING REQUIREMENTS, CONTRACT FORMS, and CONTRACT CONDITIONS as listed in the Table of Contents, and applicable parts of Division 1 - GENERAL REQUIREMENTS, shall be included in and made a part of this Section.
- B. Examine all Drawings and all other Sections of the Specifications for requirements therein affecting the work of this Section.

## 1.2 SUMMARY

- A. This work of this Section consists of fixed, watertight, aluminum canopies where shown on the Drawings, as specified herein, and as required for a complete and proper installation.
  - 1. Work includes incorporation of composite wall panels specified under Section 07 42 43 – COMPOSITE WALL PANELS.
  - 2. Coordinate canopies with Division 26 - ELECTRICAL work for lighting in canopy.

## 1.3 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 07 42 43 – COMPOSITE WALL PANELS.
- C. Section 07 92 00 - JOINT SEALANTS: Sealants.
- D. Division 26 – ELECTRICAL: Recessed linear LED light fixtures at canopy.

## 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 B211/B211M - Standard Specification for Aluminum and Aluminum-Alloy Rolled or Cold Finished Bar, Rod, and Wire.
  - 2. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.
  - 3. ASTM B241/B241M - Standard Specification for Aluminum and Aluminum-Alloy Seamless Pipe and Seamless Extruded Tube.
  - 4. ASTM B483/B483M - Standard Specification for Aluminum and Aluminum-Alloy Drawn Tube and Drawn Pipe for General Purpose Applications.

5. ASTM C1107/C1107M - Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Nonshrink).

## 1.5 DESIGN REQUIREMENTS

- A. Awning materials, assembly and attachments to resist wind, suction, and uplift design loads of 30 pounds per square foot at any point without damage of permanent set.
- B. Awning materials, assembly and attachments to resist snow loads of 45 pounds per square foot at any point without damage of permanent set.

## 1.6 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.

## 1.7 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, for each item furnished hereunder. Provide the following additional information:
    - a. Product data on awning covering, color fastness, stitching and seaming methods, and attachment devices to framing system.
  2. Shop drawings:
    - a. Plan, elevation and section dimensioned drawings for typical awning.
    - b. Large scale design details of awning set showing attachment brackets, framing components and complete installation details for awning units, bearing registration stamp of a Professional Structural Engineer registered in the State of Rhode Island.
  3. Provide calculations for loading and stresses for awnings bearing the Professional Structural Engineer's seal. Show how design load requirements specified herein and other performance requirements required by the Rhode Island State Building Code have been satisfied.

## 1.8 QUALIFICATIONS

- A. Awning fabricator, with a minimum of 3 years documented experience demonstrating previously successful work of the type specified herein.

**1.9 QUALITY ASSURANCE**

- A. General: Notify the Architect where conflicts apply between referenced standards, existing materials, and existing methods of construction.
- B. 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 as required by RISBC-1 Rhode Island Building Code.
  - 1. Prepare Shop Drawings for awnings under direct supervision of a same Engineer experienced in design of this work.

**1.10 DELIVERY, STORAGE AND HANDLING**

- A. 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.

**1.11 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. 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. Architectural Metal Systems, Orlando FL.
  - 2. Dittmer Architectural Aluminum, Winter Springs Fl.
  - 3. Mason Corporation, Birmingham AL.
  - 4. Mapes Industries, Inc., Lincoln NE.

**2.2 DESIGN CRITERIA**

- A. General: Design, fabricate, assemble and erect canopy systems, and interfacing conditions with contiguous work. In addition to the specified performance requirements, canopies shall conform to, or exceed the requirements of the applicable building code and referenced industry standards for operating forces, deflection and deformation under load.
- B. Engineering criteria: The manufacturer for canopy systems 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: Canopy design and its installation shall be to conformance with the International Building Code, 2018 edition, as published by the International

Code Council, Inc. (I.C.C.), as revised by RISBC-1 Rhode Island Building Code:

- a. Design Wind Speed (v): 137 miles per hour (3 second gust), both positive (acting inward) and negative (acting outward) wind pressure loading.
  - b. Occupancy Risk Factor: III.
2. Ground Snow Load (Pg): 30 psf.
  3. Minimum Flat Roof Snow Load (Pf): 30 psf.

## 2.3 MATERIALS

- A. Aluminum fascia: Box style extruded aluminum 6063 alloy, heat treated to T6 temper, minimum 0.080 inch thick.
- B. Structural members (beams and struts): Extruded aluminum 6061 alloy, heat treated to T6 temper.
  1. Struts: tubular extrusion of size indicated on Drawings.
  2. Beams: "I-beam" shape of size indicated on Drawings or size recommended by manufacturer to meet engineering requirements.
- C. Decking: Flat bottom style extruded aluminum 6063 alloy, heat treated to T6 temper, minimum 0.062 inch thick, designed for specified loading.
- D. Fittings: Elbows, T-Shapes, wall brackets; machined and threaded aluminum.
- E. Mounting: High strength cast aluminum or type 18-8 stainless steel brackets and flanges.
- F. Exposed Fasteners: Flush countersunk stainless steel screws or bolts; consistent with design of system.
- G. Finish exposed components: Clear anodized finish conforming with 204-R1 per Aluminum Association AA-M10C22A31

## 2.4 ACCESSORIES

- A. Grout: Ready mixed, non-metallic high strength controlled expansion grout of flowable consistency, conforming to ASTM C1107/C1107M with minimum compressive strength of 9000 pounds per square inch at 28 days.
  1. Acceptable manufacturers offering similar products which may be considered as equal include the following:
    - a. L&M Construction Chemicals, Omaha NE., Product: "Crystex",
    - b. Five Star Products, Inc., Fairfield CT.
    - c. Cormix Construction Chemicals, Dallas TX.

## 2.5 FABRICATION - FRAMING

- A. Do not fabricate materials until all specified submittals have been submitted to, and approved by, the Architect.
- B. Fit and shop assemble complete awning units, ready for deliver to site.

- C. Fabricate components with joints tightly fit and welded.
- D. Factory weld beams and columns with neatly mitered corners into one-piece rigid construction. All welds shall be smooth and uniform using an inert gas shielded arc. Suitable edge preparation shall be performed to assure 100 percent penetration of welds. Field welding is not permitted. Mechanical joints shall be allowed only when shipping limitations required their use and prior approval has been obtained from the Architect.
- E. Deck construction: Manufactured of extruded aluminum modules which interlock in a self flashing manner. Roll form decking is not acceptable as equal
- F. Exposed fastenings: Unobtrusively located, consistent with design of component, except where specifically noted otherwise.
- G. Supply components required for anchorage of framing. Fabricate anchors and related components of same material and finish as framing, except where specifically noted otherwise.
- H. Grind exposed joints flush and smooth with adjacent finish surface. Make exposed joints butt tight, flush, and hairline. Ease exposed edges to small uniform radius.
- I. Accurately form components to suite each other and to building structure.

### **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 substrate anchors are acceptable and are ready to receive work.
- C. Beginning of installation means acceptance of existing substrates and site conditions.

#### **3.2 PREPARATION**

- A. Clean and strip primed steel items to bare metal where site welding is required.
- B. Supply items required to be embedded into masonry with setting Templates, to appropriate trades.

#### **3.3 INSTALLATION - FRAMING**

- A. Install units in accordance with manufacturer's instructions; install plumb and level, accurately fitted, free from distortion or defects.
- B. Provide anchors required for connecting framing to existing structure. Anchor framing to structure.
- C. Conceal bolts and screws whenever possible. Where not concealed, use flush countersunk fastenings.

3.4 TOLERANCES

- A. Maximum variation from plumb: 1/4 inch per story, non-cumulative.
- B. Maximum misalignment from true position: 1/4 inch.

3.5 CLEANING

- A. Upon completion of the work of this Section in any given area, remove tools and all rubbish and debris from the work area; leave area in broom-clean condition.
- B. Clean work under provisions of Section 01 73 00 – EXECUTION.
- 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 10 82 13  
EXTERIOR GRILLES AND SCREENS**PART 1 - GENERAL**

## 1.1 GENERAL PROVISIONS

- A. The BIDDING REQUIREMENTS, CONTRACT FORMS, and CONTRACT CONDITIONS as listed in the Table of Contents, and applicable parts of Division 1 - GENERAL REQUIREMENTS, shall be included in and made a part of this Section.
- B. Examine all Drawings and all other Sections of the Specifications for requirements therein affecting the work of this Section.

## 1.2 SUMMARY

- A. Design, engineer, furnish and install exterior perforated metal cladding system. Work includes, but is not limited to:
  - 1. Self-supporting exterior aluminum framed architectural screen system.

## 1.3 RELATED REQUIREMENTS

- A. Section 05 50 00 – METAL FABRICATIONS.

## 1.4 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. AAMA - Metal Curtain Wall, Window, Storefront and Entrance Guide Specification Manual.
  - 2. AAMA 2605 - Specification for High Performance Organic Coatings on Architectural Extrusions and Panels.
  - 3. ASCA 96 - Voluntary Specification for Performance of Organic Coatings on Architectural Aluminum Curtainwall, Extrusions and Miscellaneous Aluminum Components.
  - 4. ASTM B 209 - Aluminum Alloy, Sheet and Plate.
  - 5. ASTM B 221 - Aluminum-Alloy Extruded Bars, Rods, Wire, Shapes, and Tubes.
  - 6. ASTM B 241 - Aluminum-Alloy Seamless Pipe and Seamless Extruded Tube.

## 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, fabrication methods, finishes, performance data, and installation instructions for each item furnished hereunder.
  - 2. Sample 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. Shop drawings:
  - a. 1/4 inch scale elevations and plans.
  - b. Large scale design details of exterior architectural screen system; indicating sizes, types, and gauges of all metal components; expansion provisions.
    - 1) Provide details of perimeter conditions and typical joinery.
    - 2) Provide details of bracing and stabilizing members; attachment clips and brackets; and complete installation details.
  - c. Provide reaction loads imposed on the structure, including all deadload, seismic, and windload reactions at each anchor location.
  - d. Provide all shop drawings bearing dimensions of actual measurements taken at the project.
  - e. Design engineering shall be the responsibility of the framing systems manufacturer.
4. Certificates:
  - a. Welders certificates as specified under Article entitled "QUALITY ASSURANCE".
5. Delegated Design Submittals:
  - a. Provide calculations for loading and stresses for metal stairs, landings and all railings (handrails and guardrails) bearing the Professional Structural Engineer's seal. Show how design load requirements and other performance requirements as required by the Florida State Building Code have been satisfied.

#### 1.6 QUALIFICATIONS

- A. Installer, with a minimum of 5 years documented experience demonstrating previously successful work of the type specified herein, and approved by product manufacturer.
- B. 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.
- C. Licensed Professionals: Provide the services of a Professional Structural Engineer, registered in the State of Florida 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 Florida State Building Code.
  1. Prepare engineered stamped Shop Drawings for architectural screen system.

#### 1.7 DELIVERY, STORAGE AND HANDLING

- A. Protect pre-finished aluminum surfaces with wrapping. Do not use adhesive papers or sprayed coatings which bond when exposed to sunlight or weather.

#### 1.8 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 PERFORMANCE/DESIGN CRITERIA

- A. General: Design, fabricate, assemble and erect exterior architectural screen system and interfacing conditions with contiguous work, to ensure continuity of building enclosure and that all segments of the assemblies will be free from leakage under every condition of weather and exposure. In addition to the specified performance requirements, exterior architectural screen system shall conform to, or exceed the requirements of the applicable building code and referenced industry standards for deflection and deformation under load.
- B. Engineering criteria: The manufacturer for each curtain wall system shall employ the services of a qualified structural engineer, registered to practice in the State of Florida, 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. Structural Performance: Provide screening capable of withstanding the effects of the following loads, based on testing unit's representative of those indicated for the Project that pass AAMA/WDMA/CSA 101/I.S.2/A440 (NAFS), Uniform Load Structural Test.
    - a. Wind loading: 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:
    - b. Design Wind Speed (v): 137 miles per hour (3 second gust), both positive (acting inward) and negative (acting outward) wind pressure loading.
    - c. Occupancy Risk Factor: III.
    - d. Exposure: "B".
    - e. Wind Loads in accordance with ASCE-7-10.

## 2.2 MATERIALS

- A. Extruded Aluminum: ANSI/ASTM B221; 6063 alloy, T5 temper.
- B. Sheet Aluminum: ASTM B209; alloy as required for forming and finishing.
- C. Perforated Metal:
  - 1. Acceptable Manufacturers, or approved equal
    - a. Diamond Manufacturing Company, Wyoming PA.
    - b. McNichols Co.
    - c. Erdle Perforating Company Inc., Rochester, NY
  - 2. Characteristics:
    - a. Material: Aluminum, 0.375 minimum thickness, or of greater thickness as engineered by fabricator for stiffness required to prevent oil-canning or deflection of sheet, and as railing guardrails.
    - b. Perforation size: 3/8 inch.
    - c. Perforation shape: Round.
    - d. Arrangement of perforations: Staggered.

- e. Open area: 40.00 percent.
  - f. Margins: As indicated on approved shop drawings.
  - g. Side margins: As indicated on approved shop drawings.
  - h. End margins: Finished end pattern.
3. Finish: Shop applied PVDF finish, two coats in color selected by Architect.

D. Fasteners: Type 304 stainless steel.

### 2.3 FABRICATION ARCHITECTURAL SCREEN SYSTEM

- A. General: Aluminum sections shall be of sizes and profiles indicated on the approved shop drawing details; shall present straight, sharply defined lines and arises; and shall be free from defects impairing strength, durability, or appearance.
- B. Factory pre-fabricated aluminum screen which consist of horizontal framing, beams and column supports, and perforated screening materials, permanently anchored to foundation.
- 1. All aluminum horizontal extrusions shall have a minimum wall thickness of 0.125 inch or as required to meet wind and snow load requirements.
  - 2. Extrusions shall have a nominal wall thickness of 0.125 inch and projections as indicated on the Drawings.
- C. Fabrication: Horizontal components shall be mechanically fastened by means of extruded aluminum screw splines.

### 2.4 FACTORY FINISHING

- A. Aluminum finish: 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 605.2 (latest edition), 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 "Duramar XL."
    - d. Valspar Corp., product: "Flurothane."
  - 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. Primer: Corrosion resistant, epoxy or urethane based primer compatible with finish coating, averaging 0.2 to 0.3 mils dry film thickness.
  - 5. Barrier Coat: Epoxy-based primer compatible with finish coating, averaging 0.70 to 0.80 mils dry film thickness.
  - 6. Finish Coat (Color Coat): Polyvinylidene flouride enamel averaging 0.70 to 0.80 mil dry film thickness.

7. Top Coat: Polyvinylidene fluoride enamel clear top coat averaging 0.45 to 0.55 mils dry film thickness
  8. Color and Appearance: as selected by Architect from manufacturer's full range of non-exotic and premium 'dark' colors, which exclude colors designated by the coating manufacturer as "bright," "exotic," "pearlescent," or "metallic".
    - a. Gloss: Medium, measured by ASTM D523, 35 plus minus 5 at 60 degrees Fahrenheit.
- B. Concealed Steel Items: Galvanized in accordance with ASTM A 386 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.

## 2.5 ACCESSORIES

- A. Fasteners: 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 and other components of the curtain wall assemblies. All such devices shall be of suitable type and adequate capacity for each intended purpose.

## 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 substrate anchors are acceptable and are ready to receive work.
- C. Beginning of installation means acceptance of existing substrates and site conditions.

### 3.2 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Install components plumb and level, accurately fitted, free from distortion or defects.
- C. Isolate steel supports from aluminum extrusions.
- D. Conceal bolts and screws whenever possible. Where not concealed, use flush countersunk fastenings.

End of Section

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Section 11 52 13  
PROJECTION SCREENS**PART 1 - GENERAL**

## 1.1 GENERAL PROVISIONS

- A. The BIDDING REQUIREMENTS, CONTRACT FORMS, and CONTRACT CONDITIONS as listed in the Table of Contents, and applicable parts of Division 1 - GENERAL REQUIREMENTS, shall be included in and made a part of this Section.
- B. Examine all Drawings and all other Sections of the Specifications for requirements therein affecting the work of this Section.

## 1.2 SUMMARY

- A. Manually-operated, wall bracket-mounted pull-down "green screen" for video background.

## 1.3 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 for construction and demolition recycling.
- C. Section 06 10 00 - ROUGH CARPENTRY: Wood blocking.

## 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 for projection screens,.
  - 2. Manufacturer's installation instructions.
  - 3. Manufacturer's sample warranties.
  - 4. Shop drawings: Installation details showing mounting conditions, clearances, dimensions, and electrical connections.
- B. Closeout Submittals: Submit the following under provisions of Section 01 78 00 - CLOSEOUT SUBMITTALS:
  - 1. Manufacturer's warranty.
  - 2. Maintenance information on regular cleaning, stain removal for screen surfaces.

## 1.5 WARRANTY

- A. Provide manufacturer's standard 2 year warranty which shall include coverage of screen surfaces from discoloration. Warranty is in addition to and not in lieu of, other liabilities that 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 Draper, Inc., Product: "Luma2".
- B. 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. Draper, Inc. Spiceland, Indiana
  - 2. Da-Lite Screen Company, Inc., Warsaw, Indiana
  - 3. Bretford Manufacturing Inc., Schiller Park, Illinois
  - 4. Stewart Filmscreen Corporation, Torrance, California

## 2.2 PULL DOWN VIDEO BACKGROUND SCREEN

- A. Pull-down video background screen: Pull down manually operated screen having a material area 120 by 120 inches equal to Draper model: "Luma2".
  - 1. Projection surface: Equal to Draper "Chroma Key Green" fabric, flame and mildew resistant.
  - 2. Direction of roll: Standard.
  - 3. Rollers: Removable, 1-1/2 inch or larger diameter, extruded aluminum alloy 6063-T5 or alloy 6063-T6 tube with a minimum wall thickness of 0.065 inch.
  - 4. Mounting: Wall mount with 6 inch wall brackets.
  - 5. Finish: Projection screen steel case and mounting brackets to be white baked enamel finish.

**PART 3 - EXECUTION**

## 3.1 EXAMINATION

- A. Verify that surfaces and concealed blocking are ready to receive work of this Section.
- B. Beginning of installation means acceptance of existing substrate.

## 3.2 INSTALLATION

- A. Install projection screen units in accordance with manufacturer's instructions. Secure units level and plumb.
- B. Establish top of units as indicated on the Contract Drawings.

## 3.3 CLEANING

- A. Clean projection screen surfaces in accordance with manufacturer's instructions.
- B. Cover units with protective cover taped to frame. Remove cover at Date of Substantial Completion.

End of Section

PROJECTION SCREENS

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Construction Documents / 05.20.2022



Section 12 30 00  
CASEWORK**PART 1 - GENERAL**

## 1.1 GENERAL PROVISIONS

- A. The BIDDING REQUIREMENTS, CONTRACT FORMS, and CONTRACT CONDITIONS as listed in the Table of Contents, and applicable parts of Division 1 - GENERAL REQUIREMENTS, shall be included in and made a part of this Section.
- B. Examine all Drawings and all other Sections of the Specifications for requirements therein affecting the work of this Section.

## 1.2 SUMMARY

- A. This section specifies all work and materials for casework of types and sizes shown on the Drawings, as specified herein. The types of work of this section includes, but is not limited to:
  - 1. Plastic laminated base and wall cabinets, including wiring troughs, aluminum linear bar grilles, filler panels, rigid insulation, and blank electrical boxes and other accessories as needed for a complete and proper installation.
  - 2. Furnish and install epoxy resin laboratory shelving countertops with splashes and integral sinks where indicated.
    - a. Resin sinks and basins including overflows, plugs, strainers and tailpieces that occur above the floor and required for mounting in the equipment. Furnish fittings unattached and unassembled, properly tagged and identified with installation information.
    - b. Provide back and side splashes at countertops abutting wall construction and return to edge of countertop at all conditions.
  - 3. Furnish science area plumbing and gas fixtures and fittings, including
    - a. Nipples and locknuts, required for mounting in or on the equipment.
    - b. All fixtures delivered unattached and unassembled, properly tagged and identified with installation information.
  - 4. Provide light fixtures including switches, integral convenience receptacles and other components, for installation in or on the equipment. Fixtures and fittings that are a functional integral part of the equipment shall be factory installed and pre-wired.
  - 5. Furnish electrical service fixtures, including nipples, required for mounting in or on equipment. Furnish all fixtures unattached and unassembled to the Electrical filed subcontractor properly tagged and identified with installation information.
- B. 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.
- C. Furnish and provide all materials and services as may be additional or separately described under other Sections of this Specification.

1. No attempt is made in this Section to list all elements of casework 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.
  - D. Remove all debris, dirt and rubbish accumulated as a result of this installation, and leave the premises clean and ready for use. Clean equipment, cabinet interior and exterior surfaces, and worktops.
- 1.3 RELATED REQUIREMENTS
- A. Section 01 74 19 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL: Procedural and administrative requirements for construction and demolition recycling.
  - B. Section 09 65 13 - RESILIENT BASE AND ACCESSORIES: 4-inch vinyl base installed in toe space.
  - C. Division 22 - PLUMBING:
    1. Eye wash stations.
    2. Connections to all plumbing work furnished under this Section.
  - D. Division 23 - HEATING, VENTILATING, AND AIR CONDITIONING: Return air ductwork.
  - E. Division 26 - ELECTRICAL: All electrical work related to items in this Section
- 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 C209 - 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 - Test Methods of Evaluating Properties of Wood-Base Fiber and Particle Panel Materials.
    5. ASTM E84 - Test Method for Surface Burning Characteristics of Building Materials.
    6. AWI (Architectural Woodwork Institute) Quality Standards, Eighth Edition.
    7. APA Grades and Specifications.
    8. 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.
    9. 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.

## 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.
  2. Materials schedule: A complete schedule of casework components, coordinated with the Contract Drawings.
  3. Manufacturer's instructions for resin tops: Manufacturer's installation instructions indicating special procedures, and perimeter conditions requiring special attention.
  4. Shop Drawings in sufficient detail to show fabrication, installation, anchorage, and interface of the work of this Section with the work of adjacent trades.
  5. Selection samples:
    - a. Plastic laminate chips for initial color selection by Architect.
    - b. Sample card indicating Manufacturer's full range of wood veneer stains, colors of laminate, edging or other surfacing material, available for selection by Architect.
    - c. Provide additional samples requested by Architect for initial selection of colors and finishes.
  6. Verification samples:
    - a. Complete sample base cabinet unit, 24 inches wide, with resin countertop and at least one drawer, and one door with specified hardware including locks. Sample shall show full construction of all joints in casework and sample joint in worktop. Reviewed and accepted sample will be used for the purpose for establishing a quality control standard, and may not be incorporated into the work.
    - b. Sample of each type of hardware in specified finish.
  7. Test data on chemical resistance of plastic laminate.

## 1.6 FIELD MEASUREMENTS

- A. Field dimensions: The casework vendor 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 casework vendor's need for accurate field dimensions prior to custom fabrication.
  2. The Contractor and the casework vendors shall cooperate to establish and maintain these field dimensions.
  3. The casework vendor shall verify confirm all dimensions at the Project site relative to casework, all, and bring any significant discrepancies to the attention of the Architect prior to casework fabrication.

**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 PRODUCT HANDLING**

- A. **Delivery and Storage:** Deliver materials under protective cover and store within dry enclosed space.
- B. **Protection:** Use all means necessary to protect materials of this Section during transition, before, during, and after installation and to protect installed work and materials of all other trades.
  - 1. Store under cover in a ventilated building not exposed to extreme temperature and humidity changes.
  - 2. Do not deliver casework to site until all concrete, masonry work is dry. Do not begin installation until veneer plaster has fully cured and is dry.
- C. **Replacements:** In the event of damage, immediately make all repairs and replacements necessary to the approval of the Architect, at no change in Contract Sum.

**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.
  - 1. Warranties shall be effective starting from Date of Project Substantial Completion and are effective for specified term lengths.
  - 2. Provide manufacturer's two year warranty against all defects in material or workmanship.

**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. **Casework:**
    - a. New England Lab Furniture Systems. Woburn, MA.
    - b. CIF Lab Solutions, Vaughan, Ontario, Canada.
    - c. Labscape, LLC., Ramsey NJ.
  - 2. **Plastic laminate:**
    - a. Wilsonart, LLC. Temple TX.
    - b. Arborite Corporation, Quebec, Canada.
    - c. Formica Corporation, Cincinnati, OH.
    - d. Laminart, (Division of Wilsonart LLC), Schaumburg, IL.
    - e. Panolam Industries International, Inc. (Pionite and Nevamar Brands), Shelton CT.

## 2.2 CASEWORK MATERIALS

### A. Wood materials:

1. General Requirements: In general, all materials shall be the best of their respective kinds for the purpose intended and all methods used in construction shall conform to the best practices of the Scientific Laboratory Equipment Industry, including any specialized materials required.
  - a. Woods Used: All woods shall be carefully and thoroughly air-dried, then kiln dried by the laboratory equipment manufacturer in his own humidity controlled kilns to a moisture content of 4-1/2 percent. All kiln dried lumber shall then be tempered to a moisture content of 6 percent before use. This moisture content shall be maintained throughout production.
  - b. Exposed Surfaces: All exterior casework surfaces exposed to view after installation, and the exposed interior ends, top and bottom of open cases shall be plain sliced White Maple. Backs shall be printed hardboard finished to match interior. The solid woods used for all surfaces exposed to view after completion of installation shall be clear, with color and graining in conformance with the normally accepted standards required of the Scientific Laboratory Equipment Industry. The finished installation must provide an attractive and harmonious appearance.
  - c. Direction of wood grain: Vertical on door, end panels and exposed backs, drawer faces, aprons and top rails.
2. Structure: Solid White Maple, plain sawn frame.
3. Drawer Fronts: Solid White Maple, plain sawn.
4. Exposed Plywood: 3/4 inch White Maple plain sawn plywood
  - a. Exposed surface: 1/8 inch thickness veneer of highest grade hardwood selected as to grain and color
5. Unexposed interior plywood used in cabinets and cases shall be clear Poplar Grade A veneer face, Grade B, back. All interior plywood shall have high grade, clear veneers and assembled with polyvinyl emulsion glue. All interior unexposed shelves shall be 7-ply Poplar plywood, White Maple banded, interiors of all open cabinets, and underside of wall cabinets.
  - a. Exposed surfaces inside casework: 1/8 inch thick veneer of unselected but sound hardwood stained to match exterior.
6. Hardboard meeting or exceeding Commercial Standards CS 251 and Federal Specifications LLL-B-00810. Tempered hardboard 1/4 inch thick - smooth both sides.
7. Fiberboard to be of uniform density and meet the following minimum standards:
  - a. Screw Holding, Face 355 lbs.
  - b. Screw Holding, Edge 300 lbs.
  - c. Modulus of Rupture 4,500 psi.
  - d. Modulus of Elasticity 500,000 psi.
  - e. Internal Bond 100 psi.
8. Framing and blocking at mechanical grille enclosures: Nominal 2x framing, American Softwood Lumber Standard PS 20-70 and with specific grading

requirements of SPIB: Kiln dried (KD15), Structural Light Framing, N<sup>o</sup>. 2 grade, free of warping and large knots

- B. Stainless Steel: Alloy 18-8, Type 302/304 in accordance with AISS Specifications. All exposed surfaces except as otherwise noted shall be finished with No. 4 satin finish.

## 2.3 CASEWORK CONSTRUCTION, GENERAL

- A. General:
  - 1. Quantities, sizes and configurations as shown on Drawings. Frameless cabinets are not considered equal to those specified.
  - 2. Joint construction:
    - a. Blind, not extended to faces of cabinets.
    - b. Acceptable joinery methods: mortise and tenon, multiple dowel or stopped tongue and groove.
    - c. Reinforcement: screws, cleats, hot glue and stapled pins.
  - 3. Provide leveling devices for all open frame tables.
  - 4. Drawer fronts and hinged doors are to overlay the cabinet body. Maintain a maximum 1/8 inch reveal between pairs of doors, between door and drawer front, or between multiple drawer fronts within the cabinet.
  - 5. There shall be a one inch clear dimension from the bottom of the countertop to the door or drawer below.

## 2.4 CABINET MATERIALS

- A. Exterior Exposed Surfaces: High-pressure decorative laminate complying with NEMA LD 3, Grade VGS.
- B. Thermoset Decorative Panels: Medium-density particleboard complying with ANSI A208.1, Grade M-2; with surface of thermally fused, melamine-impregnated decorative paper complying with LMA SAT-1.
- C. Cabinet liner, vinyl covered board, foils or other similar materials are not acceptable on any components.

## 2.5 CABINET CONSTRUCTION

- A. Face Style: Flush overlay; door and drawer faces cover cabinet body members or face frames with only enough space between faces for operating clearance.
- B. Face Frames: Frameless.
- C. Base Units
  - 1. Cabinet Ends: 3/4" melamine particleboard with 1 mm thick PVC edge. Provide a 3/4" x 3" water resistant fir plywood base, tongue and grooved to bottom edge for protection against dampness. Exposed cabinet ends shall be [high pressure laminate finish.
  - 2. Front top rail: 3/4" x 4" melamine particleboard with 1 mm thick PVC edge, fastened to cabinet ends with locking double mechanical fasteners.

3. Rear Bottom Support Rails: 3/4" x 4" melamine particleboard, fastened to cabinet with dowels.
  4. Rear Top Support Rails: 3/4" x 9" melamine particleboard, fastened to cabinet with dowels.
  5. Toe Space Rail: 3/4" x 4" water resistant fir plywood fastened to cabinet ends with pocket screws to form a 4" high x 2" deep toe space.
  6. Cabinet Bottoms: 3/4" melamine particleboard with 1 mm thick PVC edge, set flush and fastened with dowels.
  7. Cabinet Backs: Removable one piece 1/4" melamine covered medium density fiberboard on all cupboard units. Backs are white in color. Backs are not provided on drawer units.
  8. Vertical Dividers: Provide full height dividers and half height dividers of 1 1/2" melamine particleboard secured to bottom, front top rail and rear top rail with dowels and screws. Exposed edges to be edgebanded with 1 mm PVC
  9. Shelves: 3/4" melamine particleboard with 1 mm thick PVC edge on front, on metal pin type shelf supports at 1-1/4" spacing. Provide full depth shelves in standard cupboards and open units. Construct shelves over 36" from 1" melamine particleboard.
  10. Drawer Construction:
    - a. Drawer Construction: Fabricate drawer box back, front and sides of 1/2" 9 ply hardwood plywood and finish with a laboratory grade clear finish. Use dovetail joinery on all four joints. Provide 1/4" birch plywood drawer bottom and groove into all four sides of the drawer box and glued into position. Fix drawer body to drawer front with screws.
  11. Door and Drawer Fronts: 3/4 inch high pressure laminate particleboard banded on all sides with 3mm thick PVC edge in one of the standard colors. Provide full overlay construction.
  12. Horizontal Intermediate Rails: (Front) when specified on drawings, provide 3/4" x 4" melamine particleboard, exposed edge 1 mm thick PVC, fastened with glued dowels.
- D. Wall and Floor Cases:
1. Case Ends: 3/4 inch melamine particleboard with 1 mm thick PVC edge on exposed edges. Provide floor cases with a 3/4" x 3" waterproof plywood base, tongue and grooved to bottom edge of end for protection against dampness.
  2. Tops of Wall and Floor Cases: 3/4 inch melamine particleboard with 1 mm thick PVC edge on exposed edge, fastened to ends with dowels.
  3. Bottoms of Wall Cases: 3/4 inch thick melamine particleboard with 1 mm thick PVC edge on exposed edge, set flush and fastened to cabinet ends with dowels.
  4. Bottoms of Floor Cases: 3/4 inch melamine particleboard with 1 mm PVC edgebanding, fastened to cabinet with dowels.
  5. Backs: 1/2" melamine particleboard to match cabinet color. Rabbet back into cabinet so as to be fully captured on all four sides.
  6. Fixed Center Shelf on Floor Cases: 1" melamine particleboard on all open, hinged and sliding door cabinets. Fasten fixed center shelves to ends with dowels.

7. Adjustable Shelves: 3/4 inch melamine particleboard with 1 mm thick PVC edge on exposed front edge. Set on metal pin type shelf supports at 1 1/4" spacing.
8. Tall Case Doors: For additional strength and ease of operation, all doors for tall cabinets shall be split doors, each being half height.

E. Doors:

1. Solid Doors:
  - a. Full overlay construction: 3/4 inch [high pressure laminate particleboard, banded on all edges with 3mm thick PVC edge in one of the standard colors.
  - b. Provide two hinges on all doors up to 36" in height and a minimum of three hinges on any doors exceeding this height.

## 2.6 EPOXY RESIN SHELVING COUNTERTOPS AND INTEGRAL SINKS

- A. Acceptable Manufacturers: Subject to compliance with the requirements specified herein, manufacturers offering products which may be incorporated in the work include the following:
1. The Durcon Company, Inc., Plymouth MI.
  2. Epoxyn Products, Mountain Home, AR.
  3. Kewaunee Scientific Equipment Corporation, Statesville NC.
  4. Laboratory Tops, Inc., Taylor TX.
  5. One Pointe Solutions, Austin, TX.
- B. Countertops: 1 inch thick molded modified epoxy resin tops that has been especially compounded, oven cured and possess high resistance to mechanical and thermal shock.
1. Tops shall be a uniform mixture throughout their full thickness and not depend upon a surface coating for chemical or stain resistance.
  2. Integrally molded curbs: 4 inches high and 1 inch thick, and the junction between top and curb to be coved to a 5/8 inch radius. End curbs shall be provided at end of runs to maintain continuity of the integral curb.
  3. Countertops 10 feet or less in length shall be seamless. When length of top exceeds 10 feet, seams may be provided parallel to the short dimension (Locate as shown on reviewed and accepted shop drawings). Limit seams to absolute minimum number.
  4. Color: Gray or as otherwise selected by the Architect from full range of available colors.
  5. Provide all countertops with a marine lip on exposed edges.
- C. Sinks: Molded of same material as countertops, size as indicated on Drawings, with all inside corners coved and bottom pitched to drain outlet.
1. Provide modified epoxy resin outlets.
  2. Provide waterfall countertop sides where indicated.
  3. Apply sink basins to countertops and ship as integral one piece unit.
  4. Provide sink supports for specified sinks.



5. Provide one overflow for each sink.
- D. Sealant, for joints between countertops and dissimilar materials: Joint Sealer Type 'SM' as specified in Section 07 92 00 - JOINT SEALANTS.
- E. Shelving: Molded of same material and thickness as countertops, size as indicated on Drawings. Provide all shelving with a marine lip on exposed edges.

## 2.7 PLASTIC LAMINATE FACING

- A. Basis of Design: Chemical resistant laminate Ralph Wilson Plastics Co. (Wilsonart), product "*Wilsonart HPL - Virtual Design Library Spectrum Series*" Type 690-90 laminate with "crystal finish", or approved equal conforming to the following:
  1. Flame spread: 30 (ASTM E84 , tested bonded to FR particle board).
  2. Smoke Developed: 135 (ASTM E84, tested bonded to FR particle board).
  3. Stain resistance (Reagents 1 through 15): No effect.
  4. Scratch resistance: 4.5 Newtons.
  5. Chemical and stain resistant to acids, solvents, bases, reagents, and stains: Provide documented list, which shall include, but is not limited to:
    - a. Nitric Acid (all concentrations)
    - b. Glacial Acetic Acid (99% concentrated)
    - c. Sulfuric Acid (all concentrations)
    - d. Hydrochloric Acid (all concentrations)
    - e. Phosphoric Acid (all concentrations)
    - f. Formic Acid (all concentrations)
    - g. Carbon Tetrachloride
    - h. Carbon Disulfide
    - i. Acetone
    - j. Formaldehyde
    - k. Methanol
    - l. Ethyl Acetate
    - m. Chloroform
    - n. Phenol (all concentrations)
    - o. EDTA
    - p. Xylene
    - q. Dopxame
    - r. Sodium Hydroxide (all concentrations)
    - s. Sodium Sulfide 15%
    - t. Ammonium Hydroxide (all concentrations)
    - u. Zinc Chloride (all concentrations)
    - v. Sodium Chromate
    - w. Iodine
    - x. All standard scientific stains and indicators.

6. Manufacturers and laminate colors/patterns: As indicated on Drawings or as otherwise selected by Architect.
- B. Countertop backing: EWA C-C PLUGGED EXT, fir plywood, sanded.
  - C. 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.
  - D. Edging for plastic laminated 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.

## 2.8 FITTINGS

- A. Plumbing Fixtures:
  1. General: specifically designed for laboratory use equal to Chicago Faucet Company, T & S Brass company, or Water Saver Faucet Company, with chrome laboratory type finish. Fixtures shall be all from one manufacturer.
  2. Water fixtures: gooseneck type with laboratory serrated hose nozzles and furnished with integral vacuum breakers. Provide with 2-gallon per minute flow regulators.
- B. Electrical fixtures: Provide required holes or cut-outs where indicated on all cabinetwork or table tops. Provide receptacle boxes at base cabinets, tables and aprons as shown on Drawings.
  1. Pedestal boxes shall be cast aluminum type.
  2. Receptacle (outlet) boxes: Galvanized of a type best adaptable to intended use, in general 4 inch square or octagon.
    - a. Coordinate locations of receptacle boxes with Electrical Drawings.
    - b. Boxes shall be solid flush type, square cornered, without ears, 1-2-3 and 4-gang.
    - c. Provide boxes with only the holes necessary to accommodate the conduits connected. All boxes shall be furnished with lugs or ears for attachment of covers, and outlet devices.
  3. Plates shall be polished stainless steel.
  4. Light fixtures shall be furnished complete per these specifications mounted in place with switch and lamps.
  5. Pull and junction boxes: Galvanized code steel construction with removable cover plate secured by 1/4-inch brass machine screws, conforming to the requirements of the National Electrical Code.

## 2.9 HARDWARE

- A. Hinges:

1. Hinge for full overlay cabinet doors: Self closing concealed hinge having maximum 110 degree angle of opening, 3 way adjustment. Hinges shall be equal to Blum "Soft-Close BLUMotion Clip-Top Overlay Hinge" with straight arm, model N°. 71B3550.
    - a. Number of hinges: Provide number of hinges indicated in Drawings, or if not indicated, provide number recommended by manufacturer for size and weight of door.
  2. Base plates for maintaining 1/8" reveals between door/drawers within the same cabinet, and between doors of adjoining cabinets.
  3. One pair of hinges per door to 48 inch height. One and one-half pair of hinges per door over 48 inches in height.
  4. Hinge mounting: Flathead screws so applied to door and cabinet as to withstand a weight load of 150 pounds minimum.
- B. Pulls: Stainless steel Richelieu "Model 754" or approved equal with large end posts provide 10 inch pulls except where 6 inch is indicated on the Drawings.
- C. Catches:
1. Base and wall cabinets: Spring-tension nylon roller catch with steel strike plate; one catch for each door required at double doors without locks.
  2. Tall cases: One pair of heavy-duty spring tension rubber roller catches for each door; positive catch and lower type latch installed on left hand door.
- D. Locks: Heavy duty, cylinder-type lock with five disc tumblers equal to Illinois Lock Company. Positive tumbler operations shall be accomplished by cam action without the aid of springs.
1. Locations: All drawers and hinged doors on casework
  2. Keying: All casework locks keyed alike within each room; Masterkey all casework in Project. No two rooms shall be keyed alike unless otherwise directed by Owner's Representative. Provide 4 keys for each room, and 6 masterkeys (total).
    - a. The lock system shall guarantee security which restricts the duplicating of keys to registered locksmiths.
  3. Strike plates: Finish 26D.
- E. Drawer Slides: Side-mounted, epoxy powder coated to match drawer body color, full-extension, self-closing design with positive in-stop. Out-stops designed to permit easy removal of drawer, but to prevent inadvertent drawer removal. Captive nylon rollers, both front and rear, with adjuster cam to regulate body side sway.
1. Standard Drawers: Equal to Accuride model 3832, 100 pound capacity, with clear zinc finish.
  2. File Drawers and Deep Drawers (greater than 12 inches deep): Equal to Accuride model 4034, 150 pound capacity, with clear zinc finish.
- F. Label Holders: Self-adhesive type aluminum with satin finish, designed for 2-1/2 inch by 1-1/8 inch cards, unless otherwise indicated.
- G. Number Plates: None Required.

- H. Adjustable shelf supports: Manufacturer's standard adjustable shelf supports. Flush cabinet interior sides, without shelf system permanent projection.
1. Shelf supports: BHMA B84072, wrought steel, mortise mounted.
  2. Shelf support clips: Pin type, corrosion resistant coated finish.
  3. Shelf adjustment on 1-1/4 inch centers.
- I. Leveling Devices:
1. Provide leveling devices at all open frame tables adaptable to table legs.
  2. Device construction: 1/2 inch diameter bolt threaded through a 1/2 inch tee nut securely screwed to bottom of leg, or to 1-5/8 inch U-shaped 12 gauge metal bracket with leveling bolts mounted at the four bottom corners of a base cabinet.
  3. Bolts: cadmium plated steel with a hexagonal head to provide bearing against a 12 gauge flat steel floor plate, installed so as to be accessible for adjustment through cupboard bottoms and drawer openings when installed on base cabinets.
- J. Leg Shoes:
1. Locations: all table legs, unless otherwise specified, to conceal leveling device.
  2. Construction: Pliable, black vinyl material 2-1/2 inches high.
- K. Floor Glides:
1. Locations: open-leg and pedestal tables.
  2. Construction: Non-marring material at least 1-1/2 inch diameter to prevent indenting composition flooring: with at least a 5/8 inch height adjustment.
  3. Use of metal buttons unacceptable.
- L. Auxiliary Support Struts:
1. Locations and function: support drain troughs and fume hood superstructures, or other abnormal loads.
  2. Construction: two 16 gauge channel uprights fastened top and bottom by two adjustable "U" shaped spreaders, each 1/8 inch by 1-1/2 inch by length required, with hangers to support mechanical service piping and drain lines.
- M. Tote Trays: Molded one-piece high-impact polystyrene plastic with all top edges turned down. Trays shall be furnished with label holders and in the sizes specified. Trays shall be as manufactured by Fabri-Form of Indiana, or equal.
- N. Install hardware uniformly and precisely after final finishing is complete. Set hinges snug and flat in mortises for leaf concealment. Turn screws to flat seat. Adjust and align hardware so that moving parts operate freely and contact points meet accurately. Allow for final field adjustment after installation.
- O. Wire management grommets and covers: 3 inch diameter, as manufactured by Doug Mockett & Company, Manhattan Beach CA., model number "EDP." 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.

P. Hardware Finish: Satin finish stainless steel US32D, unless otherwise noted.

#### 2.10 FABRICATION OF PLASTIC LAMINATE CLAD ITEMS

- A. 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, Custom Grade.
- B. Shop fabricate all plastic laminate clad items. Adhere plastic laminate to particle board backing sheets by cold-press-method. Use of contact cements are not permitted, except at wet areas. Apply plastic laminate finish in full uninterrupted sheets consistent with manufactured sizes. Apply laminate backing sheet to reverse side of tops.
- C. Fit corners and joints hairline. Make all joints and miters tight, secure with concealed fasteners.

### PART 3 - EXECUTION

#### 3.1 EXAMINATION

- A. Coordinate work of this Section with related work of other Sections as necessary to obtain proper installation of all items.
- B. Verify site dimensions of cabinet locations in building prior to fabrication.
- C. Verify adequacy of support framing and anchors.

#### 3.2 INSTALLATION

- A. Erect casework straight, level and plumb and securely anchor in place. Scribe and closely fit to adjacent work. Cut and fit work around pipes, and ducts.
- B. Install all casework plumb, level, true and straight with no distortions. Cabinets at right angles to each other shall be erected at 90 degrees to each other unless otherwise indicated. Shim as required, using concealed shims. Where cabinets abut other finished work, scribe and apply filler strips, filler panels and fascias for accurate fit with fasteners concealed where practical and flush with cabinets alongside.
- C. Base Cabinets: Set cabinets straight, plumb and level. Adjust sub-tops within 1/16 inch of a single plane. Fasten each individual cabinet to wall, with stainless steel or chrome finished oval head screws with grommets spaced 24 inches o.c. Bolt continuous cabinets together. Secure individual cabinets with not less than two fasteners into floor, where they do not adjoin other cabinets.
  1. Where required, assemble units into one integral unit with joints flush, tight, and uniform.. Align similar adjoining doors and drawers to a tolerance of 1/16 inch.
- D. Wall Cabinets: Securely fasten to solid supporting material, not plaster, lath, or wall board. Anchor, adjust, and align wall cabinets as specified for base cabinets.

1. Reinforcement of stud walls to support wall-mounted cabinets will be done during wall erection by trade involved, but responsibility for accurate location and sizing of reinforcement is part of this work.

### 3.3 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.

### 3.4 ADJUSTING

- A. To whatever extent work was not completed at shop or prior to installation of casework, perform and complete the specified finishing of casework.
- B. Repair damaged and defective casework 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, drawers, hardware, fixtures, and other moving or operating parts to function smoothly.

### 3.5 CLEANING

- A. Clean casework, counters, shelves, legs, hardware, fittings and fixtures.
- B. Clean Up: Remove all cartons, debris, sawdust, scraps, etc., and leave spaces clean and all casework ready for Owner's use.

End of Section

**SECTION 210000****FIRE PROTECTION****PART 1 - GENERAL**

## 1.1 GENERAL PROVISIONS

- A. All the Contract Documents and General Provisions of the Contract including, but not limited to, General and Supplementary Conditions, and Division 1 Specification Sections apply to this Section.
- B. The work of this Section provides and contains general information which is inherently made a part of each Section and applies to all work performed under this Contract.
- C. The Drawings on which this Contract is based are listed in Section 00860. Consult all Drawings, note all conditions that may affect the Work and care for same in executing the Contract.

## 1.2 DESCRIPTION OF WORK

- A. Provide all labor, materials, equipment, services and accessories necessary to Design, Furnish and Install the work of this Section, complete and functional, as indicated in the Contract Documents and as specified herein. The Design shall conform to the documents and shall be subject to approval by the Architect.
- B. Without limiting the generality thereof, the work to be performed under this Section includes
  - 1. Prepare Working Drawings for approval of the Architect, the local authority having jurisdiction, and the owner's insurance company under stamp of an independent Rhode Island Registered Professional Fire Protection Engineer.
  - 2. Pipe and Fittings
  - 3. Valves
  - 4. Hangers
  - 5. Sprinkler Heads
  - 6. Systems Identification
  - 7. Flushing and Testing of the interior system as provided herein. Coordinate, witness, and certify the flushing and testing of the exterior system and submit certificates. The exterior installation is provided in Division 2.
  - 8. Drilling, Coring, Cutting & Patching of holes and openings (where the largest dimension thereof does not exceed 12 inches), for Fire Protection Piping and Equipment. All such holes require sleeves.
  - 9. Scaffolding, Rigging, and Staging required for all Fire Protection Work. Comply with Division 1 requirements.
  - 10. Provide Seismic Restraints for all Fire Protection Systems conforming to the requirements of the State Building Code which Section is herein incorporated by reference as work of the Fire Protection Sub Contractor.
  - 11. Furnishing of Access Panels
  - 12. When open-flame or spark producing tools such as blower torches, welding equipment, and the like are required in the process of executing the work, the General Contractor shall be notified not less than twenty four hours in advance of the time that the work is to begin and the location where work is to be performed. Provide fire protective covering and maintain constant non-working fire watch through the Local Fire Department where work is being performed and until it is completed.

13. It shall be the responsibility of this division 210000 to provide all personnel as required to fully coordinate with the commissioning agent. The hours of training and instruction outlined in this division 210000 and the Testing requirements shall be in addition to those tests and requirements outlined in sections 018000 and 210800 and required to fulfill commissioning obligations.

### 1.3 RELATED WORK

- A. The following items of work related to the Fire Protection Work are included under other Sections of the Specifications:
  1. Cutting & Patching beyond 1.2B.84 above: SECTION 010450 - CUTTING AND PATCHING.
  2. Installation of Access Panels: Respective finish section.
  3. Excavation and Backfill: DIVISION 31
  4. Finish Painting: SECTION 099000: PAINTING
  5. Wiring for Supervisory Switches, Electrical Alarm, and Flow Switches, and Power Wiring: SECTION 260000 - ELECTRICAL
  6. Temporary Facilities: SECTION 015000 - TEMPORARY FACILITIES

### 1.4 COMMISSIONING REQUIREMENTS

- A. An independent Commissioning Agent (CA) will be retained for this project. The commissioning process will be implemented in accordance with the NE-CHPS.
- B. The Fire Protection Subcontractor shall assist and support the CA as necessary in accordance with the requirements of Specification Section 01 91 13 – Commissioning Requirements/Plan.
  1. Commissioning of a system or systems specified in this Section is part of the construction process. Documentation and testing of these systems, as well as training of the Tenant's and Building Owner's operation and maintenance personnel, is required in cooperation with Tenant's and Building Owner's Representatives and the Commissioning Agent. Project Closeout is dependent on successful completion of all commissioning procedures, documentation and issue closure. Refer to Commissioning Requirements/Plan, Section 01 91 13, for detailed commissioning requirements.

### 1.5 CODES, ORDINANCES, AND PERMITS

- A. Perform all work in accordance with the following Codes:
  1. SBC-1: The State Building Code.
  2. NFPA-13-2013, and Owner's insurance company requirements.
  3. All applicable Local, State, and Federal Codes, Statutes, or Regulations.
  4. Local Fire Department.
  5. Local Building Department.
- B. Obtain all permits, inspections, and approvals, from the governing authorities and pay all fees and include cost in the bid, including approvals for the cross connection control device. Provide the Owner with the cross connection permit for the device in the Owner's name.

### 1.6 DISCREPANCIES IN DOCUMENTS

- A. Where Drawings or Specifications conflict or are unclear, advise Designer in writing before Award of Contract. Otherwise, Designer's interpretation of Contract Documents shall be final, and no additional compensation shall be permitted due to discrepancies or unclarity thus resolved.



- B. Where Drawings or Specifications do not coincide with manufacturers' recommendations, or with applicable codes and standards, alert Designer in writing before installation. Otherwise, make changes in installed work as Designer requires within Contract Price.
- C. If the required material, installation, or work can be interpreted differently from drawing to drawing, or between drawings and specs, this contractor shall provide that material, installation, or work which is of the higher standard.
- D. It is the intent of these contract documents to have the contractor provide systems and components that are fully complete and operational and fully suitable for the intended use. There may be situations in the documents where insufficient information exists to precisely describe a certain component or subsystem, or the routing of a component. In cases such as this, where the contractor has failed to notify the Designer of the situation in accordance with the paragraph above, the contractor shall provide the specific component or subsystem with all parts necessary for the intended use, fully complete and operational, and installed in workmanlike manner either concealed or exposed per the design intent.
- E. In cases covered by the paragraph above, where the contractor believes he needs engineering guidance, he shall submit a sketch identifying his proposed solution and the Designer shall review, note if necessary, and approve the sketch.

#### 1.7 MODIFICATIONS IN LAYOUT

- A. HVAC, Plumbing, Fire Protection, and Electrical Drawings are diagrammatic. They indicate general arrangements of mechanical and electrical systems and other work. They do not show all offsets required for coordination nor do they show the exact routings and locations needed to coordinate with structure and other trades and to meet architectural requirements.
- B. In all spaces, prior to installation of visible material and equipment, including access panels, review Architectural Drawings for exact locations and where not definitely indicated, request information from Designer.
- C. Check Contract Drawings as well as Shop Drawings of all subcontractors to verify and coordinate spaces in which work of this Section will be installed.
- D. Maintain maximum headroom at all locations. All piping and associated components to be as tight to underside of structure as possible.
- E. Make reasonable modifications in layout and components needed to prevent conflict with work of other trades and to coordinate according to Paragraphs A, B, C, D above. Systems shall be run in a rectilinear fashion.
- F. Where conflicts or potential conflicts exist and engineering guidance is desired, submit sketch of proposed resolution to Designer for review and approval.

#### 1.8 RECORD DRAWINGS

- A. General: Refer to DIVISION 01 - GENERAL REQUIREMENTS for general requirements for maintaining as-built drawings and submitting final reproducible record documents.
- B. The General Contractor will provide two sets of black or blue line on white Drawings to the Fire Protection Subcontractor, one set of which shall be maintained at the site and which shall, at all times, be accurate, clear, and complete, showing the actual locations of

all equipment and piping as it is being installed. The Record Drawings shall be available to the Architect/Engineer's field representative at all times.

- C. Provide electronic AutoCAD drawings to indicate revisions to piping size and location both exterior and interior; including locations of valves and other equipment requiring periodic maintenance or repair; actual equipment locations, dimensioned from column lines; concealed equipment, dimensioned to column line; mains and branches of piping systems, with valves and control devices located and numbered, concealed unions located, and with items requiring maintenance located.
- D. Include in the Record Drawings any addenda, sketches, and supplementary Drawings issued during the course of construction.
- E. Non-availability of Record Drawings or inaccuracies therein will postpone the final inspection until they are available.
- F. All valves shown on these Drawings shall be numbered with numbers corresponding to those on the valve charts.
- G. All costs related to the foregoing requirements shall be paid by the Fire Protection Subcontractor.

#### 1.9 OPERATING INSTRUCTIONS AND MAINTENANCE MANUALS

- A. Provide operating instructions to the owner's designated representative with respect to operation functions and maintenance procedures for all equipment and systems installed. At the completion of the project, turn over to the Architect four (4) complete manuals in three-ring, loose-leaf binders, containing the following:
  - 1. Complete Shop Drawings of all equipment.
  - 2. Operation description of all systems.
  - 3. Names, addresses, and telephone numbers of all suppliers of the system.
  - 4. Preventive maintenance instructions for all systems.
  - 5. Spare parts list of all system components.
  - 6. Valve tag chart noting location of any and all valves controlling the fire protection systems including main control, main drain, auxiliary drain, drum drip, inspectors test connections and any low point drains connected to these systems.

#### 1.10 SHOP DRAWINGS AND MATERIAL SCHEDULES

- A. Refer to SECTION 013300 - SUBMITTALS for substitution of equipment and submittal of Shop Drawings. If apparatus or materials are substituted for those specified, and such substitution necessitates changes in or additional connections, piping, supports or construction, same shall be provided as the responsibility, and at the expense, of the Fire Protection Subcontractor.
- B. Fabrication of any material or performing of any work prior to the final approval of the Submittals will be entirely at the risk of the Subcontractor. The Subcontractor is responsible for furnishing and installing materials called for in the Contract Documents, even though these materials may have been omitted from approved Submittals.
- C. Submit Shop Drawings for the following materials and equipment.
  - 1. Coordinated Working Drawings and hydraulic calculations including size, type, length, temperature rating of sprinkler heads, piping and the like. Indicate flow test results, design criteria, hydraulic reference points, diffuser and light locations.
  - 2. Access Panels and Covers

3. Sprinkler Heads
4. Hangers and Seismic Restraints
5. Pipe, Fittings, and Appurtenances
6. Systems Identification

#### 1.11 COORDINATION DRAWINGS

- A. Before materials are purchased or Work is begun, prepare and submit to the Architect, Coordination Drawings showing the size and location of all equipment and piping lines relevant to the complete system. Ensure that these Drawings are compatible and correctly annotated and cross-referenced at their interfaces.
- B. Coordination Drawings are for the Contractor's and the Architect's use during Construction and shall not be construed as replacing any Shop or Record Drawings required elsewhere in these Contract Documents.
- C. Detailed procedures for Coordination Drawings are contained in DIVISION 01 of these Contract Documents.

#### 1.12 GUARANTEE

- A. Guarantee all work under this Section free from defects in workmanship or materials for a period of one (1) year from the date of final acceptance of the building, as set forth in the Contract.
- B. Replace any such defective work developing during this period, unless such defects are clearly the result of bad usage of equipment by others. Where such defective work results in damage to work of other Sections of the Specifications, restore such work to its original condition by mechanics skilled in the affected trade.

#### 1.13 DRAWINGS

- A. All work shown on the Drawings is intended to be approximately correct to scale but shall be taken in a sense as diagrammatic. Sizes of pipes and general method of running them are shown, but it is not intended to show every offset and fitting. To carry out the true intent and purpose of the plans, furnish all necessary parts to make a complete working system ready for use.
- B. The Drawings and Specifications are intended to supplement each other so that any details shown on the Drawings and not mentioned in the Specifications, or vice-versa, shall be executed the same as if mentioned in the Specifications and shown on the Drawings.
- C. Refer to the Architectural, Structural, and Other Mechanical and Electrical Drawings which indicate the construction in which this work shall be installed. Locations shown on the plans shall be checked against the general and detailed drawings of the construction proper. All measurements must be taken at the building.

#### 1.14 SYSTEM DESCRIPTION

- A. The systems shall be designed in accordance with NFPA-13-2013.
- B. Refer to reflected ceiling plan for location of all sprinkler heads. All sprinkler heads are to be installed dead center of tile.

1.15 PIPE MARKER IDENTIFICATION SYSTEM

- A. Mark all fire mains installed under this Section with a marking system in basic colors conforming to those specified in ANSI/ASME A-13.1. Markings shall indicate pipe content and direction of flow. Apply markers every 20 feet on center on piping which is exposed in mechanical or storage areas and above suspended accessible ceilings. Also, apply at all access panels, valves, tee joints, alarms, and/or controls.
- B. Adhesive system may not be used.

1.16 PIPE MARKER IDENTIFICATION SYSTEM

- A. All equipment and systems shall be identified with signs furnished and attached in accordance with NFPA 13.

1.17 BREAKDOWN

- A. Submit a breakdown of the contract price to aid the Architect in determining the value of the work installed as the job progresses.
- B. No requisition will be approved until the breakdown is delivered to the Architect.

1.18 VISIT TO SITE

- A. Prior to submitting a bid, visit the site of work and become familiar with existing conditions at the site of the work. Any assumptions made are at this Subcontractor's expense.

**PART 2 - PRODUCTS**

2.1 GENERAL

- A. All materials and equipment furnished under this Section shall be new, unused, first quality of a manufacturer of established reputation and shall be U.L./F.M. approved. Each valve, fitting, section of pipe, and piece of equipment shall have cast or indelibly stamped thereon the manufacturer's name and pressure rating where applicable. All threads for fire department connection shall conform to the standards of the Local Fire Department.

2.2 PIPE AND FITTINGS

- A. Pipe and fittings shall conform to the latest A.S.A., A.S.T.M., C.A., and F.S. Standards. All grooved products shall be of one manufacturer to conform to NFPA Standards.
- B. All piping installed under this Section shall be in accordance with the following:

<u>Service</u>	<u>Materials</u>
sprinkler piping 1-1/2 inch and smaller	steel pipe, black for wet system,
Sprinkler and standpipe piping 2 inch to 6 inch	Schedule 10, ASTM A-135 U.L./F.M. steel black for wet system.

- C. Fittings on fire line piping, 2 inch and larger, shall be Victaulic Fire Lock Ductile Iron Fittings conforming to ASTM A-536 with integral grooved shoulder and back stop lugs and grooved ends for use with Style 009-EZ or Style 005 couplings.
- D. Branch line fittings shall be welded or shall be Victaulic 920/920N Mechanical Tees.
- E. Schedule 10 pipe shall be roll grooved. Schedule 40 pipe where used with mechanical couplings shall be rolled groove and shall be threaded where used with screwed fittings.
- F. Fittings for threaded piping shall be malleable iron screwed sprinkler fittings.
- G. Grooved fittings shall be manufactured by Victaulic, Grinnell, Anvil, or equal.

### 2.3 JOINTS

- A. Threaded pipe joints shall have an approved thread compound applied on male threads only. Teflon tape shall be used for threads on sprinkler heads.
- B. Joints on piping, 2 inch and larger, shall be made up with Victaulic, or equal, Fire Lock Style 005, rigid coupling of ductile iron and pressure responsive gasket system for wet or dry sprinkler system as recommended by manufacturer. Couplings on dry systems shall be galvanized. Cutting, roll grooving, lubrication, and assembly of all joints shall be made strictly in accordance with manufacturer's recommendations. Exercise particular caution in the use of lubricant to avoid "squeeze out" of lubricant when system is in service.
- C. Grooved joints and fittings shall be manufactured by Victaulic, Grinnell, Anvil, or equal.

### 2.4 SPRINKLERS

- A. All sprinklers to be used on this project shall be Quick Response type and shall be stamped with date of manufacture and temperature rating. Temperature ratings shall be determined by the location of the heads per NFPA 13-2013, and shall be minimum 155 degrees F. throughout except in special areas around heat producing equipment, skylights, and attics in which case use temperature rating to conform with hazard as specified in NFPA 13-2013. Orifice diameter and K factor shall be appropriate to meet the hydraulic design criteria, the available water supply, and NFPA Standards.
- B. Furnish spare heads of each type installed located in a cabinet along with special sprinkler wrenches. The number of spares and location of cabinet shall be in complete accord with NFPA 13-2013.
- C. Sprinklers shall be manufactured by Tyco, Victaulic, Viking, or equal.
- D. Upright sprinkler heads in areas with no ceilings shall be Tyco Model "TY-FRB" Quick Response, upright natural brass finish heads. Include heavy duty sprinkler guards in all mechanical and storage rooms, gymnasium outdoor activity, aerobics, wrestling, auto shops and general shop. In pool area, all heads shall have a corrosive resistant lead coating.
- E. Pendent wet sprinkler heads shall be Tyco Model "TY-FRB" Quick Response recessed adjustable escutcheon, white polyester finish.
- F. Concealed heads shall be Tyco Model "RFII" Quick Response concealed type, 1-1/2 inch adjustment white cover plate. In special areas, as may be noted on the Drawings, provide

alternate cover plate finishes.

- G. Sprinkler heads located in concealed combustible spaces shall be Tyco Model "CC2" upright sprinkler head, natural brass finish.

## 2.6 SUPPLEMENTARY STEEL, CHANNEL, AND SUPPORTS

- A. Furnish and install All Supplementary Steel, Channels, and Supports required for the proper installation, mounting, and support of all equipment.
- B. Supplementary Steel and Channels shall be firmly connected to building construction in a manner approved by the Architect.
- C. The type and size of the Supporting Channels and Supplementary Steel shall be determined by the Fire Protection Subcontractor and shall be sufficient strength and size to allow only a minimum deflection in conformance with the manufacturer's requirements for loading.
- D. All Supplementary Steel and Channel shall be installed in a neat and workmanlike manner parallel to the walls, floor, and ceiling construction. All turns shall be made with 90 degree fittings, as required to suit the construction and installation conditions.

## 2.7 HANGERS AND SEISMIC RESTRAINTS

- A. Hangers shall be furnished, installed, and supported from the building structure in accordance with NFPA – 13 and the State Building Code.

## 2.9 ACCESS DOORS

- A. Furnish Access Doors for access to all concealed control valves, drains, inspector's tests, supervisory devices, and to all other concealed parts of the system that require accessibility for the proper operation and maintenance of the system. These doors shall be installed under the appropriate Section of the Specifications for the surface upon which the panels are mounted.
- B. All Access Doors shall be located in a workmanlike manner in closets, storage rooms, and/or non-public areas, positioned so that the valve or part can be easily reached, and the size shall be sufficient for this purpose (minimum size 12 inch x 16 inch). When access doors are required in corridors, lobbies, or other habitable areas, they shall be located as directed by the Architect.
- C. Access Doors shall be prime painted and be complete with cylinder lock and two keys as manufactured by Acudor, Inland Steel Products Company "Milcor", or Walsh-Hannon-Gladwin, Inc., "Way Lector". Type shall be as follows:

Acoustical Tile Ceiling	Acudor AT-5020
W.B. Surfaces	Acudor DW-5040
Masonry Construction	Acudor UF-5000
Fire Rated Construction	Acudor FB-5060

- D. Access Doors Shop Drawings shall be submitted to the Architect for approval.

## PART 3 - EXECUTION

### 3.1 WORKMANSHIP AND INSTALLATION METHODS

FIRE PROTECTION  
21 00 00 - 8

- A. All work shall be installed in a first-class manner consistent with the best current trade practices. All materials shall be securely installed plumb and/or level, and all flush mounted equipment shall have front edge flush with finished wall surface.
- B. Protect all concealed heads. Coordinate and advise finishing trades so as to prevent painting of sprinkler heads or inadvertent filling with paint or jointing compound of required air spaces in the case of the concealed type sprinkler heads.

### 3.2 WORK COORDINATION AND JOB OPERATIONS

- A. The equipment shall not be installed in congested and possible problem areas without first coordinating the installation of same.
- B. Before materials are purchased or work is begun, prepare and submit to the Architect, Coordination Drawings showing the size and location of all equipment and piping lines relevant to the complete system. Ensure that these Drawings are compatible and correctly annotated and cross-referenced at their interfaces.
  - 1. Coordination Drawings are for the Contractor's and the Architect's use during construction and shall not be construed as replacing any Shop or Record Drawings required elsewhere in these Contract Documents.
- C. Detailed procedures for Coordination Drawings are contained in DIVISION 01 - GENERAL REQUIREMENTS of these Contract Documents.
- D. Particular attention shall be directed to the coordination of piping and other equipment installed in the ceiling areas. Coordinate the elevations of all piping in hung ceiling areas to insure adequate space for the installation of recessed lighting fixtures before other mechanical equipment is installed.
- E. Furnish to the General Contractor, and all other Subcontractors, all information relative to the portion of the Fire Protection installation that will affect them, sufficiently in advance so that they may plan their work and installation accordingly.
- F. In case of failure to give proper information as indicated above, sufficiently in advance, pay for all back-charges for the modification, renovation, and relocation of any portion of the work already performed.
- G. Obtain from the other trades, all information relative to the Fire Protection Work to be executed in conjunction with the installation of their respective equipment.

### 3.3 CUTTING AND CORE DRILLING

- A. Perform all cutting and core drilling operations that are outlined in Part 1 of this SECTION. Throughout the performance of the cutting and coring work, ensure that the structural integrity of the walls, floors, overhead structure, and other structural components is maintained until permanent work is installed. Prior to any coring or cutting, verify all locations of same with the General Contractor. All cutting and coring is to be performed in accordance with approved Coordination Drawings.
- B. Cut all masonry and concrete with an approved diamond blade concrete saw in a neat straight direction, perpendicular to the plane of the wall or floor.
- C. Use a core drilling process which produces clean, sharp edges and the minimum hole size which will accommodate the size of pipe sleeve specified.

- D. Patch all holes up to the sizes indicated in this Section with material and methods as are specified in the Section of the Specifications for the finish trade involved. Holes which are improperly done due to poor materials or method, shall be patched to the satisfaction of the Architect by the finish trade and back-charged to this Subcontractor.

### 3.4 CLEANING AND PROTECTION

- A. Protect all materials and equipment during shipment and installation and properly handle and store at the job site so as to prevent damage. Assume full responsibility for protection of work until its completion and final acceptance.
- B. Keep the premises reasonable clean at all times and remove rubbish caused by the Fire Protection work as directed by the Architect.
- C. Upon completion of this work, clean all sprinklers, and equipment and replace damaged parts. Failure to fulfill this obligation will result in back-charges for correction of the defective work by others.

### 3.5 SLEEVES, INSERTS, AND ESCUTCHEONS

- A. All piping passing through slabs, floors, walls, and partitions shall be sleeved and all such sleeves shall be furnished and installed by the Fire Protection Subcontractor as detailed on the Drawings and herein specified. Fire Protection Contractor, shall do his core drilling as approved by the Architect and the cored opening shall have a sleeve caulked and leaded in place. Set sleeves in concrete floors and walls as soon as forms set and before concrete is poured.
- B. All pipes passing through floor, whether slab-on grade or above grade levels shall be sleeved with sleeve extending 1 inch above floor. This includes all piping in toilet room pipe space, stairwells, closets, and partitions. In mechanical penthouses, pipe sleeves shall extend 4 inches above floor.
- C. All sleeves shall be Schedule 40 galvanized steel pipe and shall be reamed. There shall be annular space between the sleeve and pipe per NFPA requirements. Sleeves on drywall, masonry, or concrete walls and partitions shall be flush with wall on both sides.
- D. The space between sleeve and pipe, in all cases, shall be filled with U.L./F.M. approved caulking compound. This includes pipes concealed in chases and/or partitions.
- E. Inserts, where required, shall be furnished and set by the Fire Protection Subcontractor and, where necessary, may be drilled or power driven and shall be sized such that the insert will not exceed a depth of penetration of 1 inch into concrete.
- F. Escutcheons: All exposed pipe, uncovered, passing through walls, or floors, or ceilings, shall be fitted with C.P. brass spun or split type escutcheons with approved clamping device for holding in position. Floor escutcheons shall be deep enough to fit over sleeves, fastened to pipe, and extend down to floor.

### 3.6 TESTING

- A. Flush the system and test all work in the presence of the Architect and/or Engineer and as required by NFPA and the Insurance Company. The flushing and testing procedures to be followed are specified herein. At the completion of the testing, submit fully executed copies of Contractor's Material and Test Certificate for both above ground and underground piping as contained in NFPA-13.
  - 1. Sprinkler System:



- a. Hydrostatic Testing: The interior system shall be hydrostatically tested at 200 psi for 2 hours in accordance with NFPA 13 paragraph 25.2.1.
- b. Operational Testing: Water flow switches and associated alarm systems shall be tested by water flow through the inspector's test assemblies in accordance with NFPA 13.
- c. Main Drain Test: A flow test shall be performed on the main drain valve and recorded on the Contractor's test certificate in conformance with NFPA 13.

### 3.7 ALTERNATES

- A. Refer to Alternates, Section 01 23 00, for alternates affecting the scope of work under this Section.
- B. The work of this Section, which is required by the scope of work as stated in the Alternates, Section 01 23 00, shall comply with the applicable quality and performance requirements for similar work under this Section.
- C. The alternates which effect the Electrical Sections are:
  1. Add Alternate No.1 – Science Classrooms 222, 302 (including HVAC), and Classroom 123 Ceiling.
    - a. Add Alternate Number 1: Refer to Drawings.

END OF SECTION

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**SECTION 220000****PLUMBING****PART 1 - GENERAL**

## 1.1 GENERAL PROVISIONS

- A. All the Contract Documents and General Provisions of the Contract including, but not limited to, General and Supplementary Conditions, and Division 1 Specification Sections apply to this Section.
- B. The work of this Section provides and contains general information which is inherently made a part of each Section and applies to all work performed under this Contract.
- C. The Drawings on which this Contract is based are listed in Section 00860. Consult all Drawings, note all conditions that may affect the Work and care for same in executing the Contract.
- D. Refer to Section 01030, Alternates, for alternates, which may affect the work of this Section.

## 1.2 DESCRIPTION OF WORK

- A. Provide all labor, materials, equipment, services and accessories necessary to furnish and install the work of this Section, complete and functional, as indicated in the Contract Documents and as specified herein.
- B. The work covered by this Section of the Specifications includes the furnishing of all labor and materials and in performing all operations in connection with the installation of the Plumbing Work.
- C. Without limiting the generality thereof, the work to be performed under this Section includes:
  - 1. Sanitary, Waste & Vent Systems as shown on the drawings.
  - 2. Potable Cold, Hot, and Hot Water Re-circulation System.
  - 3. Insulation.
  - 4. Fixtures and Equipment
  - 5. Connection to Equipment Furnished by Others
  - 6. Flushing, Sterilization, and Tests
  - 7. Furnishing of Access Panels
  - 8. Drilling, Coring and Cutting & Patching of holes and openings where the largest dimension thereof does not exceed 16 inches for Plumbing Piping and Equipment.
  - 9. Scaffolding, Rigging, and Staging required for all Plumbing Work. Comply with Division 1 requirements.
  - 10. Provide Seismic Restraints for all Plumbing Systems conforming to the requirements of the State Building Code, which Section is herein incorporated by reference.
  - 11. Preparation of Co-ordination Drawings.
  - 12. Smoke and Firestopping Seals and sealing of all wall penetrations as detailed on the drawings. Refer to Section 078400 which defines the firestopping materials and methods.
  - 13. When open-flame or spark producing tools such as blower torches, welding equipment, and the like are required in the process of executing the work, the

General Contractor shall be notified not less than twenty four hours in advance of the time that the work is to begin and the location where work is to be performed. Provide fire protective covering and maintain constant non-working fire watch, paying all fees, where work is being performed and until it is completed. Fee for fire watch shall be included in the bid.

### 1.3 COMMISSIONING REQUIREMENTS

- A. An independent Commissioning Agent (CA) will be retained for this project. The commissioning process will be implemented in accordance with the NE-CHPS.
- B. The Plumbing Subcontractor shall assist and support the CA as necessary in accordance with the requirements of Specification Section 01 91 13 – Commissioning Requirements/Plan.
  - 1. Commissioning of a system or systems specified in this Section is part of the construction process. Documentation and testing of these systems, as well as training of the Tenant's and Building Owner's operation and maintenance personnel, is required in cooperation with Tenant's and Building Owner's Representatives and the Commissioning Agent. Project Closeout is dependent on successful completion of all commissioning procedures, documentation and issue closure. Refer to Commissioning Requirements/Plan, Section 01 91 13, for detailed commissioning requirements.

### 1.4 RELATED WORK

- A. The following Related Work will be performed under the designated Sections:
  - 1. Cutting and Patching beyond above: SECTION 010450 - CUTTING AND PATCHING
  - 2. Electric Power Wiring: SECTION 260000 - ELECTRICAL
  - 3. HVAC Equipment: SECTION 230000 - HVAC
  - 4. Finish Painting: SECTION 099000 - PAINTING
  - 5. Installation of Access Panels: SECTION describing material in which panel is installed.
  - 6. Laboratory Casework and Sinks: SECTION 123000 LABORATORY EQUIPMENT

### 1.5 CODES, ORDINANCES, AND PERMITS

- A. Perform all work in accordance with the requirements of the local Building Department, State Plumbing and Fuel Gas Codes, A.D.A., NFPA, The Architectural Barrier Code, Energy Code and applicable State and Federal Laws. Give all requisite notices, file all requisite plans, and obtain all permits required to perform all Plumbing Work. Where the Contract Documents indicate more stringent requirements than the above Codes and Ordinances, the Contract Documents shall take precedence.
- B. Obtain all permits, inspections, and approvals, from the governing authorities and pay all fees and include cost in the bid, including approvals for the cross connection control device. Provide the Owner with the cross connection permit for the device in the Owner's name.

### 1.6 DISCREPANCIES IN DOCUMENTS

- A. Where Drawings or Specifications conflict or are unclear, advise Designer in writing before Award of Contract. Otherwise, Designer's interpretation of Contract Documents shall be final, and no additional compensation shall be permitted due to discrepancies or unclarities thus resolved.

- B. Where Drawings or Specifications do not coincide with manufacturers' recommendations, or with applicable codes and standards, alert Designer in writing before installation. Otherwise, make changes in installed work as Designer requires within Contract Price.
- C. If the required material, installation, or work can be interpreted differently from drawing to drawing, or between drawings and specs, this contractor shall provide that material, installation, or work which is of the higher standard.
- D. It is the intent of these contract documents to have the contractor provide systems and components that are fully complete and operational and fully suitable for the intended use. There may be situations in the documents where insufficient information exists to precisely describe a certain component or subsystem, or the routing of a component. In cases such as this, where the contractor has failed to notify the Designer of the situation in accordance with the paragraph above, the contractor shall provide the specific component or subsystem with all parts necessary for the intended use, fully complete and operational, and installed in workmanlike manner either concealed or exposed per the design intent.
- E. In cases covered by the paragraph above, where the contractor believes he needs engineering guidance, he shall submit a sketch identifying his proposed solution and the Designer shall review, note if necessary, and approve the sketch.

#### 1.7 MODIFICATIONS IN LAYOUT

- A. HVAC, Plumbing, Fire Protection, and Electrical Drawings are diagrammatic. They indicate general arrangements of mechanical and electrical systems and other work. They do not show all offsets required for coordination nor do they show the exact routings and locations needed to coordinate with structure and other trades and to meet architectural requirements.
- B. In all spaces, prior to installation of visible material and equipment, including access panels, review Architectural Drawings for exact locations and where not definitely indicated, request information from Designer.
- C. Check Contract Drawings as well as Shop Drawings of all subcontractors to verify and coordinate spaces in which work of this Section will be installed.
- D. Maintain maximum headroom at all locations. All piping and associated components to be as tight to underside of structure as possible.
- E. Make reasonable modifications in layout and components needed to prevent conflict with work of other trades and to coordinate according to Paragraphs A, B, C, D above. Systems shall be run in a rectilinear fashion.
- F. Where conflicts or potential conflicts exist and engineering guidance is desired, submit sketch of proposed resolution to Designer for review and approval.

#### 1.8 SHOP DRAWING AND MATERIAL SCHEDULES

- A. Refer to SECTION 013000 - SUBMITTALS for submittal of Shop Drawings. If apparatus or materials are substituted for those specified, and such substitution necessitates changes in or additional connections, piping, supports or construction, same shall be provided as the responsibility, and at the expense, of the Plumbing Subcontractor.
- B. Fabrication of any material or performing of any work prior to the final approval of the Submittals will be entirely at the risk of the Subcontractor. The Subcontractor is

responsible for furnishing and installing materials called for in the Contract Documents, even though these materials may have been omitted from approved Submittals.

- C. Submit Shop Drawings for the following materials and equipment.
  - 1. Valves, Piping, couplings and Fittings
  - 2. Fixtures, Drains and Equipment including Supports
  - 3. Access Panels and Covers
  - 4. Insulation
  - 5. Drains, and Hydro Mechanical Specialties
  - 6. Hangers, Anchors, Guides, and Supports including Seismic Restraints
  - 7. Cleanouts
  - 8. Piping Identification System

#### 1.9 COORDINATION DRAWINGS

- A. Before materials are purchased or Work is begun, prepare and submit to the Architect, Coordination Drawings showing the size and location of all equipment and piping lines relevant to the complete system. Ensure that these Drawings are compatible and correctly annotated and cross-referenced at their interfaces (match lines).
- B. Coordination Drawings are for the Contractor's and the Architect's use during Construction and shall not be construed as replacing any Shop or Record Drawings required elsewhere in these Contract Documents.
- C. Detailed procedures for Coordination Drawings are contained in DIVISION 01 - GENERAL REQUIREMENTS of these Contract Documents.

#### 1.10 RECORD DRAWINGS

- A. General: Refer to DIVISION 01 - GENERAL REQUIREMENTS for general requirements for maintaining as-built drawings and submitting final reproducible record documents.
- B. The General Contractor will provide two sets of Drawings to the Plumbing Subcontractor, one set of which shall be maintained at the site and which shall, at all times, be accurate, clear, and complete, showing the actual locations of all equipment and piping as it is being installed. The Record Drawings shall be available to the Architect/Engineer's field representative at all times.
- C. Provide electronic AutoCAD drawings to indicate revisions to piping size and location both exterior and interior; including locations of valves and other equipment requiring periodic maintenance or repair; actual equipment locations, dimensioned from column lines; concealed equipment, dimensioned to column line; mains and branches of piping systems, with valves and control devices located and numbered, concealed unions located, and with items requiring maintenance located.
- D. Include in the Record Drawings any addenda, sketches, and supplementary Drawings issued during the course of construction.
- E. Non-availability of Record Drawings or inaccuracies therein will postpone the final inspection until they are available.
- F. All valves shown on these Drawings shall be numbered with numbers corresponding to those on the valve charts.
- G. All costs related to the foregoing requirements shall be paid by the Plumbing Subcontractor.

## 1.11 OPERATING INSTRUCTIONS AND MAINTENANCE MANUALS

- A. Provide operating instructions to the Owner's designated representative with respect to operation functions and maintenance procedures for all equipment and systems installed. At the completion of the project, turn over to the Architect four (4) complete manuals, in three-ring, loose-leaf binders, containing the following:
1. Complete Shop Drawings of all equipment.
  2. Operation description for all systems.
  3. Names, addresses, and telephone numbers of all suppliers of the system.
  4. Preventative maintenance instructions for all systems.
  5. Spare parts lists of all system components.
  6. Valve tag chart.

## 1.12 GUARANTEE

- A. Refer to Division 1 of the Contract. Guarantee all work under this Section free from defects in workmanship and materials for a period of one (1) year from the date of final acceptance of the building, as set forth in the Contract. Replace any such defective work developing during this period, unless such defects are clearly the result of bad usage of equipment by others. Where such defective work results in damage to work of other Sections of the Specifications, restore such work to its original condition by mechanics skilled in the affected trade.

## 1.13 DRAWINGS

- A. All work shown on the Drawings is intended to be approximately correct to scale, but shall be taken in a sense as diagrammatic. Sizes of pipes and general method of running them are shown, but it is not intended to show every offset and fitting. To carry out the true intent and purpose of the plans, furnish all necessary parts to make complete working systems ready for use. The Plumbing Drawings are intended to show the main stacks and risers and may or may not necessarily show all runout piping particularly in lavatories and gang toilet areas. Contractor shall include all runout piping to all referenced scheduled fixtures and equipment appearing on the Plumbing Drawings.
- B. All floor drains installed on this project, including all kitchen floor drains and trough drains, shall be equipped with trap primers. The trap primer piping is not shown on the drawings and shall be located in the field by the Contractor as dictated by field piping conditions.
- C. The Plumbing Drawings and Specifications are intended to supplement each other so that any details shown on the Drawings and not mentioned in the Specifications, or vice-versa, shall be executed the same as if mentioned in the Specifications and shown on the Drawings.
- D. Refer to the Architectural, Structural, and other Mechanical and Electrical Drawings, which indicate the construction in which this Work shall be installed. Locations shown on the plans shall be checked against the general and detailed Drawings of the construction proper. All measurements shall be taken at the Building.

## 1.14 VALVE TAGS, NAMEPLATES, AND CHARTS

- A. All valves on pipes of every description shall have neat circular brass valve tags at least 1-1/2 in. in diameter attached with brass hook to each valve stem. Stamp on these valve tags, in letters as large as practical, the number of the valve and the service, such as "H.W., C.W., GAS", for hot water, cold water, and gas respectively. The numbers for each service shall be consecutive. Where valves are located above ACT ceilings, furnish

and install valve finder ceiling tack, tack shall be minimum 7/8 in. diameter with 1/2 in. steel point, color as determined by Owner.

- B. Nameplates, catalog numbers, and rating identifications shall be securely attached to Electrical and Mechanical equipment with screws or rivets. Adhesives or cements will not be permitted.

#### 1.15 PIPE MARKER IDENTIFICATION SYSTEM

- A. Mark all piping installed under this Section and at all Access Panels with a marking system in basic colors conforming to those specified in ANSI/ASME A-13.1. Markings shall indicate pipe content and direction of flow. Markers shall be applied at all valves and tee joints, and on straight runs of pipe at every 20 ft.-0 in. on center. Adhesive markings are not acceptable. Markers shall be painted on under the scope of this Section or may be snap-on system.
- B. Clearly mark potable and non-potable water system with 4 inch wide colored bands, with arrow for direction of flow, every twenty-five (25) feet on center on all piping installed whether it is concealed or exposed and also on both sides of floor and/or wall penetrations. Mark potable water green and non-potable yellow. Within 6 in. of each band identify with letter "Potable C.W.", Non-Potable H.W." Color of letter shall match banding.

#### 1.16 SANITARY SYSTEMS

- A. Furnish and install complete Sanitary, Waste, Vent, Systems (all hereinafter called Drainage Systems) to convey wastes from all Soil and Waste, Fixtures, Equipment as indicated and/or described in these Plans and Specifications. Urinal waste shall be 2 in. cast iron or sizes indicated on the drawings. Waste piping smaller than 3 in. shall not be used underground. The use of double "Y's" in the horizontal shall not be permitted. All piping shall be installed straight and true and located concealed within building construction.
- B. All horizontal Drainage Systems Piping within the building, 3 in. and smaller, shall be pitched at least 1/4 in. per ft. in the direction of flow. Drainage Piping 4 in. and larger shall be pitched at least 1/8 in. per ft. Make changes in direction of drainage lines with 45 wyes, long turn wyes, or sweep bends.
- C. Furnish and install all cleanouts indicated on the Drawings and/or where required in Drainage Pipes regardless of size so that the distance between cleanouts does not exceed 45 ft. o.c. Cleanouts shall be installed at the base of all risers and at each change of direction.
- D. Refer to drawings for termination points, which generally are connection to piping below slab.

#### 1.17 DOMESTIC WATER SYSTEMS

- A. Furnish, install, sterilize, and test in accordance with the documents and the Plumbing Code, complete potable and non-potable Domestic Cold, Hot, and Hot Water Recirculating Systems including all piping, valves, low point drains, shock absorbers, hangers, insulation, backflow preventers and water heating equipment. Clearly mark the systems as provided above. This work shall start as indicated on the Drawings.
- B. In general, piping shall pitch upward in the direction of flow with each branch and riser separately valved and with 1/2 in. hose end drain on the outlet side of the valve and at all



low points in the system. Install shutoff valves for each battery of fixtures and other valves as necessary to isolate any part of each system.

#### 1.18 EQUIPMENT FURNISHED BY OTHERS

- A. Miscellaneous items, including but not necessarily limited to the following, shall be furnished and set by others as specified in other SECTIONS of the Documents.
  - 1. Laboratory Casework
  - 2. Miscellaneous Sinks
- B. Verify the extent of the connection requirements from the General and Mechanical Plans and Specifications and be responsible for: Setting in place, all such sinks and furnishing and installing trim and roughing including, but not limited to, drains, vent, water, or other plumbing piping, traps, tailpiece, nipples, escutcheons, faucets, and stop valves for all items which above are not so supplied. Include for all sinks which are installed in cabinet work a pair of 1/2 in. ball valve stops and a rough bronze p-trap, or sediment trap as required.
- C. The Plumbing Subcontractor shall be responsible in making final connections to all equipment furnished by others to ascertain complete cross-connection prevention compliance and to furnish and install vacuum breaker and backflow preventers which may be required to be Code compliant and are not so furnished with the equipment.
- D. All sinks are intended to be "Accessible" and all drain outlets on all sinks and lavatories where furnished by the Plumbing Subcontractor or the other SECTIONS shall have an off-set drain. Set all roughing tight to wall in all cases to comply with ADA Standards. Provide where required ADA insulation kits to prevent injury where a barrier is not included in the casework. Refer to Equipment Drawings.

#### 1.19 PAINTING

- A. All interior exposed piping is to be painted and all painting, except as noted, will be done by the Painting Subcontractor. All uncovered piping and hangers shall be thoroughly cleaned of rust, oil, and other containments by the Plumbing Subcontractor and left ready to receive primer coat.
- B. Painting for pipe markings shall be done under this Section.
- C. Painting of exterior gas piping at gas meters, on roof, and at rooftop equipment, shall be done under this Section.

#### 1.20 HOISTING EQUIPMENT AND MACHINERY

- A. Unless otherwise specified, all hoisting and rigging equipment and machinery required for the proper and expeditious prosecution and progress of the Work of this Section shall be furnished, installed, operated and maintained in safe condition by each sub-contractor, as specified under Section 015000, TEMPORARY FACILITIES AND CONTROLS.

#### 1.21 STAGING AND SCAFFOLDING

- A. Unless otherwise specified, each sub-contractor shall provide all lifts and man-lifts, and furnish, erect and maintain in safe condition, all staging and scaffolding as specified under Section 015000 Temporary Facilities and Controls, as needed for proper execution of the work of this Section. Staging and scaffolding shall be of adequate design, erected and removed by experienced stage builders having all accident prevention devices required by Federal, state and local laws.

1.22 BREAKDOWN

- A. Submit a breakdown of the contract price to aid the Architect in determining the value of the work installed as the job progresses.
- B. No requisition will be approved until the breakdown is delivered to the Architect.

1.23 VISIT TO SITE

- A. Prior to submitting a Bid, visit the site of work and become familiar with existing conditions. Any assumptions made are at this Subcontractor's expense.

**PART 2 - PRODUCTS**

2.1 GENERAL

- A. All materials and equipment furnished under this SECTION shall be new, unused, first quality of a manufacturer of established reputation. Each valve, fitting, section of pipe, and piece of equipment supplied to project shall have cast or indelibly stamped thereon the manufacturer's name, pressure rating where applicable, type, and any other specific information provided by manufacturer. Materials shall conform to Massachusetts Code as a minimum requirement and shall appear on the Massachusetts Approved Plumbing Products list.

2.2 PIPE AND FITTINGS

- A. Pipe and fittings shall conform to the latest A.S.A., A.S.T.M., C.A., and F.S. standards.
- B. All piping installed under this SECTION shall be in accordance with the following:

<u>Service</u>	<u>Material</u>
Above ground Drainage and Vent, piping 2 in. and larger	No Hub cast iron soil pipe and fittings bearing collective trademark of the CISPI
Above ground drainage, and Vent piping 2 in. and smaller	Type 'L' hard tempered copper tubing
Domestic water piping above ground	Type 'L' hard tempered copper tubing
Exposed piping at fixtures	Schedule 40 chrome plated red brass I.P.S.

- C. Fittings for sweat drainage piping shall be cast bronze or wrought copper of recessed drainage pattern.

2.3 JOINTS

- A. Above ground shall be made up of heavy duty – 4 band stainless steel clamps, and gaskets. Couplings shall be in compliance with CISPI 310 and shall bear the mark of NSF International. Couplings shall be Husky "SD 4000", Clamp - All HI-TORQ 125, Mission "HW", or equal.
- B. Copper tubing and sweat fittings shall be assembled with lead free solder, Silverbrite, Oatey, Harris, or equal, and a non-corrosive flux recommended by the manufacturer

(includes waste piping and water piping). Press pipe and fittings are acceptable joining method for domestic water piping.

- C. Joints between copper waste/vent tubing and cast iron shall be made with cast iron threaded fittings and copper thread by sweat fittings.
- D. Joints between copper tubing and ductile iron water pipe or at flanged joints to tanks shall be made with a combination iron and brass flange with composition gasket and iron bolts.
- E. Joints between floor or wall flanges and fixtures shall be made with one-piece special molded neoprene gaskets which shall be furnished by the fixture manufacturer.
- F. Threaded pipe joints including plastics shall be made up with teflon tape.

#### 2.4 VALVES

- A. Furnish and install valves where indicated on the Drawings or where specified and located so that they may be operated, repaired, or replaced with a minimum effort and repacked under pressure.
- B. The following list of valves is intended only as a guide for type and quality. Valves shall be as manufactured by Apollo, Milwaukee, Nibco, Elkhart, Watts or approved equal.

Shutoff valves 2 in. and smaller	Apollo #70LF-202 through #70LF-208 solder end lead-free ball va
Stop and waste valves 1 in. and smaller	Apollo #95LF-203 through #95LF-205, lead-free
Check valves	Walworth #406 SJ
Drain valves	Apollo #78-103-01 or #78-203-01 ball valve with cap and chain 1/2 in. x 3/4 in. hose end

#### 2.5 INSULATION

- A. Insulation for all water piping and all horizontal roof leaders whether concealed or exposed shall be 1 in. thick, heavy density, preformed snap-on insulation equal to Johns Manville Micro-Lok HP, 850 degrees snap-on system. Insulation for cold water piping shall have a factory applied vapor barrier with ends and butts sealed with overlapping 4 in. sealing strips.
- B. Valves, fittings, and the underside of roof drain bodies shall be insulated with pre-formed fiberglass fitting insulation cut from dense fiberglass blanket and covered with pre-molded P.V.C. fitting covers. P.V.C. covers shall overlap the adjoining insulation and shall be secured with pressure sensitive vinyl tape over a vapor barrier adhesive seal at the joints. (Note: Staples or tacks are not permitted on covers).
- C. All insulation shall have self-sealing type, all service jacket (ASJ-SSL) factory applied. At all exposed piping, cover jacket with continuous P.V.C. jacket.
- D. Sealers, solvents, tapes, and adhesives, and mastics used in conjunction with the installation of insulation under this Section shall possess the maximum possible fire safe qualities available and shall be NFPA approved.

- E. Covering shall be applied over clean and dry surfaces. No covering shall be applied until after the approval of all pressure and leakage tests.
- F. Insulation shall be as manufactured by Johns Manville, Inc., Owens-Corning Fiberglass Corporation SSL II-ASJ, or Knauf Insulation 1000. Insulation shall be applied by skilled insulation mechanics in a first class manner.

## 2.6 TRAPS

- A. Furnish and install traps with cleanouts on all fixtures and equipment requiring connection to the sanitary system of the same size and material as the pipe on which they occur. Traps installed on threaded pipe shall be recessed drainage pattern.

## 2.7 DRAIN VALVES

- A. It shall be possible to drain the water from all sections of the Potable and Non-Potable Hot and Cold Water Piping. Furnish and install 1/2 in. x 3/4 in. hose end ball valves with cap and chain.

## 2.8 PIPING ACCESSORIES

- A. Furnish and install where indicated on Drawings, Watts Regulator Company lead free pressure reducing valve and strainer combination size as indicated on the Drawing or equal, as manufactured by Donnelly Products Company or McDonnell and Miller.
- B. Trap primer connections are required on all floor drains to maintain trap seal. The requirement for trap primer connections shall include all floor drains in the kitchen including trough drains furnished by others. Trap primers shall be Precision Plumbing Products, Inc. as indicated in the schedule on the drawings.

## 2.9 CLEANOUTS

- A. Cleanout plugs on the Sanitary System shall be of heavy cast brass of the screwed type. Plugs shall be full size up to and including 4 inch.

## 2.10 ACCESS DOORS

- A. Furnish Access Doors for access to all concealed control valves, cleanouts, valves, expansion joints, and to all other concealed parts of the Plumbing System that require accessibility for the proper operation and maintenance of the system. These doors shall be installed under the appropriate SECTION of the Specifications as determined by the surface upon which the panels are mounted.
- B. All Access Doors shall be located in a workmanlike manner in closets, storage rooms, and/or other non-public areas, positioned so that the valve or part can be easily reached, and the size shall be sufficient for this purpose (minimum size 12 in. x 16 in.). Furnish Access Doors for each pipe space to permit thorough inspection of same. When access doors are required in corridors, lobbies, or other habitable areas, they shall be located as directed by the Architect.
- C. Access doors shall be prime painted and completed with cylinder lock and two (2) keys as manufactured by Acudor, Inland Steel Products Company "Milcor", or Walsh-Hannon-Gladwin, Inc., "Way Locator". Type shall be as follows:
  - 1. Acoustical Tile Ceiling Acudor AT-5020
  - 2. G.W.B. Surfaces Acudor DW-5040
  - 3. Masonry Construction Acudor UF-5000
  - 4. Fire Rated Construction Acudor FB-5060

- D. Access Door Shop Drawings shall be submitted to the Architect for approval.

2.11 SUPPLEMENTARY STEEL, CHANNEL, AND SUPPORTS

- A. Furnish and install all supplementary steel, channels, and supports required for the proper installation, mounting, and support of all equipment.
- B. Supplementary Steel and Channels shall be firmly connected to building construction in a manner approved by the Architect.
- C. The type and size of the Supporting Channels and Supplementary Steel shall be determined by the Plumbing Subcontractor and shall be sufficient strength and size to allow only a minimum deflection in conformance with the manufacturer's requirements for loading.
- D. All Supplementary Steel and Channel shall be installed in a neat and workmanlike manner parallel to the walls, floor, and ceiling construction. All turns shall be made with 90 deg. fittings, as necessary to suit the construction and installation conditions.

2.14 HANGERS, ANCHORS, GUIDES, AND PIERS

- A. All piping shall be supported from the Building Structure by means of approved hangers and supports. Piping shall be supported to maintain required grading and pitching of lines, to prevent vibration, and to secure piping in place, and shall be so arranged as to provide for expansion and contraction.
- B. The spacing for hangers for horizontal piping shall be in accordance with the following:
  1. Cast Iron Soil Pipe: 5 ft.-0 in. at the hubs for 5 ft. lengths. For 10 ft. lengths, use one (1) hanger at the hub and one (1) at midpoint of the length. Install cast iron pipe in accordance with CISPI Handbook - latest edition.
  2. Copper Tubing: 6 ft.-0 in. o.c. for 1-1/4 in. and smaller, and 10 ft.-0 in. o.c. for 1-1/2 in. and larger.
  3. Steel Pipe: 10 ft.-0 in. o.c. for 1-1/2 in. and over; 8 ft. - 0 in. for 1-1/4 in.; 6 ft. - 0 in. for 1 in. and smaller.
- C. Hanger rod diameter shall be as follows:

Pipe Size	Rod Diameter
1/2 in. thru 2 in.	3/8 in.
2-1/2 in. and 3 in.	1/2 in.
4 in. and 5 in.	5/8 in.
6 in.	3/4 in.

8 in. and over	7/8 in.
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- D. Vertical lines shall be adequately supported at their bases by a suitable hanger placed in the horizontal line near the riser and at every 10 ft. interval.
- E. All Hangers shall be adjustable Clevis Hanger. Hanger rods shall have machine threads. Malleable iron brackets of approved type shall be used along the walls. All Hangers for copper tubing shall be copper plated except where pipe is insulated, in which case, Steel Clevis Hanger and pipe shield shall be used.
- F. Piping shall not be hung from the hangers of other trades.
- G. Hangers shall be manufactured by Grinnell, Carpenter and Paterson, Fee and Mason, or equal.
- H. Wire and strap hangers will not be permitted in this installation.
- I. Install a 14 gauge metal pipe shield between pipe insulation and all pipe hangers. Hangers shall be sized so that the pipe insulation passes through the hanger and is supported on the shield.

## 2.16 PLUMBING FIXTURES

- A. Furnish and install all fixtures and equipment, including supports, connections, fittings, and any incidentals, to make a complete installation in accordance with the Drawings and as specified.
- B. The Architect shall be final judge as to whether fixtures and trim fulfill the requirements of the Specifications and as to whether they are of suitable quality.
- C. All fixtures requiring hot and cold water shall have the cold water faucet on the right hand side of the fixture and the hot water faucet on the left hand side of the fixture.
- D. Escutcheons shall be furnished and installed on all supplies and traps. Escutcheons shall be one (1) piece chrome plated brass with set screws.
- E. All fixtures shall have the manufacturer's guaranteed label or trademark indicating first quality. All acid resisting enameled ware shall bear the manufacturer's symbol signifying acid resisting material.
- F. Unless otherwise specified, faucets and all exposed fittings shall be chromium plated.
- G. All supply pipes shall run in a reasonable straight vertical line from the stops to faucets. Traps shall be installed perpendicular to walls.
- H. Fixture Schedule:
  - 1. Refer to Schedule on Drawings for Plumbing Fixture Specifications.

## 2.17 SCAFFOLDS AND STAGING

- A. General: Trade Contractors shall obtain required permits for, and provide scaffolds, staging, and other similar raised platforms, required to access their Work as specified in Section 01 50 00 - Temporary Facilities and Controls and herein.
  - 1. Scaffolding and staging required for use by this Trade Contractor pursuant to requirements of Section 01 50 00 - Temporary Facilities and Controls shall be

- furnished, erected, maintained in a safe condition, and dismantled when no longer required, by this Trade Contract requiring such scaffolding.
2. 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 other than those required to be provided, maintained and removed by the General Contractor pursuant to MGL (Refer to Section 01 50 00 - Temporary Facilities and Controls and as additionally required for dust control).
  3. General Contractor is responsible to provide enclosures required for temporary heat; refer to Section 01 50 00 - Temporary Facilities and Controls.
    - a. Furnishing portable ladders and mobile platforms of all required heights, which may be necessary to perform the work of this trade, are the responsibility of this Trade Contractor.

## 2.18 HOISTING MACHINERY AND EQUIPMENT

- A. All hoisting equipment, rigging equipment, crane services and lift machinery required for the work by this Trade Contractor shall be furnished, installed, operated and maintained in safe conditions by this Trade Contractor, as referenced under Section 01 50 00 - Temporary Facilities and Controls.

## PART 3 - EXECUTION

### 3.1 WORKMANSHIP AND INSTALLATION METHODS

- A. All work shall be installed in a first-class manner consistent with the best current practices. All materials shall be securely installed plumb and/or level, and all flush mounted equipment shall have front edge flush with finished wall surface.
- B. All piping shall be installed true to line and grade in the case of underground piping. All piping above ceilings or exposed shall be grouped together, be parallel to each other, and be either parallel or perpendicular to the structure. Utilize gang hangers wherever feasible. Group all valves together where feasible.

### 3.2 WORK COORDINATION AND JOB OPERATIONS

- A. The equipment shall not be installed in congested and possible problem areas without first coordinating the installation of same.
- B. Particular attention shall be directed to the coordination of piping and other equipment installed in the ceiling areas. Coordinate the elevations of all piping in hung ceiling areas to insure adequate space for the installation of recessed lighting fixtures before other mechanical equipment is installed.
- C. Furnish to the General Contractor, and all other Subcontractors, all information relative to the portion of the Plumbing installation that will affect them, sufficiently in advance so that they may plan their work and installation accordingly.
- D. In case of failure to give proper information as indicated above sufficiently in advance, pay for all back-charges for the modification, renovation, and relocation of any portion of the work already performed.
- E. Obtain from the other trades, all information relative to the Plumbing Work to be executed in conjunction with the installation of their respective equipment.

### 3.3 CUTTING AND CORE DRILLING

- A. Perform all cutting and core drilling operations that are outlined in Part 1 of this SECTION. Throughout the performance of the cutting and coring work, ensure that the structural integrity of the walls, floors, overhead structure, and other structural components, which are to remain, is maintained until permanent work is installed. Prior to any coring or cutting, verify all locations of same with the General Contractor. All cutting and coring is to be performed in accordance with approved Coordination Drawings
- B. Cut all masonry and concrete with an approved diamond blade concrete saw in a neat straight direction, perpendicular to the plane of the wall or floor.
- C. Use a core drilling process which produces clean, sharp edges and the minimum hole size which will accommodate the size of pipe sleeve specified. Submit procedures for cutting thru existing steel beams to Architect for review.
- D. The patching of holes shall be performed by Plumbing Sub-contractor utilizing methods outlined for the finish trade involved. Holes shall be patched to the satisfaction of the Architect.

### 3.4 CLEANING AND PROTECTION

- A. Protect all materials and equipment during shipment and so as to prevent damage. Water closets, lavatories, and sinks shall be boarded over and all other fixtures shall be protected with pasted on paper. Post notice prohibiting the use of the fixtures prior to completion. Assume full responsibility for protection of work until its completion and final acceptance.
- B. Keep the premises reasonably clean at all times and remove rubbish caused by the Plumbing Work as directed by the Architect.
- C. Upon completion of this work, clean all fixtures and equipment installed herein and replace damaged parts. Failure to fulfill this obligation will result in back-charges for correction of the defective work.

### 3.5 SLEEVES, INSERTS, AND ESCUTCHEONS

- A. All piping passing through slabs, floors, walls, partitions, foundation walls and grade beams, shall be sleeved and all such sleeves shall be furnished and installed by the Plumbing Subcontractor as detailed on the Drawings and herein specified. Set sleeves in concrete floors and walls as soon as forms are set and before concrete is poured. Core drilling openings shall have a sleeve caulked and leaded in place.
- B. All pipes passing through floor, whether slab-on grade or above grade levels, shall be sleeved with sleeve extending 1 in. above floor. This includes all piping in toilet room pipe space, stairwells, closets, partitions and pre-cast planks.
- C. All sleeves shall be Schedule 40 galvanized steel and shall be reamed. There shall be a minimum of 1 in. annular space between the sleeve and pipe provide greater clearance where seismic requirements dictate. Sleeves on insulated pipe shall be large enough to allow insulation to pass through sleeve. Sleeves on drywall, masonry, or concrete walls and partitions, shall be flush with wall on both sides.
- D. The space between sleeve and pipe in all cases shall be filled with a U.L./F.M. approved caulking compound. This includes pipes concealed in chases and/or partitions.



- E. Inserts where required shall be furnished and set by the Plumbing Subcontractor and where necessary may be drilled or power driven and shall be sized such that the insert will not exceed a depth of penetration of 1 in. into concrete.
- F. Escutcheons: All exposed pipe, uncovered, passing through walls or floors or ceilings shall be fitted with C.P. brass spun or split type escutcheons with approved clamping device for holding in position. Floor escutcheons shall be deep enough to fit over sleeves, fastened to pipe, and extend down to floor.

### 3.6 FIRESTOPPING

- A. Plumbing piping penetrations shall be so made that the possible spread of fire or products of combustion will not be substantially increased. Openings around pipe penetrations through fire-resistance rated walls, partitions, floors or ceilings shall be firestopped using approved methods to maintain the fire-resistance rating. Refer to Section 07 84 00 for Firestopping. All fire stopping material and installation will be by the Plumbing Subcontractor.

### 3.7 TESTING

- A. Test all Work in the presence of the Architect and/or Engineer and as required by Local Codes.
- B. After Soil, and Vent Piping is in place and before being buried or furred in, plug lower ends and fill the system with water up to the top of stacks. Piping is to be left tight under these conditions and water level shall be maintained intact for the period of at least four (4) hours.
- C. Test all water piping by applying a hydrostatic pressure of 150 PSIG using a pump for this purpose. Make sure that all lines are properly plugged or capped and that air has been vented before applying pressure which shall remain constant without pumping for two (2) hours at least.
- D. Any leaks in joints or evidence of defective pipe on fittings disclosed by test shall be immediately corrected by replacing defective parts with new joints or materials. No makeshift repair effected by caulking threaded pipe with lead wool, application or Wilky or patented compounds will be permitted.

### 3.8 CHLORINATION

- A. Upon completion of the Plumbing Work, thoroughly chlorinate the entire domestic water system before putting same in service. Chlorinate all work in the presence of the Architect and/or Engineer. The chlorinating agent shall be as a solution of sodium hypochlorite. Water shall be fed slowly into the new line with chlorine in the proper amount to produce a dosage of 50 PPM. Open and close all valves while system is being chlorinated.
- B. After the sterilization agent has been applied for 24 hours, pay for an independent testing agency to test for residual chlorine. A residual of not more than 5 PPM shall be required in all parts of the line.
- C. If test show 5 PPM or greater of residual chlorine, flush out system until all traces of the chemical used are removed.
- D. Provide testing report from independent testing agency.

3.9 ALTERNATES

- A. Refer to Alternates, Section 01 23 00, for alternates affecting the scope of work under this Section.
- B. The work of this Section, which is required by the scope of work as stated in the Alternates, Section 01 23 00, shall comply with the applicable quality and performance requirements for similar work under this Section.
- C. The alternates which effect the Electrical Sections are:
  - 1. Add Alternate No.1 – Science Classrooms 222, 302 (including HVAC), and Classroom 123 Ceiling.
    - a. Add Alternate Number 1: Refer to Drawings.

END OF SECTION

**SECTION 23 00 00****HEATING, VENTILATING AND AIR CONDITIONING****PART 1 - GENERAL**

## 1.2 GENERAL REFERENCES

- A. Bidding Requirements, Contract Forms, General and Supplementary Conditions and Division 1, General Requirements are hereby made a part of this Section.

## 1.3 SCOPE OF WORK

- A. Work Included: The scope of work consists of the installation of all materials to be furnished under this SECTION, and without limiting the generality thereof, consists of furnishing all labor, materials, equipment, plant, transportation, rigging, staging, appurtenances and services necessary and/or incidental to properly complete all heating, ventilating and air conditioning work as shown on the Drawings, as described in the Specifications, or as reasonably inferred from either, in the opinion of the Architect as being required, and includes:
1. Heat pump roof top unit.
  2. Supply ductwork with associated terminal boxes, and supply registers and diffusers.
  3. Return and exhaust ductwork with associated grilles and registers.
  4. Refrigerant piping systems and accessories.
  5. Piping and ductwork insulation.
  6. Balancing, air
  7. Automatic temperature controls.
  8. Furnish, erect and maintain staging and scaffolding, including mechanical hoisting and rigging equipment required for the performance of the heating, ventilating and air conditioning work.
  9. Smoke and Firestopping Seals and sealing of all wall penetrations as detailed on the drawings. Refer to Section 078400 which defines the firestopping materials and methods.
- B. The HVAC Subcontractor shall be responsible for all cutting and patching related to the work of this Section except in finished surfaces. Patching is the responsibility of the trade effected.
1. For coordination of cutting and patching, refer to Section 01 31 00, PROJECT MANAGEMENT AND COORDINATION.
  2. For cutting and patching specifications, refer to Section 001700, EXECUTION REQUIREMENTS.
- C. Items to be Furnished Only: Furnish the following items for installation by the designated Sections:
1. Access Panels
    - a. Access panels for access to heating, ventilating and air conditioning equipment shall be furnished under this Section for installation by the General Contractor or appropriate Subcontractor.
- D. Items to be Installed Only: Install the following items as furnished by the

designated Sections:

1. SECTION 26 00 00 - ELECTRICAL
  - a. Duct mounted smoke detectors.

E. Related Work: The following items of work are not included in this Section and are specified under the designated SECTIONS:

1. DIVISION 1 - GENERAL REQUIREMENTS  
SECTION 01 31 00 PROJECT MANAGEMENT AND COORDINATION
  - a. Coordination of cutting and patching.
- SECTION 01 73 00 - CUTTING AND PATCHING
2. DIVISION 2 - SITE CONSTRUCTION
  - a. Excavation, backfill, pumping and shoring.
3. DIVISION 3 - CONCRETE
  - a. Concrete bases and supports.
4. DIVISION 7 - THERMAL AND MOISTURE PROTECTION  
SECTION 07 00 02 - ROOFING AND FLASHING
  - a. Flashing for all roof penetrations.
5. DIVISION 8 - DOORS AND WINDOWS
  - a. Door louvers and undercut doors.
6. DIVISION 9 - FINISHES  
SECTION 09 00 09 - PAINTING
  - a. Field painting, except as noted otherwise. Field painting of radiation shall be done using the electrostatic method.
7. DIVISION 8 - OPENINGS  
SECTION 08 90 00 - LOUVERS AND VENTS
  - a. Exterior wall louvers.
8. DIVISION 11 - EQUIPMENT  
SECTION 11 40 00 - FOOD SERVICE EQUIPMENT
  - a. Kitchen equipment.
9. DIVISION 21 - FIRE SUPPRESSION  
SECTION 21 00 00 FIRE SUPPRESSION
  - a. Sprinklers and equipment.
10. DIVISION 22 - PLUMBING  
SECTION 22 00 00 - PLUMBING
  - a. Domestic water heaters.
  - b. Town water make-up.
11. DIVISION 26 - ELECTRICAL  
SECTION 26 00 00 - ELECTRICAL
  - a. Power wiring except power wiring to variable air volume terminal units
  - b. Starters and disconnects where not furnished integral with equipment.
  - c. Emergency generator and related equipment.
  - d. Wiring of smoke detectors.
  - e. Wiring of Solid State Controller and wiring to associated destratification fans.
  - f. Wiring of Solid State Controllers to respective exhaust fans.

F. The work of this Section is shown on Drawings numbered, M0.01 through M7.06”

#### 1.4 DEFINITIONS

A. “HVAC” as used hereinafter in this SECTION shall mean “Heating, Ventilating and

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## Air Conditioning.”

- B. “HVAC Subcontractor” as used hereinafter in this SECTION shall mean the “Heating, Ventilating and Air Conditioning Subcontractor,” i.e., the filed bid subcontractor under this Section 23 00 00.
- C. “Concealed” shall be defined as areas where piping is located in chases, shafts, pipe tunnels, and above furred ceilings.
- D. “Underground” shall mean piping exterior to or within the building that is buried. All other piping shall be considered “exposed.”
- E. “Piping” shall mean, in addition to pipe, all fittings, valves, hangers, and other accessories relating to such piping systems.
- F. “Provide” shall mean “provided complete in place,” that is, “furnished and installed.”

## 1.5 VALVE TAGS, NAMEPLATES AND CHARTS

- A. Furnish and install on each gate and globe valve, and on all automatic control valves used in this contract, a two-inch diameter brass tag with stamped numeral a minimum height of one-half inch painted white. The tags shall be attached to the valve handles or stem necks with brass hooks or chains and properly secured.
- B. These numbers shall correspond to numbers indicated for valves on the Record Drawings and on two printed detailed lists. These printed lists shall state the numbers and locations of each valve and control and the section, fixture or equipment which it controls, and other necessary information such as requiring the opening or closing of another valve or valves, when any one valve is to be opened or closed.
- C. These printed lists shall be prepared in form to meet approval of the Architect and shall be framed under glass.
- D. Nameplates, catalog numbers and rating identification shall be securely attached to electrical and mechanical equipment with screws or rivets. Adhesives or cements will not be permitted.

## 1.6 SHOP DRAWINGS

- A. General: Refer to Division 1, General Requirements, Section 01 33 00, Submittal Procedures, for submittal provisions and procedures.
- B. In accordance with Division 1, General Requirements, submit to the Architect for approval complete sets of detailed information consisting of manufacturers’ bulletins, capacities, shop drawings, and parts lists of all material to be provided for this project.
- C. 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. Unless noted otherwise, this is NOT a proprietary specification and it should be noted that “Or approved equal” applies to all products denoted herein. It is understood that all manufactures will have minor variations in

configuration, appearance, and product specifications and such minor variations shall not eliminate such manufacturers as an "approved equal". It is the intent of this specification to encourage open and competitive involvement from multiple manufacturers that are able to supply similar products.

- D. In accordance with the requirements of the Commissioning Specification, Section 01 91 13, and NE-CHPS, provide a copy of submittals to the Commissioning Agent to obtain comments during the design review cycle.

#### 1.7 CODES, REGULATIONS AND PERMITS

- A. All work done under this SECTION shall conform to the codes and regulations governing such work as set forth by the Rhode Island Department of Public Safety, the Rhode Island State Building Code and all local codes having jurisdiction.
- B. Give notices, file plans, obtain permits and licenses, and obtain necessary approvals from authorities having jurisdiction. Deliver certificates of inspection to Architect. No work shall be covered before examination and approval by Architect, inspectors and authorities having jurisdiction. Imperfect or condemned work shall be replaced with work conforming to requirements, without extra cost to Owner, subject to the approval of the Architect. If work is covered before due inspection and approval, the HVAC Subcontractor shall pay costs of uncovering the installed work, whether it meets contract requirements or not.
- C. Refer to Supplementary General Conditions 00 80 00 for payment fees.
- D. Refer to Division 1, Section 01 41 00, Regulatory Requirements.

#### 1.8 INTENT

- A. It is not intended that the Drawings show every pipe, fitting, and appurtenance. All such parts necessary for the complete execution of the work, in accordance with the best practices of the trade and to the satisfaction of the Architect shall be provided whether these parts may have been specifically mentioned or not, or indicated on the Drawings.

#### 1.9 DRAWINGS AND SPECIFICATIONS

- A. The Drawings and Specifications are complementary each to the other, and any labor or material called for by either, whether or not by both, or necessary for the successful operation of any components shall be furnished and installed.
- B. Before installing any work, verify that it does not interfere with the clearances required for other work. Installed work which interferes with existing necessary services shall be modified as directed by the Architect, at no additional cost to the Owner.
- C. Be familiar with the Drawings and Specifications of all other trades to prevent interferences and assure complete coordination.

## 1.10 GIVING INFORMATION

- A. Keep fully informed as to the shape, size and position of all openings and foundations required for all apparatus furnished under this SECTION and give full information to the General Contractor sufficiently in advance of the work, so that all such openings and foundations may be built in advance. Furnish all sleeves and supports herein specified, so the General Contractor may build same in place.
- B. In the case of failure to give proper information as noted above, assume the cost of having necessary changes to the work made by the General Contractor.

## 1.11 OBTAINING INFORMATION

- A. Obtain detailed information from the manufacturers of apparatus which is to be provided, for the proper methods of installation. Obtain all information from the General Contractor and other Subcontractors which may be necessary to facilitate the work and the completion of the whole project.

## 1.12 MATERIALS AND EQUIPMENT

- A. All materials and equipment furnished under this SECTION shall be new and of the best grade for the service intended. The manufacturers mentioned in the specifications are intended to indicate the quality desired. Any substitutions shall be as approved by the Architect as herein provided by the "or equal" clause, in addition to meeting the limitations of space and capacity shown or specified. Re-built materials and equipment will not be accepted.

## 1.13 REFERENCES

- A. National standards referenced herein are included to establish recognized quality only. Equivalent quality and testing standards will be acceptable subject to their timely submission, review and acceptance by the Designer.
- B. Refer to SECTION 01420 - REFERENCES for schedule of references.
- C. Reference Standards:
  - 1. Reference herein to any technical society, organizations, group or body are made in accordance with the following abbreviations:
 

ADC	Air Diffusion Council
AMCA	Air Moving and Conditioning Association
ANSI	American National Standards Institute
ARI	Air Conditioning & Refrigeration Institute
ASHRAE	American Society of Heating, Refrigeration and Air Conditioning Engineers
ASME	American Society of Mechanical Engineers
ASTM	American Society of Testing Materials
AWG	American Wire Gauge
AWS	American Welding Society
FS	Federal Specifications
IEEE	Institute of Electrical and Electronic Engineers
NEC	National Electrical Code

NEMA	National Electrical Manufacturer Association
NFPA	National Fire Protection Association
SMACNA	Sheet Metal and Air Conditioning Contractors National Association
UL	Underwriters Laboratories, Inc.

#### 1.14 COORDINATION DRAWINGS

- A. Before materials are purchased or work is begun, the HVAC Subcontractor shall prepare and submit to the Designer, Coordination Drawings showing the size and location of his equipment, ductwork and piping lines relevant to the complete system. He shall ensure that these drawings are compatible and correctly annotated and cross- referenced at their interfaces.
- B. Coordination drawings are for the Contractor's and the Designer's use during construction and shall not be construed as replacing any shop or record drawings required elsewhere in these Contract Documents.

#### 1.15 MOTORS AND STARTERS

- A. Motors for all equipment under this SECTION shall be quiet in operation and shall be guaranteed to run without objectionable noise or vibration.
- B. Motors smaller than one-half (1/2) horsepower shall be wound for 120 volts, single phase, 60 hertz.
- C. Motors one-half (1/2) horsepower and larger shall be wound for 480 volt, 3 phase, 60 hertz.
- D. Starters provided for all other equipment shall be provided by the Electrical Subcontractor.
- E. Starters shall have properly calibrated thermal overload, compensating type thermal heaters in accordance with motor characteristics. Starters shall be magnetic for remote control and be equipped with auxiliary contacts.
- F. Voltages shown in Paragraphs B and C are typical unless otherwise noted.
- G. All motors one horsepower and over shall be premium efficiency type.

#### 1.16 TEMPORARY HEATING

- A. Special reference is made to "Heating during Construction", Section 01 50 00 - TEMPORARY FACILITIES AND CONTROLS.

#### 1.17 OPERATIONS AND MAINTENANCE MANUALS

- A. Refer to SECTION 01 78 00 - CLOSEOUT SUBMITTALS, for submittal procedures pertaining to operating and maintenance manuals.
- B. At least two (2) months prior to the time of turning over this contract to the Owner for Use & Occupancy or substantial completion, secure and deliver to the Architect



three (3) complete indexed files containing approved operating and maintenance manuals, shop drawings, and other data as follows:

1. Operating manuals and operating instructions for the various systems.
  2. Catalog data sheets for each item of mechanical or electrical equipment actually installed including performance curves, rating data and parts lists.
  3. Catalog sheets, maintenance manuals, and approved shop drawings of all mechanical or electrical equipment controls and fixtures with all details clearly indicated.
  4. Names, addresses and telephone numbers of repair and service companies for each of the major systems installed under this Contract.
  5. Copies of all service contracts provided for the guarantee period.
  6. Copies of all equipment and system warranties.
- C. Non-availability of operating and maintenance manuals or inaccuracies therein may be grounds for cancellation and postponement of any scheduled final inspection by the Owner until such time as the discrepancy has been corrected and/or retainage of sufficient monies to prepare same.
- D. Provide qualified trained personnel to insure proper operation of the systems and to train the Owner's operating and maintenance personnel in the proper operation and maintenance of the systems. Instruction period shall be a minimum of two (2) eight-hour days. Coordinate with Commissioning Agent per specification section 01 91 00.
- E. Refer to SECTION 01 75 00, Starting and Adjusting. Coordinate all start-up, operation, and testing activities with the Project Manager, General Contractor and the Commissioning Agent per specification section 019100.

#### 1.18 RECORD DRAWINGS

- A. General: Refer to Division 1, General Requirements, SECTION 017800, Close-out Submittals for Requirements.
- B. The work of this Section is shown on Drawings numbered, M0.01 through M7.06

#### 1.19 CONTRACT COST BREAKDOWN

- A. Within 30 days of commencing the work, submit to the Architect a complete breakdown of the Contract price to aid in determining the value of the installed work during the construction period. The form shall correspond to the construction schedule with a percentage of progress to complete breakdown with progress description by month.

#### 1.20 GUARANTEE AND SERVICE

- A. Attention is directed to the provisions of the CONTRACT AND GENERAL CONDITIONS regarding guarantees/warranties for the Work.
- B. Manufacturers shall provide their standard guarantees/warranties for work under this Section. However, such guarantees/warranties shall be in addition to and not in lieu of all other liabilities which the manufacturer and the Contractor may have by law or by other provisions of the Contract Documents.

## 1.21 DEBRIS REMOVAL AND CLEAN-UP

- A. The HVAC Subcontractor shall, at the end of each day's work, remove waste materials and debris resulting from the installation of the heating, ventilating and air conditioning system. The HVAC Subcontractor shall deposit such waste and debris in a dumpster on-site. Dumpster shall be provided by the General Contractor. The General Contractor shall be responsible for the emptying of dumpster when required.

The HVAC Subcontractor shall, at the completion of his work, remove from the school property all tools, equipment and surplus materials resulting from the installation of the heating, ventilating and air conditioning system.

## 1.22 COMMISSIONING REQUIREMENTS

- A. An independent Commissioning Agent (CA) will be retained for this project. The commissioning process will be implemented in accordance with the LEED for Schools v2009 and Commissioning Credits EAp1 – Fundamental Commissioning of Building Energy Systems and EAc3 – Enhanced Commissioning.
- B. This contractor shall assist and support the CA as necessary in accordance with the requirements of specification section 019100 – COMMISSIONING.
1. "Commissioning of a system or systems specified in this section is part of the construction process. Documentation and testing of these systems, as well as training of the Tenant's and Building Owner's operation and maintenance personnel, is required in cooperation with Tenant's and Building Owner's Representatives and the Commissioning Agent. Project Closeout is dependent on successful completion of all commissioning procedures, documentation and issue closure. Refer to Commissioning Specification, Section 019100, for detailed commissioning requirements."

## 1.22 COMMISSIONING REQUIREMENTS

- A. An independent Commissioning Agent (CA) will be retained for this project. The commissioning process will be implemented in accordance with the NE-CHPS.
- B. The HVAC Subcontractor shall assist and support the CA as necessary in accordance with the requirements of Specification Section 01 91 13 – Commissioning Requirements/Plan.
1. Commissioning of a system or systems specified in this Section is part of the construction process. Documentation and testing of these systems, as well as training of the Tenant's and Building Owner's operation and maintenance personnel, is required in cooperation with Tenant's and Building Owner's Representatives and the Commissioning Agent. Project Closeout is dependent on successful completion of all commissioning procedures, documentation and issue closure. Refer to Commissioning Requirements/Plan, Section 01 91 13, for detailed commissioning requirements.

**PART 2 - PRODUCTS****2.1 ACCESS PANELS**

- A. All work shall be installed so that all parts requiring inspection, operation, maintenance and repair are readily accessible. Minor deviations from the drawings may be made to accomplish this, but changes of magnitude shall not be made prior to written approval from the Architect.
- B. Furnish access panels for installation in walls and ceilings at locations indicated on the drawings or as required to permit access.
- C. All access panels shall be located in closets, storage rooms and/or other non-public areas, in a workmanlike manner, positioned so that junction can be easily reached and the size shall be sufficient for this purpose (minimum 12 inches x 16 inches). When the access panels are required in corridor, lobbies or other habitable areas, they shall be located as directed by the Architect.
- D. Access panels shall be as manufactured by Inland Steel Products Company "Milcor", Walsh-Hannon-Gladwin, Inc., "Way-Loctor" or approved equal. Types shall be as follows:
  - 1. Masonry or Tile "Milcor" Type M
  - 2. Drywall "Milcor" Type DW
  - 3. Fire-Rate "Milcor"
- E. Units shall have 16 gauge steel frame and 14 gauge steel hinged door panel. Door shall have concealed spring hinges allowing door to be opened to 175 degrees.
- F. Provide flush screwdriver operated camlocks in accordance with manufacturer's schedule of panel sizes and number of locks.
- G. Units shall be factory primed for field painting by Section 09 00 09.
- H. Install U.L. rated 1-1/2 hour Class B access panels where required to comply with applicable code requirements.

**2.2 FILTERS**

- A. **MERV 8**
  - 1. Air Filters shall be Model Pre Pleat 62RM8 panel filters, as manufactured by Flanders Precisionaire or approved equal.
  - 2. Each filter shall consist of an electrostatically charged synthetic only media, with corrosion-resistant expanded metal backing and moisture resistant enclosing frame. The filter shall be 1", 2" or 4" nominal depth. The grid shall be 100% bonded to the media on the air exiting side to eliminate media vibration and pull away.
  - 3. The grid shall be formed to provide a uniform V-wedge shaped pleat with the open area on the air exiting side for maximum utilization of the media and low airflow resistance. The filter shall be classified for flammability by Underwriters Laboratories, Standard 900 as Class 2.
  - 4. The filter shall have a Minimum Efficiency Reporting Value of 8 by ASHRAE Standard 52.2.

- B.     MERV 13
1.     Air Filters shall be Model Dominator High Efficiency Rigid Cell Extended Surface Filter, as manufactured by Purolator or approved equal.
  2.     Each filter shall consist of 100% synthetic media. The cell sides shall be high strength, high impact polystyrene plastic and the entire filter shall be completely incinerable. The filter shall be 4" nominal depth.
  3.     The filter shall be classified by Underwriters Laboratories, Standard 900 as Class 1.
  4.     The filter shall have a Minimum Efficiency Reporting Value of 13 by ASHRAE Standard 52.2.

### 2.3 FOUNDATIONS AND SUPPORTS

- A.     All mechanical equipment and systems shall be substantially supported without distortion or excessive vibration. The methods of support shall be as hereinafter described, except as otherwise noted on the drawings. This Contractor shall locate all equipment bases and shall provide all anchor bolts and templates to the General Contractor who shall form and set all concrete work and shall set all anchor bolts. Anchor bolts and nuts shall be galvanized.
- B.     Concrete housekeeping pads shall follow equipment plan shape and be 6 inches in height. Where equipment is set directly on housekeeping pads the space between equipment base and pad top shall be filled by the General Contractor with non-shrinking grout. Where equipment shape or mounting is such as to require an air space between equipment bases and pad, the pad shall then be furnished with a smooth troweled surface. All equipment shall be anchored to housekeeping pads or all intervening vibration isolator bases shall be anchored to the structure.
- C.     Where steel frame floor supports are indicated to be provided, such framing shall be all-welded type with two coats of red primer. The framing system shall be substantial type with members sized to prevent equipment distortion or excessive vibration. Framing shall be simple post and beam box type with diagonal bracing to prevent lateral movement. Beam members shall be positioned to align with equipment support points for proper bolting and posts shall be positioned to prevent excessive beam cantilevering. Posts shall be provided with baseplate anchored to the structure.
- D.     Where steel framing supports are indicated to be provided for roof mounted equipment (those without integral curbs for setting into roof structure) the same framing system as described above shall be used, except members shall be galvanized and bolted together. Posts shall be positioned to align both framing and roof structural members with pitch pockets at roof penetrations.
- E.     Ground-mounted equipment shall be supported with framing system similar to roofing application described above except that posts shall be set on poured-in-place concrete piers with galvanized anchor bolts. Concrete piers shall be provided by the General Contractor.

### 2.4 INSULATION MATERIALS (GENERAL REQUIREMENTS)

- A.     All insulation materials to be furnished for installation under this section shall be as manufactured by Owens-Corning, Certainteed, Knauf, or Schiller Company.

- B. Shop drawings shall be submitted for all insulation system materials to be furnished for installation under this section. Submittals shall include descriptions of the application of all materials to be used for each insulation class and catalog cuts of all materials furnished.
- C. All insulation materials to be furnished for installation under this section shall conform to fuel contributed flame spread and smoke developed limits set forth in NFPA Standard 90A as determined by NFPA 255, ASTM E84 or UL723 tests.

2.26 INSULATION (PIPING)

- A. Piping systems shall be insulated as specified herein and as indicated on the drawings.

Fluid	Fluid Temp. Range F.	Run-outs Up to 1"	≤ 1.5"	> 1.5"	Class
Hot Water	105-200	1/2	1½	2	104
Coil Drains	Any	3/4	3/4	3/4	Inside 104 Outside 107
Refrigerant Piping	Any	1/2	1/2	1.0	107

Run-outs not exceeding twelve (12) inches in length

Note: Provide 0.016 inch thickness embossed aluminum protective jacketing on all insulated piping within mechanical rooms within 6 feet of floors.

- B. Insulation shall be omitted from the following piping:
  1. Equipment vent piping.
  2. Equipment drain piping beyond shut off valve.
  3. Piping within fintube covers.

Class 104

Piping: Insulation shall consist of high density (minimum #4) molded fiberglass sectional pipe insulation with a minimum R value of 4.0 H. degrees F. ft.<sup>2</sup>/BTU per inch, with factory applied all-service jacket with vapor barrier, butt and lap end strips shall be self-sealing or secured with vapor seal adhesive. Mechanical Room piping shall be covered with PVC Piping Insulation Cover

Fittings, Valves and Flanges: 2 inch size and smaller shall be insulated with 1 pound density and secured with 20 gauge annealed steel wire. Then apply insulating and finish cement to match the adjacent pipe insulation thickness and then have two (2) 1/8 inch thick smoothing and finishing coats of vapor seal adhesive applied using intermediate glass fabric reinforcing. Vapor seal adhesive shall lap adjacent pipe cover. Fittings may be insulated with two layers of fiberglass with PVC covers. Mechanical Room fittings, valves and flanges shall be covered with PVC Piping Insulation Cover.

Valves, Fittings and Flanges: 2½ inch size and larger shall be insulated using sections of high density fiberglass molded sectional pipe insulation cut to fit, secured with 20 gauge annealed steel wire. All voids and pockets shall then be

filled with insulating cement and finish cement. Finish shall be two 1/8 inch thick smoothing and finishing coats of vapor seal adhesive applied using intermediate glass fabric reinforcing. Vapor seal adhesive shall lap adjacent pipe cover. Mechanical Room fittings, valves and flanges shall be covered with PVC Piping Insulation Cover.

Class 107

Tubing and Piping: Insulation shall consist of flexible type foamed plastic pipe insulation with flame spread rating of 25 or less and smoke development rating of 50 or less per ASTM E84-75 test, integral vapor barrier. Insulation shall be slit type, field sealed with companion adhesive.

Fittings, Valves and Flanges: Tubing Systems – Fittings shall be made by miter cutting of adjacent straight piping runs and sealing joints with companion adhesive. Valves shall be insulated by using a combination of nested pipe insulation and sheets to form a complete enclosure with all joints sealed with companion adhesive. Flanges shall be insulated by using sheets cut to fit pipe side of flange and wrapping sheets around flange perimeter. All joints shall be sealed using companion adhesive. Piping Systems – Fittings shall be insulated using nested sections of pipe insulation mitered to form a square corner and sealing joints with companion adhesive. Valves and flanges shall be insulated as described for tubing systems.

C. PVC Piping Insulation Cover:

1. Piping insulation cover shall be of nominal thirty (30) mil UV stabilized PVC preformed to appropriate shapes for straight piping, fittings, valves and accessories. Solvent welding type adhesive shall form a permanent chemical bond between surfaces and shall present a continuous vapor barrier across the joint.
2. Mechanical Room piping insulation cover shall be of nominal thirty (30) mil colored PVC preformed to appropriate shapes for straight piping, fittings, valves and accessories. Solvent welding type adhesive shall form a permanent chemical bond between surfaces and shall present a continuous vapor barrier across the joint. The following color coding shall be utilized:
  - Hot Water Supply & Return: Red
  - Chilled Water Supply & Return: Dark Blue
3. PVC piping insulation cover shall incorporate the following characteristics.

<u>Typical Properties</u>	<u>Test Method</u>	<u>Value</u>
Service Range	N.A.	0°F. to 150°F
Specific Gravity	ASTM D-792	1.48
Flame Spread	ASTM E-84-97a	25
Smoke Developed	ASTM E-84-97a	50
<u>Typical Properties</u>	<u>Test Method</u>	<u>Value</u>
Flexural Strength	ASTM D-638	11,500 psi
Tensile Modulus	ASTM D-638	470,000 psi
Elongation at Yield	ASTM D-638	3% MD
Flexural Modulus	ASTM E-790	460,000 psi
Electrical Conductance	D-257	Non-conductor
Gardner-SPI Impact	D-3679	8 lb/mil (30 mil sample)

Abrasion	Taber Method	10,000 revolutions, CS-17 wheel, 1,000 gr weight
Water Vapor Transmission	ASTM E96-95	0.009 perms

- D. Refrigerant Piping: Insulate refrigerant suction and liquid piping system with  $\frac{3}{4}$  inch thick foamed plastic. Insulation shall be Armaflex, or equal, and shall be installed and adhered to in accordance with the manufacturer's recommendations. Provide two (2)  $\frac{3}{4}$ " thickness of insulation where refrigerant piping is exterior to building.

## 2.5 INSULATION (SHEET METAL)

- A. Sheet metal work shall be insulated as specified herein and as indicated on the drawings.
- B. Insulation shall be applied to the following:
1. All air conditioning systems ductwork and associated equipment exposed to view located in machine rooms, fan rooms and mechanical spaces; all systems outside air plenums, ducts and louver boxes; all system exhaust air plenums, ducts and louver boxes from louver connections back to automatic dampers. All portions of heating and ventilating and air conditioning unit casings not internally insulated, all air conditioning systems return air fans and all equipment shall have Class 131 insulation.
  2. All concealed air conditioning system supply and return air ductwork and associated equipment including terminal box reheat coil casings, shall have Class 135 insulation.
  3. Insulation liner shall be provided where indicated on the drawings. Refer to sheet metal work.
  4. All sound attenuators in insulated system ductwork shall be insulated. Sound attenuator sections furnished with Rooftop air handling units shall be insulated in field when not furnished insulated by the unit manufacturer.
- C. Insulation shall be omitted from the following sheet metal work:
1. Toilet, locker and storage exhaust ductwork except where noted on drawings.
  2. Air conditioning systems ductwork exposed to view servicing the space the ductwork resides in.
- D. All louver plenums, louver blank-off plates and ductwork which will conduct air shall have insulation thickness increased to a minimum of 2 inches or as indicated on drawings.
- E. All supply and return ductwork located outside shall have rigid board insulation with thickness increased to a minimum of 3 inches and be provided with a weatherproof cover in addition to the vapor barrier.
1. Class 130
    - a. Insulation shall consist of a UL listed duct wrap system complying with UL 1978 and ASTM E-119. Blanket material shall be in alumina (45%  $\pm$ ) composite incorporating the following characteristics.
    - b. Service Range: 0°F to 2300°F

- c. Melting Point: 3200°F
  - d. R Value @ 70°F:  $4.5 \frac{Hr.Sq.Ft.^{\circ}F.Inch}{BTU}$
  - e. R Value @ 283°F:  $9.9 \frac{Hr.Sq.Ft.^{\circ}F.Inch}{BTU}$
  - f. Flame Spread: 5 (ASTM E84/UL-723)
  - g. Smoke Developed: 5 (ASTM E84/UL-723)
  - h. The blanket shall have a foil facing, adhered to the blanket mat, incorporating the following characteristics:
  - i. Tensile Strength: M.D. 40#/IN (ASTM D-828)  
C.D. 40#/IN (ASTM D-828)
  - j. Puncture Resistance: 100 Units (Min) (ASTM D-781)
  - k. Self adhesive filament tape shall be of the high performance type equal to 3M Company \*898.
  - l. Banding material, 3/4" wide, minimum 0.015" thick, carbon steel for construction requirements of zero clearance to combustibles or 1 hour ratings. Stainless steel banding shall be used for 2 hour requirements (SS wire ties or 1/4" SS hose clamps may be substituted for hanger insulation only).
  - m. Tensioning tool for banding material manufactured by Okle or by Signoide Company; seals such as those manufactured by Okle or by Signode Company; and crimping tool such as those manufactured by Okle or Signode.
  - n. 10 gauge, 4" to 5" long, copper coated steel pins; 1/2" x 1/2" galvanized steel speed clips; capacitor discharge stud gun (110/115) such as that manufactured by AGM.
  - o. Grease duct access door hardware; 4 1/2" x 5" long, 1/4" wing nuts and 1/4" metal washers; 4" long steel hollow tubing to fit threaded rods.
2. Class 131
- a. Insulation shall consist of 2 inch thick minimum 4 pound density rigid fiberglass board with reinforced foil vapor barrier cut to fit duct shape and applied by impaling insulation on pins attached to duct surface. Pins shall be located approximately 1 per square foot of surface. Insulation shall be secured on pins using metal washers with excess pin length trimmed. Seal seams and all vapor barrier penetrations using 4 inch wide reinforced foil tape self-sealing type or secured using vapor seal adhesive.
  - b. Note: Flanges protruding from sheet metal shall be covered with 4 inch wide insulation board strips and sealed with 4 inch wide reinforced tape secured with vapor seal adhesive.
  - c. Finish shall consist of pre-sized glass fabric jacket applied to insulation surface and secured with lagging adhesive. All plenums and ducts within 5 feet of floors shall have edges reinforced with metal corner beads applied to insulation and sealed with 4 inch reinforced foil tape secured with vapor seal adhesive prior to finish.
3. Class 135
- a. Insulation shall consist of minimum 2 inch thick flexible fiberglass blanket with reinforced foil vapor barrier. Insulation shall be tightly wrapped around duct and secured using bonding adhesive covering not less than 50 percent of sheet metal surface. Seams



and penetrations shall be sealed by using 4 inch wide reinforced foil tape self-sealing type or secured with vapor seal adhesive. The bottom of ducts over 24 inches wide shall have additional support for blanket consisting of pins attached to duct surface at a rate of 1 per 2 square feet, evenly spaced. Insulation shall be impaled on pins and secured using mechanical washers with excess pin length trimmed.

F. Ductwork Weatherproof Insulation Cover:

1. Weatherproof insulation cover shall be a self-adhering roll-type roofing membrane consisting of a laminated assembly of aluminum facing, two (2) layers of styrene-butadiene-styrene and a nominal forty (40) mil layer of rubberized asphalt adhesive. Asphalt adhesive compound shall be pressure sensitive, protected by a release paper until installation. Composite assembly shall incorporate the following characteristics.

<u>Typical Properties</u>	<u>Test Method</u>	<u>Value</u>
Service Range	N.A.	-25°F. to 150°F.
Heat Aging	ASTM D-794	No visible blistering, delamination or deterioration
Flame Spread	ASTM E-84-97a	0 (NFPA Class "A")
Smoke Density	ASTM E-84-97a	5
Tear Strength	ASTM D-1424	680 gr MD 640 gr CD
Tensile Strength	ASTM D-1000	500 psi MD 625 psi CD
Elongation	ASTM D-1000	296% MD 228% CD
Static Uplift	ASTM E-907	No damage or failure evident @ 75 psf for 1 minute
Wind Driven Rain	South Florida Test 5683	No leakage, damage or failures evident @ 100 MPH
Lap Joint Tensile Strength	MFM Method	Exceeds material strength
Lap Joint Peel Strength	MFM Method	11 lb/in (180° angle)
Abrasion	Taber Method	10,000 revolutions, CS-17 wheel, 1,000 gr weight
Low Temperature Flexibility	MFM Method	100,000 cycles @ 10°F with no cracking
Q-U-C Accelerated Weathering	Q Panel Co. UV Chamber per Rubber Manufacturer's Association	4,000 hr exposure surface and lap joints, no effect
Reflectivity	Photo-volt meter	129 (black surface ≈ 29)
Water Vapor Transmission	ASTM E96-95	0.009 perms

## 2.6 INSULATION MATERIALS (MECHANICAL)

- A. Summary:
1. Extent of mechanical insulation required by this section is indicated on the drawings, by the requirements of this section, and Section 15B.03, "General Requirements – Mechanical Work".
  2. Types: Types of mechanical insulation specified in this section include the following:
    - a. Flexible unicellular pipe insulation.
    - b. Fiberglass duct insulation.
    - c. Fiberglass equipment insulation.
    - d. Insulation jackets.
    - e. Insulation accessories.
  3. Related Sections: Refer to other sections of Division 23 for the following:
    - a. Refrigerant piping and specialties
    - b. Sheet metal ductwork
- B. Quality Assurance:
1. Codes and Standards: Provide insulation conforming to the following standards:
    - a. American Society for Testing and Materials (ASTM)
    - b. American Society of Heating, Refrigerating and Air Conditioning (ASHRAE)
    - c. National Fire Protection Association (NFPA)
- C. Submittal:
1. Product Data: Submit manufacturer's technical product data and installation instructions for each type of mechanical insulation. Submit schedule showing manufacturer's product number, K-value, thickness, and furnished accessories for each mechanical system requiring insulation. Also furnish necessary test data certified by an independent testing laboratory.
- D. Insulation – General Requirements:
1. General: Provide insulation conforming with the referenced publications and the specified temperature ranges and densities in pounds per cubic foot (pcf).
  2. Insulation Exterior: Provide insulation exterior that is cleanable, grease resistant, non-flaking, and non-peeling.
  3. Physical Changes: Provide insulation that shows no physical changes that adversely affect its qualities under normal use at the intended use temperature.
- E. Flexible Unicellular Pipe Insulation:
1. General: Provide 1 inch thick flexible unicellular pipe insulation conforming to ASTM C534, Type 1 (tubular). Provide flexible unicellular pipe insulation for temperatures of minus 40 degrees F. to 210 degrees F.
  2. Fittings, Flanges, and Valves: Provide insulation for fittings, flanges and valves premolded, precut, or job fabricated of the same thickness and conductivity as used on adjacent piping.
- F. Fiberglass Duct Insulation:
1. General: Provide fiberglass duct insulation for concealed spaces as

follows:

- a. For concealed insulation, provide 1½ inch thick flexible fiberglass duct insulation with minimum 1½ pound per cubic foot density and with factory applied vapor-proof jacket ASTM C921, Type I.
- G. Fiberglass Equipment Insulation:
1. General: Provide fiberglass equipment insulation for concealed spaces as follows:
    - a. For concealed insulation, provide 1½ inch thick flexible fiberglass equipment insulation conforming to (ASTM C553, Type I {Resilient, Flexible}, Class B5 {up to 400 degrees F., 2.0 pcf nominal}) (ASTM C592, Class I {up to 850 degrees F., one side metal-mesh covered, 8 pcf average minimum}).
- H. Insulation Jackets:
1. General: Provide insulation jackets in accordance with ASTM C921. Test insulation jacket as a composite with the insulation.
- I. Insulation Accessories:
1. General: Provide insulation accessories compatible with materials to which applied and suitable for the service. Provide insulation accessories that do not corrode, soften or otherwise attack the insulation or jacket in either the wet or dry state.
- J. General Insulation Installation: Install insulation material with smooth and even surfaces. Unless otherwise specified, install insulation materials, accessories and finishes in accordance with the manufacturer's published recommendations.
- K. Insulation for Low Temperature Piping:
1. General: Unless otherwise specified, insulate low-temperature piping.
  2. Locations Insulated: Install insulation in the following locations and as indicated:
    - a. Refrigerant suction piping.
- L. Flexible Unicellular Insulation: Install flexible unicellular insulation as follows:
1. Slip flexible unicellular pipe insulation on the pipe prior to connection wherever possible, and seal the butt joints with adhesive.
  2. Where the slip-on technique is not possible, slit the insulation and apply to the pipe, seal the seams and butt joints with adhesive.
  3. Protect flexible unicellular insulation from compression at all pipe hanger locations by the use of compression resistant inserts and protective metal shields. Provide inserts of the same thickness and outside contour as the adjoining insulation, mold or shape to fit at least 90 degrees of the pipe circumference, and seal into adjoining pipe insulation with adhesive.
  4. Insulate all fittings, flanges and valves (except valve stems, hand wheels and operators) in piping insulated with flexible unicellular insulation with similar pipe or sheet insulation of the same thickness.
  5. Seal all joints at fittings and valves with adhesive.
  6. Insulate screwed fittings with sleeved fitting covers fabricated from miter-cut pieces of pipe insulation according to the manufacturer's sleeving size recommendations and overlap and seal to the adjacent pipe insulation.
  7. Insulate all valves and welded fittings with fitting covers fabricated from similar pipe insulation or sheet insulation.

- M. Insulation for Air Handling and Air Distribution Equipment and Ducts:
1. General: Unless otherwise specified insulate air handling and air distribution equipment.
  2. Ventilation System Locations Insulated: Install insulation for ventilation systems with leaving temperature less than 90 degrees F. in the following locations and as indicated:
    - a. Ducts and apparatus in concealed spaces.
  3. Air Conditioning System Locations Insulation: Install insulation for air conditioning systems of all types, velocities and pressures, in the following locations and as indicated:
    - a. All supply ductwork.
- N. Concealed Duct Flexible Insulation: Secure the flexible insulation for concealed ducts with long sides or diameters less than 24 inches tightly and smoothly with a bonding adhesive, Category 3, applied in 6 inch wide transverse strips on 12 inch centers. Secure the flexible insulation for ducts with long sides or diameters of 24 inches or more tightly and smoothly with metal or nylon anchors or pins, cemented or welded to the ducts, spaced not more than 13 inches apart each way. Do not permit sagging of the insulation and provide sufficient bonding adhesive or fasteners to prevent this.
- O. Insulation Jackets: Provide insulation for air handling and air distribution equipment and ducts with jackets as specified under "Insulation Jackets" article, of this section. Install the jackets at all joints with a 2 inch wide lap drawn tight and secured with staples on 4 inch centers and 1 inch from edges of laps.

## 2.7 MOTORS

- A. This section identifies basic requirements for motors. It includes motors that are factory-installed as part of equipment and appliances as well as field-installed motors.
- B. Quality Assurance:
1. Comply with NFPA 70 "National Electrical Code".
  2. NRTL Listing: Provide NRTL listed motors.
    - a. Term "Listed": As defined in "National Electrical Code", Article 100.
    - b. Listing Agency Qualifications: "Nationally Recognized Testing Laboratory" (NRTL) as defined in OSHA Regulation 1910.7.
  3. Comply with NEMA MG 1: "Motors and Generators".
  4. Comply with UL 1004: "Motors, Electric".
- C. All motors provided for this project shall comply with the requirements of this section, except as otherwise indicated.
1. Motors 1/2 HP and Larger: Polyphase
  2. Motors Smaller than 1/2 HP: Single phase.
  3. Frequency Rating: 60 Hz.
  4. Voltage Rating: Determined by voltage of circuit to which motor is connected for the following motor voltage ratings (utilization voltages):
    - a. 120V Circuit: 115 V – motor rating.
    - b. 208V Circuit: 200 V – motor rating
    - c. 240V Circuit: 230 V – motor rating.

- d. 480V Circuit: 460 V – motor rating.
  5. Service factors indicated for motors are minimum values and apply at frequency and utilizing voltage at which motor is connected. Provide motors which will not operate in service factor range when supply voltage is within 10 percent of motor voltage rating.
  6. Capacity: Sufficient to start and operate connected loads at designated speeds in indicated environment, and with indicated operating sequence, without exceeding nameplate ratings. Provide motors rated for continuous duty at 100 percent of rated capacity.
  7. Temperature Rise: Based on 40 degree C. ambient except as otherwise indicated.
    - a. Enclosure: Totally Enclosed Air Over
- D. Polyphase Motors:
1. General: Squirrel-cage induction type conforming to the following requirements except as otherwise indicated.
    - a. NEMA Design Letter Designation: "A" or "B"
  2. Multi-Speed Motors: Separate winding for each speed.
  3. Premium Efficiency Motors: Nominal efficiency equal to or greater than that stated in NEMA Standard Publication MG 1-2003, Tables 12-12 and 12-13 respectively.
  4. Variable speed motors for use with solid-state drives: Energy efficient, squirrel-cage induction, design B units with ratings, characteristics, and features coordinated with and approved by drive manufacturer.
  5. Internal thermal overload protection for motors: For motors so indicated, protection automatically opens control circuit arranged for external connection. Protection operates when winding temperature exceeds safe value calibrated to the temperature rating of the motor insulation.
  6. Bearings: Double-shielded, prelubricated ball bearings suitable for radial and thrust loading of the application.
  7. Rugged Duty Motors: Totally enclosed with 1.25 minimum service factor. Provide motors with regreasable bearings and equipped with capped relief vents. Insulate windings with nonhygroscopic material. External finish shall be chemical resistant paint over corrosion resistant primer. Provide integral condensate drains.
  8. Motors for reduced in-rush starting: Coordinate with indicated reduced in-rush controller type and with characteristics of driven equipment load. Provide required wiring leads in motor terminal box to suit control method.
- E. Single-Phase Motors:
1. General: Conform to the following requirements except as otherwise indicated.
  2. Energy Efficient Motors: One of the following types as selected to suit the starting torque and other requirements of the specific motor application:
    - a. Permanent Split Capacitor
    - b. Split-Phase Start, Capacitor-Run
    - c. Capacitor-Start, Capacitor-Run
  3. Shaded-Pole Motors: Use only for motors smaller than 1/20 HP.
  4. Internal Thermal Overload Protection for Motors: For motors so indicated, protection automatically opens the power supply circuit to the motor, or a control circuit arranged for external connection. Protection operates when winding temperature exceeds a safe value calibrated to the temperature rating of the motor insulation. Provide device that automatically resets

when motor temperature returns to normal range except as otherwise indicated.

5. Bearings, belt connected motors and other motors with high radial forces on motor shaft shall be ball bearing type. Sealed, prelubricated sleeve bearings may be used for other single phase motors.

## 2.8 PIPE, HANGERS, SUPPORTS AND ANCHORS

- A. Provide all necessary labor, supervision, materials, equipment and services required to furnish and install all pipe supports, hangers, anchors and other suitable supporting appliances necessary to support firmly and substantially all parts of the apparatus described in this specification. Equipment shall be as manufactured by B-Line, Uni-Strut, Grinnell or Carpenter & Patterson.
  1. Pipe shall be adequately supported by pipe hanger and supports and restrained by anchors. Hangers, etc. for insulated pipes shall be sized to accommodate insulation thickness.
- B. Steel pipe hangers, anchors and supports shall have the manufacturer's name, part number, and applicable size stamped into each part for identification.
- C. Hangers, anchors and supports shall be designed and manufactured in conformance with the following standards as appropriate.
  1. ASTM B633: Specification for Electro-deposited Coatings of Zinc on Iron and Steel.
  2. ASTM A123: Specification for Zinc (Hot-Galvanized) Coatings on Products Fabricated from Rolled, Pressed, and Forged Steel Shapes, Plates, Bars and Strip
  3. ASTM A653 G90: Manufacturers Standardization Society: Pipe Hangers and Supports – Materials, Design and Manufacture
  4. MSS SP69: Manufacturers Standardization Society: Pipe Hangers and Supports – Selection and Application
- D. Hangers:
  1. Uninsulated pipes 2 inches and smaller:
    - a. Adjustable steel swivel ring (band type) hanger.
    - b. Adjustable steel swivel J-hanger.
    - c. Malleable iron ring hanger or hinged ring hanger.
    - d. Malleable iron split-ring hanger with eye socket.
    - e. Adjustable steel clevis hanger.
  2. Uninsulated pipes 2½ inches and larger.
    - a. Adjustable steel clevis hanger.
    - b. Pipe roll with sockets.
    - c. Adjustable steel yoke pipe roll.
- E. Pipe Anchors:
  1. Provide a complete system of accessories as required to transmit thermal expansion forces to the building structure for redirection to the piping expansion compensation system. Anchors shall consist of structural attachments, framing members for translating forces to and from the building structure and plates welded to the appropriate piping sections.
  2. Structural attachments shall be as appropriate for the point of connection intended. Verify anchor connection points with Project Structural Engineer

- prior to fabrication.
3. Framing members shall be sized to accept the forces associated with the Contractor's proposed piping system arrangement with a minimum factor of safety of 3.0.
  4. Framing point of attachment to the appropriate piping section shall be of a minimum thickness of 1/4" and shall increase by 1/16" in thickness for each two-pipe size increases above three inches in diameter (3"Φ). Framing point of attachment to the appropriate piping section shall be of a minimum length of 16" and shall increase by 2" in length for each two pipe size increases above three inches in diameter (3" Φ).
  1. Welds to connect framing point of attachment to the appropriate piping section shall be full penetration fillet welds parallel to the central axis of the piping. All welding processes, including but not limited to procedures and welding operator qualifications, shall be in strict accordance with the requirements of Section IX of the ASME and Pressure Vessel Code (edition, including any addenda, in effect at the time of the contract execution).
- F. Pipe Clamps:
1. Provide pipe clamps with weld-less eye nuts to allow flexibility in the hanger assembly as required to adjust for horizontal movement. Provide double bolted pipe clamps for insulated lines.
- G. Multiple or Trapeze Hangers:
1. Trapeze hangers shall be constructed from 12 gauge roll formed ASTM A570 Gr. 33 structural steel channel, 1 $\frac{5}{8}$  x 1 $\frac{5}{8}$ " minimum, or stronger as required.
  2. Mount pipes to trapeze with 2 piece pipe straps sized for outside diameter of pipe.
  3. For pipes subjected to axial movement:
    - a. Strut mounted roller support. Use pipe protection shield or saddles on insulated lines.
    - b. Strut mounted pipe guide.
- H. Wall Supports:
1. Pipes 4 Inches and Smaller:
    - a. Carbon steel hook.
    - b. Carbon steel J-hanger.
  2. Pipes Larger than 4 Inch:
    - a. Welded strut bracket and pipe straps.
    - b. Welded steel brackets, with roller chair or adjustable steel yoke pipe roll. Use pipe protection shield or saddles on insulated lines.
- I. Floor Supports:
1. In mechanical spaces where weight of piping or other apparatus makes it impractical to support same suspended only from structure above, flanged pipe standards shall be installed to support the weight of the piping, valves and fittings. Main passageways and access space must not be obstructed.
  2. Hot piping under 6 inch and all cold piping:
    - a. Carbon steel adjustable pipe saddle and nipple attached to steel base stand sized for pipe elevation. Pipe saddle shall be screwed or welded to appropriate base stand.

3. Hot piping 6 inches and larger:
  - a. Adjustable roller stand with base plate.
  - b. Adjustable roller support and steel support sized for elevation.
  
- J. Vertical Supports:
  1. Steel riser clamp sized to fit outside diameter of pipe.
  
- K. Copper Tubing Supports:
  1. Hangers shall be sized to fit copper tubing outside diameters.
    - a. Adjustable steel swivel ring (band type) hanger.
    - b. Malleable iron ring hanger, or hinged ring hanger.
    - c. Malleable iron split-ring hanger with eye socket.
    - d. Adjustable steel clevis hanger.
  2. For supporting vertical runs use epoxy painted or plastic coated riser clamps.
  3. For supporting copper tube to strut use epoxy painted pipe straps sized for copper tubing, or plastic inserted vibration isolation clamps.

Note: Copper plating of hangers is for purposes of identification only. This superficial coating shall not be designed to provide significant protection in corrosive areas.
  
- L. Plastic Pipe Supports:
  1. V-bottom clevis hanger with galvanized 18 gauge continuous support channel.
  
- M. Supplementary Structural Supports:
  1. Design and fabricate supports using structural quality steel bolted framing materials as manufactured by B-Line or Uni-Strut.
  2. Channels shall be roll formed, 12 gauge, ASTM A570 Grade 33 steel, 1 $\frac{5}{8}$ " x 1 $\frac{5}{8}$ " or greater as required by loading conditions. Submit designs for pipe tunnels, pipe galleries, etc., to Engineer for approval.
  3. Clamps and fittings shall be specifically designed and listed for use with the strut system.
  
- N. Upper Attachments:
  1. Beam clamps shall be used where piping is to be suspended from building steel. Clamp type shall be selected on the basis of load to be supported, and load configuration.
    - a. C-Clamps shall have locknuts and cup point set screws. Top flange c-clamps shall be used when attaching a hanger rod to the top flange of structural shapes. Refer to manufacturer's recommendations for setscrew torque. Retaining straps shall be used to maintain the position on the beam where required.
    - b. Center loaded beam clamps shall be used where specified. Steel clamps, malleable iron or forged steel beam clamps with cross bolt shall be as required to fit beams.
  2. Concrete Inserts:
    - a. Cast in place spot concrete inserts shall be used where applicable, either steel or malleable iron body. Spot inserts shall allow for lateral adjustment and have means for attachment to forms. Select inserts to suit threaded hanger rod sizes.
      - 1) Arrange pipe hangers, and auxiliary framing if required, to



limit the maximum pipe load, with pipes fully insulated and filled with water, to not exceed 1500 pounds on any one slab insert.

- 2) Inserts shall be spaced not closer than 4 feet o.c. in either direction. Where pipe inserts are closer together than 4 feet o.c. notify the Architect for review.
  - b. Continuous concrete inserts shall be used where applicable. Channels shall be 12 gauge, ASTM A570 Grade 33 structural quality carbon steel, complete with Styrofoam inserts and end caps with nail holes for attachment to forms. The continuous concrete insert shall have a minimum load rating of 2,000 lbs/ft. in concrete. Select channel nuts suitable for strut and rod sizes.
  - c. Provide inserts for placement in form-work before concrete is poured.
  - d. Provide inserts for suspending hangers from reinforced concrete slabs and sizes of reinforced concrete beams.
  - e. Where concrete slabs form finished ceilings, provide inserts to be flush with slab surface.
  - f. Provide hooked rod to concrete reinforcement section for inserts carrying pipe over 4 inches.
- O. Vibration Isolation and Supports:
1. Refer to Section "Vibration Isolation and Seismic Restraints" for vibration isolation requirements.
  2. All horizontal runs of pipe in all mechanical equipment rooms, and for a distance of fifty (50) equivalent pipe diameters beyond the respective mechanical equipment rooms, shall be isolated from building structure by means of units designed for insertion of rids. Selection of correct isolators for each application shall be made by the vibration isolation manufacturer subject to approval of the Architect.
- P. Accessories:
1. Hanger rods shall be threaded both ends, or continuous threaded rods of circular cross section. Use adjusting locknuts at upper attachments and hangers. No wire, chain or perforated straps shall be allowed.
  2. Shields shall be 180° galvanized sheet metal, 12" minimum length, 18 gauge minimum thickness, designed to match outside diameter of the insulated pipe.
  3. Pipe protection saddles shall be formed from carbon steel, 1/8 inch minimum thickness, sized for insulation thickness. Saddles for pipe sizes greater than 12 inches shall have a center support rib.
- Q. Finishes:
1. Hangers not in direct contact with copper pipe shall be zinc plated in accordance with ASTM B633, SC3 or have an electro-deposited epoxy finish.
  2. Strut channels shall be pre-galvanized in accordance with ASTM A653 G90 or Strut channels shall be electro-deposited epoxy finish.
  3. Hangers and strut located outdoors shall be hot dip galvanized after fabrication in accordance with ASTM A123.
  4. Hangers and strut located in corrosive areas shall be Type 316 stainless steel with matching stainless steel hardware.

5. Hangers and clamps for support of bare copper piping shall be painted with electro deposited copper colored epoxy.

R. Support Spacing:

1. Horizontal steel piping shall be supported in accordance with MSS SP-69 Tables 3 and 4, excerpts of which follow below:

NOMINAL PIPE SIZE	ROD DIAMETERS	MAX. SPACING
1/2" - 1 1/2"	3/8"	7'0"
1 1/2"	3/8"	9'0"
2"	3/8"	10'0"
2 1/2"	1/2"	11'0"
3"	1/2"	12'0"
4"	5/8"	14'0"

2. Horizontal copper tubing shall be supported in accordance with MSS SP-69 Tables 3 and 4, excerpts of which follow below:

NOMINAL TUBE SIZE	ROD DIAMETERS	MAX. SPACING
1/2" - 3/4"	3/8"	5'0"
1"	3/8"	6'0"
1 1/4"	3/8"	7'0"
1 1/2"	3/8"	8'0"
2"	3/8"	9'0"
2 1/2"	1/2"	10'0"
3"	1/2"	11'0"
4"	1/2"	12'0"

- S. Provide means of preventing dissimilar metal contact such as plastic coated hangers, copper colored epoxy paint, or non-adhesive isolation tape. Galvanized felt isolators sized for copper tubing may also be used.
- T. Install hangers to provide a minimum 1/2 inch space between finished covering and adjacent work.
- U. Place a hanger within 12 inches of each horizontal elbow.
- V. Support vertical piping independently of connected horizontal piping. Support vertical pipes at every other floor. Wherever possible, locate riser clamps directly below pipe couplings or shear lugs.
- W. Where several pipes can be installed in parallel and at the same elevation, provide trapeze hangers as specified herein above. Trapeze hangers shall be spaced according to the smallest pipe size, or install intermediate supports according to schedule herein above.
- X. Do not support piping from other pipes, ductwork or other equipment which is not building structure.

2.9 PIPING MATERIALS

- A. All piping materials installed under this section shall be new and shall consist of the following materials of construction:

<u>System of Section</u>	<u>Piping Class</u>
Refrigerant Piping	12

- B. Class 12 Piping System

<u>All Pipe Sizes</u>	
Construction	Hard brazed joints.
Piping	Copper tubing, Type ACR, hard drawn; cleaned, dehydrated and capped for refrigeration service, ANSI B70.1, ASTM A280.
<u>All Pipe Sizes</u>	
Fittings	Wrought copper, brazed joint type, ANSI B16.22.
Couplings	Same as "Fittings" above.
Brazing Alloy	East Flo, Sil Fos, Phos. Co. minimum 1100 °F melting temperature ASTM B260.

2.10 REFRIGERANT PIPING AND SPECIALTIES

- A. Summary:
1. Extent of refrigeration piping, fittings, valves and accessories is indicated (on the drawings and by the requirements of this section and section 15B.03 "General Requirements – Mechanical").
    - a. Refrigeration piping is specified on a performance basis and the Contractor is responsible for the design and preparation of shop drawings covering all refrigeration piping work.
  2. Related Sections: Refer to other Division 15 sections for the following:
    - a. Mechanical Insulation
- B. Quality Assurance:
1. Codes and Standards: Provide refrigeration piping conforming to the requirements of the following:
    - a. Air Conditioning and Refrigeration Institute (ARI).
    - b. American National Standards Institute (ANSI).
    - c. American Society for Testing and Materials (ASTM).
    - d. American Society of Heating, Refrigerating and Air Conditioning Engineers (ASHRAE).
    - e. Manufacturer’s Standardization Society of the Valve and Fittings Industry, Inc. (MSS).

- C. Submittal:
  - 1. Refer to Section 15B.02, "Submittals" for basic information relating to submittal requirements.
  - 2. Product Data: Submit manufacturer's technical product data on the following:
    - a. Refrigerant Valves
    - b. Refrigerant Specialties
- D. Refrigerant Piping:
  - 1. Refrigerant Piping: Dimensions and material requirements for pipe, pipe fittings and components shall conform to ASHRAE 15 and ANSI B31.5 and shall be compatible with fluids used and capable of withstanding the pressures and temperatures of the service.
    - a. Tubing used for refrigerant service shall be cleaned, sealed, capped, or plugged prior to shipment from the manufacturer's plant.
- E. Valves and Accessories:
  - 1. Valves: Provide valves designed, manufactured and tested specifically for refrigerant service.
    - a. Internal parts shall be removable for inspection or replacement without applying heat or breaking pipe connections. Threaded ends of valves shall conform to ANSI B2.1.
- F. Execution – General:
  - 1. Installation: Install piping components to ensure proper and efficient operation of the equipment and controls and in accordance with manufacturer's printed instructions.
    - a. Provide proper supports for the mounting of vibration isolators, stands, guides, anchors, clamps and brackets.
    - b. Provide piping connected to equipment with vibration isolators with flexible connections which shall conform to vibration and sound isolation requirements for the system.
    - c. Conform to ASHRAE 15 and ANSI B31.5.

## 2.11 REGISTERS, GRILLES AND DIFFUSERS

- A. Registers, grilles and diffusers shall be of model, size and capacity and furnished as scheduled on the drawings. Equipment shall be as manufactured by Titus, Tuttle & Bailey, Krueger or Metal-Aire and shall be supplied with white baked enamel finish except where noted otherwise.
- B. All supply registers shall be furnished with individually adjustable face louvers. Registers and grilles shall be supplied with white baked enamel finish except where noted otherwise.
- C. Diffusers, registers and grilles for installation in walls or plastered ceilings shall be provided with sponge rubber frame gaskets and Phillips head screws for attachment of device frame to building construction.
- D. The diffuser shall be provided with a removable core permitting easy access to core sections. Diffuser neck shall extend no less than 1 inch above the core to

accommodate an internal duct connection to prevent leakage to ceiling space. Diffusers shall be assembled in patterns which provide one, two, three or four-way air discharge with each side delivering a quantity of air proportional to the area served.

- E. When indicated by manufacturer's model number on the equipment schedule, the ceiling diffusers shall be of the restricted multi-orifice jet induction and air mixing type consisting of louver sections with built-in diffusing vanes. The vanes shall be arranged to discharge air from adjacent louvers at an angle of 45 degrees in opposite directions to ensure rapid mixing of primary and room air. Each individual diffusing vane shall be welded in place and mechanically fastened to adjacent louver sections to make a rigid unit. The vanes shall extend to the discharge edges of the louvers. Where louver sections join core frame, the louver ends shall be welded to core frame. The leaving edge of each louver shall be hemmed and the louver ends shall be rounded and hemmed before welding the core frames.
- F. All duct connections to registers, grilles and diffusers shall have all interior surfaces with the line of sight or within 4 feet of the opening painted with dull black paint.

## 2.12 ROOF TOP HEAT PUMP UNITS

### A. MANUFACTURERS

1. Daikin (Basis of Design)
2. Carrier
3. JCI

### B. GENERAL DESCRIPTION

1. Furnish as shown on plans, Daikin Applied Rebel Single zone Heating and Cooling Unit(s) model DPS. Unit performance and electrical characteristics shall be per the job schedule.
2. Configuration: Fabricate as detailed on prints and drawings:
  - a. Return plenum / economizer section
  - b. Filter section
  - c. ASHP coil section
  - d. Supply fan section
  - e. Electric Heat section
  - f. Condensing unit section
3. The complete unit shall be cETLus listed.
4. The unit shall be ASHRAE 90.1-2016 compliant and labeled.
5. Each unit shall be specifically designed for outdoor rooftop application and include a weatherproof cabinet. Each unit shall be completely factory assembled and shipped in one piece. Packaged units shall be shipped fully charged with R-410 Refrigerant and oil.
6. The unit shall undergo a complete factory run test prior to shipment. The factory test shall include a refrigeration circuit run test, a unit control system operations checkout, a unit refrigerant leak test and a final unit inspection.
7. All units shall have decals and tags to indicate caution areas and aid unit service. Unit nameplates shall be fixed to the main control panel door. Electrical wiring diagrams shall be attached to the control panels. Installation, operating and maintenance bulletins and start-up forms shall be supplied with each unit.

8. Performance: All scheduled EER, IEER, capacities and face areas are minimum accepted values. All scheduled amps, kW, and HP are maximum accepted values that allow scheduled capacity to be met.
  9. Warranty:
    - a. The manufacturer shall provide 12-month parts only warranty. Defective parts shall be repaired or replaced during the warranty period at no charge. The warranty period shall commence at startup or six months after shipment, whichever occurs first.
    - b. Five year compressor parts only warranty.
- C. CABINET, CASING, AND FRAME
1. Panel construction shall be double-wall construction for all panels. All floor panels shall have a solid galvanized steel inner liner on the air stream side of the unit to protect insulation during service and maintenance. Insulation shall be a minimum of 1" thick with an R-value of 7.0, and shall be 2 part injected foam. Panel design shall include no exposed insulation edges. Unit cabinet shall be designed to operate at total static pressures up to 5.0 inches w.g.
  2. Exterior surfaces shall be constructed of painted galvanized steel, for aesthetics and long-term durability. Paint finish will include a base primer with a high-quality polyester resin topcoat. Finished, unabraded panel surfaces shall be exposed to an ASTM B117 salt spray environment and exhibit no visible red rust at a minimum of 3,000 hours exposure. Finished, abraded surfaces shall be tested per ASTM D1654, having a mean scribe creepage not exceeding 1/16" at 1,000 hours minimum exposure to an ASTM B117 salt spray environment. Measurements of results shall be quantified using ASTM D1654 in conjunction with ASTM D610 and ASTM D714 to evaluate blister and rust ratings.
  3. Service doors shall be provided on the fan section, filter section, control panel section, and heating vestibule in order to provide user access to unit components. All service access doors shall be mounted on multiple, stainless steel hinges and shall be secured by a latch system. Removable service panels secured by multiple mechanical fasteners are not acceptable.
  4. The unit base shall overhang the roof curb for positive water runoff and shall seat on the roof curb gasket to provide a positive, weathertight seal. Lifting brackets shall be provided on the unit base to accept cable or chain hooks for rigging the equipment.
  5. RTU-2 must come with horizontal supply and return connections. If factory horizontal supply and return connections are not available the unit manufacturer is responsible for any required transition curb.
- D. OUTDOOR/RETURN AIR SECTION
1. Unit shall be provided with an outdoor air economizer section. The economizer section shall include outdoor, return, and exhaust air dampers. The economizer operation shall be fully integral to the mechanical cooling and allow up to 100% of mechanical cooling if needed to maintain the cooling discharge air temperature. The outdoor air hood shall be factory installed and constructed from galvanized steel finished with the same durable paint finish as the main unit. The hood shall include moisture eliminator filters to drain water away from the entering air stream. The outside and return air dampers shall be sized to handle 100% of the supply air volume. The dampers shall be parallel blade design. Damper

blades shall be gasketed with side seals to provide an air leakage rate of 1.5 cfm / square foot of damper area at 1" differential pressure in according with testing defined in AMCA 500. A barometric exhaust damper shall be provided to exhaust air out of the back of the unit. A bird screen shall be provided to prevent infiltration of rain and foreign materials. Exhaust damper blades shall be lined with vinyl gasketing on contact edges. Control of the dampers shall be by a factory installed direct coupled actuator. Damper actuator shall be of the modulating, spring return type. A comparative enthalpy control shall be provided to sense and compare enthalpy in both the outdoor and return air streams to determine if outdoor air is suitable for "free" cooling. If outdoor air is suitable for "free" cooling, the outdoor air dampers shall modulate in response to the unit's temperature control system.

2. Unit is provided with a factory installed and tested outdoor air monitor, with +/- 15% accuracy down to 40 cfm/ton, and a field installed Duct/Space mounted CO2 sensor. Outside air damper position will modulate between the Demand Control Ventilation Limit (minimum position setpoint) and the Ventilation Limit (maximum non-economizer position setpoint) to satisfy the space requirements. Damper position will be controlled to the greater of the two command signals, either minimum outside air flow or space IAQ (CO2).
3. Economizer assembly Fault Detection and Diagnostics (FDD) shall be 90.1, IECC, and California Title 24 compliant. MicroTech III controls shall display a warning, and write a warning to the BAS, if the economizer malfunctions in accordance with 90.1, IECC, and Title 24 specifications.

#### E. EXHAUST FAN

1. Exhaust fan shall be a single width, single inlet (SWSI) airfoil centrifugal fan. The fan wheel shall be Class II construction with aluminum fan blades that are continuously welded to the hub plate and end rim. The exhaust fan shall be a direct drive fan mounted to the motor shaft. Belts and sheaves are not acceptable due to the additional maintenance.
2. The fan motor shall be a totally enclosed EC motor that is speed controlled by the rooftop unit controller. The motor shall include thermal overload protection and protect the motor in the case of excessive motor temperatures. The motor shall have phase failure protection and prevent the motor from operation in the event of a loss of phase. Motors shall be premium efficiency.
3. The unit DDC controller shall provide building static pressure control. The unit controller shall provide proportional control of the exhaust fans to maintain the adjustable building pressure setpoint. The field shall mount the required sensing tubing from the building to the factory mounted building static pressure sensor.
4. Exhaust fans shall be capable of 10:1 turndown. This can be done via ECM fans or multiple DD plenum fans with VFDs and fan isolation dampers.

#### F. FILTERS

1. Unit shall be provided with a draw-through filter section. The filter rack shall be designed to accept a 2" prefilter and a 4" final filter. The unit design shall have a hinged access door for the filter section. The manufacturer shall ship the rooftop unit with 2" MERV 8 and 4" MERV 14 filters.

**G. COOLING COIL**

1. The indoor coil section shall be installed in a draw through configuration, upstream of the supply air fan. The coil section shall be complete with a factory piped cooling coil and an ASHRAE 62.1 compliant double sloped stainless steel drain pan.
2. The direct expansion (DX) cooling coils shall be fabricated of seamless high efficiency copper tubing that is mechanically expanded into high efficiency aluminum plate fins. Coils shall be a multi-row, staggered tube design with a minimum of 3 rows. All cooling coils shall have an interlaced coil circuiting that keeps the full coil face active at all load conditions. All coils shall be factory leak tested with high pressure air under water.
3. The cooling coil shall have an electronic controlled expansion valve. The unit controller shall control the expansion valve to maintain liquid subcooling and the superheat of the refrigerant system.
4. The refrigerant suction lines shall be fully insulated from the expansion valve to the compressors.
5. The drain pan shall be stainless steel and positively sloped. The slope of the drain pan shall be in two directions and comply with ASHRAE Standard 62.1. The drain pan shall have a minimum slope of 1/8" per foot to provide positive draining. The drain pan shall extend beyond the leaving side of the coil. The drain pan shall have a threaded drain connection extending through the unit base.
6. DX coil to be epoxy coated.

**H. HOT GAS REHEAT**

1. Unit shall be equipped with a fully modulating hot gas reheat coil with hot gas coming from the unit condenser
2. Hot gas reheat coil shall be a Micro Channel design. The aluminum tube shall be a micro channel design with high efficiency aluminum fins. Fins shall be brazed to the tubing for a direct bond. The capacity of the reheat coil shall allow for a 20°F temperature rise at all operating conditions.
3. The modulating hot gas reheat systems shall allow for independent control of the cooling coil leaving air temperature and the reheat coil leaving air temperature. The cooling coil and reheat coil leaving air temperature setpoints shall be adjustable through the unit controller. During the dehumidification cycle the unit shall be capable of 100% of the cooling capacity. The hot gas reheat coil shall provide discharge temperature control within +/- 2°F.
4. Each coil shall be factory leak tested with high-pressure air under water.
5. HGRH coil to be epoxy coated.

**I. SUPPLY FAN**

1. Supply fan shall be a single width, single inlet (SWSI) airfoil centrifugal fan. The fan wheel shall be Class II construction with fan blades that are continuously welded to the hub plate and end rim. The supply fan shall be a direct drive fan mounted to the motor shaft. Belts and sheaves are not acceptable due to the additional maintenance.
2. All fan assemblies shall be statically and dynamically balanced at the factory, including a final trim balance, prior to shipment.
3. Supply fan and motor assembly combinations larger than 8 hp or 22" diameter shall be internally isolated on 1" deflection, spring isolators and include removable shipping tie downs.



4. The fan motor shall be a totally enclosed EC motor that is speed controlled by the rooftop unit controller. The motor shall include thermal overload protection and protect the motor in the case of excessive motor temperatures. The motor shall have phase failure protection and prevent the motor from operation in the event of a loss of phase. Motors shall be premium efficiency.
5. Supply fans shall be capable of 10:1 turndown. This can be done via ECM fans or multiple DD plenum fans with VFDs and fan isolation dampers.

J. HEATING SECTION – SCR ELECTRIC HEATER

1. The rooftop unit shall include an electrical resistance heating coil section. SCR modulating electric heating coil shall be factory installed downstream of the supply air fan in the heating section of the rooftop unit. Heating coils shall be constructed of a low watt density, nickel - chromium alloy resistance wire with intermediate supports that include ceramic bushings. The electrical contactors shall be of the full line-breaking type with all the electrical power legs being disconnected when the contactors are not energized. All electrical circuit wiring shall be designed with copper conductors, aluminum wires are not acceptable. Heating element branch circuits shall be individually fused to a maximum of 48 Amps per NEC requirements. The power supply for the electric heater shall be factory wired into the units main disconnect switch.
2. The heater shall have an automatic reset, high temperature limit safety protection. A secondary high limit protection shall also be provided that requires a manual reset. An airflow switch shall be provided with the heating module to prevent the electric heater from operating in the event of no airflow.
3. The electric heat elements shall be controlled by the factory installed DDC unit control system. The heater shall have proportional SCR control. The unit controller shall modulate the electric heater to maintain the discharge air temperature setpoint.
4. Duct heaters mounted within the rooftop unit in the field shall not be acceptable. The manufacturer's rooftop unit ETL certification shall cover the complete unit including the electric heating modules

K. HEAT PUMP HEATING

1. The evaporator coil, condenser coil, compressors and refrigerant circuit shall be designed for heat pump operation. The refrigerant circuit shall contain a 4-way reversing valve for the heat pump operation. The outdoor coil shall have an electronic expansion valve to control the refrigerant flow. The unit controller shall modulate the expansion valve to maintain compressor operation within the compressor operational envelope.
2. The refrigerant system shall have a pump-down cycle.
3. The unit shall have an electric resistance heating coil for auxiliary heating. When the heat pump operation cannot maintain the discharge air temperature setpoint the electric heating coil shall temper the airstream to the discharge air temperature setpoint.
4. Unit shall be capable of operating in ASHP down to 0F.
5. All coils shall be epoxy coated: Evaporator coil, HGRH coil, and condenser coil.

L. CONDENSING SECTION

1. Outdoor coils shall have seamless copper tubes, mechanically bonded

- into aluminum plate-type fins. The fins shall have full drawn collars to completely cover the tubes. A sub-cooling coil shall be an integral part of the main outdoor air coil. Each outdoor air coil shall be factory leak tested with high-pressure air under water.
2. Outdoor air coils shall be protected from incidental contact to coil fins by a coil guard. Coil guard shall be constructed of cross wire welded steel with PVC coating.
  3. Fan motors shall be an ECM type motor for proportional control. The unit controller shall proportionally control the speed of the condenser fan motors to maintain the head pressure of the refrigerant circuit from ambient condition of 25~120°F. Mechanical cooling shall be provided to 25° F. The motor shall include thermal overload protection and protect the motor in the case of excessive motor temperatures. The motor shall have phase failure protection and prevent the motor from operation in the event of a loss of phase.
  4. The condenser fan shall be low noise blade design. Fan blade design shall be a dynamic profile for low tip speed. Fan blade shall be of a composite material
  5. The unit shall have scroll compressors. One of the compressors shall be an inverter compressor providing proportional control. The unit controller shall control the speed of the compressor to maintain the discharge air temperature. The inverter compressor shall have a separate oil pump and an oil separator for each compressor that routes oil back to the compressor instead of through the discharge line.
  6. Pressure transducers shall be provided for the suction pressure and head pressure. Temperature sensor shall be provided for the suction temperature and the refrigerant discharge temperature of the compressors. All of the above devices shall be an input to the unit controller and the values be displayed at the unit controller.
  7. Refrigerant circuit shall have a bypass valve between the suction and discharge refrigerant lines for low head pressure compressor starting and increased compressor reliability. When there is a call for mechanical cooling the bypass valve shall open to equalizing the suction and discharge pressures. When pressures are equalized the bypass valve shall close and the compressor shall be allowed to start.
  8. Each circuit shall be dehydrated and factory charged with R-410A Refrigerant and oil.
  9. Provide condenser vandal guards.
  10. Condenser coils to be epoxy coated.

M. ELECTRICAL

1. Unit wiring shall comply with NEC requirements and with all applicable UL standards. All electrical components shall be UL recognized where applicable. All wiring and electrical components provided with the unit shall be number and color-coded and labeled according to the electrical diagram provided for easy identification. The unit shall be provided with a factory wired weatherproof control panel. Unit shall have a single point power terminal block for main power connection. A terminal board shall be provided for low voltage control wiring. Branch short circuit protection, 115-volt control circuit transformer and fuse, system switches, and a high temperature sensor shall also be provided with the unit. Each compressor and condenser fan motor shall be furnished with contactors and inherent thermal overload protection. Supply fan motors shall have contactors and

- external overload protection. Knockouts shall be provided in the bottom of the main control panels for field wiring entrance.
2. A single non-fused disconnect switch shall be provided for disconnecting electrical power at the unit. Disconnect switches shall be mounted internally to the control panel and operated by an externally mounted handle.
  3. Units to be provided with factory installed 115V GFI outlet powered by unit single point power.

#### N. CONTROLS

1. Provide a complete integrated microprocessor based Direct Digital Control (DDC) system to control all unit functions including temperature control, scheduling, monitoring, unit safety protection, including compressor minimum run and minimum off times, and diagnostics. This system shall consist of all required temperature sensors, pressure sensors, controller and keypad/display operator interface. All MCBs and sensors shall be factory mounted, wired and tested.
2. Unit controls shall come factory installed with a BACnet MSTP/IP communications card. MSTP/IP to be confirmed by contractor before unit is ordered.
3. The stand-alone DDC controllers shall not be dependent on communications with any on-site or remote PC or master control panel for proper unit operation. The microprocessor shall maintain existing set points and operate stand alone if the unit loses either direct connect or network communications. The microprocessor memory shall be protected from voltage fluctuations as well as any extended power failures. All factory and user set schedules and control points shall be maintained in nonvolatile memory. No settings shall be lost, even during extended power shutdowns.
4. The DDC control system shall permit starting and stopping of the unit locally or remotely. The control system shall be capable of providing a remote alarm indication. The unit control system shall provide for outside air damper actuation, emergency shutdown, remote heat enable/disable, remote cool enable/disable, heat indication, cool indication, and fan operation.
5. All digital inputs and outputs shall be protected against damage from transients or incorrect voltages. All field wiring shall be terminated at a separate, clearly marked terminal strip.
6. The DDC controller shall have a built-in time schedule. The schedule shall be programmable from the unit keypad interface. The schedule shall be maintained in nonvolatile memory to insure that it is not lost during a power failure. There shall be one start/stop per day and a separate holiday schedule. The controller shall accept up to sixteen holidays each with up to a 5-day duration. Each unit shall also have the ability to accept a time schedule via BAS network communications.
7. The keypad interface shall allow convenient navigation and access to all control functions. The unit keypad/display character format shall be 4 lines x 20 characters. All control settings shall be password protected against unauthorized changes. For ease of service, the display format shall be English language readout. Coded formats with look-up tables will not be accepted. The user interaction with the display shall provide the following information as a minimum:
  - a. Return air temperature.

- b. Discharge air temperature.
  - c. Outdoor air temperature.
  - d. Space air temperature.
  - e. Outdoor enthalpy, high/low.
  - f. Compressor suction temperature and pressure
  - g. Compressor head pressure and temperature
  - h. Expansion valve position
  - i. Condenser fan speed
  - j. Inverter compressor speed
  - k. Dirty filter indication.
  - l. Airflow verification.
  - m. Cooling status.
  - n. Control temperature (Changeover).
  - o. VAV box output status.
  - p. Cooling status/capacity.
  - q. Unit status.
  - r. All time schedules.
  - s. Active alarms with time and date.
  - t. Previous alarms with time and date.
  - u. Optimal start
  - v. Supply fan and exhaust fan speed.
  - w. System operating hours.
    - 1) Fan
    - 2) Exhaust fan
    - 3) Cooling
    - 4) Individual compressor
    - 5) Heating
    - 6) Economizer
    - 7) Tenant override
8. The user interaction with the keypad shall provide the following:
- a. Controls mode
    - 1) Off manual
    - 2) Auto
    - 3) Heat/Cool
    - 4) Cool only
    - 5) Heat only
    - 6) Fan only
  - b. Occupancy mode
    - 1) Auto
    - 2) Occupied
    - 3) Unoccupied
    - 4) Tenant override
  - c. Unit operation changeover control
    - 1) Return air temperature
    - 2) Space temperature
    - 3) Network signal
  - d. Cooling and heating change-over temperature with deadband
  - e. Cooling discharge air temperature (DAT)
  - f. Supply reset options
    - 1) Return air temperature
    - 2) Outdoor air temperature
    - 3) Space temperature
    - 4) Airflow (VAV)

- 5) Network signal
- 6) External (0-10 vdc)
- 7) External (0-20 mA)
- g. Temperature alarm limits
  - 1) High supply air temperature
  - 2) Low supply air temperature
  - 3) High return air temperature
- h. Lockout control for compressors.
- i. Compressor interstage timers
- j. Night setback and setup space temperature.
- k. Building static pressure.
- l. Economizer changeover
  - 1) Enthalpy
  - 2) Drybulb temperature
- m. Currently time and date
- n. Tenant override time
- o. Occupied/unoccupied time schedule
- p. One event schedule
- q. Holiday dates and duration
- r. Adjustable set points
- s. Service mode
  - 1) Timers normal (all time delays normal)
  - 2) Timers fast (all time delays 20 sec)
- t. If the unit is to be programmed with a night setback or setup function, an optional space sensor shall be provided. Space sensors shall be available to support field selectable features. Sensor options shall include:
  - 1) Zone sensor with tenant override switch
  - 2) Zone sensor with tenant override switch plus heating and cooling set point adjustment. (Space Comfort Control systems only)
- u. To increase the efficiency of the cooling system the DDC controller shall include a discharge air temperature reset program for part load operating conditions. The discharge air temperature shall be controlled between a minimum and a maximum discharge air temperature (DAT) based on one of the following inputs:
  - 1) Airflow
  - 2) Outside air temperature
  - 3) Space temperature
  - 4) Return air temperature
  - 5) External signal of 1-5 vdc
  - 6) External signal of 0-20 mA
  - 7) Network signal

## 2.13 SHEET METAL WORK

- A. General: Ductwork systems shall be fabricated and installed in accordance with recommendations contained in the SMACNA "HVAC Duct Construction Standards", Second Edition 1995, and as herein specified. Tables and figures referred to hereinafter are taken from the SMACNA publication.
- B. Duct Pressure Classes: As shown on drawings. Where no specific duct pressure class designations are provided on drawings, the 2 inch water gauge pressure

class is the basis of compliance with the standards, regardless of velocity in the duct, except when the duct is variable volume supply or designated exhaust. All variable volume ducts upstream of VAV boxes have a 3 inch WG basis of compliance when the drawings do not give pressure class. All AC unit discharge plenums of VAV systems shall have a 6 inch WG basis and the ductwork to the first branch take-off a 4 inch WG basis of compliance when the drawings do indicate a pressure class. Negative pressure ductwork between lab hoods and exhaust fan inlet shall be 5 inch water gauge pressure class. Snaplock construction is not permitted. Refer to NFPA for Smoke Exhaust Ductwork Gauge Requirements.

- C. Casings and Plenums: Casing and plenum sheet metal gauges, reinforcing and construction details shall be in accordance with Figures 6-1 through 6-12. Intake and exhaust plenums shall be sealed liquid tight and drained. Where through-louver drainage can not be achieved, a 1 inch drain connection with serviceable 3 inch deep trap, shall be provided within a heated space to prevent freezing, and piped to the nearest floor drain. Bottom of plenums shall pitch toward drainage openings.
- D. Hangers and Supports: Ductwork sheet metal supports shall be in accordance with Chapter IV, including all plenum and casing sheet metal which is suspended.
- E. Sealing: All duct joints and air device connections shall be sealed in accordance with Table 1-2 except that all supply systems shall be sealed Class A. The sealant shall be Hardcast 550 with imbedded fabric, except for joints with dissimilar metals then a lead gasket shall be provided. Louver plenums shall be sealed water tight to a height of 12 inches above the plenum bottom.
- F. Branch Take-Offs: Branch main take-offs for round ductwork shall be 45 degree lateral tap and where terminal boxes occur, shall be 45° angle entry in accordance with Figure 2-6.
- G. Elbows: Elbows for round ducts shall be stamped type elbows with centerline radius equal to 1.5 times duct diameter. Where space is limited, the centerline radius may be reduced to 1.0 times the diameter for only those ducts entering into corridor ceiling spaces from vertical duct shafts. Elbows for rectangular and oval ductwork shall have a centerline radius equal to 1.5 times the duct width.
  - 1. Where space is restricted and as approved in writing by the Engineer, square throat elbows with single or double thickness turning vanes, as required, may be used. Elbows shall be in accordance with Figure 2-2 except that throat types RE-4, RE-6, RE-7, RE-9 and RE-10 are specifically prohibited. Provide an access door upstream of all square throat elbows with single (or double) thickness turning vanes.
- H. Transitions and Offsets: Transitions in round ducts shall be conical reducers. Transitions in rectangular ducts shall be in accordance with Figure 2-7 except that offset type 1 and offset type 2 are specifically prohibited.
- I. Flexible Connections: Flexible connections shall be in accordance with Figure 2-17. Flexible connectors shall be installed to provide alignment of equipment and devices with ducts in operating positions. Provide on the inlet and outlet side of all air moving equipment incorporating rotating elements. Connections shall be of glass fiber reinforced neoprene captured by a fingered metal band at each edge.

Maintain a maximum three inch (3") separation and a minimum 1½ inch separation between the connected devices such that a standard four inch (4") connector will be installed slack.

- J. Access Doors: Access doors in sheet metal ducts shall be provided with sash locks. Access doors in casings and plenums shall be provided with Type 2 locks (handles). All doors shall be hinged. Door insulation shall match adjacent casings. Doors shall be provided on all plenum and mixing sections, fire dampers, smoke dampers, combination fire/smoke dampers, reheat coils (inlet side), air valves and terminal filter equipment.
- K. Volume Dampers: Volume dampers shall be in accordance with SMACNA except that, in addition to those indicated on drawings, each branch main and branch shall be provided with damper typical to locations indicated in Figure 2-1. Additional dampers shall be provided where shown on plans, details and where specified elsewhere. Damper gauge to be two (2) gauges heavier than the duct in which they are mounted. Provide with locking quadrants or push rods and pillow blocks as appropriate. Dampers shall be sufficiently large to extend the full width of the branch duct to which it is attached. Provide scooped profile as required.
- L. Fire Dampers and Smoke Dampers: Fire and smoke dampers shall be in accordance with National Fire Code NFPA 90A Standard requirements and bear an Underwriters label. Dampers shall be installed in accordance with manufacturer's installation instructions. Dampers shall be UL listed, labeled, and shall be dynamic-static designed in accordance with UL Standard 555. Dampers shall be listed to support the appropriate fire rating required for wall and/or floor penetrations served. Dampers in lined ducts shall be in accordance with Figure 2-22. Where required as a condition of damper listing, provide slip joint. To permit breakaway, no screws, rivets, bolts or other fasteners shall be used; each joint shall have an access door as applicable. Provide an access door in the duct to service fusible link. Access doors for insulated ducts shall be double wall insulated sandwich type. Fire dampers shall be out of air stream Type B or C. Combination fire/smoke dampers may be used in lieu of separate dampers. All smoke dampers and combination fire/smoke dampers shall be furnished with pneumatic or electric actuators as required, and appropriate UL label. Provide 10 gauge welded sleeve where dampers can not be placed directly into the fire and/or smoke wall.
1. All smoke dampers and fire/smoke dampers shall be supplied with electric/electronic actuators, 165 degree F. "McCabe Link" (for use in general HVAC ductwork), 185 degree F. "McCabe Link" (for use in smoke control exhaust ductwork). All fire/smoke dampers shall be capable of being reset remotely. All fire/smoke dampers shall be supplied with one (1) end switch that will indicate both full closed and full open. All fire/smoke dampers shall fail open upon loss of control signal. All smoke dampers shall fail closed upon loss of control signal.
  2. Except where specifically noted otherwise, the maximum permissible pressure drop for any fire damper at air flow quantity required by Design Documents shall not exceed 0.1 inches of water.
  3. Except where specifically noted otherwise, the maximum permissible pressure drop for any smoke damper assembly at air flow quantity required by design documents shall be as follows:

a.	Up to 1,000 FPM	0.05 Inches of Water
b.	1,000 to 2,000 FPM	0.10 Inches of Water
c.	Over 2,000 FPM	0.20 Inches of Water

4. Damper sizes shall be adjusted accordingly where required to reduce pressure drop.
  5. Installed dampers found to have pressure drops in excess of specified values shall be replaced at no additional cost to the Owner.
- M. All fire, smoke and combination fire/smoke dampers shall be dynamically rated for the following conditions:
- |    |                                       |           |
|----|---------------------------------------|-----------|
| 1. | Fan (VAV) Discharge to Terminal Units | 3,500 FPM |
| 2. | Fan (CV) Discharge to Reheat Coils    | 1,500 FPM |
| 3. | Terminal Box/Reheat Coil Discharge to |           |
|    | a. Terminal Device (Diffuser, etc.)   | 1,000 FPM |
| 4. | Return/Exhaust Terminal Device        |           |
|    | a. (Register, etc.) to fan inlet      | 1,800 FPM |
- N. Exposed Ductwork: All ductwork exposed to view, except in mechanical rooms, shall not be cross-broken or beaded. Where reinforcement can not be eliminated by using heavy duty gauge, it shall be internal. Seams shall be of non-standing type and duct shall be cleaned and degreased to accept application of paint.
- O. Flexible Ductwork: Shall be manufactured in accordance with UL-181, Class 0 and the amended Standards of NFPA 90A. The flexible ductwork shall be tested and listed by UL under these standards.
1. Ductwork shall be fabricated of minimum 0.0065" thick, grade 3003 aluminum alloy incorporating a "0" temper.
  2. Spiral construction shall incorporate a continuous grooved seam, flat pipe lock, doubled over, to create an effective triple locking joint. Double locking seams shall not be accepted.
  3. Corrugations formed into the spiral tape impart rigidity and shall support duct flexibility. Corrugations shall not exceed 3% of the nominal duct diameter.
  4. Joints for securing to ductwork and/or equipment collars shall incorporate a reinforcing band around the circumference of the flexible duct and its connection point. Self-tapping sheet metal screws shall extend through the reinforcing band through the connecting collar, sandwiching the flexible ductwork between. Final air sealant shall be provided by Hardcast 550 with imbedded fabric.
  5. Where associated ductwork is specified to be insulated, matching thickness insulating jacket, complete with vapor barrier, shall be used.
  6. Length of flexible duct shall not exceed 48 inches except where specifically noted otherwise on drawings.
  7. Flexible ductwork shall not be used in conjunction with ductwork rated for 6 inches WG and higher. Flexible duct shall not be installed to penetrate any walls, ceilings, roofs, floors, etc.
  8. The intent of this specification section is to allow the use of flexible ductwork as a final connection to a terminal device. Bends shall not exceed 90 degrees or have a radius less than inside diameter of duct.
- P. Exhaust systems serving bathrooms, shower rooms and similar rooms where the exhaust air may contain a high moisture content shall be constructed of aluminum and shall be sealed watertight and pitched to prevent any accumulation of moisture. Provide a trapped drain at all low points and at the base of each riser.
- Q. Exhaust systems serving laboratory exhaust hoods shall be constructed of Type



316 stainless steel with externally welded, liquid tight joints, unless indicated otherwise on the drawings.

- R. Provide 24 gauge piping sheet metal protective covers, shields or saddles to protect piping insulation. Protective covers shall totally encapsulate any and all exposed HVAC piping within six feet (6') of finished floor. Shields and saddles shall extend a minimum of six inches (6") ahead and behind the projected footprint of the pipe support addressed and shall completely cover the lower 180° arc of the insulated piping.
- S. Acoustic Liner:
1. All ductwork noted on plans to be acoustically lined, shall have one-inch (1") thick "ToughGard R" duct liner with enhanced surface. Acoustical liner shall be composed of rotary-type glass fibers for superior acoustic performance. The fibers shall be bonded together with a thermosetting resin into a insulation blanket which is overlaid with a durable, water repellent, fire-resistant black composite air stream surface.
  2. Acoustic liner shall comply with ASTM C1071 for air velocities up to 6000 FPM.
  3. Acoustic liner shall comply with ASTM C1104 for vapor sorption.

Note: Duct dimensions shown are of clear inside dimensions after application of liner.

#### 2.14 SUPPLEMENTAL SUPPORT SYSTEM

- A. This Contractor shall provide all supplemental supports required to direct equipment and materials support loads to approved structural load bearing points. All mechanical equipment and systems shall be substantially supported without distortion or excessive vibration. The methods of support shall be as hereinafter described, except as otherwise noted on the drawings.
- B. The supplemental support system shall be substantial type with members sized to prevent equipment distortion or excessive vibration. The HVAC Subcontractor shall provide support components as required such that all equipment shall operate without objectionable noise or vibration being transmitted to the structure.
- C. The supplemental support system shall conform to requirements of this specification. Manufacturer's published characteristics referenced are intended as a guide only. The supplier shall verify support elements submitted are in accordance with specified materials and construction and are appropriately sized to accept and direct the proposed loading.
- D. All supplemental support elements shall be by one (1) manufacturer: Unistrut, B-Line or Telestrut. The acceptable standard or quality shall be as follows:
1. Framing Members:
    - a. Nominal Size: 1 $\frac{5}{8}$ " x 1 $\frac{5}{8}$ " "U" channel
    - b. Body: Mild Carbon Steel, ASTM A570 Grade 33
    - c. Gauge: 12 Gauge (0.105" thick)
    - d. Slot Width: 7/8" nominal
    - e. Pre-Punching: 9/16" Diameter, 1 $\frac{1}{8}$ " on center, 3 sides
    - f. Finish: Hot-Dipped Galvanizing, G90 weight, ASTM A123
    - g. Conformance: Metal Forming Manufacturers Association (MFMA)

- Standard Publication MFMA-1.
2. Fittings:
    - a. Nominal Size: 1<sup>5</sup>/<sub>8</sub>" (length per device)
    - b. Shape: Per Service from Manufacturer's Standard Catalog
    - c. Body: Hot Rolled Mild Carbon Steel, ASTM A570, Grade 33
    - d. Gauge: 1/4" Nominal Thickness
    - e. Hole Size: 9/16" Nominal
    - f. Finish: Hot Dipped Galvanizing, G90 weight, ASTM A123
    - g. Conformance: Metal Forming Manufacturer's Association (MFMA) Standard Publication MFMA-1
  3. Accessories:
    - a. Nominal Size: Per Service from Manufacturer's Standard Catalog
    - b. Shape: Per Service from Manufacturer's Standard Catalog
    - c. Body: Hot Rolled Mild Carbon Steel, ASTM A570, Grade 33
    - d. Gauge: 1/4" Nominal Thickness
    - e. Hole Size: 9/16" Nominal
    - f. Conformance: Metal Forming Manufacturer's Association (MFMA) Standard Publication MFMA-1.
    - g. Rollers: Gray Cast Iron
  4. Nuts and Bolts:
    - a. Nominal Size: 1/2" diameter x (Size per device)
    - b. Body: Mild carbon steel, ASTM A570, Grade 33, and Case Hardened
    - c. Threading: Coarse, Unified & American, UNC Classes 2A and 2B
    - d. Mounting: Spring or non-spring
    - e. Finish: Electro-Galvanized, G90 weight, ASTM A123
    - f. Conformance: Metal Forming Manufacturer's Association (MFMA) Standard Publication MFMA-1
- E. Supplemental support system members shall be positioned to align with equipment support points for proper bolting.

## 2.15 TERMINAL BOXES

- A. Single duct type:
1. Terminal Casing  
Furnish and install Titus, Enviro-Tec or Metal-Aire, single duct terminals of sizes and capacities (CFM) indicated on the drawings. Terminals shall be constructed of not less than 24 gauge zinc-coated steel, mechanically assembled and sealed to form an air-tight casing; maximum air leakage of 2 % at 3" w.g. Spot-welded casings are not acceptable. Interior walls of the terminal casing shall be lined with 1/2 -inch dual-density fiberglass with 4 pounds per cubic foot skin density, rated for a maximum air velocity of 4500 fpm. Insulation must meet all requirements of UL 181 and NFPA 90-A. Raw edges exposed to the airstream shall be coated and sealed. Sound power data shall be submitted with no corrections or noise reduction factors applied.
  2. Air Control Valve Assembly  
Terminal air control valve shall be dual-wall construction, consisting of two (2) metal thicknesses with 1/2-inch dual-density insulation sandwiched between, creating an effective radiated sound barrier. Insulation shall be as specified for terminal casing. The control blade of the air valve shall be 16-gauge, designed to operate through a 45-degree arc. Multi-blade

dampers and single blade volume controllers (operating through 90°) are not acceptable. The control blade shall be bolted or welded to a continuous shaft which rotates in self-lubricating nylon bearings. Blade shall close against a closed-cell gasket seat; it shall be preloaded to insure a tight seal. Blade shall not deflect at inlet pressures up to 6" w.g. Elliptical or oval dampers are not an acceptable substitution.

3. Controls  
Terminal unit control shall be furnished by the ATC Contractor and factory installed by the terminal box manufacturer. See ATC Specification Paragraph 2.51. The terminal box manufacturer shall bear all costs associated with mounting the controls. Terminal boxes shall be provided with a sheetmetal control enclosure. Provide a factory-applied typed label unique to each VAV terminal box indicating DDC address, TAG, maximum flow setting, minimum flow setting.
4. Pressure-Independent Models with Pressure Differential Controller  
Pressure differential reset controller shall maintain setpoint (CFM) within 5%, regardless of system pressure change. CFM limiting devices are not acceptable. The reset controller shall constantly monitor thermostat input, air flow (CFM), and system static and total pressures in a manner as to minimize under-or over-controlling in relation to the space temperature requirements. The reset controller shall be capable of field adjustment of minimum and maximum CFM settings without the use of tools. Flow curve for field balancing shall be affixed to terminal casing. Differential flow taps and factory-set CFM shall be provided is so noted at terminal schedule on the drawings. Controller shall maintain pressure independence to as low as .03" w.g. Averaging sensor shall be mounted in the inlet of the terminal and shall provide a minimum of one air pickup point for each 2-1/2" of inlet diameter. Single-point differential sensors are not acceptable.
5. Acceptable Alternate Manufacturers:
  - a. Nailor and Price

## 2.16 VALVES

- A. All valves shall conform to requirements of this specification for the services indicated. Manufacturer's numbers referenced are intended as a guide only. The supplier shall verify valves submitted are in accordance with specified materials and construction.
- B. All valves of a given type shall be by one (1) manufacturer. The acceptable standard of quality shall be as follows.

## 2.17 VIBRATION ISOLATION AND SEISMIC RESTRAINTS

- A. Provide vibration isolation and seismic restraint systems as identified by the requirements of this section and the contract documents. Attention is directed to the structural, architectural, mechanical and electrical documents which identify HVAC equipment and systems requiring vibration isolation treatment and seismic restraint.
- B. The HVAC Subcontractor shall provide vibration isolation components as required such that all equipment shall operate without objectionable noise or vibration being transmitted to the structure.

- C. The HVAC Subcontractor shall provide seismic restraint of non-structural building components (HVAC). Restraint systems are intended to withstand the stipulated seismic accelerations applied through the component's center of gravity.
- D. The work in this section includes the following:
1. Vibration isolation elements for equipment.
  2. Equipment isolation bases.
  3. Piping flexible connectors.
  4. Seismic restraints for isolated equipment.
  5. Seismic restraints for non-isolated equipment.
  6. Certification of seismic restraint designs and installation supervision.
  7. Conform to vibration isolation and seismic restraint types herein specified.
- E. Examine the contract documents for sizes, horsepowers, rotational speeds, equipment location, length of span between columns and beams and construction type to determine the isolator selection type and deflection required for each piece of mechanical equipment.
- F. Conform to the requirements of the American Society of Heating, Refrigerating, and Air Conditioning Engineers (ASHRAE) Handbooks, "HVAC Applications" 1995 Edition; Chapter 43 "Sound and Vibration Control", and Chapter 50 "Seismic Restraint Design".
- G. Isolators and restraints of the same type shall be the product of the same manufacturer. The manufacturer shall publish and maintain a full line of materials, engineering and application data and operating and maintenance instructions.
- H. Seismic Certification and Analysis:
1. Seismic restraint calculations must be provided for all connections of equipment to the structure. All performance of products (such as strut, cable, anchors, clips, etc.) associated with restraints must be supported with manufacturer's data sheets or certified calculations.
  2. Seismic restraint calculations must indicate specific code paragraph references (see CODE AND STANDARDS REQUIREMENTS) for each acceleration criteria. Seismic calculations shall indicate the component values required to determine the force to be restrained ( $F_p = A_v C_c P a_c W_c$ ). Specifically,  $A_v$  value from Contour Map, USE GROUPS, SEISMIC HAZARD EXPOSURE GROUP, SEISMIC PERFORMANCE CATEGORIES, MECHANICAL, ELECTRICAL COMPONENT AND SYSTEM SEISMIC COEFFICIENT ( $C_c$ ) Attachment Amplification Factor ( $a_c$ ) AND PERFORMANCE CRITERIA FACTOR (P) must be determined and the resultant values shall be clearly indicated in the certified calculations. Note: For roof mounted equipment both the seismic acceleration and wind load shall be calculated, the highest load shall be utilized for the design of the restraints and isolators.
  3. Seismic restraint calculations must be provided for all connections of equipment to the structure. Performance of all products (such as strut, cable, anchors, clips, etc.) associated with restraints must be supported with manufacturer's data sheets or certified calculations.
  4. Seismic restraint calculations must be based on the acceleration criteria shown in **TABLE A** acting through the equipment's center of gravity.
  5. For roof mounted equipment both the seismic acceleration and wind loads

- (30 psf) shall be calculated, the highest load shall be utilized for the design of the restraints and isolators.
6. Certification of calculations to support seismic restraint designs must be stamped by a professional engineer registered to practice in the Rhode Island, with at least five years of seismic design experience.
  7. Analysis must indicate calculated dead loads, derived loads and materials utilized for connections to equipment and structure. Analysis must detail anchoring methods, bolt diameter, embedment and/or weld length.
  8. An in-force \$1,000,000.00 coverage limit Seismic Design Errors and Omissions insurance certificate must accompany submittals. Manufacturer's product liability insurance certificates are not an acceptable substitution.
- I. Manufacturer of vibration isolation and seismic control equipment shall assume the following responsibilities:
1. Determine vibration isolation and seismic restraint sizes and locations.
  2. Provide equipment vibration isolation and seismic restraints as specified. Furnish manufacturer's product data covering each isolator and restraint type for style, characteristics, and finish.
  3. Guarantee specified isolation system deflections.
  4. Provide installation instructions, drawings and field supervision to insure proper installation and performance of systems.
  5. Isolator quantities, dimensions, deflections, capacities and type shall remain the responsibility of the manufacturer and the Contractor.
- J. Provide project specific catalog cuts and/or data sheets on the vibration isolators and restraints proposed for inclusion on this project. Reference each and every "TYPE" and detail each compliance with this specification.
1. Provide an itemized list of all isolated and non-isolated equipment. Provide detailed schedules showing isolator and seismic restraints proposed for each piece of equipment, referencing material and seismic calculation drawing numbers.
  2. Show base construction for equipment; include dimensions, structural member sizes and support point locations.
  3. When walls and slabs are used as seismic restraint locations, details of acceptable methods for duct and pipe must be included.
  4. Indicate isolation devices selected with complete dimensional and deflection data before condition is accepted for installation.
  5. Provide specific details of seismic restraints and anchors; include number, size and locations for each piece of equipment.
  6. Coordination or contract drawings shall be marked-up with the specific locations and types of restraints shown for all pipe and duct. Rod bracing at various installation angles and assigned load at each restraint location shall be clearly delineated. Any and all tributary loads shall be considered for proper restraint sizing.
  7. For ceiling suspended equipment provide minimum/maximum installation angle allowed for restraint system as well as braced and unbraced rod lengths at each allowable installation condition.
  8. Calculate thrust for fan heads, for axial and centrifugal fans, to determine whether thrust restraints are required.
- K. Housekeeping pad attachment shall be by the project Structural Engineer. Material and labor required for attachment and construction shall be by the Division

3 subcontractor.

1. Housekeeping pads shall be coordinated with the Seismic Restraint vendor and sized to provide a minimum edge distance of 10 bolt diameters of clearance all around the outermost anchor bolt to allow for the use of full anchor ratings.
- L. Supplementary support steel and connections shall be provided by the HVAC Subcontractor for all equipment, piping, ductwork, etc. including roof mounted equipment, as required or specified.
- M. The HVAC Contractor shall provide restraint attachment plates to the General Contractor, to be cast into housekeeping pads, concrete inserts, double sided beam clamps, etc. by the Division 3 Subcontractor, in accordance with the requirements of the Seismic Restraint vendor.
- N. Definitions:
1. The term EQUIPMENT will be used throughout this specification and it includes ALL non-structural HVAC components within the facility and/or serving this facility, such as equipment located in out buildings or outside of the main structure on grade within five feet of the foundation all. Equipment buried underground is excluded. Entry of services through the foundation walls is included. Equipment requiring vibration isolation and seismic restraint includes, but is not limited to, the following:
    - a. Air cooled condensing units
    - b. Rooftop air handling units
    - c. Cabinet heaters
    - d. Ductwork
    - e. Fans (all types)
    - f. Motor control centers
    - g. Piping
    - h. Tanks (all types)
    - i. Unit heaters
    - j. Variable frequency drives
    - k. NOTE: HVAC equipment and systems not listed herein above are still included in this specification.
  2. Life Safety Systems defined:
    - a. All systems involved with fire protection such as fire dampers.
    - b. All systems involved with and/or connected to emergency power supply including smoke evacuation.
    - c. All medical and life support systems.
    - d. Fresh air relief systems on emergency control sequences including air handlers, ductwork, dampers, etc.
  3. Positive attachments are those locations at which equipment, piping, ductwork, etc. are tied to the facility structural elements by incorporating:
    - a. Cast-in or wedge type expansion anchors, or
    - b. Double sided beam clamps, or
    - c. Welded or through bolted connections to the structure.
  4. Transverse bracing are those restraints applied to limit motion perpendicular or angular to the centerline of the pipe or duct.
  5. Longitudinal bracing are those restraints applied to limit motion along the centerline of the pipe or duct.
- O. Substitution of internally or externally isolated and restrained equipment in lieu of

the isolation and restraints specified in this section is acceptable provided all conditions of this section are met. The equipment manufacturer shall provide a letter of guarantee from their Engineering Department stamped and certified per the section on Seismic Restraints and Analysis stating that the seismic restraints are in full compliance with these specifications. Letters from field offices or representatives are unacceptable.

1. All costs for converting to the specified vibration isolation and/or restraints shall be borne by the equipment manufacturer in the event of non-compliance with the preceding.
2. In the event that the equipment is internally isolated and restrained, the entire unit assembly must be seismically attached to the structure. This attachment and certification thereof shall be by this section.

TABLE A

"G" FORCES FOR VARIOUS CONDITIONS  
 (SEISMIC ZONE 2 - AV > 0.1 ≤ 0.2)

PIPE AND DUCT	RIGIDLY MOUNTED EQUIPMENT	FLEXIBLY MOUNTED EQUIPMENT	ALL LIFE SAFETY
.25	.40	.40	.60

P. All vibration isolation and seismic devices described in this section shall be the product of a single manufacturer. Mason Industries shall be considered the Base Manufacturer of these specifications for the purposes of establishing a standard of equality; products of other manufacturers are acceptable provided their systems strictly comply with intent, structural design, performance and deflections of the Base Manufacturer.

- Q. Seismic Restraint and Vibration Isolation Devices:
1. All isolation and seismic restraint devices shall be capable of accepting, without failure, the "G" forces as determined by the seismic certification and calculations as described in this section of the specifications.
  2. Corrosion protection for outdoor applications shall be as follows:
    - a. Springs cadmium plated, zinc electroplated or electrostatically deposited, baked enamel powder coated.
    - b. Hardware cadmium plated.
    - c. All other metal parts hot spray or hot dipped galvanized.
  3. Seismic Restraint Types:
    - a. All seismic restraint devices shall maintain the equipment in a captive position and shall not short circuit isolation devices during normal operating conditions.
    - b. All seismic restraint devices shall have provisions for bolting and/or welding to the structure.
    - c. Welding of springs to isolator housing, base plans, etc. is strictly prohibited.
    - d. TYPE I: Spring Isolator – Restrained
      - 1) Spring shall have a minimum outer diameter to overall height ratio of 0.8:1 at rated deflection.
      - 2) Reserve deflection (from published load ratings to solid height) of 50% of the rated deflection.

- 3) Ductile top cut with adjusting bolt tapped for equipment attachment locking cap screw.
- 4) Minimum 1/4" thick neoprene acoustical base pad or cup on underside, unless designated otherwise.
- 5) Integral restraining bolts with elastomeric cushions preventing metal-to-metal contact.
- 6) Internal spring adjusting nut or bolt with leveling capability.
- 7) Built-in all-directional limit stops with minimum 1/4" clearance under normal operation.
- 8) Mountings shall have Anchorage Preapproval "R" number from California OSHPD, certifying the horizontal and vertical seismic load ratings.
- 9) Cast or aluminum housings, (except ductile iron) are not acceptable.
  - a) Mason Industries, Type SLR
- e. Type II: Where required, each corner or side of equipment base shall incorporate a seismic restraint snubber having an all directional resilient pad limit stop. Restraints shall be fabricated of plate, structural members or square metal tubing. Angle bumpers are not acceptable.
  - 1) Mason Industries Type Z-1225/Z-1011
- f. Type III: Restraints for suspended systems:
  - 1) Vibration isolated systems shall be braced with multiple 7 x 19 strand galvanized cable rope.
    - a) Mason Industries Type SCB
  - 2) Non-isolated systems shall be braced with structural steel strut type with approved fastening devices to equipment and structure.
    - a) Mason Industries Type SSB
  - 3) Steel angles (by HVAC Subcontractor) shall be provided to prevent rod bending of hung equipment where indicated by the Seismic Restraint vendor's submittals. Steel angles shall be attached to the rods with a minimum of three ductile iron clamps at each restraint location. Welding of support rods to angles is not acceptable. Rod clamp assemblies shall have Anchorage Preapproval "R" number from California OSHPD.
    - a) Mason Industries Model SRC
  - 4) Pipe clevis cross braces are required at all restraint locations. They shall be special purpose preformed channels deep enough to be held in place by bolts passing over the clevis cross bolt. Clevis cross braces shall have Anchorage Preapproval "R" number from California OSHPD.
    - a) Mason Industries Model CCB
- g. Type IV: Double deflection neoprene isolator encased in ductile iron or steel casing.
  - 1) Mountings shall have Anchorage Preapproval "R" number from California OSHPD, certifying the horizontal and vertical seismic load ratings.
    - a) Mason Industries Type RC or BR
- h. Type V: Rigid attachment to structure utilizing wedge type



expansion anchors for bolting and steel plates, either cast-in or anchored with wedge type expansion bolts, for welding. Powder shots are not acceptable. Concrete anchor bolt spacing shall be in accordance with manufacturer's published standards.

4. Vibration Isolator Types:
  - a. Type A: Spring Isolator – Free Standing
    - 1) Spring shall have a minimum outer diameter to overall height ratio of 0.8:1 at rated deflection.
    - 2) Reserve deflection (from published load ratings to solid height) of 50% of the rated deflection.
    - 3) Ductile top cut with adjusting bolt tapped for equipment attachment locking cap screw.
    - 4) Minimum 1/4" thick neoprene acoustical base pad or cup on underside, unless designated otherwise.
      - a) Mason Industries Type SLF
  - b. Type B: Spring Isolator – Restrained
    - 1) Spring shall have a minimum outer diameter to overall height ratio of 0.8:1 at rated deflection.
    - 2) Reserve deflection (from published load ratings to hold height) of 50% of the rated deflection.
    - 3) Ductile top cup with adjusting bolt tapped for equipment attachment locking cap screw.
    - 4) Minimum 1/4" thick neoprene acoustical base pad or cup on underside, unless designated otherwise.
    - 5) Integral restraining bolts with elastomeric cushions preventing metal-to-metal contact.
    - 6) Internal spring adjusting nut or bolt with leveling capability.
    - 7) Built-in all-directional limit stops with minimum 1/4" clearance under normal operation.
    - 8) Mountings shall have Anchorage Preapproval "R" number from California OSHPD, certifying the horizontal and vertical seismic load ratings.
      - a) Mason Industries Type SLR, SSLFH
  - c. Type C: Spring Hanger Isolator
    - 1) Spring shall have a minimum outer diameter to overall height ratio of 0.8:1 at rated deflection. Spring element shall have a steel upper spring retainer and a lower elastomer retainer cup with an integral bushing to insulate lower support rod from the hanger box.
    - 2) Reserve deflection (from published load ratings to solid height) of 50% of the rated deflection.
    - 3) Steel hanger box shall be capable of 30 degree misalignment between the rod attachment to structure and the connection to the supported equipment. Hanger boxes shall withstand three times the rated load without failure.
      - a) Mason Industries Type 30
  - d. Type D: Double deflection neoprene isolator encased in ductile iron or steel casing.
    - 1) Mountings shall have Anchorage Preapproval "R" number from California OSHPD, certifying the horizontal and vertical seismic load ratings.

- a) Mason Industries Type RC or BR
- e. Type E: Elastomer Hanger Isolator
  - 1) Molded neoprene element with an integral bushing to insulate lower support rod from the hanger box.
  - 2) Steel hanger box shall withstand three times the rated load without failure.
- a) Mason Industries Type HD
- f. Type F: Combination Spring/Elastomer Hanger Isolator
  - 1) Spring and neoprene elements in a steel hanger box with the features as described for Type C and E isolators.
- a) Mason Industries Type 30N
- g. Type G: Pad type elastomer isolator
  - 1) Neoprene pad shall have 0.75" minimum thickness, deflection rating of 0.1 inch under rated load. Supports shall be connected in the center by a 1/8" tear strip to facilitate trimming to desired size in two inch increments.
  - 2) 1/16" galvanized steel plate between multiple pad layers.
  - 3) Load distribution plate where attachment to equipment bearing surface is less than 75% of the pad area.
  - 4) When bolting is required for seismic compliance, neoprene and duck washers and bushings shall be provided to prevent short circuiting of bolt.
- a) Mason Industries Type Super Waffle (SW) pad
- h. Type H: Pad type elastomer isolator
  - 1) Laminated canvas duck and neoprene maximum loading 1000 psi, minimum 1/2" thick.
  - 2) Load distribution plate where attachment to equipment bearing surface is less than 75% of the pad area.
  - 3) When bolting is required for seismic compliance, neoprene and duck washers and bushings shall be provided to prevent short circuiting.
- a) Mason Industries Type HL Pad
- i. Type I: Thrust Restraints
  - 1) A spring element same as Type A shall be combined with steel angles, backup plates, threaded rod, washers and nuts to produce a pair of devices capable of limiting thrust movement of air moving equipment to 1/4".
  - 2) Restraints shall be easily converted in the field from a compression type to tension type.
  - 3) Unit shall be factory pre-compressed.
- a) Mason Industries Type WB
- j. Type J: Telescoping Riser Guide
  - 1) Telescoping arrangement of two sizes of steel tubing separated by a minimum 1/2" thickness of Type H pad.
- a) Mason Industries Type VSG
- k. Type K: Resilient Pipe Anchors and Guides
  - 1) All directional acoustical pipe anchor, consisting of a telescopic arrangement of two sizes of steel tubing separated by a minimum 1/2" thickness of Type H pad.
  - 2) Vertical restraints shall be provided by a similar material arranged to prevent vertical travel in either direction.
  - 3) Allowable loads on neoprene pad shall not exceed 500 PSI and the design shall be balanced for equal resistance

- in any direction.
- a) Mason Industries Type ADA
- I. Type M: Flashable restrained isolator
- 1) Shall have all features of Type B isolator.
  - 2) Shall have waterproof spring covers for adjustment or removal of springs.
  - 3) Unit shall have a structural top plate for welding or bolting of supplementary support steel.
  - 4) Isolator shall accept 2" roofing insulation and be flashed directly into the waterproofing membrane.
  - 5) To be complete with wood nailer and flashing.
    - a) Mason Industries Type RFS.
- m. Type P: Elastomer Isolator
- 1) Double deflection neoprene compression mountings shall have all metal surfaces neoprene coated.
  - 2) Non-skid top and bottom surfaces.
  - 3) Threaded bolting sleeves shall be embedded in the isolator.
  - 4) Drilled tie-down bolt holes shall be provided in the base plate.
    - a) Mason Industries Type ND
5. Equipment Bases:
- a. All curbs and roof rails are to be bolted or welded to the building steel or anchored to the concrete deck to attain specified acceleration criteria and shall also be capable of resisting a minimum psf wind loads (non-simultaneous).
  - b. Type B-1: Integral Structural Steel Base:
    - 1) Constructed of structural members as required to prevent base flexure at equipment startup and misalignment of driver and driven units. Perimeter members shall be a minimum of 1/10<sup>th</sup> the longest unsupported span.
    - 2) Centrifugal fan bases shall be complete with motor slide rails and drilled for driver and driven units.
    - 3) Height saving brackets shall be used to reduce operating height and maintain 1" operating clearance under base.
      - a) Mason Industries Type MSL, WFSL
  - c. Type B-2: Concrete Inertia Base
    - 1) Steel concrete forms for floating foundations. Bases for pumps shall be large enough to support elbows and/or suction diffusers. The base depth shall be a minimum of 1/12 the longest unsupported span, but not less than 6" or greater than 12".
    - 2) Forms shall include concrete reinforcement consisting of steel bars or angles welded in place on 8" centers both ways in a layer 1½" above the bottom.
    - 3) Isolators may be set into pocket housings which are an integral part of the base construction or utilize height saving brackets set at the proper height to maintain 1" clearance below the base.
    - 4) Base shall be furnished with steel templates to hold anchor bolt sleeves and anchors while concrete is being poured.
      - a) Mason Industries Type KSL or BMK

- d. Type B-3: Spring Roof Curb
- 1) Spring isolation curbs that bear directly on the roof support structure and are flashed and waterproofed into the roof's membrane waterproofing system. Equipment manufacturer's or field fabricated curbs shall not be used.
  - 2) All spring locations shall have removable waterproof covers to allow for spring adjustment and/or removal. Disassembly of the weather and air seal to gain access to the isolators is not acceptable.
  - 3) Springs shall have all of the features of Type B.
  - 4) Curbs shall have continuous sheet metal sides and have provision for 2" insulation to be installed and furnished by the Roofing Contractor.
  - 5) Waterproofing shall consist of a continuous galvanized flexible counter flashing nailed over the lower curb's waterproofing membrane and joined at the corners by EPDM bellows.
  - 6) Wood nailer and flashing shall be provided.
  - 7) Shall have a California OSHPD Seismic Anchorage Preapproval "R" number.
  - 8) Shall include a means of incorporating a sound barrier package, supported from the top isolated rail consisting of two layers of waterproof gypsum board furnished and installed by the General Contractor.
  - 9) Contractor shall have the option of ordering the curb built to the roof pitch or field leveled in accordance with all seismic provisions of this section.
  - 10) Overhung condensing units (when applicable) shall be supported by Type B isolators and spanning (width) steel support angle. These isolators shall in turn be supported on a field built curb (by others).
    - a) Mason Industries Type RSC
- e. Type B-4: Flashable Roof Rail System – Isolated
- 1) Continuous structural support rails that combine equipment support and isolation mounting into one unitized assembly.
  - 2) Rails shall incorporate Type B springs which are adjustable, removable and interchangeable after equipment has been installed.
  - 3) The system shall maintain the same installed and operating height with or without the equipment load and shall be capable of being utilized as a blocking device.
  - 4) The entire assembly shall be an integral part of the roof's membrane waterproofing.
  - 5) Unit to be supplied with continuous upper and lower galvanized flashing.
    - a) Mason Industries Type RIR
- f. Type B-5: Not Used.
- g. Type B-6: Non-isolated roof curb
- 1) Same as B-3 without spring isolation.
    - a) Mason Industries Type URC
- h. Type B-8: Non-isolated.
- 1) Same as continuous support rails, Type B-4 without the

- spring isolation.
        - a) Mason Industries Type RUR
  - i. Type B-9: Steel Rails
    - 1) Steel members of sufficient strength to prevent equipment flexure during operation.
    - 2) Height saving brackets as required to reduce operating height.
    - 3) Rails shall be cross braced at support and equipment attachment points when used in seismic zones.
      - a) Mason Industries Type R, ICS
6. Flexible Connectors:
- a. All connectors shall be installed on the equipment side of shutoff valves; horizontal and parallel to equipment shafts whenever possible. Piping shall be supported and/or anchored to resist pipe movement beyond the allowable movement of the flexible connector.
  - b. Installations must include check valves and/or other design and installation precautions to reduce the threat to life safety when subjected to the specified seismic accelerations.
  - c. Type FC-1: Spherical Elastomer Connector
    - 1) Manufactured of peroxide cured EPDM in the covers, liners and polyester tire cord frictioning. Curing must take place in steel molds closed within heated hydraulic presses.
    - 2) Solid steel rings shall be used within the raised faced rubber flanged ends to prevent pullout. Flexible cable bead wire is not acceptable.
    - 3) Sizes 2" and larger shall have two spheres reinforced with a molded-in ductile iron external ring between spheres. Bolted-on strap type reinforcing are not acceptable. Flanges shall be split ductile iron with hooked or similar interlocks. Sizes 16" to 24" may be single sphere.
    - 4) Threaded one piece bolted flange assemblies with female threaded ends for sizes 3/4" to 1 1/2".
    - 5) Rated at 250 psi up to 170° F. with a uniform drop in allowable pressure to 170 psi at 250° F. for sizes through 14". 16" through 24" single sphere minimum ratings are 180 psi at 170° F and 130 psi at 250°F.
    - 6) Factory tested at 150% of rated pressure for 12 minutes before shipment. Safety factor to burst and flange pullout shall be a minimum of 3:1.
    - 7) Concentric reducing expansion joints with equal ratings and features may be substituted.
    - 8) Connectors shall be installed in piping gaps equal to the length of the connector under pressure.
    - 9) Control rods are required in unanchored installations where the installation exceeds the pressure requirement without control rods.
      - a) Control rods shall have 1/2" thick neoprene washer bushings large enough in diameter to take the thrust at 1,000 psi maximum on the washer area.
    - 10) Connectors bolted to Victaulic type coupling or gate,

butterfly or check valves to have a minimum 5/8" flange spacer (by others) installed between the connector and the coupling flange. Connectors must mate to a flat faced flange in all instances.

- a) Mason Industries SAFEFLEX Type SFU, SFEJ, SFDEJ or SFDCR
- d. Type FC-2: Flexible Stainless Steel Hose
  - 1) Stainless steel hose and braid rated with 3:1 safety factor.
  - 2) 2" diameter and smaller with male nipples, 2½" and larger with fixed flat faced steel flanges.
  - 3) Lengths shall be: 9" for 2½" through 4"; 11" for 5" and 6"; 12" for 8"; 13" for 10"; 14" for 12" through 16".
    - a) Mason Industries Type BSS
- e. Type FC-3: Upbraided Exhaust Hose
  - 1) Low pressure stainless steel annularly corrugated with one floating and one fixed flanged end.
  - 2) Maximum temperature of 1500 degrees F.
    - a) Mason Industries Type SSE
- f. Type FC-4: Flexible Bronze Braided Hose
  - 1) Metal hose and braid rated with a minimum 3:1 safety factor. (Minimum 150 PSI)
  - 2) Copper tube ends.
    - a) Mason Industries Type BBF

## 2.18 AUTOMATIC TEMPERATURE CONTROLS

### A. General

1. Furnish and install, as hereinafter specified, a native BACnet, Direct Digital Control (DDC), automatic temperature control system as manufactured by KMC controls system. This is a proprietary specification; equals will not be considered.
2. The DDC Contractor shall be fully licensed at the time of bid to do business in the job site area. The DDC Contractor must be either a wholly owned factory branch office or a fully licensed dealer of the manufacturer's listed above with a technical staff, complete spare parts inventory, and test and diagnostic equipment to keep systems in operation 24 hours per day, seven days per week. He shall have emergency service available in the local area for temperature control systems for which he is currently performing on-call emergency service 24 hours per day, seven days per week. Wholesale, distributor, or representative type ATC Contractors are unacceptable. This requirement will be strictly enforced.

### B. Scope of Work

1. The ATC contractor shall furnish and install all equipment, accessories, and wiring required for a complete and functioning web-based building management system.
2. The control system shall consist of, but not limited to all temperature controls as specified herein including all CPU's, DDCP's, CRT's, printers, sensors, software, thermostats, valves, actuators, dampers, damper operators, relays, control panels, and other accessory equipment and appurtenances, including electrical wiring, to fulfill the intent of the specifications and provide for a complete and operable system.
3. Provide actuators for equipment such as dampers, inlet guide vanes, etc.,

where such actuators are not provided by the equipment manufacturers. Refer to floor plans for location and numbers of required actuators. Actuators shall be Belimo, or equal. Coordinate requirements with the HVAC subcontractor.

4. All materials and equipment used shall be standard components, regularly manufactured for this type of work and shall not be custom designed especially for this project. All components shall have been thoroughly tested and proven in actual use.
6. The ATC contractor shall review and study all HVAC drawings and the entire specification to familiarize themselves with the equipment and systems operation and to verify the quantities and types of dampers, operators, alarms, bells, etc., he has to provide. Numerous references to the ATC contractor are made throughout this specification identifying work to be performed under the HVAC section in addition to work specifically indicated under this paragraph. It will be assumed that, if no specific inquiries are made during the bidding period, the HVAC/ATC subcontractors have reviewed all requirements and interfaces between equipment and controls, to result in a complete, integrated and fully operational HVAC system.
7. The Automatic Temperature Control Contractor shall provide one (1) copy of ADS server software to be installed on customer provided server, located in Technology Office.
8. The automatic temperature control contractor shall furnish and install power meters. Meters shall be networked into the building management system and shall provide point mapping of all available data to the new workstations. Meters shall be manufactured by Veris Model H8206. Exact location and installation of meters shall be coordinated with electrical subcontractor.

C. Work by Others

1. Automatic temperature control valves, duct humidifiers and separable wells for immersion elements furnished by the control manufacturer shall be installed by the HVAC contractor under the ATC contractor's supervision.
2. Automatic dampers that are specified to be furnished by the ATC contractor shall be installed by the HVAC subcontractor, under the ATC contractor's supervision.
3. Concrete foundations shall be provided by the general contractor. The HVAC Contractor shall furnish dimensional drawings to the general contractor.
4. All finished painting required for the temperature control piping and equipment, shall be by the general contractor.
5. All cutting and patching necessary for the installation of the temperature control system, shall be by the HVAC contractor.
6. Installation of duct smoke detectors shall be by the HVAC subcontractor, under the ATC contractor's supervision.

D. Submittals and Shop Drawings

1. Submit shop drawings and obtain written review comments before ordering or installing any equipment or material.
2. Submit shop drawings of all equipment. Shop drawings shall consist of but not limited to manufacturer's scaled drawings, valves and damper schedules, cuts and catalogs, including descriptive literature which shall

indicate the construction, material, physical dimensions and complete operating data. All ATC shop drawings shall also contain a written description of the Sequence of Operations, enumerating and describing the function of each component.

3. Submit the following for approval:
  - a. Control drawings with detailed wiring diagrams, including bills of materials and written sequences of operation, for each system type.
  - b. Valve and damper schedules showing sizes, configurations, capacities, pressure drops and locations of equipment. Include type and quantities of actuators.
  - c. Data sheets for control system components.
  - d. Complete software information including names of software packages provided, control sequences performed, complete information on user programmability (commands, language details, programming sequences, etc.), and detailed printouts of the actual software within each DDCP including user definable comment statements inserted throughout the program to guide a novice operator through the various sequences of the actual program.
  - e. Calculations for valve coefficients (CVs).
  - f. Operators user's manuals.
    - g. Complete point-to-point check-out procedures to ensure that all physical points are consistently tested and verified for this project.

E. Equipment Operation Instruction and Maintenance Manuals

1. On completion and acceptance of the work, furnish for approval three copies of written instructions on the proper operation and maintenance of all equipment and apparatus furnished under this section.
2. Each manual shall be provided with an index sheet listing the contents in alphabetical order and shall contain but not limited to the following material:
  - a. Updated copies of all submittal data and shop drawings as specified previously.
  - b. Manufacturer's instructions regarding the installation, maintenance and calibration of each component used in the ATC system installed by the ATC contractor.
  - c. Copies of all warranties and guarantees issued by each equipment manufacturer.
  - d. "As-built" interconnecting wiring diagrams and wire lists of the field installed system with complete, properly identified numbering of each system component and device.
  - e. A set of "User's Manual" detailing the operation of the Building Management and Control System (BMCS). The manual shall describe the hardware operation as well as provide instructions in computer access and programming. This manual shall be submitted under separate cover. The User Manual shall be written for an inexperienced user. It shall describe in layman's language, the functions and procedures of "using" the system.

F. Acceptance Testing

1. At substantial completion of the work, the ATC contractor shall prepare a



punch list of all items remaining to be completed or corrected. The failure to include any items on such list does not alter the responsibility of the ATC contractor to complete all work in accordance with the contract documents. This list shall be delivered to the engineer prior to the ATC contractor's request for formal acceptance testing.

2. Additionally, the ATC contractor shall provide an equipment list and point list to the engineer prior to formal acceptance testing. Each material item and point must be initialed by the installing DDC technician that the item has been physically inspected for proper installation, functionality, and database entry.

The verification form shall be similar to the following:

<u>DDC Floor</u>	<u>Point Cabinet #</u>	<u>Point Name</u>	<u>Point Type</u>	<u>Point Address</u>	<u>Sensor On/Off</u>	<u>Oper. Reading</u>	<u>Test Initials</u>	<u>Test Time Date</u>
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3. The engineer will prepare a list of items to be corrected or completed that shall include the punch list items identified by the ATC contractor, and any additional items found to be incomplete or incorrect. All items on both lists shall be completed or corrected before acceptance testing may proceed. The ATC contractor shall notify the engineer when he is ready to proceed with the acceptance test that system is complete and operates as required by the contract documents.

4. Acceptance Test Procedure:
  - a. The ATC contractor shall demonstrate in the presence of the Engineer that all functions of the ATC and BMCS systems are operating as specified in the contract documents, including any required change orders. The final checkout will include, but not be limited to, the following items:
    - 1) Verification of the location, calibration and proper wiring/connection of all BMCS input and output devices.
    - 2) All BMCS software and output functions shall be tested individually.
    - 3) The proper operation and calibration of all ATC devices and actuators shall be verified individually.
    - 4) When system performance is deemed satisfactory by the Architect, system parts shall be accepted for beneficial use. Warranty shall begin. All minor deficiencies found will be noted in writing by the Engineer. All deficiencies so noted shall be corrected by the ATC contractor before the final acceptance will be issued.
    - 5) The ATC contractor shall allow sufficient time to complete the acceptance test procedure.
  - b. Acceptance testing shall be coordinated with the Commissioning Agent. Refer to specification section 019100 for additional requirements.

G. Training/Owner's Instruction

1. The ATC contractor shall provide three copies of an operator's user's manual describing all operating and routine maintenance service procedures to be used with the system as specified previously. The ATC contractor shall instruct the Owner's designated representatives in these procedures during the start-up and test period. The duration of the

instruction period shall be no less than 40 hours and shall take place at the site. The training sessions shall be delineated such that at least 16 hours of training occur after the completion of system testing and balancing and commissioning. This training shall include instruction in the use and operation of the point editor function and graphics.

2. Training sessions shall be coordinated with the Commissioning Agent. Refer to specification section 019100 for additional requirements.

#### H. Warranty

1. The ATC contractor shall guarantee the control system free from defects in material and workmanship and guarantee performance of the systems as required by the contract documents for one year of normal use and service beginning on the date the Owner has accepted the system.
2. The ATC contractor shall through the warrantee period, schedule visits to the site in order to provide two seasonal system review sessions with the building operators. The intent is for system review to take place at the time of seasonal system changeover. The contractor shall establish diagnostic trend logs on the OWS for the purposes of evaluating all major systems in the building, and a sample of terminal systems. Following any calibrations and adjustments the logs shall be submitted to the Architect for review.

#### I. Products

1. The Building Management and Control System (BMCS) shall consist of Network Level 1 controllers and Level 2 DDC controllers to monitor and control equipment per the control sequences. Level 1 controllers shall provide overall system coordination, accept control programs, perform automated DDC and energy management functions, control peripheral devices and perform all necessary mathematical functions. The controller shall be a microcomputer of modular design. The word size shall be 16 bits or larger, with a memory cycle time of less than 1 microsecond. Level 1 controllers will share information with and from the entire network of Level 1 and Level 2 controllers for full global control. Level 1 controllers shall permit multiuser operation from workstations and laptop computers connected either locally or over the Level 1 network. Level 2 controllers, also referred to as local control units shall provide intelligent, stand alone control of HVAC, lighting equipment, and access control. Each unit shall have its own internal RAM memory and will continue to operate all local control functions in the event of a failure to any Level 1 controller. In addition, it shall be able to share information with and from the entire network for full global control.

#### J. Communications Processing

1. The BMCS shall operate as a true token-pass peer-to-peer communication network. Resident processors in each Multi-purpose controllers shall provide for full exchange of system data between other Multi-purpose controllers on the high performance peer to peer communications network. Systems that limit data exchange to a defined number of system points are not acceptable.
2. Systems that operate via polled response or other types of protocols that rely on a central processor or similar device to manage interpanel communications may be considered only if a similar device is provided as a stand-by. Upon a failure or malfunction of the primary device, the stand-by shall automatically, without any operator intervention, assume all

- BMCS network management activities.
3. The failure of any Multi-purpose controller on the network shall not affect the operation of other Multi-purpose controllers. A panel failure shall be annunciated at the specified graphical workstation, alarm printers, or operator terminals.
- K. Color Graphic Workstation (located in Custodians Office).
1. The operator workstation will be furnished by the automatic temperature control contractor. The workstation shall consist of the latest generation of PC and shall operate at speed commensurate with the requirements of the ATC graphics and trending requirements. The ATC contractor shall furnish the PC with a dedicated UPS.
  2. Network Connection: Graphical workstations shall allow for access to the BMCS network through a pull-down menu approach using only a mouse or similar point device. The keyboard shall be required only when entering text or for programming functions.
    - a. The workstation shall be used as an interface to the BMCS network and shall not be required to process any control or energy management algorithms nor manage any BMCS network communications.
  3. Graphical Software
    - a. Software Description - workstation functions will include monitoring and programming of Level 1 and Level 2 controllers. Monitoring consists of alarming, reporting, graphic displays, long term data storage, automatic data collection, and operator-initiated control actions such as schedule and setpoint adjustments. The workstation software must be able to communicate to all Level 1 and Level 2 controllers, and where necessary integrate information that is common to one or more controllers. It shall be possible to program off-line from any Level 1 or Level 2 controller.

The software will be oriented towards operators and programmers. In the operator's mode, all information will be available in graphic or text displays. Graphic displays will feature animation effects to enhance the presentation of the data, to alert operators of problems, and to facilitate location of information throughout the DDC system.

All operator functions shall be selectable through a mouse. A "windows" environment shall be used to allow multiple functions to be displayed on the screen simultaneously.
    - b. Operating System - The software will utilize the IBM's OS/2 Warp multi-user, multi-tasking operating system or equivalent. Provide Microsoft's OS/2 Lan Manager software for operation of the file server.
    - c. Network Communications - The network consists of a high speed LAN comprised of Level 1 controllers, workstations and a file server. The file server acts as the central database for the workstations, so that all additions or changes made by one operator are immediately available to other operators on the network.
    - d. System Database - The workstation database shall consist

of all points and programs in each of the controllers that have been assigned to the network. In addition, the database will contain all workstation files including graphic slides, alarm reports, text reports, historical data logs, schedules, and polling records. The software shall conform to the following:

- 1) Utilize Microsoft's SQL database server.
  - 2) Whenever a new controller is added to the system, the software will automatically update that controller with its assigned points and programs. The system will also be able to verify that the point database in each controller is identical to the one at the workstation. If any discrepancy is found, it will automatically modify its database or notify an operator of the error.
  - 3) The database shall also contain host level points consisting of variables which can be used for host level reports and alarming. These variables can be setpoints or the result of any boolean algebra expression.
  - 4) Object Tree - It shall possible for an operator view the entire database through a graphical object tree display. This tree will present all controllers and their associated points, programs, graphics, alarms, and reports in an easy to understand structure.
- e. System Configuration - Configuration of the database shall be through application modules, each having a unique "icon" for easy visual identification. Each module will provide a windowed menu in which to enter the required data base information. System configuration shall have the following features:
- 1) Each site, whether local or remote, shall have a separate record for storing pertinent communication parameters.
  - 2) Controllers will be associated with a specific site file. The controller record will also contain the controller passwords and communication logon and logoff text strings as required.
  - 3) Point records will include as a minimum a 32 character point description, engineering units, logging parameters, point status, and point value.
  - 4) All database records will be available to the user at all times, regardless of the current tasks being performed by the workstation.
- f. Color Graphic Displays - The system shall allow for the creation of user defined, color graphic displays for the viewing of mechanical and electrical systems, or building schematics. These graphics shall contain point information from the database including any attributes associated with the point (engineering units, etc.). In addition operators shall be able to command equipment or change setpoints from a graphic through the use of the mouse. Requirements of the color graphic subsystem include:
- 1) SVGA, bit-mapped displays. The user shall have the ability to import CAD-generated picture files in the OS/2 Metafile format as background displays. Updates to imported CAD drawings will not affect

- workstation added animation.
- 2) A library of built in stencils, symbols and display shapes common to the HVAC industry.
- 3) An online graphics drawing editor that provides for all standard geometric shapes, multiple line thicknesses, shading, up to 16 colors, cutting and pasting of objects, inclusion of text, and zooming.
- 4) Built-in control panel objects such as buttons, knobs, gauges, line graphs, etc. to enable operators to interact with the graphic displays in a manner that mimics their mechanical equivalents found on field installed control panels.
- 5) Status changes or alarm conditions can be highlighted by objects changing screen location, size, color, text, blinking or changing from one display to another.
- 6) Ability to link graphic displays through user defined objects, alarm testing, or the result of a mathematical expression. Operators will be able to move from one graphic to another by selecting an object with a mouse, no menus will be required.
- 7) The graphic system shall allow for one touch modification of any analog or digital point in the database regardless of its location in the network.
- g. Automatic Monitoring - The software shall allow for the collection of data and reports from any Level 1 or Level 2 controller through either a hardwire or modem communication link. The time schedules and content of the polling shall be user configurable and include any subset of the controller's data base including application programs.
- h. Alarm Management - The software shall be capable of both accepting alarms directly from Level 1 controllers, or generating alarms based on polling of data in controllers and comparing to limits or conditional equations configured in the host software. Any alarm (regardless of its origination) will be integrated into the overall alarm management system and will appear in all standard alarm reports, be available for operator acknowledgment, and have the option for displaying graphics, reports, or initiating communication to another controller or remote computing device. Alarm management features shall include:
  - 1) A minimum of 255 alarm levels. Each alarm level will establish a unique set of parameters for controlling alarm display, acknowledgment, keyboard annunciation, alarm printout and record keeping.
  - 2) When an alarm occurs the Alarm counter will be incremented by one.
  - 3) Printout of the alarm or alarm report to an alarm printer or report printer.
  - 4) Print the alarm acknowledgment or Return to Normal message.
  - 5) Sound an audible beep on alarm initiation or acknowledgment.

- 6) It shall be possible to direct alarm displays to all or any of 16 groups of workstations on the network. Each configured path can be assigned on a unique basis to individual alarm levels.
- i. Report Generation - The software will contain a built-in report generator, featuring word processing tools for the creation of custom building reports.
    - 1) Reports can be of any length and contain any points with the database of Level 1 and Level 2 controllers.
    - 2) The report generator will have access to the user programming language in order to perform mathematical calculations inside the body of the report, control the display output of the report, or prompt the user for additional information needed by the report.
    - 3) It shall be possible to run other executable programs whenever a report is initiated.
    - 4) Report Generator activity can be tied to the alarm management system, so that any of the configured reports can be displayed in response to an alarm condition.
  - j. Scheduling - It shall be possible to configure and download from the workstation schedules for any of the controllers on the network.
    - 1) Time of day schedules shall be in a calendar style configured for either monthly or weekly operation. Scheduling shall be programmable up to one year in advance.
    - 2) Each schedule will appear on the screen as a monthly calendar correctly showing the day, weekday, month and year. It shall be possible to scroll from one month to the next and view or alter any of the schedule times.
    - 3) Schedules will be assigned to specific controllers and stored in their local RAM memory. Any changes made at the workstation will be automatically updated to the corresponding schedule in the controller.
    - 4) It shall be possible to configure multiple Holiday schedules in a yearly format. Holiday schedules will override the standard operating schedule for those days that have been defined as holidays. Holidays shall be differentiated on the calendar through color coding of the date. Any changes to a holiday schedule will be automatically updated to the standard schedule to which it has been superimposed.
    - 5) There shall also be a provision for Special Day schedules. Special Day schedules will override both the standard schedule and its associated Holiday schedule. Special Days will be differentiated on the calendar through color - coding of the date. Any changes to a Special Day schedule will be automatically updated to the standard schedule to which it has been superimposed.
    - 6) The use of Holiday or Special Day schedules is strictly optional. Standard schedules do not require either of these two types of schedules.

- 7) The Scheduling application shall include built-in editing tools to permit users to copy and paste portions of schedules to different days, weeks or months. Users can select from a particular day, a range of days, or a nonconsecutive group of days over which to edit a schedule.
- k. Programmer's Environment - the programmer's environment will include access to a superset of the same programming language supported in the Level 1 controllers. Here the programmer will be able to configure application software off-line (if desired) for custom program development, write global control programs, system reports, wide area networking data collection routines, and custom alarm management software.
- l. Security
  - 1) The software shall employ a two tiered password system. The first tier shall consist of the user's name. The second tier shall be a unique password consisting of up to 8 alphanumeric characters.
  - 2) Each password shall have a unique access level. At least 8 levels will be defined as follows:
    - ◇ No Access - View only graphics as presented in the log-in program.
    - ◇ View Only - View all applications, but perform no database modifications.
    - ◇ Acknowledge Alarms - View Only privileges plus the ability to acknowledge alarms.
    - ◇ Change Values - View and Control point information, Acknowledge Alarms and modify Time Schedules.
    - ◇ Enable / Disable - Change Value level plus allow the enabling or disabling of points and alarms.
    - ◇ Configure - Minimal program level functions including creating and editing any object.
    - ◇ Program - All privileges except password and create users
    - ◇ Administrative - All privileges.
- m. Saving/Reloading Programs
  - 1) The workstation software shall have an application to save and restore field controller memory dumps. The site and device record files shall serve as a menu tree to coordinate save/reload records. Each record shall have a minimum 12 character record name and a 32-character description.
  - 2) The Save/Reload application shall have the capability to set the system clock in a Level 1 controller.
  - 3) Default values store in the workstation database shall be sent to the controller during a reload operation either automatically or at the user's option.
  - 4) If during a poll of a controller, the workstation determines that the controller program has been lost, it shall be possible for the workstation to automatically reload the program without operator involvement.
    - a) The software shall provide, as a minimum, the

following functionality:

- Graphical viewing and control of environment
  - Scheduling and override of building operations
  - Collection and analysis of historical data
  - Definition and construction of dynamic color graphics
  - Editing, programming, storage and downloading of controller database.
- b) The graphical interface shall allow for all system operations and applications to be quickly and easily selected using the mouse in conjunction with groups of drop-down menus, lists, graphics and icons. Provide functionality such that all operations can also be performed using the keyboard as a backup interface device. Provide additional capability that allows at least ten (10) special function keys to perform often-used operations.
- c) Software shall provide for a windowed approach which supports concurrent viewing and commanding of system operations. The software shall provide a multi-tasking environment that allows the user to run several applications simultaneously. The mouse shall be used to quickly select and switch between multiple applications. This shall be accomplished through the use of Microsoft Windows or similar industry standard software that supports concurrent viewing and controlling of systems operations. The software shall be capable of simultaneously displaying and performing a minimum of two of the functions listed below in any workstation:
- (1) Dynamic color graphics and graphic control
  - (2) Alarm reporting and acknowledging
  - (3) Time-of-day scheduling
  - (4) Trend data definition and presentation
  - (5) Graphic definition
  - (6) Graphic construction
- d) Graphic displays shall be high-resolution, multi-colored presentations of actual building data and parameters. Graphic displays may be quickly and easily viewed via any or all of the following methods as a minimum:
- Graphic links
  - Drop down menus
  - Special functions keys for points in alarm
- (1) Graphic links shall be standard symbols which can be located on graphic displays as desired by the user. These links shall allow the user to view any graphic display, either in a hierarchical fashion or



- as otherwise defined. The quantity of possible links shall be limited only by the space available on each display.
- (2) Drop-down menus may be used to view graphic displays by selecting from customized lists which include all graphics available for viewing. Provide the capability to quickly scroll through all lists.
- e) Special function keys shall be used to quickly view graphic alarm displays and user-defined default graphics, such as campus or building site plans. From the alarm display, the user may quickly view the graphic on which the associated point in alarm resides.
- f) Provide static and dynamic graphic display capabilities. Static displays such as site plans, building layouts, floor plans and schematics shall provide the user with maps to allow for quick and easy access to any building information. Dynamic graphic displays may represent any real-time system information. Any system point or group of points may reside on a dynamic display. Dynamic displays such as schematics of any mechanical system or piece of equipment shall allow the user to monitor and control actual building operating parameters. Point values such as temperature, humidity and flow, and point status such as on/off, normal and alarm shall automatically and continually update to indicate current operating conditions. As a minimum, symbols, text and colors shall be dynamic in nature.
- g) Provide functionality to allow for any analog point value to be displayed as an individual dynamic display window for use as a convenient control and diagnostic tool. The display window shall include the following information as a minimum:
- Point name
  - Point description
  - Setpoint
  - Current value
  - Range of values
  - High and low limit setpoints
- (1) All values shall be displayed in both text and symbolic form, such as an analog bar, gauge or other standard measurement device. Setpoint values shall be changed by simply moving a pointer to the desired setting on the measurement device. After user verification of the correct setting the system shall control at the new setpoint.

- Provide the capability to superimpose these displays on their associated schematic graphics or on separate displays in user-defined groups.
- h) Provide the capability to control any point from a dynamic graphic display. Relevant point information windows may be accessed by pointing to a symbol or text. Setpoints may be changed by simply entering the new value. Status may be changed by selecting from predefined lists. The display shall ask the user to verify the change before allowing the system to respond.
  - i) Provide alarm annunciation capabilities, such that alarm status shall be displayed automatically on the screen regardless of system operation or application modes. The quantity of current alarms shall be displayed via a flashing icon or similar symbol. In addition, provide an audible signal to indicate the occurrence of new alarms. An alarm window may be displayed to view the alarms. From the alarm window the user shall be able to view the graphic and display a customized message of at least 250 characters associated with the point in alarm. When the graphic is displayed, the symbol of the point in alarm shall be flashing and shall have changed color. The user shall also be able to acknowledge, respond to and clear selected alarm conditions as desired.
  - j) Provide a graphical spreadsheet-type format for simplification of time-of-day scheduling and overrides of building operations. Provide the following spreadsheet graphic types as a minimum:
    - Weekly schedules
    - Zone schedules
    - Monthly calendars
    - (1) Weekly schedules shall be provided for each building zone or piece of equipment with a specific occupancy schedule. Each schedule shall include columns for each day of the week as well as holiday and special day columns for alternate scheduling on user-defined days. Equipment scheduling shall be accomplished by simply inserting occupancy and vacancy times into appropriate information blocks on the graphic. In addition, temporary overrides and associated times may be inserted into blocks for modified operating schedules. After overrides have been executed, the original schedule will

- automatically be restored.
- (2) Zone schedules shall be provided for each building zone as previously described. Each schedule shall include all commandable points residing within the zone. Each point may have a unique schedule of operation relative to the zone's occupancy schedule, allowing for sequential starting and control of equipment within the zone. Scheduling and re-scheduling of points may be accomplished easily via the zone schedule graphic.
  - (3) Monthly calendars for a 24-month period shall be provided which allow for simplified scheduling of holidays and special days in advance. Holidays and special days shall be user-selected with the pointing device and shall automatically reschedule equipment operation as previously defined on the weekly schedules.
- k) Provide trending capabilities that allow the user to easily monitor and preserve records of system activity over an extended period of time. Any system point (physical or calculated) may be trended automatically at predetermined time-based intervals or changes of value, both of which shall be user-definable. Trend data may be stored on hard disk for future diagnostics and reporting. Any point, regardless of physical location in the network, shall be collected and stored in each DDC controller's point group. Each DDC controller panel shall have a dedicated RAM-based buffer for trend data and shall be capable of storing a minimum of 70,000 samples.
- (1) Trend data report graphics shall be provided to allow the user to view all trended point data. Reports may be customized to include individual points or pre-defined groups of at least six points. Provide additional functionality to allow any trended data to be transferred easily to an off-the-shelf spreadsheet package such as Lotus 1-2-3 or Microsoft Excel. This shall allow the user to perform custom calculations such as energy usage, equipment efficiency and energy costs and shall allow for generation of these reports on high-quality plots, graphs and charts.
  - (2) A collection schedule function shall be provided to automatically collect trend

- data. A menu shall prompt for days of the week and time of day for collection of selected points. Provide a minimum of 12 user-selected time schedules per day.
- l) Provide additional functionality that allows the user to view trended data on trend graph displays. Displays shall be actual plots of both static and real-time dynamic point data. Up to four points may be viewed simultaneously on a single graph, with color selection and line type for each point being user-definable. Displays shall include an "X" axis indicating elapsed time and a "Y" axis indicating a range scale in engineering units for each point. The "Y" axis may be manually or automatically scaled at the user's option. Different ranges for each point may be used with minimum and maximum values listed at the bottom and top of the "Y" axis. All "Y" axis data shall be color-coded to match the line color for the corresponding point.
- (1) Static graphics shall represent actual point data that has been trended and stored on disk. Exact point value may be viewed on a data window by pointing or scrolling to the place of interest along the graph. Provide capability to print any graph on the system printer for use as a building management and diagnostics tool.
- (2) Dynamic graphs shall represent real-time point data. Any point or group of points may be graphed, regardless of whether they have been predefined for trending. The graphs shall continuously update point values. At any time the user may redefine sampling times or range scales for any point. In addition, the user may pause the graph and take "snapshots" of screens to be stored on the PC disk for future recall and analysis. As with static graphs, exact point values may be viewed and the graphs may be printed.
- m) A full screen, forms based point editor and programming function shall allow for point additions, deletions, changes, program modification and creation and point and program storage. This program shall be similar to a word-processing format such that full documentation of program changes may be available. This program shall provide the user with the capability to insert full English narratives to describe the control program. Search, insert, find, cut and paste functions shall allow for quick program

- modifications.
- n) Provide a general purpose graphics package such as PC Paint Plus "In-a-Vision" which shall allow the user to quickly and easily define or construct color graphic displays. In addition, provide a library of standard HVAC equipment and symbols such as Rooftop air handling units and standard electrical symbols that shall aid the user in definition of standard or custom graphics. Additional libraries of standard symbols may be easily added to the package or the user can define or construct symbols as desired for additional customization. Graphic displays may be defined or created to represent any building parameter, mechanical system or group of system points as described to facilitate building operation and analysis.
- (1) Provide the user with the capability to easily define all system operating parameters.
  - (2) Libraries of standard application modules such as temperature, humidity and static pressure control may be used as "building blocks" in defining or creating new control sequences.
  - (3) The user shall have the capability to easily create and archive new modules and control sequences as desired via a word processing type format.
  - (4) Provide a library of standard forms to facilitate definition of point characteristics. Forms shall be self-prompting and incorporate a fill-in-the-blank approach for definition of all parameters.
  - (5) The system shall immediately detect an improper entry and automatically display an error message explaining the nature of the mistake.
- o) Provide the capability to backup and store all system databases on the PC hard disk. In addition, all database changes may be performed while the PC is on-line without disrupting other system operations. Changes shall be automatically recorded and downloaded to the appropriate multi-purpose control units. Similarly, changes made at the multi-purpose control units shall be automatically uploaded to the PC, ensuring system continuity. The user shall also have the option to selectively download changes as desired.
- (1) The workstation shall provide for automatic upload and download of program changes. Any program change made at the workstation shall be

- downloaded to the respective multi-purpose control unit. Any program change made at the multi-purpose control unit shall be uploaded to the workstation disk.
- (2) Should a multi-purpose control unit lose its RAM database, the workstation shall automatically download that control unit's program from the hard disk.
  - (3) An auto-boot function shall allow an unattended workstation to automatically re-start from a power failure.
- p) Provide context-sensitive help menus to provide instructions appropriate with operations and applications currently being performed.
  - q) Multiple user security levels shall be provided to allow for various degrees of system access and control. Provide a minimum of four levels of access, with each increasing level allowing control of additional system operations and applications. A minimum of twelve unique passwords, including user initials, shall be provided. The system shall automatically generate a report of log-on/log-off time and system activity for each user. Provide automatic log-off capability to prevent unauthorized system use. Automatic log-off time shall be user-definable in one-minute increments and may be disabled if desired.
  - r) The workstation shall be provided with a key element display that **records** logos, log-offs, TOD overrides, alarms and alarm acknowledgments. Provide a 500 element circular buffer for recording purposes. Key element reports may be filtered by operator name and may be run for a user defined time interval.
- n. All points mapped to the workstation shall be available in both text and graphic format. All operator functions available on the text side of the workstation must also be available on the graphics side.
- L. Multi-Purpose Controllers
- 1. Provide multi-purpose DDC controllers as required. Each multi-purpose controller shall be a microprocessor-based direct digital control unit and shall be capable of operating as a standalone controller on a high performance peer to peer network. Provide each multi-purpose controller with sufficient memory to operate in a truly independent manner; that is, each controller shall support its own inputs and outputs, operating system, database and programs necessary to perform control sequences and energy management routines. Additionally, each multi-purpose controller shall have sufficient memory to support the application specific controllers and LAN control panels connected to it over the local area networks.
  - 2. Each multi-purpose controller shall be capable of full operation either as a

completely independent unit or as a part of the building-wide control system. All units shall contain the necessary equipment for direct interface to the sensors and actuators connected to it.

3. Control strategies shall be owner definable at each multi-purpose controller, and for all control units in the system from any one operator terminal. Each control unit shall provide the ability to support its own operator terminal if so desired.
4. Each multi-purpose controller shall include its own microcomputer direct digital controller, power supply, input/output modules, and battery. The battery shall be self-charging and be capable of supporting all memory within the control unit if the commercial power to the unit is interrupted or lost for a minimum of 100 hours. Upon a power failure at the remote unit, operator intervention shall not be required to maintain the database.

M. Networking Communications

1. General - the network architecture shall consist of two levels. The top level shall be a high speed Ethernet LAN designed to support network controllers, central plant controllers, work stations and a file server. The second level shall be a RS485 Token passing bus to support a family of dedicated local controllers for control of HVAC equipment, lighting, and access control. The second level bus shall communicate bidirectionally with the high speed LAN through Level 1 controllers for transmission of global data.
2. High Speed LAN - this Ethernet local area network shall operate at a minimum speed of 10 Mb/sec utilizing a TCP/IP communications architecture. The high speed LAN will provide transfer of point data, alarms and file activity among Level 1 controllers, work stations and the file server. The high speed LAN shall support a minimum of 50 nodes consisting of Level 1 controllers or workstations.  
Any data from a Level 2 controller can also be transmitted onto this bus through a Level 1 controller. The high speed LAN shall support multi-user communications and multi-session activity. That is, all global data sharing shall occur simultaneously with the transmission of alarm data or user activity.
3. Field Bus - the level 2 bus, or field bus, supports local control units of modular size for operation of the building's HVAC, lighting and access control systems. This RS485 bus shall operate at a minimum speed of 19200 baud, with a minimum length of 4000 feet or 32 nodes before requiring a network repeater. A minimum of 127 Level 2 controllers shall be configureable on the field bus. Manufacturers with baud rates of less than 19200 shall be limited to 64 Level 2 controllers to insure adequate global data and alarm response times.  
The field bus shall permit peer to peer communications among all Level 2 controllers and allow simultaneous communications with laptop computers that are connected to a Level 2 controller. Failure of the Level 1 controller will not impair the operation of its associated field bus.
4. Network Transparency - all points contained on Level 1 and Level 2 controllers shall be considered global points. Any program in any controller on the network shall be able to reference any point in any controller regardless of its location on the network.
5. Workstation Communications - workstations shall be connected directly to the high speed LAN. Workstations shall be able to communicate to any

Level 1 controller, Level 2 controller, to additional workstations or the file server. Work stations shall also be able to communicate via modems to remote controllers via a RS232 connection. Telephone communications shall operate simultaneously with communication to any controllers connected on the high speed LAN.

6. Laptop Communications - the laptop computer shall communicate with either Level 1 or Level 2 controllers. Through the laptop, operators shall be able to view points and change parameters on any Level 1 or Level 2 controller on the network.
7. Dial-up Communications - it shall be possible to access the network remotely through a standard dial-up modem. This modem shall permit direct access to the high speed LAN via a Level 1 controller. It shall be possible to configure multiple modems in Level 1 controllers to enable multi-user communications when more than 1 telephone line is available.

N. DDC Controllers:

1. A Level 1 controller has its own on-board CPU, clock/calendar, EPROM, RAM, ROM, communication port(s), and network connections to the high speed LAN and the field bus. The Level 1 controller may either have on-board or remote mounted I/O. Level 1 controllers are capable of complete standalone operation. Level 1 controllers are available with an optional user display.  
The firmware shall consist of the operating system, communication software, programming language, and resident control application software. The firmware may optionally contain user interface software to support dumb terminal operation. Where this is not provided the Level 1 controller must be optionally programmable from the laptop computer.  
The custom application software shall reside in battery backed RAM or EPROM. RAM will also be used for storing trend data and clock/calendar information.  
Level 1 controllers shall provide communication to both the high speed LAN and the field bus. In addition, a minimum of 1 RS232 or RS485 port shall be provided for connection to a workstation or laptop computer. When the port is RS232, it shall optionally support communication to a modem or printer. Where multiple RS232 ports are available, multi-user communications shall be supported.
2. Analog Inputs - the Analog Input (AI) function shall monitor each analog input, perform A/D conversion, and hold the digital value in a buffer for interrogation. The A/D conversion shall have a minimum resolution 12 bits. Input ranges shall be within the range of 0-10 VDC or 4 - 20 mA.
3. Digital Inputs - the Digital Input (DI) function shall accept dry contact closures and voltage level transitions. A voltage level below 1 volt shall be read as ON (closed), a voltage level above 3 volts shall be read as OFF (open).
4. Pulse Accumulator Inputs - the pulse accumulator input function shall have the same characteristics as the DI, except that, in addition a buffer shall be included to totalize pulses between interrogations. Each input shall accept pulses at a minimum of 2 per second.
5. Temperature Inputs - temperature inputs originating from a thermistor, shall be monitored and buffered as an AI, and provide automatic conversion to degrees F or C without any additional signal conditioning.
6. Input Wiring - all inputs shall be two wire devices and shall not require shielded wire for accurate operation.



7. Outputs - output types shall include digital, universal and tri-state. Outputs shall be available with built-in hand-off-auto switches for local overrides.
  8. Digital Output - the Digital Output (DO) function shall provide contact closure for momentary (Pulse Width Modulation) and maintained operation of field devices. Output pulse width shall be selectable between 0.1 and 3200 seconds with a minimum resolution of 0.1 seconds. Isolation and protection against voltage surges up to 180 VAC peak shall be provided. Contact rating shall be a minimum of 1 amps at 24 VAC. Each digital output shall be equipped with an optional ON/OFF/AUTO switch to manually obtain either output state. Manual overrides shall be reported to the controller at each update. An LED shall be provided to indicate the state of each digital output.
  9. Universal Output - a Universal Output shall provide 0-20VDC, 0-20 mA control signal (with a maximum resolution of .1 volt and .1 mA), and standard Form C relay operation (1 amps, 24 VAC). It shall be possible to select the mode of output operation for each output by simply wiring to the appropriate terminations on the controller. No circuit boards or output cards shall have to be exchanged to select the desired output mode.
  10. A three-position manual override switch shall allow selection of the ON, OFF, or AUTO output state. In addition each UO shall be equipped with an override potentiometer to allow manual adjustment of the analog output signal over its full range, when the 3 position manual override switch is placed in the ON position.
  11. The Form C output mode shall be capable of standard digital output operation including pulse width modulation.
  12. All current outputs shall be fuse protected to 120VAC.
  13. Tri-State Outputs - tri-state outputs shall consist of two 24VAC relays for control of bi-directional motors and actuators. Each tri-state output is capable of PWM (pulse width modulation) to a resolution of .1 second.
- O. DDC Controller Resident Software Features
1. General:
    - a. All necessary software to form a complete operating system as described in this specification shall be provided.
    - b. The software programs specified in this Section shall be provided as an integral part of DDC Controllers and shall not be dependent upon any higher level computer for execution.
  2. Control Software Description:
    - a. Software Description - The application software shall be configured for each Level 1 controller either locally through a laptop computer or through a workstation. Level 1 controllers shall contain PROM as the resident operating system. Application software will be RAM resident. Application software will only be limited by the amount of RAM memory. There will be no restrictions placed on the type of application programs in the system.

Each Level 1 controller shall be capable of parallel processing, executing all control programs simultaneously. Any program may affect the operation of any other program. Each program shall have the full access of all I/O facilities of the processor. This execution of control function by Level 1 controllers shall not be interrupted due to normal user communications including;

- interrogation, program entry, printout of the program for storage, etc.
- b. Real-Time Operating System - Provide a real time operating system in PROM memory requiring no operator interaction to initiate and commence operations. The program shall include:
    - 1) Operation and management of all devices.
    - 2) Error detection and recovery from arithmetic and logical faults
    - 3) Editing software to allow the user to develop or alter application programs.
    - 4) System self-testing
    - 5) Multi-user.
    - 6) Multi-tasking.
  - c. Editor - When programming a controller through either a dumb terminal or laptop computer, editing and word processing features will include as a minimum:
    - 1) Cut, copy, paste, and undo.
    - 2) Search and replace.
    - 3) Comments.
    - 4) Scrolling.
    - 5) Character, line, and page cursor control.

When programming in terminal mode, the system will allow full screen, character editing for correction or modification of any portion of a program. Syntax errors will be highlighted, and programmers must make corrections prior to the program being compiled. When programming Level 2 controllers, the programming environment will be identical to Level 1 programming with automatic uploading and downloading of the compiled code to the controller.
  - d. Point Identification - Users must be able to assign unique identifiers for each connected point. Identifiers must have at least twelve alpha/numeric characters. All references to these points in programs, reports, and command messages shall be by these identifiers.

Each point name can have up to a 40 character description, and optionally engineering units (up to 8 characters).
  - e. User Programming Language - The application software shall be user programmable. This includes all strategies, sequences of operation, control algorithms, parameters, and setpoints. The source program shall be English language and programmable by the user.

The language shall be structured to allow for the easy configuration of control programs, schedules, alarms, reports, telecommunications, local displays, mathematical calculations, passwords, and histories.

The language shall allow the creation of timers anywhere in the logic of a program. Each timer shall increment in seconds and increment to a maximum of 365 days.

The language shall be self-documenting. Users shall be able to place comments anywhere in the body of a program. Program listings shall be configurable by the user in logical groupings.
  - f. Application Software - The system shall contain include ROM

- based, built-in software modules for the creation of standard application programs. Modules will include as a minimum:
- 1) PID Algorithm
  - 2) Self-tuning PID
  - 3) Calendar Functions (Seconds, minutes, hour, day of week, day of month, day of year, month and year)
  - 4) Curve fit
  - 5) Optimum Start
- g. Mathematical Functions - Each controller shall be capable of performing basic mathematical functions (+,-,X,/), squares, square roots, exponential, logarithms, boolean logic statements, or combinations of both.  
The controllers shall be capable of performing complex logical statements including operators such as >,<=, and,or,exclusive or, etc. These must be able to be used in the same equations with the mathematical operators and nested up to five parenthesis deep.
- h. Passwords - Level 1 controllers will have up to 8 levels of passwords. The highest level will allow access to all functions within the system. The remaining 4 levels will be definable by the user to include any subset of system commands.
- i. History Logging - Each controller shall be capable of logging any system variable over user defined time intervals ranging from 1 second to 1440 minutes. Any system variables (inputs, outputs, math calculations, flags, etc.) can be logged in history. A maximum of 32767 values can be store in each log. Each log can will record either the instantaneous, average, minimum or maximum value of the point. Logs can be automatic or manual. If shall be possible to find the average of a log, the standard deviation, the sum, minimum or maximum. It shall also be possible to reference any value within a log for use in a control program.
- j. Reporting - The system shall be able to create user definable reports containing any combination of text and system variables. Report templates will be created by users in a word processing environment. Reports can be displayed based on any logical condition or through a user command.  
Numerical displays shall be up to 10 digits in length, with up to 4 digits to the right of the decimal point. The format of each numerical display shall be user definable.
- k. Alarming - For each system point, alarms can be created based on high/low limits or conditional expressions. All alarms will be tested each scan and can result in the display of one or more alarm messages or reports. Messages and reports can be sent to the optional display panel, a local terminal, to the Host Computer, via modem to a remote computing device.
- l. Debugging Tools - The language shall have built in program debugging tools for program simulation and error detection.  
When a control program is placed in a debug mode, a continuous record shall be kept of the last 128 steps before discarding the oldest data. Up to 4 control programs can be placed in a debug mode concurrently.
- m. Overriding Programs - It shall be possible to disable any point in

the system and modify it to a user definable value. Any points that have been disabled will be kept in a log and viewable by an operator at any time.

Q. Dampers

1. All automatic dampers shall be furnished by this Contractor. Automatic control dampers shall be Ruskin CD60 or approved equal. All dampers for modulating control shall be of the proportioning type with adjacent louvers rotating in opposite directions. Damper frames shall be constructed of 16 gauge galvanized sheet metal. Bearings shall be nylon with oil impregnated sintered iron bushings. All linkages shall be fastened to blades within the damper. Provide double linkages on damper panels over 42" wide.
2. Replaceable rubber seals shall be provided with the dampers. Seals shall be installed along the top, bottom and sides of the frames and along each blade. Seals shall provide a tight closing, low leakage damper. Leakage and floor characteristics charts shall be submitted to the architect prior to approval of dampers.
3. Electronic Actuator
  - a. Actuators for damper control shall be direct coupled over the shaft, enabling it to be mounted directly to the damper shaft without the need for connecting linkage. The fastening clamp assembly shall be of a "V" bolt design with associated "V" shaped toothed cradle attaching to the shaft for maximum strength eliminating slippages. Spring return actuators shall have a "V" clamp assembly of sufficient size to be directly mounted to an integral jackshaft of up to 1.05 inches when the damper is constructed in this manner. Single bolt or set screw type fasteners are not acceptable.
  - b. The actuator shall have electronic overload or digital rotation sensing circuitry to prevent damage to the actuator throughout the entire rotation of the actuator. Mechanical end switches or magnetic clutch to deactivate the actuator at the end of rotation are not acceptable.
  - c. For power failure/safety applications, an internal mechanical spring return mechanism shall be built into the actuator housing. Non-mechanical forms of fail-safe operation are not acceptable.
  - d. All spring return actuators shall be capable of both clockwise or counterclockwise spring return operation by simply changing the mounting orientation.
  - e. Actuators shall be Belimo, or equal.
4. All of the automatic dampers shall be furnished by the Temperature Control Contractor and installed by the Sheetmetal Subcontractor.
5. Combination smoke/fire control dampers amperage draw of motor shall be provided by temperature control contractor. Dampers shall meet UL555S leakage class 2 standards and shall be equipped with wall sleeves and factory mounted electric actuators. Dampers shall be Ruskin S050 or approved equal.

R. Electronic Sensors

1. All mixed air and coil discharge sensors shall utilize industry standard thermistor with averaging elements. Sensing elements shall be a minimum of 25 ft. and temperature sensed shall be averaged over the entire length of the element.

2. Space type sensors shall have an accuracy of +/- .5 degrees over sensed temperature range (20/120F).
  3. Well type sensors used for liquid immersion shall have stainless steel removable wells. Sensing element shall have an accuracy of +/- .5 degrees over amperage draw of motor the range (70/220F or 20/120F) of the sensor. Each sensor shall have a suitable electrical box to enclose all wiring connections.
  4. Temperature control wells shall be installed by mechanical contractor under supervision of temperature control contractor.
- S. Smoke Detectors
1. The Electrical Contractor shall furnish smoke detectors to be installed in ductwork by the Sheetmetal Subcontractor. The Electrical Contractor shall wire from the detectors to the associated HVAC unit control circuit for shutdown of fans. The Electrical Contractor shall wire the normally closed contacts in series to the fan starter holding coil. All wiring to smoke detectors shall be by the Electrical Contractor.
  2. All units shall utilize smoke detectors, as specified.
- T. Current Sensors
1. Current sensors shall be analog type, sensitivity dated for the application with a 4-20 ma or 0-10 Vdc output. Span and sensitivity shall be adjustable. Sensors shall be used for all fans and pumps.
- U. Air Static Pressure Transmitter
1. Transmitter shall have range of 0-1" or 0.5" w.g. and send a 4-20 milliamp output signal. Zero set range and span set range +/- 5% of full range output. A combined static error (non-linearity, non-repeatability, and hysteresis) +/- .5% of full range output. Transmitter ranges shall be selected by ATC contractor as appropriate for intended use.
- V. Water Differential Pressure Transmitter
1. Low differential pressure transducer for wet-wet application. 4-20 milliamp output signal. Setra C230 or equal.
- W. Building Management and Control System Wiring
1. All input and output control wiring to the control units shall be #18 twisted and shielded cable. All shield to be grounded at the control panel, shields at the sensors or transducers to be folded back and taped.
  2. Communication trunk wiring shall be #18 twisted and shielded cable. Trunk isolator/extenders shall be installed on either end of trunk.
  3. All cable splices shall have joints soldered and taped including the shield. No mechanical connections will be acceptable.
  4. No digital input or output points shall be more than 250 feet from its respective panel.
  5. All wiring within the panels must be made with connectors of appropriate size and design for the terminals being applied.
  6. All connections within the panels must be made with connectors of appropriate size and design for the terminals being applied.
  7. All cables must be labeled and identified on corresponding termination drawings. A copy of the termination drawing will be adequately protected and left in its respective panel.

- X. Control Wiring
1. Electrical work will be in accordance with NFPA 70, ANSI C2 and Division 16 of these specifications. Electrical wiring, terminal blocks and other high voltage contacts will be fully enclosed and marked to prevent accidental injury.
  2. All wiring associated with the installation will be the responsibility of the Contractor. The term "wiring" is construed to include furnishing of wire, conduit, miscellaneous material and labor as required to install a total working system.
  3. It is the responsibility of the Electrical Contractor to provide adequate connections and extensions from 120 volt power sources to the various items of equipment requiring power under this contract. Branch circuits serving equipment under this contract will be separate and used only for such equipment. All branch circuit conductors 120 volts or greater will be at least 14 gauge copper, type THW, 600 volt insulation, installed in minimum 3/4 inch conduit (EMT).
  4. Transient Protection - All electronic equipment including processors, relays, monitoring devices, temperature sensors and other non-computerized solid state equipment will be adequately protected against power line transients or RFI interference. Equipment that fails to operate properly due to transient or other electrical interference, in the opinion of the Engineer, will be required to be retrofitted with the appropriate protection device(s).
- Y. Points List: (the following points list is the minimum required points that will be available to all user interface devices)
1. Rooftop Heat Pump Units:
    - a. Unit enable/disable.
    - b. Supply fan status.
    - c. Return fan status.
    - d. Discharge air temp. setpoint (winter)
    - e. Discharge air temp. setpoint (summer)
    - f. Discharge static pressure.
    - g. Discharge air humidity.
    - h. Return air temp.
    - i. Return air humidity.
    - j. Recirculation air damper command.
    - k. Filter status.
    - l. Occupied setpoint.
    - m. Unoccupied setpoint.
    - n. Freezestat.
    - o. Return air CO2 monitoring (where applicable).
    - p. DX command/position.
    - r. Outside air entering temperature. (DB/WB)
  2. Global Points:
    - a. Outdoor air temp. (DB/WB)
    - b. Outdoor air humidity. (Rh)
  3. Variable air volume terminal boxes:
    - a. Room temp.
    - b. Room setpoint
    - c. CFM
    - d. Minimum CFM setpoints (cooling, heating, standby, unoccupied).
    - e. Maximum CFM setpoints (cooling, heating, standby,

- unoccupied).
- f. Discharge air temp.

## 2.19 FIRESTOP SYSTEMS

- A. General: Provide firestopping at all new fire-rated construction where penetrated by the Work of this Section.
- B. Refer to Section 078400 - Firestopping, for all product requirements for maintaining integrity of fire-rated construction at penetrations.

## PART 3 EXECUTION

### 3.1 MATERIALS AND WORKMANSHIP

- A. All materials installed in this work shall be new, unless noted for re-use, without damaged functional or aesthetic components. All equipment finished shall be touched up with matching finishes where slight scratches occur. Equipment or material subject to severe deterioration shall be completely refinished or replaced as directed by the Architect.
- B. All labor utilized in the installation of work shall be experienced in the respective trade required. The installation of exposed finished materials shall be neatly done flush, straight and/or plumb, without distortion, meeting the building finished surfaces.
- C. All HVAC materials and equipment shall conform to the Standards listed within this Section of the Specifications and wherever such standards have been established, items shall bear its respective label.
- D. Where labor to be furnished must meet specific Code requirements, only individuals certified to do such shall be used.
- E. All equipment shall be installed in accordance with the manufacturer's instructions and recommendations with adequate clearance for access for maintenance.

### 3.2 COORDINATION

- A. This Contractor shall give full cooperation to other trades and to the General Contractor and shall furnish any information necessary to permit the work of all trades to be installed satisfactorily and with least possible interference or delay. If this Contractor installs his work before coordinating with other trades, he shall make the necessary changes in his work to correct the condition, without extra charge. In areas, if due to construction conditions, more than one trade is required to use common openings in beams, conduits, etc., this Contractor must plan and locate the positions of the items of piping, ducts, conduits, etc., which are under the scope of his Contract with that of items under the scope of other Contractors, in order that all items are properly located and may be accommodated within the space available. Location and positioning shall be done prior to installation and to the satisfaction of the Architect and/or Engineer.
- B. This Contractor shall obtain detailed printed information from the manufacturer of equipment which he is to provide for the proper methods of installation. He shall also obtain all information from the General Contractor and other Contractors

which may be necessary to facilitate his work and the completion of the whole project. All equipment shall be installed in strict accordance with manufacturer's recommendations.

- C. The work to be accomplished under this Section includes work within existing areas adjacent to the site of new construction. Continuity of services within existing areas shall be maintained. Any interruption of services necessary to accomplish the work shall be made only with the consent of the General Contractor and at such time(s) as the Owner designates.
- D. This Contractor shall not unnecessarily disturb or interfere with the Owner's use of the facilities associated with or adjacent to this Contract. When interference is necessary, permission shall be obtained from the General Contractor before any operation or service line is disturbed or disconnected.
- E. This Contractor shall include under coordination work the installation of all systems in conformance with governing codes. This Contractor is advised that no piping, ducts or equipment foreign to the electrical equipment shall be permitted to be installed in, enter or pass through such spaces or rooms provided for switchboards and panelboards in accordance with Article 384 of the National Electrical Code.
- F. Diffusers, grilles and registers located in the ceiling shall be located as shown on the Architectural Reflected Ceiling Plan and coordinated with ceiling grid, lights, speakers, etc. Items shown on the HVAC Drawings, but not located on the Reflected Ceiling Plan shall be coordinated to be located as indicated on the HVAC Drawings.

### 3.3 COORDINATION DRAWINGS

- A. Coordination Drawings shall be initiated under this Section of the Specifications. It is this Contractor's responsibility for preparation of project Coordination Drawings showing the installation of all equipment, piping, ducts and accessories to be provided under this Section of the Specifications. These Drawings shall be prepared at not less than 3/8 inch = 1'0" scale and shall show building room layouts, structural elements, ceiling grid, diffusers, registers, grilles, ductwork and lighting layouts out of function. A reproducible copy of each Drawing prepared shall then be submitted to each Contractor working under the Plumbing, Fire Protection and Electrical Sections of this Specification, who shall be responsible to coordinate their equipment and systems and shall show these on the Drawings submitted. After each Trade Contractor has fulfilled their obligations, they shall return the Drawings to the HVAC Contractor. After each Drawing has been coordinated between trades, each trade shall sign each Drawing indicating acceptance of the installation condition. This Contractor shall then print the coordination original, and these prints shall be submitted, through the General Contractor to the Architect, for review and comment, similar to Shop Drawings. Comments made on these Drawings shall result in a correction and resubmittal of the Drawings. A master small scale Drawing of the entire building shall be initially prepared showing all areas involved and the Drawing numbers covering each area.

### 3.4 PROTECTION AND CLEAN UP

- A. This Contractor shall be responsible for maintenance and protection of all materials and equipment furnished by him during the construction period from loss, damage



or deterioration until final acceptance by the Owner. All materials and equipment on the job site shall be stored and protected from the weather. All piping and equipment openings shall be temporarily closed during construction to prevent obstruction and damage.

- B. All equipment with damaged finished surfaces shall be cleaned and repainted with the same paints as were factory applied.
- C. Clean-Up: Keep the job site free from the accumulation of waste materials and rubbish daily. At completion of the work, remove all rubbish, construction equipment and surplus materials from the site and leave the premises in a clean condition

### 3.5 OPERATING AND MAINTENANCE MANUALS

- A. This Contractor shall provide four (4) complete sets of operating and maintenance manuals to the Owner prior to the operating instruction period. Maintenance manuals shall be submitted for approval. The receipt of approved maintenance manuals by the Owner shall be a prerequisite to system acceptance. Each manual shall include the following:
  - 1. A complete set of Shop Drawings arranged in accordance with their appearance in the Specifications. Drawings shall be folded and included in envelopes and bound into the manual.
  - 2. A complete set of operational and servicing instructions for each piece of equipment, bound into the manual adjacent to the corresponding Shop Drawing.
  - 3. A complete listing of all equipment suppliers, together with local agent's names, addresses and telephone numbers.
  - 4. A complete set of valve listings.
  - 5. Copies of all service contracts provided for the guarantee period.
  - 6. Copies of all equipment and system warranties.

### 3.6 OPERATING INSTRUCTIONS

- A. This Contractor shall provide competent representatives of his firm and also qualified representatives for his major equipment to instruct Owner-designated personnel on the start-up, operation, shut-down and servicing of all equipment and systems furnished and installed under this Section. No less than ten (10) days notice shall be given to the Owner for the beginning of the instruction period to permit scheduling of Owner personnel. The instruction period shall be a prerequisite to system acceptance. This contractor shall coordinate this requirement with the Commissioning Agent. Refer to specification section 019100 for additional requirements.
- B. Training of the Tenant's and Building Owner's operation and maintenance personnel is required in cooperation with the Tenant's and Building Owner's representatives. Provide competent, factory authorized personnel to provide instruction to operation and maintenance personnel concerning the location, operation and troubleshooting of the installed systems. The instruction shall be scheduled in coordination with the Tenant's and Building Owner's Representatives after submission and approval of formal training plans. Refer to Commissioning Specifications, Section 019100 for contractor training requirements.

- C. At the conclusion of the operating instructions, this Contractor shall have the Owner's personnel sign-off stating they have received the required instruction. Separate statements shall be required for each piece of equipment and system. These statements shall include date, names of Owner's representative, name of instructor, and brief description of equipment or system.

### 3.7 SYSTEM START-UP AND OPERATION

- A This Contractor shall provide all labor and materials and services necessary for the initial start-up and operation of all systems and equipment furnished and installed under this Section of the Specifications.
- B This Contractor shall provide the services of qualified factory representatives for all major equipment pre-start set-up, start-up and initial operation. Such periods shall be sufficient to insure proper operation of systems and equipment.
- C This Contractor shall check all equipment during the initial start-up to insure correct rotation, proper lubrication, adequate fluid flows, non-overloading electrical characteristics, proper alignment and minimal vibration. Systems shall be checked for air flows throughout without blockages. Rooftop air handling units shall be checked for proper damper connections and positions aligned and adjusted belt drives, proper lubrication, temporary air filters installed, non-excessive electrical characteristics and minimal vibration. Miscellaneous equipment shall be started and operated as described above, as applicable. This Contractor shall prepare and submit monthly start-up and status reports for all equipment and systems as indicated on the schedules. Initial form of this report shall be submitted for review with the initial submittals. Upon closing in of the structure or upon first equipment start-up, the report filing shall be started. One copy of this report shall be submitted to the Testing and Balancing Contractor for his record purposes. Submittal of these reports is a prerequisite for processing and evaluating requisitions.
  - 1. Contractors' tests shall be scheduled and documented in accordance with the commissioning requirements. Refer to Commissioning Specifications, Section 019100 for additional requirements.
  - 2. System verification testing is part of the commissioning process. Verification testing shall be performed by the contractor and witnessed and documented by the Commissioning Agent. Refer to Commissioning Specification Section 019100 for system verification tests and commissioning requirements.
- D During operation of systems, qualified licensed personnel shall be provided and designated for maintenance of the equipment and systems in good running order. Items such as strainer cleanout, bearing lubrication, packing replacement and other consumables shall be provided without cost to the Owner. Failure of equipment during this period due to lack of proper supervision is the responsibility of this Contractor, and continued failures shall be grounds for the Owner to provide such services with back-charges to this Contractor.
- E. Prior to building flush out, all filters installed within all air handling equipment shall be replaced with filters having minimum rating of MERV 10 unless such equipment was specified with filters having a higher rating. Air handling equipment shall include but not be limited to air handling units, rooftop units, energy recovery units, make-up air units, fancoil units and classroom unit ventilators. Upon completion of building flush out, all filters installed within all air handling equipment shall be

replaced with filters having minimum rating of MERV 10 unless such equipment was specified with filters having a higher rating.

- F. Coordinate all start-up, operation, and testing activities with the Project Manager, General Contractor and the Commissioning Agent per specification section 019110.

### 3.8 SYSTEMS IDENTIFICATION

#### A. General:

1. All equipment, ductwork and piping furnished under this Section shall be marked for ease of identification in accordance with ANSI A13.1-1981 Standard or as indicated below by this Contractor.
2. Marking shall be done using painted stenciling applied to clean, smooth surfaces.
3. Lettering type and size shall be in accordance with paragraph 3.4 and Table 3 of ANSI Standard, with sharply contrasted background for ease of identification. Duct labeling shall not be less than 3 inches in height. Colors shall be in accordance with paragraph 3.2 and Table 2 of the ANSI Standard.

#### B. Equipment:

1. Equipment markings shall be prominently painted on each normally visible side of equipment. Equipment intended for installation in finished areas shall have markings located behind normally used access panels mounted so as to be readily found.
2. Equipment identification designations shall be taken from equipment schedules as indicated on the Drawings.
3. All rooftop air handling units, energy recovery units and make-up air units shall be numbered on at least two (2) sides in 4" to 6" letters of contrasting color. Number shall be associated with the street or occupancy address preceding the HVAC unit number (example, 23-1, 23-2, etc.). LED or keyed remote test switch shall be labeled with device number information corresponding to rooftop designation. Where rooftop units with duct smoke detectors are above a suspended ceiling, the tile grid shall be marked with a red dot if an LED is not present.

#### C. Piping:

1. Piping marking, except as noted below, shall be prominently painted on all piping concealed and exposed to view, at entries to shafts and at all valving. Marking spacing shall be every 20 feet and at all changes in direction.
2. Piping markings shall indicate direction of flow with piping designation taken from piping legend indicated on Drawings.
3. In lieu of painting pipe marking for outside diameters of no less than 3/4 inches but less than 6 inches labeling shall be on semi-rigid plastic which shall be wrapped entirely around the item being identified and attached to itself to form a non-removable band.
4. In lieu of painting pipe marking for outside diameters of 6 inches or greater, springs or metal bands secured to the corners at each end of the semi-rigid plastic marker so as to hold each end of the marker firmly against the pipe may be utilized.
5. In lieu of painting, for outside diameters less than 3/4 inches, labeling of

1/2 inch high lettering on 1-1/2 inch minimum diameter tags shall be attached so as direction of flow arrows will indicate proper flow direction when tag is being read.

D. Ductwork:

1. Ductwork marking shall be prominently painted on all ductwork concealed and exposed to view. Marking spacing shall be every 20 feet at all dampers and at all changes in direction.
2. Ductwork marking shall indicate direction of air flow with ductwork designation to consist of the equipment designation to which it is connected and indicate either high or low velocity system.
3. Access doors at service openings for fire dampers, smoke dampers and smoke detectors shall be identified with letters no less than 1/2 inch in height to indicate the location of the fire protection device(s) within.

E. Valve Tags:

1. Valve tags shall be 1-1/2 inch diameter brass with 1/4 inch high lettering for service designation over 1/2 inch high valve number designation and shall be provided for all valving.
2. Two (2) sets of valve lists shall be prepared showing tag numbers, valve locations and valve service. Valve tag numbers shall be marked on Record Drawings. One valve list shall be prepared based on sequenced room numbers of valve locations; one valve list shall be prepared based on valve numbers. One set of lists shall be framed under glass and duplicate list laminated between plastic sheets.
3. One (1) additional copy shall be framed under glass and mounted on the wall in location as designated by the Architect.

### 3.9 SHEET METAL WORK REQUIREMENTS

- A. Furnish and install all sheet metal work as herein specified for all air handling systems shown on drawings and/or described in the specifications.
- B. All sheet metal work shall be done in a neat and workmanlike manner with ductwork following building lines and in straight lines with smooth transitions and offsets as required to suit actual installation. Sheet metal work which does not conform to drawings and/or specifications or is poorly done shall be repaired and/or replaced as described by the Architect.
- C. Reference shall be made to the paragraph covering Coordination Drawings for the responsibility in the preparation of same.
- D. Sheet Metal Contractor shall include in his work furnishing and installing volume dampers in accordance with SMACNA requirements; additional dampers as required in the duct system for the purpose of balancing by the Balancing Contractor, as well as dampers shown on the drawings.
- E. Sheet Metal Contractor include in his work furnishing and installing automatic control, fire, smoke and combination fire/smoke dampers.
- F. Air handling systems shall conform to the following:
  1. All sheet metal work required for ductwork casing and plenums of all low pressure air handling systems shall be galvanized steel and shall conform

- to requirements of sheet metal work. Exceptions to this requirement shall be as specifically listed below or as indicated on the drawings.
2. All sheet metal work required for ductwork, casings and plenums of air handling system with scheduled total static pressure equal to or greater than 3 inches shall conform to the requirements for the static pressure scheduled. This construction shall apply from the outside air and return air dampers at the unit inlet and extend to the system terminal boxes.
  3. Sheet metal supply and return ductwork for the surgery areas from the terminal boxes to the supply diffuser (including plenum) and from the exhaust registers for 10 feet shall be aluminum.
  4. Sheet metal exhaust ductwork for lab exhaust and all other fumehoods shall be 316 stainless steel. All joints and seams shall be welded to provide a continuous seal.
- G. All casings and plenums shall be provided with 54 inch high, 20 inch wide access doors, except where larger door is required for equipment replacement, or when casing or plenum will not accommodate this size door. When alternate door of larger size is required, it shall be sized to meet requirements of equipment being served. For doors smaller than 54" x 20" the largest following door size which can be accommodated shall be provided: 48" x 20"; 36" x 18"; 24" x 18"; 18" x 18"; 18" x 12"; or 12" x 22". In all cases the bottom of the door opening shall be a minimum of 6 inches above the plenum's bottom.
- H. Two-piece streamliner shall be furnished and installed at no additional cost to the Owner around each conduit, beam or other obstruction passing through ductwork. Obstructions in ductwork shall be allowed only when offsets around ducts are not possible and shall be indicated on Coordination Drawing.
- I. Sealants: All seams in sheet metal work shall be permanently sealed airtight by the use of appropriate mastic compounds. Joints between dissimilar materials shall be provided with lead gaskets. Louver plenums shall be provided with lead gaskets. Louver plenums shall have all bottom seams and side seams up to distance of 12 inches sealed using solder.
- J. Duct Liners: Where ducts indicated on drawings or specified are to be lined, such lining shall conform to the requirements specified under Acoustic Liner indicated in Paragraph "Sheet Metal Work". Duct sizes indicated on the drawings are nominal internal dimensions and therefore shall be increased accordingly to accommodate duct lining.
- K. The Sheet Metal Contractor shall install all duct mounted smoke detectors, heat detectors and other devices furnished by the Electrical Contractor for mounting in the ductwork or air handling equipment.
- L. Fire dampers shall be installed in accordance with the manufacturer's installation instructions. Fire dampers shall be capable of maintaining the integrity of the required fire-resistance rating and shall be accessible. Where ductwork is rearranged to facilitate coordination or installation, the fire dampers shall be provided at locations where air distribution systems penetrate assemblies required to have a fire-resistance rating.
1. Exception when approved by the Architect and Engineer are as follows:
  2. When proper fire tests have shown that fire dampers are not necessary to maintain the integrity of the fire-resistance rated assembly.

3. Sub-ducts extending 22 inches vertically upward may be used in lieu of fire dampers for exhaust ducts penetrating a fire-resistance rated shaft wall.
  4. Penetrations of tenant separation and corridor walls in buildings equipped throughout with an approved automatic fire suppression system.
  5. When the ducts are constructed of steel and are part of an engineered smoke removal system.
  6. Penetrations of corridor walls when the ducts are constructed of steel and do not have openings which communicate the corridor with adjacent spaces or rooms.
  7. Penetrations of a roof assembly when ducts are open to the atmosphere.
  8. Hazardous exhaust systems as defined in the Mechanical Code.
- M. All prefabricated duct sections shall be cleaned prior to storage on the site and be provided with protective covering on all openings to maintain the interior of the ductwork clean and free of dust and other materials prior to installation. Field assembled duct sections shall be cleaned during assembly and similarly protected until installation.
- N. Blank off all portions of louvered openings not required for ventilation systems.
- O. Access doors shall be provided adjacent to each fire damper, smoke damper, combination fire/smoke damper, and smoke detector. The access opening shall be large enough to permit inspection, maintenance and resetting of the device. Where the size of the duct permits, the minimum size door should be 18 inches x 16 inches.
- P. Testing for ductwork shall be performed for all duct systems specified to be constructed to a static pressure class of 4" w.g. or greater and to all stainless steel exhaust systems serving laboratory hoods or other systems designed to convey hazardous fumes or materials. The leakage class shall be in accordance with Table 4-1 of SMACNA HVAC Air Duct Leakage Test Manual, First Edition 1985.
- Q. The Sheet Metal Contractor shall install automatic control dampers furnished by the Automatic Temperature Control System manufacturer and shall include all safing and/or duct transitions as required to complete damper installation.

### 3.10 PIPING SYSTEM INSTALLATION

- A. Installation of Pipe, Fittings and Valves:
1. Furnish and install piping approximately as indicated; straight, plumb and as direct as possible; form right angles on parallel lines with building walls.
  2. Keep pipes close to walls, partitions and ceilings; offset only where necessary to follow walls, as indicated.
  3. Locate groups of pipes parallel to each other; space them at distances to permit applying full insulation and to permit access for servicing valves.
  4. Piping shall be accurately cut to measurements established in the field and worked into place without springing or forcing. All piping shall be assembled using standard manufacturer's screwed or welded fittings. Where standard fittings are not available for branch connections, use "Threadolets" or "Weldolets" as appropriate to suit pipe sizes, neatly cut and welded into the line.
  5. Grooved joints shall be installed in accordance with the manufacturer's

latest published instructions. The gasket style and elastomeric material (grade) shall be verified as suitable for the intended service. Gaskets shall be molded and produced by the grooved coupling manufacturer. Grooved ends shall be clean and free from indentations, projections, and roll marks in the area from pipe end to groove. Grooved coupling manufacturer's factory trained field representative shall provide on-site training for contractor's field personnel in the proper use of grooving tools, application of groove, and installation of grooved piping products. Factory trained representative shall periodically visit the jobsite to ensure best practices in grooved product installation are being followed. Contractor shall remove and replace any improperly installed products.

6. All piping shall be reamed to be free of burrs.
  7. Keep pipe free from scale and dirt; protect open pipe ends whenever work is suspended during construction to prevent foreign bodies entering and lodging there. Use temporary plug or other approved material for protection.
  8. Use all long radius ells on welded piping.
  9. Provide bypass line with globe valve with isolation valves to provide bypass around all control valves which serve air handler coils and other central system equipment. Bypass valves are not required for terminal units, radiation, fancoils, cabinet heaters, unit heaters and similar equipment served from a central system. Bypass valve size shall be a minimum of one-half the supply line size.
  10. Prior to installation of any piping, submit shop drawings indicating location of all pipes larger than 2 inches in diameter. Piping may be shown on Coordination Drawings in lieu of shop drawings.
  11. Provide cap and chain for 3/4 inch hose connection for all drain valves.
- B. DX Systems:
1. Charging of refrigerant piping shall be done subsequent to pressure testing.
  2. Evacuate system to 2.5 mm of mercury and hold vacuum for eight (8) hours and then break vacuum with dry nitrogen. Re-evacuate piping to 2.5 mm and break vacuum with refrigerant charge.
  3. Pipe sizing, where indicated on drawings, are the sizes estimated for specific manufacturer's equipment and anticipated piping installation.
    - a. The Contractor shall provide piping sized for actual piping installation requirements for the field installation conditions in accordance with the system equipment manufacturer's recommendations.
  4. All refrigerant systems which require field piping shall include a filter-dryer, moisture indicator, liquid line sightglass, refrigerant charging connections and solenoid valves. Devices not furnished with the refrigeration equipment shall be provided by this Contractor.
- D. Installation of Unions:
1. Provide unions, screwed or flanged, in the following locations:
    - a. In long runs of piping to permit convenient disassembly for alterations or repairs. Provide unions in all trench piping located every 20 feet and at all connections in branch and mains leaving the trench.
    - b. In bypass around equipment.
    - c. In connections to traps, tanks, pumps, and other equipment.

- E. Installation of Valves:
1. Provide shut-off valves where indicated and in the following locations:
    - a. Risers and main branches at points of take-off from their supply or return mains. Valves shall be arranged so that piping mains for the building and for each floor can remain in service while branch line piping is out of service. Balancing valves suitable for shut-off service shall be used in returned piping.
    - b. Individual equipment, control valves, strainers, traps and other piping systems devices at inlet and outlet to permit unit removal for repairs without interfering with remainder of system.
  2. Locate valves for easy access and operation.
  3. Do not locate valves with stems below horizontal.
  4. Provide balancing valve at outlet of each equipment connection.
- F. Pipe Welding: Welding backing rings shall be used at each pipe weld. All pipe welders shall be tested and qualified under the National Certified Pipe Welders Bureau. Welders for high pressure steam shall be certified for ASME Code welding.
- G. Expansion:
1. Provide for taking up expansion in guides and anchors, where indicated and/or required.
  2. Use swing or swivel joints for connections from mains to risers and from risers to radiators, unit heaters and other heating units; use at least five (5) fittings from main to riser, including tee in main; use at least four (4) fittings from riser to radiator or unit heater, including tee in riser.
  3. When installing expansion loops, they may be cold sprung. Cold springing shall compensate for approximately half of the total expansion.
- H. Drains: All coiling coils shall have drip pans, trapped and condensation discharge piped to nearest suitable receptor except as noted otherwise. All traps shall be located inside to prevent freezing. Trap seals shall be appropriate for respective units scheduled pressure differential plus 50 percent on coils downstream of fans, and a minimum 3 inches for coils upstream of fans.
- I. Gas Piping: This Contractor shall provide for piping all vent lines to outdoors as required for the specific type of pressure reducing valves or other gas train devices requiring venting to outdoors under the Gas Codes.
- J. Intake and exhaust plenums not detailed to have through-louver drainage shall have a 1 inch drain connection with a serviceable 3 inch deep trap provided within a heated space to prevent freezing and piped to the nearest floor drain or janitor sink. Bottom of plenum shall pitch toward drainage opening. Drain lines indicated on the drawings to terminate through the wall to outdoors shall not be required to include a trap.

### 3.11 PIPING SYSTEM FLUSHING AND CLEANING

- A. This Contractor shall make temporary connections and required adjustments to the piping system for the purpose of cleaning and flushing.
- B. Steam and return piping shall be blown out by operating steam with all returns run



to waste until the system is thoroughly cleaned out. During the above period, all strainer and thermostatic trap interiors shall be removed and strainers and traps cleaned, together with dirt pockets. The system shall be left free from oil, scale and dirt. The strainer and trap interiors shall be replaced after the system has been cleaned.

- C. Compressed air lines shall be blown out using compressed air. All filters and instruments shall be removed from system during this flushing and then replaced.
- D. Chemical treatment required for cleaning shall be provided as specified under "Chemical Treatment".

3.12 PIPING SYSTEM PRESSURE TESTS

- A. All piping systems furnished and installed under this section shall be pressure and/or vacuum tested prior to being buried, concealed, and/or insulated. This Contractor shall make all necessary temporary connections and gauges required and shall isolate all equipment which may be damaged by testing procedures. This Contractor shall notify Architect in writing of his testing schedule to permit observation of procedures. Tests shall be initiated only after testing medium has reached ambient temperatures. Systems which fail testing shall be repaired in a manner approved by the Architect and testing repeated. Testing of sections of extensive systems are permitted. Written summary of all testing shall be submitted upon completion of testing indicating system, date of test, testing medium, initial and final pressures and temperatures, repair procedures and supervisor's name.
- B. The following systems shall be tested as indicated:

<u>SYSTEM</u>	<u>TEST MEDIUM</u>	<u>TEST PRESSURE PSIG</u>	<u>TIME PERIOD HOURS</u>	<u>ALLOWED DEVIATION PERCENT</u>	<u>NOTES</u>
Refrigerant	Nitrogen	250	4	-5	1
Refrigerant	Vacuum	29.5" Hg	4	-5	1

Note 1: Dry nitrogen shall be used for pressure test followed by vacuum test. Introduce refrigerant into piping to break vacuum.

- C. For testing of piping systems exposed to low ambient conditions, this Contractor shall assume responsibility of taking suitable precautions to prevent freezing within piping systems.
- D. Fuel oil systems shall be tested in accordance with requirements of applicable requirements of NFPA 30 and NFPA 31 and in accordance with all governing code requirements

3.13 INSULATION APPLICATION REQUIREMENTS

- A. Insulation materials shall be installed in accordance with the applicable insulation classes for piping, ductwork and equipment.
- B. Insulation shall be applied in a workmanlike manner so as to provide a neat and smooth surface, suitable for painting. Work and/or material that is poorly done or done in a manner not conforming to the specifications and/or drawings shall be

repaired or replaced as directed by the Architect.

- C. Insulation shall not be applied to piping and related equipment until the completion of pressure testing. Insulation shall not be applied to ductwork and related equipment until air systems have been sealed and/or pressure tested.
- D. Sections of piping and equipment may be covered as the work progresses, provided the above requirements have been met for pressure testing and tightness.
- E. All piping and equipment to be covered shall be clean and dry prior to the application of insulation.
- F. Insulation shall not be applied when ambient temperatures within the space are below 40 degrees F.
- G. Piping and duct insulation shall be carried full thickness through all floor and wall openings, except when installed through sleeves through fire-rated construction, insulation shall be discontinued at the penetration and replaced with caulking material specified for sleeves.
- H. All insulation shall be applied with edges tightly butted.
- I. All voids and/or seams in insulation shall be filled with insulating cement plaster or insulating cement.
- J. All insulation ends shall be finished to a 45 degree level with insulation cement troweled to a neat and smooth finish.
- K. Equipment nameplates, pressure vessel code labels and equipment access doors shall be left exposed with insulation edges finished as described in Paragraph J. above.
- L. Piping installed outdoors with the exception of underground conduit shall be furnished with layers of insulation of equal thicknesses with the total thickness twice that specified in insulation thickness schedule. The double layer insulation shall be installed so that all seams are staggered. Apply 45 pound roofing felt with 2 inch overlap at joints. All joints to be sealed with asphalt. Wire jacket in place with 16 gauge copper annealed wire on 9 inch centers.
- M. Under no circumstances shall pneumatic control tubing be covered with insulation.
- N. When installation thickness specified exceeds that provided as manufacturer's standard, then multiple layered material shall be used to achieve specified thickness.
- O. Any piping, ductwork or equipment which may convey a fluid gas or air below 75 degrees F. at any time in its normal operation shall be provided with insulation with an external vapor barrier except where explicitly indicated otherwise.
- P. Where specified under Pipe Hangers, Supports and Hangers, insulated refrigerant suction lines shall have calcium silicate used at all points of support. Calcium silicate sections shall be of the same thickness as the adjacent insulation with

vapor barriers continued unbroken through the support section. Support sections shall be three times the pipe diameter in length or not less than 12 inches nor more than 24 inches. 14 gauge galvanized sheet metal saddles the same length and diameter as the calcium silicate section and covering not less than 120 degrees of arc shall be provided at support points.

- Q. Insulation for piping and equipment shall be provided with wire or band supports to prevent sagging and cracking of finished surface or vapor barrier. Supports shall be applied in accordance with insulation manufacturer's recommendations. Supports shall generally be located beneath finish jacketing.
- R. Valves which are specified to be insulated shall be covered to top of bonnets.
- S. Insulation for piping systems shall be provided up to coil connections and the exterior casing, including tube returns or manifolds external to casing shall also be insulated except where noted otherwise.
- T. Engine exhaust pipes, fittings, and silencers shall be covered with 4 inch calcium silicate insulation. Insulation shall be applied in two (2) layers with staggered joints. Secure insulation in place with heavy gauge stainless steel bands. Seal all seams and joints in each layer with high temperature cement. Cover insulation with reinforced glass fiber cloth.
- W. All unlined supply and return ductwork located outdoors shall have a minimum thickness of 2 inches of rigid board insulation and an aluminum weatherproof cover applied over the vapor barrier.

### 3.14 SYSTEM BALANCING

- A. This Contractor, as part of his contract, shall obtain the services of a testing and balancing agency that specializes in this type of work, to perform the work required under this section. The testing and balancing agency selected shall not have installed, fabricated or engineered any part of the system that the testing and balancing work shall be performed on, so as to prevent any conflict of interest. In addition, the selected company shall not be a subsidiary of or be associated with persons having financial interests in the accessories, ductwork, controls, etc., undergoing these tests so that the Owner will receive a completely unbiased test and balance report upon completion of the work.
- B. The selected testing and balancing agency shall be a certified member of the AABC or the NEBB. Minimum criteria for this project shall be the General Membership Standards of the Associated Air Balance Council, as published nationally in AABC NSFMI Volume One, #81266 or as otherwise noted herein.
- C. All work performed by the approved agency shall be done in full accordance with minimum standards as set forth in AABC National Standards, Fourth Edition (1982) and ASHRAE Systems Manual (1984). In addition, vibration readings shall be taken on all rotating equipment in this section and recorded in mills of deflection.
- D. Submittals:
  - 1. The TAB Agency shall submit a company resume listing personnel and project experience in air and hydronic system balancing and a copy of the agency's Test and Balance Engineer (TBE) certificate.

2. The TAB agency shall submit the TAB procedures and agenda proposed to be used.
  3. The TAB agency shall submit sample forms, which shall include the minimum data required by the AABC National Standards.
- E. This Contractor shall cooperate with the test and balance agency in the following manner:
1. Provide sufficient time before final acceptance data so that tests and balancing can be accomplished and reviewed.
  2. Provide immediate labor and tools to make corrections when required without undue delay. Install balancing dampers as required by test and balance agency.
  3. Put all heating, ventilating and air conditioning systems and equipment into full operation and shall continue the operation of same during each working day of testing and balancing.
  4. The testing and balancing agency shall be kept informed of any major changes made to the system during construction, and shall be provided with four (4) complete sets of Construction and Coordination drawings, one (1) set of which shall be turned over to the Owner with ductwork systems differentiated by coloring each system's ductwork in a distinguishing color and diffusers, registers and grilles identified with a number corresponding with the respective item on the balancing report.
  5. Include the costs of test openings, dampers, pulley and belt changes in his contract.
- F. The items requiring testing, adjusting and balancing include the following:
1. Air Systems:
    - a. Supply Fan AHU's
    - b. Return Fans
    - c. Exhaust Fans
    - d. Zone Branch and Main Ducts
    - e. VAV Systems
    - f. Diffusers, Registers and Grilles
    - g. Coils (Air Temperature)
    - h. Induction Units
- G. TAB Preparation and Coordination:
1. Shop drawings, submittal data, up-to-date revisions, change orders, and other data required for planning, preparation, and execution of the TAB work shall be provided to the TAB agency no later than 30 days prior to start of TAB work.
  2. System installation and equipment start-up shall be complete prior to the TAB agency's being notified to begin.
  3. The building control system shall be complete and operational. The Building Control System Contractor shall install all necessary computers and computer programs, and make these operational. Assistance shall be provided as required for reprogramming, coordination, and problem resolution.
  4. All test points, balancing devices, identification tags, etc., shall be accessible and clear of insulation and other obstructions that would impede TAB procedures.
  5. Qualified installation or start-up personnel shall be readily available for the operation and adjustment of the systems. Assistance shall be provided as

required for coordination and problem resolution.

H. Reports:

1. The TAB agency shall submit the final TAB report for review by the Engineer. All outlets, devices, HVAC equipment, etc., shall be identified, along with a numbering system corresponding to report unit identification. The TAB agency shall submit an AABC "National Project Performance Guaranty" assuring that the project systems were tested, adjusted and balanced in accordance with the project specifications and AABC National Standards.
2. Submit four (4) copies of the final TAB Report.

I. Deficiencies:

1. Any deficiencies in the installation or performance of a system or component observed by the TAB agency shall be brought to the attention of the appropriate responsible person.
2. The work necessary to correct items on the deficiency listing shall be performed and verified by the affected contractor before the TAB agency returns to retest. Unresolved deficiencies shall be noted in the final report.
3. System balance reports which, upon field inspection of the systems, are found to be erroneous, shall have the questioned systems corrected by the test and balance agency until a proper balance is achieved. Such correction work shall be done at no cost to the Owner. Balancing Contractor shall field verify balancing settings and measurements as randomly selected by the Architect.

J. All instruments used for measurements shall be accurate and calibrated. Calibration and maintenance of all instruments shall be in accordance with the requirements of AABC National Standards.

K. The specified systems shall be reviewed and inspected for conformance to design documents. Testing, adjusting and balancing on each identified system shall be performed. The accuracy of measurements shall be in accordance with AABC National Standards. Adjustment tolerances shall be + or - 10% unless otherwise stated.

1. Equipment settings, including manual damper quadrant positions, manual valve indicators, fan speed control levers, and similar controls and devices shall be marked to show final settings.
2. All information necessary to complete a proper TAB project and report shall be per AABC Standards unless otherwise noted. The descriptions for work required, as listed in this section, are a guide to the minimum information needed.

L. Air Systems:

1. The TAB agency shall verify that all ductwork, dampers, grilles, registers and diffusers have been installed per design and set in the full open position. The TAB agency shall perform the following TAB procedures in accordance with the AABC National Standards.
2. For Supply Fans:
  - a. Test and adjust fan RPM to achieve maximum or design CFM.
  - b. Test and record motor voltage and amperage, and compare data with the nameplate limits to ensure fan motor is not in or above the service factor.

- c. Perform a Pitot-tube traverse of main supply and return ducts, as applicable to obtain total CFM.
  - d. Test and adjust the outside air on applicable equipment using a pitot-tube traverse. If a traverse is not practical use the mixed air temperature method if the inside and outside temperature difference is at least 20 degrees F. or use the difference between pitot-tube traverses of the supply and return air ducts.
  - e. Test and record system static profile of each supply fan.
3. For Return Fans:
- a. Test and adjust fan RPM to achieve maximum or design CFM.
  - b. Test and record motor voltage and amperage, and compare data with the nameplate limits to ensure fan motor is not in or above the service factor.
  - c. Perform a pitot-tube traverse of the main return ducts to obtain total CFM.
  - d. Test and record system static profile of each return fan.
4. For Exhaust Fans:
- a. Test and adjust fan RPM to achieve maximum or design CFM.
  - b. Test and record motor voltage and amperage, and compare data with the nameplate limits to ensure motor is not in or above the service factor.
  - c. Perform a pitot-tube traverse of main exhaust ducts to obtain total CFM.
  - d. Test and record system static profile of each exhaust fan.
5. The Balancing Contractor shall make all necessary tests and measurements and provide information as required to provide for replacement of adjustable sheaves utilized for initial balancing with optimum sized fixed sheave and select optimum replacement sheave sizes for existing equipment fan drives for systems indicated to be modified. All adjustable sheaves replaced shall be tagged to indicate which unit it was on and turned over to the Owner.
6. For Zone, Branch and Main Ducts:
- a. Adjust ducts to within design CFM requirements. As applicable, at least one zone balancing damper shall be completely open. Multi-diffuser branch ducts shall have at least one outlet or inlet volume damper completely open.
7. For VAV Systems:
- a. Set volume regulators on all terminal boxes to meet design maximum and minimum CFM requirements.
  - b. Identify the type, location, and size of each terminal box. This information shall be recorded on terminal box data sheets.
8. For Diffusers, Registers and Grilles:
- a. Test, adjust and balance each diffuser, grille and register to within 10% of design requirements. Minimize drafts.
  - b. Identify the type, location, and size of each grille, diffuser and register. This information shall be recorded on air outlet data sheets.
9. For Coils:
- a. Once air flows are set to acceptable limits, take wet bulb and dry bulb air temperatures on the entering and leaving side of each cooling coil. Dry bulb temperature shall be taken on the entering and leaving side of each coil.
10. Where air balancing can not be completed due to lack of air flow and the

reason for the lack of air flow can not be identified, a static profile shall be performed as required to identify the reason for loss of adequate air flow.

- M. The TAB agency shall conduct sound testing in the following areas per AABC National Standards and to the criteria listed, using sound meter with octave band analyzer:

1.	Test Area	Number of Locations	NC Level Acceptable
	General Office	16	30-35
	Computer/Equipment Rooms	4	40-45
	Schools/Classrooms	16	25-30

- N. The TAB agency shall conduct vibration testing on the following equipment per AABC National Standards. Test deflection in mils and velocity in inches per second shall be measured and the results compared to requirements in equipment specification sections.

1. EQUIPMENT  
Fans over 3.0 Horsepower  
Pumps over 3.0 Horsepower

- O. Indoor Air Quality Verification:

1. The TAB agency shall take measurements at design outside air. It shall measure temperature and humidity uniformity throughout the space, check filter installation for proper fit, seal, and operation and verify condensate drain operation. The TAB agency shall note any water damage or obvious contamination sources from inside or outside.
2. The TAB agency shall conduct the following air sampling tests for every 2,500 square feet of space:
  - a. Carbon Dioxide
  - b. Carbon Monoxide
  - c. Ozone
  - d. Nitrogen Oxides
  - e. Formaldehyde
3. The TAB agency shall prepare a report showing the results, location, time and date of each test. A summary of the HVAC operating conditions, and a listing of any discrepancies shall be provided.
4. All IAQ readings are applicable only to the date and time noted in 3.06C.

- P. The TAB agency shall review the project documents and Contractor submittals for their effect on the TAB process and overall performance of the HVAC system. It shall submit recommendations for enhancements or changes to the system within 30 days of document review.

- Q. During construction, the TAB agency shall inspect the installation of pipe systems, sheet metal work, temperature controls, and other component parts of the HVAC systems. Inspections shall be conducted a minimum of two times. (Typically, these are performed when 60% of the total system is installed and again when 90% of the total system is installed, prior to insulation of the duct and piping.) The TAB agency shall submit a written report of each inspection.

- R. The Installing Contractor shall isolate and seal sections of ductwork for testing. The test pressures required and the amount of duct to be tested shall be described by the Engineer in the appropriate duct classification section. All testing shall be based on one test per section only unless otherwise noted.

- S. The TAB agency shall be assisted by the Building Control Systems Contractor in verifying the operation and calibration of all HVAC and temperature control systems.
1. Automatic Temperature Control Contractor shall have all automatic valves adjusted and calibrated prior to balancing.
  2. The Balancing Contractor shall make all necessary tests and measurements and provide information as required by the Automatic Temperature Control Contractor to select the optimum range of sensing and control devices.
  3. Verify that all control components are installed in accordance with project requirements and are functional, including all electrical interlocks, damper sequences, air and water resets, fire and freezestats, and other safety devices.
  4. Verify that all controlling instruments are calibrated and set for design operating conditions.
- T. To verify system control and operation, a series of three temperature tests shall be taken at approximately two hour intervals in each separately controlled zone. The resulting temperatures shall not vary more than two degrees F. from the thermostat or control setpoint during the tests. Outside temperature and humidity shall also be recorded during the testing periods.
- U. At the time of final inspection, the TAB agency may be required to recheck, in the presence of the Owner's representative, specific or random selections of data recorded in the certified report. Points and areas for recheck shall be selected by the Owner's representative. Measurements and test procedures shall be the same as approved for the initial work for the certified report. Selections for recheck, specific plus random, will not exceed 10% of the total number tabulated in the report.
- V. The TAB agency shall test and adjust fume hood total air flow by duct pitot-tube traverse. If a pitot-tube traverse is not practical, an explanation of why a traverse was not made must appear on the appropriate data sheet. Test and record face velocities under design operating conditions using a maximum of a one square foot grid pattern across the entire open face. The TAB agency shall set sash height on hoods to obtain face velocities within 20% of 100 feet per minute unless specified otherwise. It shall test and adjust VAV controllers to obtain design exhaust air flows and make-up air flows to maintain design hood pressures and face velocities, and design room pressurization. The TAB agency shall test for turbulence and proper air flow patterns at the face and inside the hoods using a hand-held smoke puffer or other approved smoke-emitting device.
- W. The TAB agency shall test and adjust building/zone pressurization by setting the design flows to meet the required flow direction and pressure differential. For positive pressure areas, it shall set the supply air to design flow, and gradually reduce the exhaust air rate to obtain the required flow or pressure difference. For negative pressure areas, it shall set the supply air to design flow, and gradually increase the exhaust air rate to obtain the required flow or pressure difference.
- X. The TAB agency shall test and record life safety control operation on the HVAC equipment. It shall verify the installation of required smoke detectors in air handling equipment (AHE), and shall verify operation of the smoke detector by



activating the smoke detector and observing air handler shut-down. With the controls and alarm contractors, the TAB agency shall verify the operation of interconnected systems such as the AHE smoke detector's activation of the fire alarm system and the alarm system's activation of the life safety control sequences.

3.15 INSTALLATION OF FIRESTOP SYSTEMS

- A. General: Install firestop systems at all fire-rated construction where penetrated by the Work of this Section.
- B. Refer to Section 078400 - Firestopping, for all installation requirements for maintaining integrity of fire-rated construction at penetrations.

**END OF SECTION**



**SECTION 26 00 00****ELECTRICAL****PART 1 - GENERAL**

## 1.1 GENERAL REFERENCES

- A. Bidding Requirements, Contract Forms, General Conditions Contract for Construction Services and Division 1, General Requirements are hereby made a part of this Section.

## 1.2 SCOPE OF WORK

- A. The scope of work consists of the installation of all materials to be furnished under this Section, and without limiting the generality thereof, consists of furnishing all labor, materials, equipment, plant, transportation, rigging, staging, scaffolding, appurtenances, programming, software, vendor inspections, component energization, startup testing, training, scheduling, documentation, and services necessary and/or incidental to properly complete all electrical work as shown on the Drawings, as described in the Specifications, or as reasonably inferred from either, in the opinion of the Architect as being required.
- B. The work of this Section includes:
1. Access Panels.
  2. Conduit.
  3. Cord Reels.
  4. Disconnect Switches.
  5. Distributed Digital Lighting Control System.
  6. Electrical Supporting Devices.
  7. Fans (Destratification).
  8. Fire Alarm System Extension of Existing.
  9. Fire Stopping.
  10. Floor Boxes.
  11. Fuses.
  12. Grounding.
  13. Lighting Fixtures.
  14. Nameplates.
  15. Outlet Boxes and Accessories.
  16. Panelboards.
  17. Poke-Thrus.
  18. Pull Boxes, Junction Boxes and Wireways.
  19. Sleeves, Inserts and Supports.
  20. Starters.
  21. Telephone, Data, Video Outlet and Conduit System.
  22. Thermal Switches.
  23. Time Clocks.
  24. Wire and Cable.
  25. Wiring Device Plates.
  26. Wiring Devices.
  27. Alternates.
  28. Furnish, erect and maintain staging and scaffolding, including electrical hoisting and rigging equipment required for the performance of the electrical work.
  29. Existing Work and Demolition.
- C. The Electrical Subcontractor shall be responsible for all cutting related to the work of this Section except in finished surfaces. Patching is the responsibility of the trade effected.

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1. For coordination of cutting and patching refer to Section 01 31 00, Project Management and Coordination.
2. For cutting and patching Specifications, refer to Section 01 73 00, Execution.

### 1.3 CODES, REGULATIONS AND PERMITS

- A. All work done under this Section shall conform to the Codes and regulations governing such work as follows:
1. ANSI American National Standards Institution.
  2. ASTM American Society for Testing Materials.
  3. CS Commercial Standards.
  4. FS Federal Specifications.
  5. IEEE Institute of Electrical and Electronic Engineers.
  6. IES Illuminating Engineering Society.
  7. NECA National Electrical Subcontractors Association.
  8. NEMA National Electrical Manufacturer's Association.
  9. NFPA National Fire Protection Association.
  10. UL Underwriters Laboratory.
  11. NESC National Electrical Safety Code.
  12. IPCEA Insulated Power Cable Engineers Association.
  13. EEI Edison Electrical Institute.
  14. EIA Electronic Industry Association.
  15. All Local Governing Codes.
  16. NETA, National Electrical Testing Association.
  17. 2015 NFPA 1 Uniform Fire Code.
  18. 2012 Rhode Island Energy Conservation Code.
  19. 2015 NFPA 101 Life Safety Code.
  20. 2013 Rhode Island State Building Code.
  21. 2013 Rhode Island Electrical Code.
- B. Give notices, file plans, obtain and pay for permits and licenses and obtain necessary approvals from authorities having jurisdiction. Permits shall be secured through the City. Deliver certificates of inspection to Architect. No work shall be covered before examination and approval by Architect, inspectors and authorities having jurisdiction. Imperfect or condemned work shall be replaced with work conforming to requirements, without extra cost to Owner, subject to the approval of the Architect. If work is covered before due inspection and approval, the Electrical Subcontractor shall pay costs of uncovering the installed work, whether it meets contract requirements or not. Refer to Section 00 21 13 Instruction to Bidders and General Conditions Contract for Construction Services for payment of fees.

### 1.4 COMMISSIONING REQUIREMENTS

- A. An independent Commissioning Agent (CA) will be retained for this project. The commissioning process will be implemented in accordance with the NE-CHPS.
- B. The Electrical Subcontractor shall assist and support the CA as necessary in accordance with the requirements of Specification Section 01 91 13 – Commissioning Requirements/Plan.
1. Commissioning of a system or systems specified in this Section is part of the construction process. Documentation and testing of these systems, as well as training of the Tenant's and Building Owner's operation and maintenance personnel, is required in cooperation with Tenant's and Building Owner's Representatives and the Commissioning Agent. Project Closeout is dependent on successful completion of all commissioning procedures, documentation and

issue closure. Refer to Commissioning Requirements/Plan, Section 01 91 13, for detailed commissioning requirements.

#### 1.5 DEBRIS REMOVAL AND CLEAN-UP

- A. The Electrical Subcontractor shall, at the end of each day's work, remove waste materials and debris resulting from the installation of the electrical system. The Electrical Subcontractor shall deposit such waste and debris in a dumpster on site. Dumpster shall be provided by the General Contractor. The General Contractor shall be responsible for the emptying of dumpster when required.
- B. The Electrical Subcontractor shall, at the completion of his work, remove from the property all tools, equipment and surplus materials resulting from the installation of the electrical system.

#### 1.6 DEFINITIONS

- A. "E.C." or "Contractor" as used herein after in this Section shall mean the "Electrical Subcontractor," i.e., the filed bid Subcontractor under this Section 26 00 00.
- B. "Concealed" shall be defined as areas where conduit and wiring is located in chases, walls, partitions, shafts, and above finished ceilings.
- C. "Underground" shall mean conduit and wiring exterior to or within the Building that is buried. All other conduit and wiring shall be considered "exposed."
- D. "Exposed" shall mean conduit and wiring run on the surface of the Building construction.
- E. "Conduit" shall mean in addition to conduit, all fittings, hangers and other accessories relating to such conduit systems.
- F. "Provide" shall mean "provided complete in place," that is, "furnished and installed."

#### 1.7 DRAWINGS AND SPECIFICATIONS

- A. The Drawings and Specifications are complementary each to the other, and any labor or material called for by either, whether or not by both, or necessary for the successful operation of any components shall be furnished and installed.
- B. Before installing any work, verify that it does not interfere with the clearances required for other work. Installed work which interferes with existing necessary services shall be modified as directed by the Architect, at no additional cost to the Owner.
- C. Be familiar with the Drawings and Specifications of all other trades to prevent interferences and assure complete coordination.

#### 1.8 ELECTRICAL CHARACTERISTICS

- A. In general, and unless specifically indicated otherwise in the Specifications or noted on the Drawings, all new Building service, heating, ventilating, air conditioning and plumbing equipment shall be of the following characteristics:
  - 1. Motors up to and including 1/3 HP shall be suitable for 120 volt, single phase operation.
  - 2. Motors larger than 1/3 HP shall be suitable for 208 volt, three phase operation.

## 1.9 EXAMINATION OF SITE AND CONTRACT DOCUMENTS

- A. Bidders are advised to visit the site and inform themselves as to conditions under which this work will be performed. Failure to do so will, in no way, relieve the successful bidder from the responsibility of furnishing any materials or performing any work in accordance with the true intent and meaning of the Drawings and Specifications.
- B. No claim for extra compensation will be recognized if difficulties are encountered which an examination of the site conditions and contract documents prior to executing the contract would have revealed.
- C. The Electrical Subcontractor shall be responsible for ordering and furnishing the correct quantity of material required. Routing and equipment arrangements shown on the Drawings are approximate only and are not warranted to be accurate.
- D. Arrangements shall be made with the Owner prior to the visit for inspection of the existing Buildings.
- E. The Electrical Subcontractor and the General Contractor shall be responsible to coordinate with the work of other trades and vendors. The Electrical requirements involved with HVAC, Plumbing, and Fire Suppression, shall be considered part of the Electrical Subcontractors scope of work.

## 1.10 GIVING INFORMATION

- A. Keep fully informed as to the shape, size and position of all openings and foundations required for all apparatus furnished under this Section and give full information to the General Contractor sufficiently in advance of the work, so that all such openings and foundations may be built in advance. Furnish all sleeves and supports herein specified, so the General Contractor may install same in place.
- B. In the case of failure to give proper information as noted above, assume the cost of having necessary changes to the work made by the General Contractor.

## 1.11 GUARANTEE AND SERVICE

- A. The Electrical Subcontractor shall guarantee the performance of the installation and all equipment included in this Section in writing for one year from the date of final acceptance of same. Should any defects in materials or workmanship appear during this period, they shall be corrected or replaced by the Electrical Subcontractor to the satisfaction of the Architect, and at no additional expense to the Owner.

## 1.12 INTENT

- A. It is not intended that the Drawings show every conduit, fitting and appurtenance. All such parts necessary for the complete execution of the work, in accordance with the best practices of the trade and to the satisfaction of the Architect shall be provided whether these parts may have been specifically mentioned or not, or indicated on the Drawings.
- B. Electrical Subcontractor is responsible to provide equipment, components, and systems that are complete and fully working, with all necessary tests and documents.

## 1.13 MATERIALS AND EQUIPMENT

- A. All materials and equipment furnished under this Section shall be new and of the best grade

for the service intended. The manufacturers mentioned in the Specifications are intended to indicate the quality desired. Any substitutions shall be approved by the Architect as herein provided by the "or equal" clause, in addition to meeting the limitations of space and capacity shown or specified. Re-built materials and equipment will not be accepted.

#### 1.14 OBTAINING INFORMATION

- A. Obtain detailed information from the manufacturers of apparatus which is to be provided, for the proper methods of installation. Obtain all information from the General Contractor and other Subcontractors which may be necessary to facilitate the work and the completion of the whole project.
- B. Electrical Subcontractor shall inspect the site associated with this project prior to submitting his bid and shall investigate all conditions under which this work will be performed. This shall include determination of exact locations of items indicated as existing on the Drawings. Such existing locations are diagrammatic and shall not be construed as exact enough to use for equipment and labor estimating purposes. Failure to inspect existing conditions or to fully understand the work which is required shall not excuse the Electrical Subcontractor from his obligation to supply and install work in accordance with the Specifications and Drawings and under all existing site conditions. It shall be the responsibility of the Electrical Subcontractor to investigate and locate all existing underground utilities which may conflict with the installation of this electrical work. Coordinate elevations of conduits required to be installed under this Contract to avoid interference with any existing underground utilities.

#### 1.15 OPERATIONS AND MAINTENANCE MANUALS

- A. At least two (2) months prior to the time of turning over this contract to the Owner for use and occupancy or substantial completion, secure and deliver to the Architect three (3) complete indexed files containing approved operating and maintenance manuals, Shop Drawings and other data as follows:
  - 1. Operation description of all systems.
  - 2. Complete Shop Drawings of all equipment.
  - 3. Preventive maintenance instructions for all systems.
  - 4. Spare parts lists of all system components.
  - 5. Names, addresses and telephone numbers of all suppliers of the systems.
- B. Non-availability of operating and maintenance manuals or inaccuracies therein may be grounds for cancellation and postponement of any scheduled final inspection by the Owner until such time as the discrepancy has been corrected and/or retainage of sufficient monies to prepare same.
- C. Provide qualified trained personnel to insure proper operation of the systems and to train the Owner's operating and maintenance personnel in the proper operation and maintenance of the systems. Instruction period shall be five (5) eight-hour days.
  - 1. Training of the Tenant's and Building Owner's operation and maintenance personnel is required in cooperation with the Tenant's and Building Owner's Representatives. Provide competent, factory authorized personnel to provide instruction to operation and maintenance personnel concerning the location, operation and troubleshooting of the installed systems. The instruction shall be scheduled in coordination with the Tenant's and Building Owner's Representative after submission and approval of formal training plans. Refer to Commissioning Specification, Section 01 91 00, for Electrical Subcontractor training requirements.
- D. Sequence of Operation details and/or drafts of the Operations and Maintenance Manual

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shall be submitted in accordance with requirements for the preparation of Commissioning prefunctional and functional test protocols. Submittals to be scheduled in advance of final equipment/system installation and prior to performance of startup tests.

#### 1.16 RECORD DRAWINGS

- A. General: Refer to Division 1, General Requirements, Section 01 78 00, Closeout Submittals for Requirements.
- B. The Record Drawings required to be furnished under this Section are of the "E" Series Drawings.

#### 1.17 RELATED WORK SPECIFIED ELSEWHERE

- A. The following related work or material shall be provided under the designated Divisions:
  - 1. Excavation, backfill, pumping, and shoring: Division 31, "Earthwork."
  - 2. Concrete work: Division 03, "Concrete."
  - 3. Flashing and counterflashing for all roof openings: Division 07, "Thermal and Moisture Protection."
  - 4. Field Painting: Division 09, "Finishes."
  - 5. Specialty Equipment: Division 11, "Equipment."
  - 6. Elevator: Division 14, "Conveying Systems."
  - 7. Sprinkler System: Section 21 00 00, "Fire Suppression."
  - 8. Plumbing Equipment: Section 22 00 00, "Plumbing."
  - 9. HVAC Equipment: Section 23 00 00, "HVAC."
  - 10. Door Hardware: Section 08 71 10.
  - 11. For restrictions concerning the hanging of materials, piping, mounts, brackets, hangers, hooks and other items from metal decking. Steel Decking, Section 05 31 00.
  - 12. Commissioning.

#### 1.18 SHOP DRAWINGS

- A. General: Refer to Division 1, General Requirements, Section 01 33 00, Submittal Procedures, for submittal provisions and procedures.
- B. In accordance with Division 1, General Requirements, submit to the Architect for approval complete sets of detailed information consisting of manufacturer's bulletins, capacities, Shop Drawings, and parts lists of all material to be provided for this project.
- C. 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 unless otherwise noted and it should be noted that or approved equal applies to all products denoted herein. It is understood that all manufactures will have minor variations in configuration, appearance, and product Specifications and such minor variations shall not eliminate such manufacturers as an approved equal. It is the intent of this Specification to encourage open and competitive involvement from multiple manufacturers' that are able to supply similar products.
- D. In accordance with the requirements of the Commissioning Specification, Section 01 91 13, and NE-CHPS, provide a copy of submittals to the Commissioning Agent to obtain comments during the design review cycle.



## 1.19 TEMPORARY LIGHT AND POWER

- A. Provide capacity from existing building power distribution and pay all expenses related thereto.
- B. Refer to Division 1, Section 01 50 00 for requirements.

**PART 2 - PRODUCTS**

## 2.1 ACCESS PANELS

- A. Provide access panels for access to concealed junction boxes and to other concealed parts of system that require accessibility for operation and maintenance. In general, electrical work shall be laid out so access panels are not required.
- B. Access panels shall be located in a workmanlike manner in closets, storage rooms, and/or other non-public areas, positioned so that junction can be easily reached and size shall be sufficient for purpose (minimum size 12" x 16"). When access panels are required in corridors, lobbies, or other habitable areas, they shall be located as directed by the Architect.
- C. Access panels shall be as specified under Section 08 31 00, Access Panels and Doors.

## 2.2 CONDUIT

- A. Electric metallic tubing shall be electrogalvanized or sherardized steel and the rigid steel conduit shall be hot-dipped galvanized or sherardized, inside and outside, manufactured by one of the following: Pittsburgh Standard, Republic Steel Corp., Allied Tube and Conduit Corp. or equal.
- B. Flexible metal conduit shall be galvanized steel and shall contain a separate copper grounding conductor. Liquid-tight flexible metal conduit shall be similar, but shall also have an extruded moisture and oil proof outer jacket of polyvinyl chloride plastic.
- C. Non-Metallic Conduit (NMC): Rigid polyvinyl chloride (PVC) shall be Schedule 40, rated for use with 90 degree conductors, UL rated or approved equal, conforming to industry standards and NEMA TC-2, NEMA TC-3, Fed. Spec. W-C-1094, and UL 651.
- D. Rigid steel conduit fittings, couplings and connectors shall be threaded and shall be galvanized or cadmium plated. Conduit fittings and outlet boxes shall be held in place by fittings of a type approved by the Architect. Steel supports or racks shall be galvanized steel channel and fittings, Unistrut, Kindorf or Husky Products Company, or equal.
- E. Couplings and connectors for electric metallic tubing shall be galvanized steel of the compression type other than the identer type and with insulated throat or set-screw type.
- F. Steel support rods or support bolts for conduits shall be 1/8" diameter for each inch or fraction thereof of diameter of conduit size, but no rod or bolt shall be less than 1/4" in diameter.
- G. Conduit shall be supported from the Building structure, and shall be independent of ducts, pipes, ceilings and their supporting members.

## 2.3 CORD REELS

- A. References:
1. American National Standards Institute (ANSI)/ Underwriters Laboratories Inc. (UL), ANSI/UL 355-2016.
  2. CSA Group (CSA), CSA C22.2 No 21-2018 – Cord Sets and Power Supply Cords.
- B. Basis of design for the Cord Reels is based on products manufactured by Hubbell Wiring Device Kellems, or equal.
- C. Cord Reels shall be listed and labeled by a qualified agency and marked for intended location and application.
- D. Industrial Cord Reels:
1. Industrial Cord Reels shall be provided with minimum 45 foot cable rated for 20 amperes 600V with required phase conductors, neutral, and equipment grounding conductor. Reels shall be constructed of powder coated cast aluminum.
  2. Cord Reels shall have a movable guide arm that can be mounted in two positions, positive latch mechanism automatically maintains desired cord lengths, ratchet lock that can be disengaged in field for constant tension applications.
  3. Cord Reels conductor size shall be 12 AWG, unless otherwise indicated.
  4. Cord Reels shall be Hubbell HBLI45123R220M1, or equal.
- E. Accessories:
1. Manufacturer shall provide a full line of accessories to include and not be limited to cord sets, receptacles, and housings. Provide double duplex receptacles on ends of cord reels.
  2. Manufacturer shall provide cable strain relief connectors that accommodate the cable range for the Cord Reels.
  3. Mounting brackets shall be available that will attach to the structural supports and allow quick and easy installation. The support shall be equal to Hubbell wiring device inREACH mounting bracket.
- F. Examine conditions in which the Cord Reels are to be installed. Notify the respected managing construction parties in writing of any conditions that will be detrimental in the proper installation of the Cord Reels.
- G. Color of Cord Reels shall be white, unless otherwise indicated.

## 2.4 DISCONNECT SWITCHES

- A. The Electrical Subcontractor shall furnish and install disconnecting means to comply with the National Electrical Code for all motors. Disconnect switches shall be fused or unfused as shown on the Drawings, NEMA Type HD safety switches for heavy duty, with interlocking cover, side operated with provisions for padlocking the switch handle in the off position.
- B. All motor isolating switches indicated on the Drawings shall be rated in horsepower, and shall be rated for the voltage of the motor and shall be furnished and installed at the motor location whether or not the motor is within sight of the motor feeder disconnecting means.
- C. Disconnect switch enclosures shall be of the proper NEMA type for the intended location as defined by NEMA and shall be phosphate coated or equivalent code gauge galvanized sheet steel with USAFI No. 24 dark gray baked enamel finish.

- D. Disconnect switches shall bear the Underwriters' Laboratories label and be manufactured by Square D Company, Eaton/Cutler-Hammer, Siemens, or equal.

## 2.5 DISTRIBUTED DIGITAL LIGHTING CONTROL SYSTEM

### A. Part 1 – General

#### 1. Summary

##### a. Section Includes:

- 1) Digital Lighting and Plug Load Controls
- 2) Relay Panels
- 3) Emergency Lighting Control

##### b. Related Sections:

- 1) Wiring Devices
- 2) Lighting Fixtures
- 3) Building integrator shall provide integration of the lighting control system with Building Automation Systems.
- 4) Drawings and general provision of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections apply to this Section
- 5) Electrical Sections, including wiring devices, apply to the work of this Section.

##### c. Control Intent – Control Intent includes, but is not limited to:

- 1) Defaults and initial calibration settings for such items as time delay, sensitivity, and fade rates.
- 2) Initial sensor and switching zones
- 3) Initial time switch settings
- 4) Emergency Lighting Control

#### 2. References

- a. American National Standards Institute/Institute of Electrical and Electronic Engineers (ANSI/IEEE)
- b. International Electrotechnical Commission (IEC)
- c. International Organization for Standardization (ISO)
- d. National Electrical Manufacturers Association (NEMA)
- e. WD1 (R2005) - General Color Requirements for Wiring Devices.
- f. Underwriters Laboratories, Inc. (UL)
  - 1) 20 – Plug Load Controls
  - 2) 508– Industrial Controls
  - 3) 916 – Energy Management Equipment.
  - 4) 924 – Emergency Lighting

#### 3. System Description and Operation

##### a. The Lighting Control and Automation system as defined under this section covers the following equipment:

- 1) Digital Occupancy Sensors – Self-configuring, digitally addressable and calibrated occupancy sensors with LCD display and two-way active infrared (IR) communications.
- 2) Digital Switches – Self-configuring, digitally addressable pushbutton on/off, dimming, and scene switches with two-way active infrared (IR) communications.
- 3) Handheld remotes for personal control – One-button dimming, two-button on/off, or five-button scene remotes provide control using infrared communications. Remote may be configured in the field to control selected loads or scenes without special tools.
- 4) Digital Daylighting Sensors – Single-zone closed loop, multi-zone open loop and single-zone dual-loop daylighting sensors with two-

- way active infrared (IR) communications can provide switching, bi-level, tri-level or dimming control for daylight harvesting.
- 5) Digital Room Controllers – Self-configuring, digitally addressable one, two or three relay plenum-rated controllers for on/off control. Selected models include 0-10 volt or line voltage forward phase control dimming outputs and integral current monitoring capabilities.
  - 6) Digital Plug-Load Controllers – Self-configuring, digitally addressable, single relay, plenum-rated application-specific controllers. Selected models include integral current monitoring capabilities.
  - 7) Configuration Tools – Handheld remote for room configuration and relay panel programming provides two way infrared (IR) communications to digital devices and allows complete configuration and reconfiguration of the device / room from up to 30 feet away. Unit to have Organic LED display, simple pushbutton interface, and allow bi-directional communication of room variables and occupancy sensor settings. Computer software also customizes room settings.
  - 8) Digital Lighting Management (DLM) local network – Free topology, plug-in wiring system (Cat 5e) for power and data to room devices.
  - 9) Digital Lighting Management (DLM) segment network – Linear topology, BACnet MS/TP network (1.5 twisted pair, shielded,) to connect multiple DLM local networks for centralized control
  - 10) Network Bridge – Provides BACnet MS/TP-compliant digital networked communication between rooms, panels and the Segment Manager or building automation system (BAS) and automatically creates BACnet objects representative of connected devices.
  - 11) Segment Manager – Provides web browser-based user interface for system control, scheduling, power monitoring, room device parameter administration and reporting.
  - 12) Programming and Configuration Software – Optional PC-native application capable of accessing DLM control parameters within a room, for the local network, via a USB adapter, or globally, for many segment networks simultaneously, via BACnet/IP communication.
  - 13) LMCP Digital Lighting Management Relay Panel – Provides up to 8, 24, or 48 mechanically latching relays. Relays include a manual override and a single push-on connector for easy installation or removal from the panel. Panel accepts program changes from handheld configuration tool for date and time, location, holidays, event scheduling, button binding and group programming. Provides BACnet MS/TP-compliant digital networked communication between other lighting controls and/or building automation system (BAS).
  - 14) Emergency Lighting Control Unit (ELCU) – Allows a standard lighting control device to control emergency lighting in conjunction with normal lighting in any area within a building.
4. Lighting Control Applications
- a. Unless relevant provisions of the applicable local Energy Codes are more stringent, provide a minimum application of lighting controls as follows:
    - 1) Space Control Requirements – Provide occupancy/vacancy sensors with Manual-ON functionality in all spaces except where

- indicated.
- 2) Bi-Level Lighting – Provide multi-level controls where indicated.
  - 3) Task Lighting / Plug Loads – Provide automatic shut off of non essential plug loads and task lighting where indicated. Provide Automatic-ON of plug loads whenever spaces are occupied. For spaces with multiple occupants a single shut off consistent with the overhead lighting may be used for the area.
  - 4) Daylit Areas – Provide daylight-responsive automatic control where indicated.
    - a) All luminaires within code-defined daylight zones shall be controlled separately from luminaires outside of daylight zones.
    - b) Daytime setpoints for total ambient illumination (combined daylight and electric light) levels that initiate dimming shall be programmed in compliance with relevant local building energy codes.
    - c) Multiple-leveled switched daylight harvesting controls may be utilized for areas marked on drawings.
    - d) Provide smooth and continuous daylight dimming for areas marked on drawings. Daylighting control system may be designed to turn off electric lighting when daylight is at or above required lighting levels, only if system functions to turn lamps back on at dimmed level, rather than turning full-on prior to dimming.
  - 5) Where indicated controls that allow for independent control of each local control zone shall be provided. Rooms larger than 300 square feet shall instead have at least four (4) pre-set lighting scenes unless otherwise specified. Occupancy / vacancy sensors shall be provided to extinguish all lighting in the space. Spaces with up to four moveable walls shall include controls that can be reconfigured when the room is partitioned.
5. Submittals
- a. Submittals Package: Submit the shop drawings, and the product data specified below at the same time as a package.
  - b. Shop Drawings:
    - 1) Composite wiring and/or schematic diagram of each control circuit as proposed to be installed.
    - 2) Show exact location of all digital devices, including at minimum sensors, room controllers, and switches for each area on reflected ceiling plans. (Provide AutoCAD format reflected ceiling plans.)
    - 3) Provide room/area details including products and sequence of operation for each room or area. Illustrate typical acceptable room/area connection topologies.
    - 4) Network riser diagram including floor and building level details. Include network cable specification and end-of-line termination details, if required. Illustrate points of connection to integrated systems. Coordinate integration with mechanical and/or other trades.
  - c. Product Data: Catalog sheets, specifications and installation instructions.
  - d. Include data for each device which:
    - 1) Indicates where sensor is proposed to be installed.
    - 2) Prove that the sensor is suitable for the proposed application.
6. Quality Assurance
- a. Manufacturer: Minimum [10] years experience in manufacture of lighting

- controls.
7. Project Conditions
    - a. Do not install equipment until following conditions can be maintained in spaces to receive equipment:
      - 1) Ambient temperature: 0° to 40° C (32° to 104° F).
      - 2) Relative humidity: Maximum 90 percent, non-condensing.
  8. Warranty
    - a. Provide a five year limited manufacturer's warranty on all room control devices and panels.
- B. Part 2 – Products
1. Manufacturer
    - a. Acceptable Manufacturer:
      - 1) WattStopper
        - a) System: Digital Lighting Management (DLM)
      - 2) Basis of design product: WattStopper Digital Lighting Management (DLM) or subject to compliance and prior approval with specified requirements of this section, one of the following:
        - a) Lutron, Crestron, or Equal.
      - 3) Substitutions:
        - a) Proposed substitutes must be accompanied by a review of the specification noting compliance on a line-by-line basis.
        - b) By using substitutions, the Electrical Subcontractor accepts responsibility and associated costs for all required modifications to circuitry, devices, and wiring. The Electrical Subcontractor shall provide complete engineered shop drawings (including power and control wiring) with deviations from the original design highlighted for review and approval prior to rough-in.
  2. Digital Lighting Controls
    - a. Furnish the Company's system which accommodates the square-footage coverage requirements for each area controlled, utilizing room controllers, digital occupancy sensors, switches, daylighting sensors and accessories which suit the lighting and electrical system parameters.
  3. Digital Wall Switch Occupancy Sensors
    - a. Wallbox mounted passive infrared PIR or dual technology (passive infrared and ultrasonic) digital occupancy sensor with 1 or 2 switch buttons.
    - b. Digital Occupancy Sensors shall provide scrolling LCD display for digital calibration and electronic documentation. Features include the following:
      - 1) Digital calibration and pushbutton configuration for the following variables:
        - a) Sensitivity – 0-100% in 10% increments
        - b) Time delay – 1-30 minutes in 1 minute increments
        - c) Test mode – Five second time delay
        - d) Detection technology – PIR, Dual Technology activation and/or re-activation.
        - e) Walk-through mode
        - f) Load parameters including Auto/Manual-ON, blink warning, and daylight enable/disable when photosensors are included in the DLM local network.
      - 2) Programmable control functionality including:
        - a) Each sensor may be programmed to control specific loads within a local network.

- b) Sensor shall be capable of activating one of 16 user-definable lighting scenes.
- c) Adjustable retrigger time period for manual-on loads. Load will retrigger (turn on) automatically during the configurable period of time (default 10 seconds) after turning off.
- d) On dual technology sensors, independently configurable trigger modes are available for both Normal (NH) and After Hours (AH) time periods. The retrigger mode can be programmed to use the following technologies:
  - i. Ultrasonic and Passive Infrared
  - ii. Ultrasonic or Passive Infrared
  - iii. Ultrasonic only
  - iv. Passive Infrared only
- 3) Independently configurable sensitivity settings for passive infrared and ultrasonic technologies (on dual technology sensors) for both Normal (NH) and After Hour (AH) time periods.
- 4) Two RJ-45 ports for connection to DLM local network.
- 5) Two-way infrared (IR) transceiver to allow remote programming through handheld configuration tool and control by remote personal controls.
- 6) Device Status LEDs including:
  - a) PIR detection
  - b) Ultrasonic detection
  - c) Configuration mode
  - d) Load binding
- 7) Assignment of occupancy sensor to a specific load within the room without wiring or special tools.
- 8) Assignment of local buttons to specific loads within the room without wiring or special tools.
- 9) Manual override of controlled loads.
- 10) All digital parameter data programmed into an individual wall switch sensor shall be retained in non-volatile FLASH memory within the wall switch sensor itself. Memory shall have an expected life of no less than 10 years.
- c. BACnet object information shall be available for the following objects:
  - 1) Detection state
  - 2) Occupancy sensor time delay
  - 3) Occupancy sensor sensitivity, PIR and Ultrasonic
  - 4) Button state
  - 5) Switch lock control
  - 6) Switch lock status
- d. Units shall not have any dip switches or potentiometers for field settings.
- e. Multiple occupancy sensors may be installed in a room by simply connecting them to the free topology DLM local network. No additional configuration will be required.
- f. Two-button wall switch occupancy sensors, when connected to a single relay dimming room controller, shall operate in the following sequence as a factory default:
  - 1) Left button
    - a) Press and release - Turn load on
    - b) Press and hold - Raise dimming load
  - 2) Right button
    - a) Press and release - Turn load off
    - b) Press and hold - Lower dimming load

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- g. Low voltage momentary pushbuttons shall include the following features:
    - 1) Load/Scene Status LED on each switch button with the following characteristics:
      - a) Bi-level LED
      - b) Dim locator level indicates power to switch
      - c) Bright status level indicates that load or scene is active
  - h. The following button attributes may be changed or selected using a wireless configuration tool:
    - 1) Load and Scene button function may be reconfigured for individual buttons (from Load to Scene, and vice versa).
    - 2) Individual button function may be configured to Toggle, On only or Off only.
    - 3) Individual scenes may be locked to prevent unauthorized change.
    - 4) Fade Up and Fade Down times for individual scenes may be adjusted from 0 seconds to 18 hours.
    - 5) Ramp rate may be adjusted for each dimmer switch.
    - 6) Switch buttons may be bound to any load on a room controller and are not load type dependent; each button may be bound to multiple loads.
  - i. WattStopper part numbers: LMPW, LMDW. Available in white, light almond, ivory, grey, red and black; compatible with wall plates with decorator opening.
4. Digital Wall or Ceiling Mounted Occupancy Sensor
- a. Wall or ceiling mounted (to suit installation) passive infrared (PIR), ultrasonic or dual technology digital (passive infrared and ultrasonic) occupancy sensor.
  - b. Digital Occupancy Sensors shall provide graphic LCD display for digital calibration and electronic documentation. Features include the following:
    - 1) Digital calibration and pushbutton configuration for the following variables:
      - a) Sensitivity – 0-100% in 10% increments
      - b) Time delay – 1-30 minutes in 1 minute increments
      - c) Test mode – Five second time delay
      - d) Detection technology – PIR, Ultrasonic or Dual Technology activation and/or re-activation.
      - e) Walk-through mode
    - 2) Load parameters including Auto/Manual-ON, blink warning, and daylight enable/disable when photosensors are included in the DLM local network.
    - 3) Programmable control functionality including:
      - a) Each sensor may be programmed to control specific loads within a local network.
      - b) Sensor shall be capable of activating one of 16 user-definable lighting scenes.
      - c) Adjustable retrigger time period for manual-on loads. Load will retrigger (turn on) automatically within a configurable period of time (default 10 seconds) after turning off.
      - d) On dual technology sensors, independently configurable trigger modes are available for both Normal (NH) and After Hours (AH) time periods. The retrigger mode can be programmed to use the following technologies:
        - i. Ultrasonic and Passive Infrared



- ii. Ultrasonic or Passive Infrared
  - iii. Ultrasonic only
  - iv. Passive Infrared only
  - v. Independently configurable sensitivity settings for passive infrared and ultrasonic technologies (on dual technology sensors) for both Normal (NH) and After Hour (AH) time periods.
- 4) One or two RJ-45 port(s) for connection to DLM local network.
  - 5) Two-way infrared (IR) transceiver to allow remote programming through handheld commissioning tool and control by remote personal controls.
  - 6) Device Status LEDs, which may be disabled for selected applications, including:
    - a) PIR detection
    - b) Ultrasonic detection
    - c) Configuration mode
    - d) Load binding
  - 7) Assignment of occupancy sensor to a specific load within the room without wiring or special tools.
  - 8) Manual override of controlled loads.
  - 9) All digital parameter data programmed into an individual occupancy sensor shall be retained in non-volatile FLASH memory within the sensor itself. Memory shall have an expected life of no less than 10 years.
- c. BACnet object information shall be available for the following objects:
    - 1) Detection state
    - 2) Occupancy sensor time delay
    - 3) Occupancy sensor sensitivity, PIR and Ultrasonic
  - d. Units shall not have any dip switches or potentiometers for field settings.
  - e. Multiple occupancy sensors may be installed in a room by simply connecting them to the free topology DLM local network. No additional configuration will be required.
  - f. WattStopper product numbers: LMPX, LMDX, LMPC, LMUC, LMDC
5. Digital Wall Switches
- a. Low voltage momentary pushbutton switches in 1, 2, 3, 4, 5 and 8 button configuration. Wall switches shall include the following features:
    - 1) Two-way infrared (IR) transceiver for use with personal and configuration remote controls.
    - 2) Removable buttons for field replacement with engraved buttons and/or alternate color buttons. Button replacement may be completed without removing the switch from the wall.
    - 3) Configuration LED on each switch that blinks to indicate data transmission.
    - 4) Load/Scene Status LED on each switch button with the following characteristics:
      - a) Bi-level LED
      - b) Dim locator level indicates power to switch
      - c) Bright status level indicates that load or scene is active
      - d) Dimming switches shall include seven bi-level LEDs to indicate load levels using 14 steps.
    - 5) Programmable control functionality including:
      - a) Button priority may be configured to any BACnet priority level, from 1-16, corresponding to networked operation allowing local actions to utilize life safety priority
      - b) Scene patterns may be saved to any button other than

- dimming rockers. Once set, buttons may be digitally locked to prevent overwriting of the preset levels.
- 6) All digital parameter data programmed into an individual wall switch shall be retained in non-volatile FLASH memory within the wall switch itself. Memory shall have an expected life of no less than 10 years.
- b. BACnet object information shall be available for the following objects:
    - 1) Button state
    - 2) Switch lock control
    - 3) Switch lock status
  - c. Two RJ-45 ports for connection to DLM local network.
  - d. Multiple digital wall switches may be installed in a room by simply connecting them to the free topology DLM local network. No additional configuration shall be required to achieve multi-way switching.
  - e. The following switch attributes may be changed or selected using a wireless configuration tool:
    - 1) Load and Scene button function may be reconfigured for individual buttons (from Load to Scene, and vice versa).
    - 2) Individual button function may be configured to Toggle, On only or Off only.
    - 3) Individual scenes may be locked to prevent unauthorized change.
    - 4) Fade Up and Fade Down times for individual scenes may be adjusted from 0 seconds to 18 hours.
    - 5) Ramp rate may be adjusted for each dimmer switch.
    - 6) Switch buttons may be bound to any load on a room controller and are not load type dependent; each button may be bound to multiple loads.
    - 7) WattStopper product numbers: LMSW-101, LMSW-102, LMSW-103, LMSW-104, LMSW-105, LMSW-108, LMDM-101. Available in white, light almond, ivory, grey, red and black; compatible with wall plates with decorator opening.
6. DLM Handheld User Interface Remotes
- a. Battery-operated handheld devices in 1, 2 and 5 button configurations for remote switching or dimming control. Remote controls shall include the following features:
    - 1) Two-way infrared (IR) transceiver for line of sight communication with DLM local network within up to 30 feet.
    - 2) LED on each button confirms button press.
    - 3) Load buttons may be bound to any load on a room controller and are not load type dependent; each button may be bound to multiple loads.
    - 4) Inactivity timeout to save battery life.
  - b. A wall mount holster and mounting hardware shall be included with each remote control
  - c. WattStopper part numbers: LMRH-101, LMRH-102, LMRH-105.
7. Digital Partition Controls
- a. Partition controls shall enable manual or automatic coordination of lighting controls in flexible spaces with up to four moveable walls by reconfiguring the connected digital switches and occupancy sensors.
  - b. Four-button low voltage pushbutton switch for manual control.
    - 1) Two-way infrared (IR) transceiver for use with configuration remote control.
    - 2) Removable buttons for field replacement with engraved buttons and/or alternate color buttons. Button replacement may be completed without removing the switch from the wall.

- 3) Configuration LED on each switch that blinks to indicate data transmission.
  - 4) Each button represents one wall; Green button LED indicates status.
  - 5) Two RJ-45 ports for connection to DLM local network.
  - 6) WattStopper part number: LMPS-104. Available in white, light almond, ivory, grey and black; compatible with wall plates with decorator opening.
- c. Contact closure interface for automatic control via input from limit switches on movable walls (by others).
- 1) Operates on Class 2 power supplied by DLM local network.
  - 2) Includes 24VDC output and four input terminals for maintained third party contact closure inputs.
  - 3) Input max. sink/source current: 1-5mA
    - a) Logic input signal voltage High: >18VDC
    - b) Logic input signal voltage Low: <2VDC
  - 4) Four status LEDs under hinged cover indicate if walls are open or closed; supports LMPS-104 as remote status indicator.
  - 5) Two RJ-45 ports for connection to DLM local network.
  - 6) WattStopper part number: LMIO-102
8. Digital Daylighting Sensors
- a. Digital daylighting sensors shall work with room controllers to provide automatic switching, bi-level, or tri-level or dimming daylight harvesting capabilities for any load type connected to a room controller. Daylighting sensors shall be interchangeable without the need for rewiring.
- 1) Closed loop sensors measure the ambient light in the space and control a single lighting zone.
  - 2) Open loop sensors measure incoming daylight in the space, and are capable of controlling up to three lighting zones.
  - 3) Dual loop sensors measure both ambient and incoming daylight in the space to insure that proper light levels are maintained as changes to reflective materials are made in a single zone.
- b. Digital daylighting sensors shall include the following features:
- 1) The sensor's internal photodiode shall only measure lightwaves within the visible spectrum. The photodiode's spectral response curve shall closely match the entire photopic curve. The photodiode shall not measure energy in either the ultraviolet or infrared spectrums. The photocell shall have a sensitivity of less than 5% for any wavelengths less than 400 nanometers or greater than 700 nanometers.
  - 2) Sensor light level range shall be from 1-6,553 footcandles (fc).
  - 3) The capability of ON/OFF, bi-level or tri-level switching, or dimming, for each controlled zone, depending on the selection of room controller(s) and load binding to room controller(s).
  - 4) For switching daylight harvesting, the photosensor shall provide a field-selectable deadband, or a separation, between the "ON Setpoint" and the "OFF Setpoint" that will prevent the lights from cycling excessively after they turn off.
  - 5) For dimming daylight harvesting, the photosensor shall provide the option, when the daylight contribution is sufficient, of turning lights off or dimming lights to a field-selectable minimum level.
  - 6) Photosensors shall have a digital, independently configurable fade rate for both increasing and decreasing light level in units of percent per second.
  - 7) Photosensors shall provide adjustable cut-off time. Cut-off time is

- defined by the number of selected minutes the load is at the minimum output before the load turns off. Selectable range between 0-240 minutes including option to never cut-off.
- 8) Optional wall switch override shall allow occupants to reduce lighting level to increase energy savings or, if permitted by system administrator, raise lighting levels for a selectable period of time or cycle of occupancy.
  - 9) Integral infrared (IR) transceiver for configuration and/or commissioning with a handheld configuration tool, to transmit detected light level to wireless configuration tool, and for communication with personal remote controls.
  - 10) Configuration LED status light on device that blinks to indicate data transmission.
  - 11) Status LED indicates test mode, override mode and load binding.
  - 12) Recessed switch on device to turn controlled load(s) ON and OFF.
  - 13) BACnet object information shall be available for the following daylighting sensor objects, based on the specific photocell's settings:
    - a) Light level
    - b) Day and night setpoints
    - c) Off time delay
    - d) On and off setpoints
    - e) Up to three zone setpoints
    - f) Operating mode – on/off, bi-level, tri-level or dimming
  - 14) One RJ-45 port for connection to DLM local network.
  - 15) A choice of accessories to accommodate multiple mounting methods and building materials. The photosensors may be mounted on a ceiling tile, skylight light well, suspended lighting fixture or backbox. Standard tube photosensors accommodate mounting materials from 0-0.62" thickness (LMLS-400, LMLS-500). Extended tube photosensors accommodate mounting materials from 0.62"-1.25" thickness (LMLS-400-L, LMLS-500-L). Mounting brackets are compatible with J boxes (LMLS-MB1) and wall mounting (LMLS-MB2). LMLS-600 photosensor to be mounted on included bracket below skylight well.
  - 16) Any load or group of loads in the room can be assigned to a daylighting zone
  - 17) Each load within a daylighting zone can be individually enabled or disabled for discrete control (load independence).
  - 18) All digital parameter data programmed into a photosensor shall be retained in non-volatile FLASH memory within the photosensor itself. Memory shall have an expected life of no less than 10 years.
- c. Closed loop digital photosensors shall include the following additional features:
- 1) An internal photodiode that measures light in a 100-degree angle, cutting off the unwanted light from bright sources outside of this cone.
  - 2) Automatic self-calibration, initiated from the photosensor, a wireless configuration tool or a PC with appropriate software.
  - 3) Automatically establishes application-specific setpoints following self-calibration. For switching operation, an adequate deadband between the ON and OFF setpoints shall prevent the lights from cycling; for dimming operation a sliding setpoint control algorithm with separate Day and Night setpoints shall prevent abrupt ramping of loads.

- 4) WattStopper Product Number: LMLS-400, LMLS-400-L.
- d. Open loop digital photosensors shall include the following additional features:
  - 1) An internal photodiode that measures light in a 60-degree angle cutting off the unwanted light from the interior of the room.
  - 2) Automatically establishes application-specific setpoints following manual calibration using a wireless configuration tool or a PC with appropriate software. For switching operation, an adequate deadband between the ON and OFF setpoints for each zone shall prevent the lights from cycling; for dimming operation, a proportional control algorithm shall maintain the design lighting level in each zone.
  - 3) Each of the three discrete daylight zones can include any non overlapping group of loads in the room.
  - 4) WattStopper Product Number: LMLS-500, LMLS-500-L.
- e. Dual loop digital photosensors shall include the following additional features:
  - 1) Close loop portion of dual loop device must have an internal photodiode that measures light in a 100 degree angle, cutting off the unwanted light from sources outside of this con
  - 2) Open loop portion of dual loop device must have an internal photodiode that can measure light in a 60 degree angle, cutting off the unwanted light from the interior of the room.
  - 3) Automatically establishes application-specific set-points following self-calibration. For switching operation, an adequate deadband between the ON and OFF setpoints shall prevent the lights from cycling; for dimming operation a sliding setpoint control algorithm with separate Day and Night setpoints shall prevent abrupt ramping of load.
  - 4) Device must reference closed loop photosensor information as a base line reference. The device must be able to analyze the open loop photosensor information to determine if an adjustment in light levels is required.
  - 5) Device must be able to automatically commission setpoints each night to provide adjustments to electrical lighting based on changes in overall lighting in the space due to changes in reflectance within the space or changes to daylight contribution based on seasonal changes.
  - 6) Device must include extendable mounting arm to properly position sensor within a skylight well.
  - 7) WattStopper product number LMLS-600
9. Digital Load Controllers (Room, Plug Load and Fixture Controllers)
  - a. Digital controllers for lighting and plug loads automatically bind the room loads to the connected devices in the space without commissioning or the use of any tools. Room and plug load controllers shall be provided to match the room lighting and plug load control requirements. The controllers will be simple to install, and will not have dip switches or potentiometers, or require special configuration for standard Plug n' Go applications. The control units will include the following features:
    - 1) Automatic room configuration to the most energy-efficient sequence of operation based upon the devices in the room.
    - 2) Simple replacement – Using the default automatic configuration capabilities, a room controller may be replaced with an off-the-shelf.
    - 3) Multiple room controllers connected together in a local network

must automatically prioritize each room controller, without requiring any configuration or setup, so that loads are sequentially assigned using room controller device ID's from highest to lowest.

- 4) Device Status LEDs to indicate:
    - a) Data transmission
    - b) Device has power
    - c) Status for each load
    - d) Configuration status
  - 5) Quick installation features including:
    - a) Standard junction box mounting
    - b) Quick low voltage connections using standard RJ-45 patch cable
  - 6) Based on individual configuration, each load shall be capable of the following behavior on power up following the loss of normal power:
    - a) Turn on to 100%
    - b) Remain off
    - c) Turn on to last level
  - 7) Each load shall be configurable to operate in the following sequences based on occupancy:
    - a) Auto-on/Auto-off (Follow on and off)
    - b) Manual-on/Auto-off (Follow off only)
  - 8) The polarity of each load output shall be reversible, via digital configuration, so that on is off and off is on.
  - 9) BACnet object information shall be available for the following objects:
    - a) Load status
    - b) Electrical current
    - c) Total watts per controller
    - d) Schedule state – normal or after-hours
    - e) Demand response control and cap level
    - f) Room occupancy status
    - g) Total room lighting and plug loads watts
    - h) Total room watts/sq ft
    - i) Force on/off all loads
  - 10) UL 2043 plenum rated
  - 11) Manual override and LED indication for each load
  - 12) Dual voltage (120/277 VAC, 60 Hz), or 347 VAC, 60 Hz (selected models only). 120/277 volt models rated for 20A total load, derating to 16A required for some dimmed loads (forward phase dimming); 347 volt models rated for 15A total load; plug load controllers carry application-specific UL 20 rating for receptacle control.
  - 13) Zero cross circuitry for each load
  - 14) All digital parameter data programmed into an individual room controller or plug load controller shall be retained in non-volatile FLASH memory within the controller itself. Memory shall have an expected life of no less than 10 years.
- b. On/Off Room Controllers shall include:
- 1) One or two relay configuration
  - 2) Efficient 150 mA switching power supply
  - 3) Three RJ-45 DLM local network ports with integral strain relief and dust cover
  - 4) WattStopper product numbers: LMRC-101, LMRC-102

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- c. On/Off/Dimming enhanced Room Controllers shall include:
- 1) Real time current monitoring
  - 2) Multiple relay configurations
    - a) One, two or three relays (LMRC-21x series)
    - b) One or two relays (LMRC-22x series)
  - 3) Efficient 250 mA switching power supply
  - 4) Four RJ-45 DLM local network ports with integral strain relief and dust cover
  - 5) One dimming output per relay
    - a) 0-10V Dimming - Where indicated, one 0-10 volt analog output per relay for control of compatible ballasts and LED drivers. The 0-10 volt output shall automatically open upon loss of power to the Room Controller to assure full light output from the controlled lighting. (LMRC-21x series)
    - b) Line Voltage, Forward Phase Dimming - Where indicated, one forward phase control line voltage dimming output per relay for control of compatible two-wire or three-wire ballasts, LED drivers, MLV, forward phase compatible ELV, neon/cold cathode and incandescent loads. (LMRC-22x series)
    - c) Each dimming output channel shall have an independently configurable minimum and maximum calibration trim level to set the dimming range to match the true dynamic range of the connected ballast or driver.
    - d) The LED level indicators on bound dimming switches shall utilize this new maximum and minimum trim.
    - e) Each dimming output channel shall have an independently configurable minimum and maximum trim level to set the dynamic range of the output within the new 0-100% dimming range defined by the minimum and maximum calibration trim.
    - f) Calibration and trim levels must be set per output channel.
    - g) Devices that set calibration or trim levels per controller are not acceptable.
    - h) All configuration shall be digital. Devices that set calibration or trim levels per output channel via trim pots or dip-switches are not acceptable.
  - 6) Each load shall have an independently configurable preset on level for Normal Hours and After Hours events to allow different dimmed levels to be established at the start of both Normal Hours and After Hours events.
  - 7) Fade rates for dimming loads shall be specific to bound switch buttons, and the load shall maintain a default value for any bound buttons that do not specify a unique value.
  - 8) The following dimming attributes may be changed or selected using a wireless configuration tool:
    - a) Establish preset level for each load from 0-100%
    - b) Set high and low trim for each load
    - c) Set lamp burn in time for each load up to 100 hours
  - 9) Override button for each load provides the following functions:
    - a) Press and release for on/off control
    - b) Press and hold for dimming control

- 10) WattStopper product numbers: LMRC-211, LRMC-212, LRMC-213, LMRC-221, LMRC-222
- d. Plug Load Room Controllers shall include:
- 1) One relay configuration with additional connection for unswitched load
  - 2) Configurable additive time delay to extend plug load time delay beyond occupancy sensor time delay (e.g. a 10 minute additive delay in a space with a 20 minute occupancy sensor delay ensures that plug loads turn off 30 minutes after the space is vacated).
  - 3) Factory default operation is Auto-on/Auto-off, based on occupancy
  - 4) Real time current monitoring of both switched and un-switched load (LMPL-201 only)
  - 5) Efficient switching power supply
    - a) 150mA (LMPL-101)
    - b) 250mA (LMPL-201)
  - 6) RJ-45 DLM local network ports
    - a) Three RJ-45 ports (LMPL-101)
    - b) Four RJ-45 ports (LMPL-201)
  - 7) WattStopper product numbers: LMPL-101, LMPL-201.
- e. Fixture Controllers shall include:
- 1) A form factor and product ratings to allow various OEM fixture manufacturers to mount the device inside the ballast/driver cavity of standard-sized fluorescent or LED general lighting fixtures.
  - 2) One 3A 120/277V rated mechanically held relay.
  - 3) Programmable behavior on power up following the loss of normal power:
    - a) Turn on to 100%
    - b) Turn off
    - c) Turn on to last level
  - 4) Requirement for 7 mA of 24VDC operating power from the DLM local network.
    - a) The Fixture Controller does not require a connection to a neutral conductor to operate, and unlike other types of Load Controllers it does not contribute power to the DLM local network to drive accessory devices.
    - b) Power to drive the LMFC Fixture Controller electronics can come from any Room or Plug Load Controller, LMPB-100 Power Booster and/or LMZC-301 Zone Controller (described later in the LMCP LIGHTING CONTROL PANELS specification section).
  - 5) 0-10V dimming capability via a single 0-10 volt analog output from the device for control of compatible ballasts and LED drivers. The 0-10 volt output shall automatically open upon loss of power to the Fixture Controller.
  - 6) Terminals to connect an RJ-45 adaptor with 24" leads, mountable in a 1/2" KO, for connection to the DLM local network.
    - a) The adaptor leads are insulated for use in a fixture cavity, and the lead length allows the OEM fixture manufacturer flexibility to position the Fixture Controller and the RJ45 jack in the best locations on each fixture.
  - 7) A complete set of dimming features described above in the section detailing On/Off/Dimming Enhanced Room Controllers.
  - 8) WattStopper product numbers: Fixture Controller: LMFC-011,



DLM Cable Connector: LMFC-RJ-50-24, Power Booster: LMPB-100

10. DLM Local Network (Room Network)
- a. The DLM local network is a free topology lighting control physical connection and communication protocol designed to control a small area of a building.
  - b. Features of the DLM local network include:
    - 1) Plug n' Go® automatic configuration and binding of occupancy sensors, switches and lighting loads to the most energy-efficient sequence of operation based upon the device attached.
    - 2) Simple replacement of any device in the network with a standard off the shelf unit without requiring commissioning, configuration or setup.
    - 3) Push n' Learn® configuration to change the automatic configuration, including binding and load parameters without tools, using only the buttons on the digital devices in the local network.
    - 4) Two-way infrared communications for control by handheld remotes, and configuration by a handheld tool including adjusting load parameters, sensor configuration and binding, within a line of sight of up to 30 feet from a sensor, wall switch or IR receiver.
  - c. Digital room devices connect to the local network using pre-terminated Cat 5e cables with RJ-45 connectors, which provide both data and power to room devices. Systems that utilize RJ-45 patch cords but do not provide serial communication data from individual end devices are not acceptable.
  - d. If manufacturer's pre-terminated Cat 5e cables are not used for the installation, the Electrical Subcontractor is responsible for testing each cable following installation and supplying manufacturer with test results.
  - e. WattStopper Product Number: LMRJ-Series
11. DLM Segment Network (Room to Room Network)
- a. The segment network shall be a linear topology, BACnet-based MS/TP subnet to connect DLM local networks (rooms) and LMCP relay panels for centralized control.
    - 1) Each connected DLM local network shall include a single network bridge (LMBC-300), and the network bridge is the only room-based device that is connected to the segment network.
    - 2) Network bridges, relay panels and segment managers shall include terminal blocks, with provisions for separate "in" and "out" terminations, for segment network connections.
    - 3) The segment network shall utilize 1.5 twisted pair, shielded, cable supplied by the lighting control manufacturer. The maximum cable run for each segment is 4,000 feet. Conductor-to-conductor capacitance of the twisted pair shall be less than 30 pf/ft and have a characteristic impedance of 120 Ohms.
    - 4) Network signal integrity requires that each conductor and ground wire be correctly terminated at every connected device.
    - 5) Substitution of manufacturer-supplied cable must be pre-approved: Manufacturer will not certify network reliability, and reserves the right to void warranty, if non-approved cable is installed, and if terminations are not completed according to manufacturer's specific requirements.
    - 6) Segment networks shall be capable of connecting to BACnet-compliant BAS (provided by others) either directly, via MS/TP, or through NB-ROUTERS, via BACnet/IP or BACnet/Ethernet.

Systems whose room-connected network infrastructure require gateway devices to provide BACnet data to a BAS are unacceptable.

- b. WattStopper Product Number: LM-MSTP, LM-MSTP-DB
- 12. Hand Held and Computer Configuration Tools
  - a. A wireless configuration tool facilitates optional customization of DLM local networks using two-way infrared communications, while PC software connects to each local network via a USB interface.
  - b. Features and functionality of the wireless configuration tool shall include but not be limited to:
    - 1) Two-way infrared (IR) communication with DLM IR-enabled devices within a range of approximately 30 feet.
    - 2) High visibility organic LED (OLED) display, pushbutton user interface and menu-driven operation.
    - 3) Must be able to read and modify parameters for room controllers, occupancy sensors, wall switches, daylighting sensors, network bridges and relay panels, and identify room devices by type and serial number.
    - 4) Save up to eight occupancy sensor setting profiles, and apply profiles to selected sensors.
    - 5) Temporarily adjust light level of any load(s) on the local network, and incorporate those levels in scene setting. Set room mode for testing of Normal Hours (NH) and After Hours (AH) parameter settings.
    - 6) Adjust or fine-tune daylighting settings established during auto-configuration, and input light level data to complete configuration of open loop daylighting controls.
    - 7) Set room mode for testing of Normal Hours (NH) and After Hours (AH) parameter settings.
    - 8) Verify status of building level network devices.
  - c. WattStopper Product Numbers: LMCT-100, LMCI-100/LMCS-100
- 13. Network Bridge
  - a. The network bridge module connects a DLM local network to a BACnet-compliant segment network for communication between rooms, relay panels and a segment manager or BAS. Each local network shall include a network bridge component to provide a connection to the local network room devices. The network bridge shall use industry standard BACnet MS/TP network communication and an optically isolated EIA/TIA RS-485 transceiver.
    - 1) The network bridge shall be provided as a separate module connected on the local network through an available RJ-45 port.
    - 2) Provide Plug n' Go operation to automatically discover room devices connected to the local network and make all device parameters visible to the segment manager via the segment network. No commissioning shall be required for set up of the network bridge on the local network.
    - 3) The network bridge shall automatically create standard BACnet objects for selected room device parameters to allow any BACnet-compliant BAS to include lighting control and power monitoring features as provided by the DLM room devices on each local network. BACnet objects will be created for the addition or replacement of any given in-room DLM device for the installed life of the system. Products requiring that an application-specific point database be loaded to create or map BACnet objects are not acceptable. Systems not capable of

providing BACnet data for control devices via a dedicated BACnet Device ID and physical MS/TP termination per room are not acceptable. Standard BACnet objects shall be provided as follows:

- a) Read/write the normal or after hours schedule state for the room
  - b) Read the detection state of each occupancy sensor
  - c) Read the aggregate occupancy state of the room
  - d) Read/write the On/Off state of loads
  - e) Read/write the dimmed light level of loads
  - f) Read the button states of switches
  - g) Read total current in amps, and total power in watts through the room controller
  - h) Read/write occupancy sensor time delay, PIR sensitivity and ultrasonic sensitivity settings
  - i) Activate a preset scene for the room
  - j) Read/write daylight sensor fade time and day and night setpoints
  - k) Read the current light level, in footcandles, from interior and exterior photosensors and photocells
  - l) Set daylight sensor operating mode
  - m) Read/write wall switch lock status
  - n) Read watts per square foot for the entire controlled room
  - o) Write maximum light level per load for demand response mode
  - p) Read/write activation of demand response mode for the room
  - q) Activate/restore demand response mode for the room
- b. WattStopper product numbers: LMBC-300
14. Segment Manager
- a. For networked applications, the Digital Lighting Management system shall include at least one segment manager to manage network communication. It shall be capable of serving up a graphical user interface via a standard web browser utilizing either unencrypted TCP/IP traffic via a configurable port (default is 80) or 256 bit AES encrypted SSL TCP/IP traffic via a configurable port (default is 443).
  - b. Each segment manager shall have integral support for at least three segment networks. Segment networks may alternately be connected to the segment manager via external routers and switches, using standard Ethernet structured wiring. Each router shall accommodate one segment network. Provide the quantity of routers and switches as shown on the plans.
  - c. Operational features of the Segment Manager shall include the following:
    - 1) Connection to PC or LAN via standard Ethernet TCP/IP via standard Ethernet TCP/IP with the option to use SSL encrypted connections for all traffic.
    - 2) Easy to learn and use graphical user interface, compatible with Internet Explorer 8, or equal browser. Shall not require installation of any lighting control software to an end-user PC.
    - 3) Log in security capable of restricting some users to view-only or other limited operations.
    - 4) Segment Manager shall provide two main sets of interface screens – those used to initially configure the unit (referred to as the config screens), and a those used to allow users to dynamic monitor the performance of their system, and provide a

centralized scheduling interface. Capabilities using the Config Screens shall include:

- a) Automatic discovery of DLM devices and relay panels on the segment network(s). Commissioning beyond activation of the discovery function shall not be required to provide communication, monitoring or control of all local networks and lighting control panels.
  - b) Allow information for all discovered DLM devices to be imported into the Segment Manager via a single XML based site file from the WattStopper LMCS Software, significantly reducing the time needed to make a system usable by the end user. Importable information can include text descriptions of every DLM component and individual loads, and automatic creation of room location information and overall structure of DLM network. Info entered into LMCS should not have to be re-entered manually via keystrokes into the Segment Manager.
  - c) After discovery, all rooms and panels shall be presented in a standard navigation tree format. Selecting a device from the tree will allow the device settings and operational parameters to be viewed and changed by the user.
  - d) Ability to view and modify room device operational parameters. It shall be possible to set device parameters independently for normal hours and after hours operation including sensor time delays and sensitivities, and load response to sensor including Manual-On or Auto-On.
  - e) Provide capabilities for integration with a BAS via BACnet protocol. At a minimum, the following points shall be available to the BAS via BACnet IP connection to the segment manager: room occupancy state; room schedule mode; room switch lock control; individual occupancy sensor state; room lighting power; room plug-load power; load ON/OFF state; load dimming level; panel channel schedule state; panel relay state; and Segment Manager Group schedule state control. Any of above items shall be capable of being moved into an "Export Table" that will provide any integrator with only the data they need, and by using the Export Table effectively create a firewall between the integrator's request for info and the overall system performance.
- 5) Capabilities using the Segment Manager's Dashboard Screens shall include:
- a) A dynamic "tile" based interface that allows easy viewing of each individual room's lighting and plug load power consumption, and lighting and plug load power density (power consumption information requires Enhanced DLM Room and Plug Load Controllers with integral current transducers such as LMRC-21x). Tiles will be automatically organized according to location so a single tile for the building summarizes all information for tiles beneath it on every floor, in every area, in every room. Tiles shall be color coded based on three energy target parameters, allowing an owner to quickly identify rooms

- that are not performing efficiently. Tiles for rooms with occupancy sensors shall include an icon to indicate whether that room is occupied. Tiles shall be clickable, and when clicked the underlying hierarchical level of tiles shall become visible. The tile interface shall be accessible via mouse, or touch screen devices. Tiles shall be created automatically by the segment manager, based on the information found during the device discovery and/or information included in a file imported in from LMCS (such as tagged descriptions for each room) without any custom programming.
- b) Ability to set up schedules for rooms and panels, view and override current status of panel channels and relays, and assign relays to groups. Schedules shall automatically set controlled zones or areas to either a normal hours or after hours mode of operation. Support for a minimum of 100 unique schedules, each with up to four time events per day. Support for annual schedules, holiday schedules and unique date-bound schedules.
  - c) Ability to provide a simple time vs. power graph based on information stored in each Segment Manager's memory (typically two to three days' data).
  - d) Ability to group rooms and loads for common control by schedules, switches or network commands.
  - e) Ability to monitor connected load current and display power consumption for areas equipped with room controllers incorporating the integral current monitoring feature.
  - f) Provide capabilities for integration with a BAS via BACnet protocol. At a minimum, the following points shall be available to the BAS via BACnet IP connection to the segment manager: room occupancy state; room schedule mode; room switch lock control; individual occupancy sensor state; room lighting power; room plug-load power; load ON/OFF state; load dimming level; panel channel schedule state; panel relay state; and Segment Manager Group schedule state control.
- 6) If shown in the contract drawings, Segment Managers shall be integrated into a larger control network by the addition of a Network Supervisor package. The Supervisor is a server level computer running a version of the Segment Manager interface software with dedicated communication and networking capability, able to pull information automatically from each individual Segment Manager in the network. By using a Supervisor, information for individual Segment Managers can be accessed and stored on the Supervisor's hard drive, eliminating the risk of data being overwritten after a few days because of Segment Manager memory limits.
  - 7) The Segment Manager shall allow access and control of the overall system database via Native Niagara AX FOX connectivity. Systems that must utilize a Tridium Niagara controller in addition to the programming, scheduling and configuration server are not acceptable.
- d. Segment Manager shall support multiple DLM rooms as follows:
    - 1) Support up to 120 network bridges and 900 digital in-room

- devices (LMSM-3E).
  - 2) Support up to 300 network bridges and 2,200 digital in room devices, connected via network routers and switches (LMSM-6E).
  - e. WattStopper Product Numbers: LMSM-3E, LMSM-6E, NB-ROUTER, NB-SWITCH, NB-SWITCH-8, NB-SWITCH-16.
15. Programming, Configuration and Documentation Software
- a. PC-native application for optional programming of detailed technician-level parameter information for all DLM products, including all parameters not accessible via BACnet and the handled IR configuration tool. Software must be capable of accessing room-level parameter information locally within the room when connected via the optional LMCI-100 USB programming adapter, or globally for many segment networks simultaneously utilizing standard BACnet/IP communication.
  - b. Additional parameters exposed through this method include but are not limited to:
    - 1) Occupancy sensor detection LED disable for performance and other aesthetic spaces where blinking LEDs present a distraction.
    - 2) Six occupancy sensor action behaviors for each controlled load, separately configurable for normal hours and after hours modes. Modes include: No Action, Follow Off Only, Follow On Only, Follow On and Off, Follow On Only with Override Time Delay, Follow Off Only with Blink Warn Grace Time, Follow On and Off with Blink Warn Grace Time.
    - 3) Separate fade time adjustments per load for both normal and after hours from 0 - 4 hours.
    - 4) Configurable occupancy sensor re-trigger grace period from 0 - 4 minutes separate for both normal hours and after hours.
    - 5) Separate normal hours and after hours per-load button mode with modes including: Do nothing, on only, off only, on and off.
    - 6) Load control polarity reversal so that on events turn loads off and vice versa.
    - 7) Per-load DR (demand response) shed level in units of percent.
    - 8) Load output pulse mode in increments of 1 second.
    - 9) Fade trip point for each load for normal hours and after hours that establishes the dimmer command level at which a switched load closes its relay to allow for staggered On of switched loads in response to a dimmer.
  - c. Generation of reports at the whole file, partial file, or room level. Reports include but are not limited to:
    - 1) Device list report: All devices in a project listed by type.
    - 2) Load binding report: All load controller bindings showing interaction with sensors, switches, and daylighting.
    - 3) BACnet points report: Per room Device ID report of the valid BACnet points for a given site's BOM.
    - 4) Room summary report: Device manifest for each room, aggregated by common BOM, showing basic sequence of operations.
    - 5) Device parameter report: Per-room lists of all configured parameters accessible via hand held IR programmer for use with O&M documentation.
    - 6) Scene report: All project scene pattern values not left at defaults (i.e. 1 = all loads 100%, 2 = all loads 75%, 3 = all loads 50%, 4 = all loads 25%, 5-16 = same as scene 1).

- d. Occupancy sensor report: Basic settings including time delay and sensitivity(ies) for all occupancy sensors.  
Network-wide programming of parameter data in a spreadsheet-like programming environment including but not limited to the following operations:
    - 1) Set, copy/paste an entire project site of sensor time delays.
    - 2) Set, copy/paste an entire project site of sensor sensitivity settings.
    - 3) Search based on room name and text labels.
    - 4) Filter by product type (i.e. LMRC-212) to allow parameter set by product.
    - 5) Filter by parameter value to search for product with specific configurations.
  - e. Network-wide firmware upgrading remotely via the BACnet/IP network.
    - 1) Mass firmware update of entire rooms.
    - 2) Mass firmware update of specifically selected rooms or areas.
    - 3) Mass firmware upgrade of specific products.
  - f. WattStopper Product Number: LMCS-100, LMCI-100
16. LMCP Lighting Control Panels and LMZC Zone Controller
- a. Provide lighting control panels in the locations and capacities as indicated on the plans and schedules. Each panel shall be of modular construction and consist of the following components:
    - 1) Enclosure/Tub shall be NEMA 1, sized to accept an interior with 1 - 8 relays, 1 - 24 relays and 6 four-pole contactors, or 1 - 48 relays and 6 four-pole contactors.
    - 2) Cover shall be configured for surface or flush wall mounting of the panel as indicated on the plans. The panel cover shall have a hinged and lockable door with restricted access to line voltage section of the panel.
    - 3) Interior assembly shall be supplied as a factory assembled component specifically designed and listed for field installation. The interior construction shall provide total isolation of high voltage (Class 1) wiring from low voltage (Class 2) wiring within the assembled panel. The interior assembly shall include intelligence boards, power supply, DIN rails for mounting optional Class 2 control devices, and individually replaceable latching type relays. The panel interiors shall include the following features:
      - a) Removable, plug-in terminal blocks with connections for all low voltage terminations.
      - b) Individual terminal block, override pushbutton, and LED status light for each relay.
      - c) Direct wired switch inputs associated with each relay shall support 2-wire momentary switches only.
      - d) Digital inputs (four RJ-45 jacks) shall support 1-, 2-, 3-, 4-, and 8-button digital switches; digital IO modules capable of receiving 0-5V or 0-10V analog photocell inputs; digital IO modules capable of receiving momentary or maintained contact closure inputs or analog sensor inputs; digital daylighting sensors; and digital occupancy sensors. Inputs are divided into two separate digital networks, each capable of supplying 250mA to connected devices.
      - e) True relay state shall be indicated by the on-board LED and shall be available to external control devices and

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- systems via BACnet.
- f) Automatically sequenced operation of relays to reduce impact on the electrical distribution system when large loads are controlled simultaneously.
  - g) Group and pattern control of relays shall be provided through a simple keypad interface from a handheld IR programmer. Any set of relays can be associated with a group for direct on/off control or pattern (scene) control via a simple programming sequence using the relay override pushbuttons and LED displays for groups 1-8 or a handheld IR programmer for groups 1-99.
  - h) Relay group status shall be provided through LED indicators for groups 1-8 and via BACnet for groups 1-99. A solid LED indicates that the last group action called for an ON state and relays in the group are on or in a mixed state.
- 4) Single-pole latching relays with modular plug-in design. Relays shall provide the following ratings and features:
- a) Electrical:
    - i. 30 amp ballast at 277V
    - ii. 20 amp ballast at 347V
    - iii. 20amp tungsten at 120V
    - iv. 30 amp resistive at 347V
    - v. HP motor at 120V
    - vi. 14,000 amp short circuit current rating (SCCR) at 347V
    - vii. Relays shall be specifically UL 20 listed for control of plug-loads
  - b) Mechanical:
    - i. Replaceable, 1/2" KO mounting with removable Class 2 wire harness.
    - ii. Actuator on relay housing provides manual override and visual status indication, accessible from Class 2 section of panel.
    - iii. Dual line and load terminals each support two #14 - #12 solid or stranded conductors.
    - iv. Tested to 300,000 mechanical on/off cycles.
- 5) Isolated low voltage contacts provide for true relay status feedback and pilot light indication.
- 6) Power supply shall be a multi-voltage transformer assembly with rated power to supply all electronics, occupancy sensors, switches, pilot lights, and photocells as necessary to meet the project requirements. Power supply to have internal over-current protection with automatic reset and metal oxide varistor protection.
- 7) Where indicated, lighting control panels designated for control of emergency lighting shall be provided with factory installed provision for automatic by pass of relays controlling emergency circuits upon loss of normal power. Panels shall be properly listed and labeled for use on emergency lighting circuits and shall meet the requirements of UL924 and NFPA 70 - Article 700.
- 8) Integral system clock shall provide scheduling capabilities for panel-only projects without DLM segment networks or BAS

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- control.
- a) Each panel shall include digital clock capability able to issue system wide automation commands to up to (11) eleven other panels for a total of (12) twelve networked lighting control panels. The clock shall provide capability for up to 254 independent schedule events per panel for each of the ninety-nine system wide channel groups.
  - b) The clock capability of each panel shall support the time-based energy saving requirements of applicable local energy codes.
  - c) The clock module shall provide astronomic capabilities, time delays, blink warning, daylight savings, and holiday functions and will include a battery back up for the clock function and program retention in non-volatile FLASH memory. Clocks that require multiple events to meet local code lighting shut off requirements shall not be allowed.
  - d) The clock capability of each panel shall operate on a basis of ON/OFF or Normal Hours/After Hours messages to automation groups that implement pre-configured control scenarios. Scenarios shall include:
    - i. Scheduled ON / OFF
    - ii. Manual ON / Scheduled OFF
    - iii. Astro ON / OFF (or Photo ON / OFF)
    - iv. Astro and Schedule ON / OFF (or Photo and Schedule ON / OFF)
  - e) The user interface shall be a portable IR handheld remote control capable of programming any panel in the system (LMCT-100)
  - f) The clock capability of each panel shall employ non-volatile memory and shall retain user programming and time for a minimum of 10 years.
  - g) Schedules programmed into the clock of any one panel shall be capable of executing panel local schedule or Dark/Light (photocell or Astro) events for that panel in the event that global network communication is lost. Lighting control panels that are not capable of executing events independently of the global network shall not be acceptable.
- 9) The lighting control panel can operate as a stand-alone system, or can support schedule, group, and photocell control functions, as configured in a Segment Manager controller, via a segment network connection.
- 10) The lighting control panel shall support digital communications to facilitate the extension of control to include interoperation with building automation systems and other intelligent field devices. Digital communications shall be RS485 MS/TP-based using the BACnet® protocol.
- a) The panel shall have provision for an individual BACnet device ID and shall support the full 222 range (0 – 4,193,304). The device ID description property shall be writable via the network to allow unique identification of the lighting control panel on the network.
  - b) The panel shall support MS/TP MAC addresses in the range of 0 – 127 and baud rates of 9600k, 38400k,

- 76800k, and 115.2k bits per second.
- c) Lighting control relays shall be controllable as binary output objects in the instance range of 1 – 64. The state of each relay shall be readable and writable by the BAS via the object present value property.
  - d) Lighting control relays shall report their true on/off state as binary input objects in the instance range of 1 – 64.
  - e) The 99 group Normal Hours/After Hours control objects associated with the panel shall be represented by binary value objects in the instance range of 201 – 299. The occupancy state of each channel group shall be readable and writable by the BAS via the object present value property. Commanding 1 to a channel group will put all relays associated with the channel into the normal hours mode. Commanding 0 or NULL shall put the relays into the after hours mode.
  - f) Setup and commissioning of the panel shall not require manufacturer-specific software or a computer. All configuration of the lighting control panel shall be performed using standard BACnet objects or via the handheld IR programming remote. Provide BACnet objects for panel setup and control as follows:
    - i. Binary output objects in the instance range of 1 – 64 (one per relay) for on/off control of relays.
    - ii. Binary value objects in the instance range of 1 – 99 (one per channel) for normal hours/after hours schedule control.
    - iii. Binary input objects in the instance range of 1 – 64 (one per relay) for reading true on/off state of the relays.
    - iv. Analog value objects in the instance range of 101 – 199 (one per channel group) shall assign a blink warn time value to each channel. A value of 5 shall activate the blink warn feature for the channel and set a 5-minute grace-time period. A value of 250 shall activate the sweep feature for the channel and enable the use of sweep type automatic wall switches.
  - g) The description property for all objects shall be writable via the network and shall be saved in non-volatile memory within the panel.
  - h) The BO and BV 1 – 99 objects shall support BACnet priority array with a relinquish default of off and after hours respectively. Prioritized writes to the channel BV objects shall propagate prioritized control to each member relay in a way analogous to the BACnet Channel object.
  - i) Panel-aggregate control of relay Force Off at priority 2 shall be available via a single BV5 object. Force On at priority 1 shall be available via a single BV4 object.
  - j) Lockout of all digital switch buttons connected to a given panel shall be command-able via a single BV2 object. The lock status of any connected switch station shall be represented as BV101-196.
- 11) In addition to the LMCP Relay Panels, an LMZC Zone Controller

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panel shall be available for zero-relay applications. The panel is designed for applications where LMFC-011 Fixture Controllers or other distributed load controllers are used to switch and/or dim the controlled loads. Key similarities to and differences from the LMCP panel design shall include:

- a) The LMZC shall use the same intelligence board as the LMCP relay panel.
  - b) The LMZC shall not include relay driver boards or relays.
  - c) The LMZC shall have a removable interior section to facilitate installation, and a Tub/Cover. Cover is for surface mounting applications only.
  - d) The LMZC tub shall have two interior KOs to allow installation of LMPB-100 Power Boosters. Each installed Power Booster can provide an additional 150 mA for either of the two available DLM local networks provided by the LMZC.
  - e) All programming and networking (whether DLM Local Network and/or Segment Network) capabilities in the LMZC Zone Controller shall be similar to capabilities for LMCP relay panels, except for functions designed for panel-mounted HDR relays.
- 12) To aid in project start up, if LMFC Fixture Controllers are connected to an LMZC Zone Controller, Plug n' Go automatic configuration will establish a unique sequence of operation so that all LMFC-controlled fixtures will turn on to 50% output when any digital occupancy sensor detects motion.
- 13) WattStopper Product Number: Relay Panels: LMCP8, LMCP24 or LMCP48, Zone Controller: LMZC-301.
- b. User Interface
- 1) Each lighting control panel system shall be supplied with at least (1) handheld configuration tool (LMCT-100). As a remote programming interface the configuration tool shall allow setup, configuration, and diagnostics of the panel without the need for software or connection of a computer. The user interface shall have the following panel-specific functions as a minimum:
    - a) Set network parameters including panel device ID, MS/TP MAC address, baud rate and max master range.
    - b) Relay Group creation of up to 99 groups. Group creation shall result in programming of all seven key relay parameters for member relays. The seven parameters are as follows: After-hours Override Time Delay, Normal Hours Override Time Delay, Action on Transition to Normal Hours, Action on Transition to After Hours, Sensor Action During Normal Hours, Sensor Action During After Hours, Blink-Warn Time for After Hours.
    - c) Program up to 254 separate scheduled events. Events shall occur on seven day intervals with each day selectable as active or inactive, and shall be configurable as to whether the event is active on holidays. Holidays are also defined through the User Interface.
    - d) Program up to 32 separate Dark/Light events. Events shall have a selectable source as either calculated Astro with delay, or a digital IO module with an integral 0-5V or

0-10V analog photocell. Dark/Light events shall occur on seven day intervals with each day selectable as active or inactive, and shall be configurable as to whether the event is active on holidays.

- e) Button binding of digital switches to groups shall be accessible via the handheld IR remote and accomplished from the digital switch station.
  - f) Programming of panel location information shall be accomplished by the handheld IR remote and include at a minimum LAT, LON, DST zone, and an approximate city/state location.
  - g) An additional handheld IR remote may optionally be specified to be permanently mounted to the panel interior via a retractable anti-theft lanyard to allow for convenient programming of the panel while assuring that the handheld programmer is always present at that panel. An unlimited number of handheld IR remotes may also be purchased for facilities staff as determined by the end user's representative.
  - h) WattStopper Product Number: LMCT-100
17. Emergency Lighting Control Devices
- a. Emergency Lighting Control Unit – A UL 924 listed device that monitors a switched circuit providing normal lighting to an area. The unit provides normal ON/OFF control of emergency lighting along with the normal lighting. Upon normal power failure the emergency lighting circuit will close, forcing the emergency lighting ON until normal power is restored. Features include:
    - 1) 120/277 volts, 50/60 Hz, 20 amp ballast rating
    - 2) Push to test button
    - 3) Auxiliary contact for remote test or fire alarm system interface
  - b. WattStopper Product Numbers: ELCU-100, ELCU-200.

### C. Part 3 – Execution

- 1. Pre-Installation Meeting
  - a. A factory authorized manufacturer's representative shall provide the Electrical Subcontractor a functional overview of the lighting control system prior to installation. The Electrical Subcontractor shall schedule the pre-installation site visit after receipt of approved submittals to review the following:
    - 1) Confirm the location and mounting of all digital devices, with special attention to placement of occupancy and daylighting sensors.
    - 2) Review the specifications for low voltage control wiring and termination.
    - 3) Discuss the functionality and configuration of all products, including sequences of operation, per design requirements.
    - 4) Discuss requirements for integration with other trades.
- 2. Electrical Subcontractor Installation Services
  - a. Electrical Subcontractor to install all devices and wiring in a professional manner. All line voltage connections to be tagged to indicate circuit and switched legs.
  - b. Electrical Subcontractor to install all room/area devices using manufacturer's factory-tested Cat 5e cable with pre-terminated RJ-45 connectors. If pre-terminated cable is not used for room/area wiring, the Electrical Subcontractor is responsible for testing each field-terminated

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- cable following installation, and shall supply the lighting controls manufacturer with test results. Electrical Subcontractor to install any room to room network devices using manufacturer-supplied LM-MSTP network wire. Network wire substitution is not permitted and may result in loss of product warranty per DLM SEGMENT NETWORK section of specification. Low voltage wiring topology must comply with manufacturer's specifications. Electrical Subcontractor shall route network wiring as shown in submittal drawings as closely as possible, and shall document final wiring location, routing and topology on as built drawings.
- c. Install the work of this Section in accordance with manufacturer's printed instructions unless otherwise indicated. Before start up, Electrical Subcontractor shall test all devices to ensure proper communication.
  - d. Calibrate all sensor time delays and sensitivity to guarantee proper detection of occupants and energy savings.
    - 1) Adjust time delay so that controlled area remains lighted while occupied.
  - e. Provide written or computer-generated documentation on the configuration of the system including room by room description including:
    - 1) Sensor parameters, time delays, sensitivities, and daylighting setpoints.
    - 2) Sequence of operation, (e.g. manual ON, and Auto OFF)
    - 3) Load Parameters (e.g. blink warning)
  - f. Post start-up tuning – After 30 days from occupancy Electrical Subcontractor shall adjust sensor time delays and sensitivities to meet the Owner's requirements. Provide a detailed report to the Architect / Owner of post start-up activity.
3. Factory Services
- a. Upon completion of the installation, the manufacturer's factory authorized representative shall start up and verify a complete fully functional system.
    - 1) Lighting vendor shall provide a copy of its start-up protocol to the Electrical Subcontractor and the Commissioning Agent no later than three weeks prior to the start-up date.
  - b. The electrical Electrical Subcontractor shall provide both the manufacturer and the electrical engineer with three weeks written notice of the system start up and adjustment date.
    - 1) Lighting vendor shall conduct a field inspection of all lighting devices and verify their operation during start-up.
    - 2) Lighting vendor shall submit a written start-up report no later than one week after start-up completion and prior to system training.
  - c. Upon completion of the system start up, the factory-authorized technician shall provide the proper training to the owner's personnel on the adjustment and maintenance of the system.
4. Commissioning Support Services
- a. On this project, a commissioning agent will be hired to verify the installation and programming of all building systems, which includes the lighting control system. Manufacturer should include an extra day of technician's time to review the functionality and settings of the lighting control hardware with the commissioning agent, including reviewing submittal drawings and ensuring that instructions on how to configure each device are readily available. Manufacturer is NOT responsible for helping the commissioning agent perform the sample checkout of the devices and system as required for the commissioning agent's functional

test scope. It will be the commissioning agent's responsibility to create and complete any forms required for the commissioning process, although the manufacturer or Electrical Subcontractor may offer spreadsheets and/or printouts to assist the agent with this task.

- b. The commissioning agent shall work with the Electrical Subcontractor during installation of the lighting control hardware to become familiar with the specific products. The agent may also accompany the manufacturer's technicians during their start-up work to better understand the process of testing, calibration and configuration of the products. However, the Electrical Subcontractor and manufacturer shall ensure that interfacing with the agent does not prevent them from completing the requirements outlined in the contract documents.

## 2.6 ELECTRICAL SUPPORTING DEVICES

- A. All conduit and fittings on all work are to be secured by one or more of the following:
  1. Masonry - metal clips secured by toggle bolts or lead expansion sleeves.
  2. Woodwork - metal clips secured by wood screws.
  3. Bar joists - wedge hangers.
  4. Flanged beams - flange clips.
- B. All pipe hangers and equipment supports shall be constructed and installed in accordance with Seismic Zone requirements as outlined in the State Building Code. The Electrical Subcontractor shall submit one (1) copy of Shop Drawings and calculations detailing seismic hanger restraints to the local Building Authority and Architect, along with a letter of compliance signed by a registered structural engineer confirming that the piping hangers meet State Seismic Code requirements. Cable provided for seismic systems shall be color-coded and pre-stressed.

## 2.7 FANS (DESTRATIFICATION)

- A. Provide as shown on the plans, non-power overloading ceiling mounted destratification fan(s). Fan(s) shall be of the specified size, arrangement and capacity. Fan(s) having tip velocities greater or requiring horsepower greater than those identified as the Project Standard will not be acceptable.
- B. The fans shall bear the AMCA certified ratings seals for both air and sound performance. Fan ratings shall be based upon tests performed in strict accordance with AMCA Standard 210-67 test code for air moving devices. Each fan shall carry near the manufacturer's nameplate, the seal authorized by AMCA indicating that ratings are certified. Fans not bearing this seal will not be acceptable.
- C. Each fan shall have tagging identification engraved on the manufacturer's nameplate. Units shall be manufactured by Leading Edge No. 56201A, or equal as manufactured by Cook or Peerless.
- D. Propeller Criteria:
  1. Blades diameter shall be 56" and shall be constructed of die formed, aerodynamically contoured steel. Each blade shall have a high tensile steel bracket spot welded in a minimum three (3) point suspension formation, ground smooth following assembly. Bracket shall anchor its blade to the motor rotor assembly using a minimum of two (2) machine screws to support maintainability.
  2. Blades shall be finished in epoxy enamel finish over electro-statically applied epoxy powder primer, color white. Blade sets shall be weight matched to within

- two (2) grams tolerance and shall be statically and dynamically balanced following the coating and assembly processes.
3. Fans to be installed less than ten feet (10') above the floor shall have rolled edge blades a minimum of 3/16 inches in thickness in conformance with U.L. Standard 507.
- E. Motor Criteria:
1. Each fan motor shall be sized to drive its fan. Whenever starting requirements exceed operating requirements, the motor shall be selected large enough to start the fan without overheating.
  2. No motor shall operate within the service factor range.
  3. Motor shall be of the heavy duty, fixed shaft-rotating housing type carefully matched to the fan load. Motor shall be premium efficiency, 0.91 minimum power factor, poly-phase or single phase as identified on the Drawings.
  4. Motor shall be suitable for use with solid state motor speed controllers. Provide embedded automatic-reset type thermal overload protection. Fans to be so labeled in accordance with U.L. Standard 507.
  5. Motor shaft shall be steel bar rod, cold-drawn, minimum 5/8 inches in diameter. Shaft shall incorporate the necessary holes to incorporate down-rod assembly mounting and secondary safety cable mounting simultaneously.
- F. Bearings:
1. Bearings shall be of the self-aligning, heavy duty, permanently sealed and greased chrome steel ball type.
  2. The bearings shall be of sufficient size and quality to have AFBMA B50 rated lives in excess of 100,000 hours at maximum cataloged fan operating conditions.
- G. Motor rotor/housing assemblies shall be of formed steel construction, deep drawn to provide air space for motor heat dissipation. Housing shall be finished in epoxy enamel finish over electro-statically applied epoxy powder primer.
- H. Down-rod Assembly:
1. Down-rod assembly shall consist of 3/4 inch nominal outer diameter steel pipe finished in epoxy enamel finish over electro-statically applied epoxy powder primer.
  2. Upper shackle shall secure directly to the down-rod, shall consist of nominal 1/8 inch thick formed, plated steel, and shall be rubber bushed to provide a resilient floating suspension for the mounting hook.
  3. Lower yoke shall secure directly to the down-rod and shall consist of nominal 1/8 inch thick formed, plated steel. Yoke shall provide primary support directly to the motor shaft and shall provide space for the secondary support cabling.
- I. Fan accessories shall include:
1. Factory installed secondary support assembly connected to motor shaft with minimum six (6) feet of 1/8 inch 7x7 galvanized cable. Rated breaking strength shall be 920 lbs. minimum.
  2. Totally enclosing fan guard of twelve (minimum) spoke across bar construction:
    - a. Radial Bars – 5 gauge.
    - b. Circumferential Bars – 5 gauge on three (3) inch centers.
    - c. Heavy duty 16 gauge mounting brackets shall secure the fan guard assembly directly to the fan down rod assembly. Provide a secondary support assembly connected to fan guard mounting brackets with minimum six (6) feet of 3/32 inch 7x7 galvanized cable. Rated breaking strength shall be 920 lbs. minimum.

3. U.L. listed solid state motor speed controller shall incorporate infinite speed control with positive "Off" position. Controller shall incorporate 8 ampere rated (minimum triacs and solid copper wire toroidal choke-type RFI suppression circuitry.
- J. Provide connection from each destratification fan to the fire alarm system via monitor module for shutdown.

## 2.8 FIRE ALARM SYSTEM (EXTENSION OF EXISTING)

- A. The present building is equipped with a selective coded/non-coded fire alarm system manufactured by Edwards. The new fire alarm system shall be an extension of this system, integrated to provide a complete single fire alarm system.
- B. Furnish and install an addition to the existing closed circuit, electrically supervised automatic and manual, (zone coded) local energy, auxiliary fire alarm system, according to the following Specification. The system shall be wired, connected, tested and left in first class operating condition. The equipment and completed installation shall be in compliance with local and national codes, authorities having jurisdiction and in accordance with applicable sections of the latest edition of NFPA 72 for auxiliary fire alarm systems. All equipment shall be listed by Underwriters' Laboratories, Incorporated and shall meet Americans with Disabilities Act (ADA), NFPA72 and with the approval of the State Fire Marshal.
- C. Electrical Subcontractor shall provide an allowance for fire watches in his bid. If the existing system is off-line for more than 4 hours the Electrical Subcontractor shall be responsible to negotiate with local AHJ for hours, fees and number of personnel to perform the fire watch with associated project. No additional compensations shall be permitted.
- D. All new equipment shall be provided by the manufacturer of the existing equipment for complete number compatibility with the existing system and to provide one (1) manufacturer with total responsibility for the entire system operation, warranty and maintenance. No other manufacturer will be considered acceptable. Match existing devices to whatever extent is possible. Should the Electrical Subcontractor determine that the existing system may not be expanded to accommodate the devices indicated on the drawings, the Electrical Subcontractor shall furnish and install the complete replacement system in their base bid. Additional compensation will not be awarded if system upgrades or replacements are required by the existing system manufacturer. Perform a site visit prior to the submission of bids as needed to determine expandability of the existing system.
- E. All final connections, programming, testing and adjusting of the system shall be done under the direct supervision of the system supplier. After completion of the installation, a trained technician employed by the system supplier shall demonstrate the system to be satisfaction of the Owner's Representative and shall make all additional adjustments to the system operation as required by the Owner's Representative as a result of this demonstration.
- F. Warrant the new equipment to be free from defects in material and workmanship and within one (1) year from date of installation, repair or replace all or any part of the equipment found to be defective at no cost to the Owner.
- G. Shop Drawings
  1. System Shop Drawings are required to be prepared by a NICET 3 and reviewed and signed by a NICET 4 then submitted for approval. Submittals shall contain the following information:



- a. A detailed list of each new piece of equipment with model numbers for each component.
- b. Manufacturer's Specification Sheets on each item of equipment.
- c. Confirmation that the manufacturer's representative will provide jobsite supervision during the installation of the system, perform the final testing of the system and instruct the operating personnel on the operation of the system.
- d. Detailed one (1) line schematic wiring diagrams of the system and its interconnecting wiring. Typical wiring diagram will not be accepted. All data submitted shall be complete for all equipment and shall apply only to this specific project. All extraneous material shall be deleted.
- e. Provide revised battery and circuit calculations reflecting all new and existing devices. Circuit calculations shall demonstrate proper consideration of wire size, circuit loading and spare capacity allowances.
- f. Shop Drawings that are submitted for approval without all of this information will not be considered for approval.

#### H. Operation

1. The activation of any manual fire alarm station or the automatic actuation of any thermal detector, ceiling smoke detector, duct smoke detector, sprinkler system water flow switch or any other approved alarm initiating device shall immediately result in the following:
  - a. The existing city circuit shall trip, causing the Fire Department to be notified.
  - b. The zone in alarm shall light its respective alarm lamp or display the appropriate alarm message on the system LCD at the fire alarm control panel and at all remote fire alarm annunciators.
  - c. All audible alarm signals (existing and new) shall sound, and all visual units shall flash in a synchronized fashion.
  - d. All smoke doors (existing and new) shall automatically close.
  - e. Upon activation of an elevator lobby smoke detector or other designated recall device, recall all elevators to the ground floor or an alternate level as required by the local authority having jurisdiction. Provide for damper control and fire fighters hat illumination as shown and in accordance with applicable codes.
  - f. Existing control by event operations and I/O sequences shall remain unchanged and new devices shall perform in accordance with existing operation.
2. Certain duct smoke detectors shall activate damper control circuits as indicated in addition to their fire alarm system function.
3. Provide 24 volt DC power to the new LCN door closers from the fire alarm control panel.

#### I. Equipment

1. Fire Alarm Control Panel
  - a. Modify and expand the existing fire alarm control panel to provide for proper system operation from both new and existing devices. Provide new control panel modules incorporated into the existing cabinets, with 200 percent extra cabinet capacity for future system expansion capability. The operating controls and zone and supervisory indicators shall be located behind a locked door with a full size tempered glass viewing window. All control modules shall be labeled, all zone locations shall be identified and the panel shall be provided with a set of permanently mounted operating

- instructions. The panel shall contain the following modules.
- b. A control module shall be provided to act as a central processing and indicating location for the fire alarm system. It shall include acknowledge, reset, LED test and trouble silence switches, annunciator trouble, system trouble and earth LED's and a trouble sonalert and an alphanumeric LCD. The control module shall also be provided with an alarm resound feature to permit subsequent alarms to resound the signals.
  - c. Provide Class A Style Y loop style alarm initiating circuit modules with two (2) electrically supervised, normally open circuits, monitoring for alarm (shorts), trouble (opens) and ground faults. The modules shall provide alarm and trouble LED's, LED test (from control), alarm annunciator outputs and alarm resound with flasher acknowledge (from control). They shall also be equipped with zone test and disconnect switches which match the existing configuration. They shall allow the mixing of smoke detectors, heat detectors, flow switches and other initiation devices on the same zone, without the use of limiting resistors at manual stations and detectors and without using a separate source of power for the detectors.
  - d. Provide Class "A" four (4) wire loop style notification appliance circuit modules for control and supervision of the audible and visual signals. Each signal circuit shall have a trouble LED and fuse. Supervision shall be provided for opens, shorts and earth grounds.
  - e. Provide adequate power supply module supplying 6 amperes each of continuous filtered power. The power supply shall be capable of furnishing the system power and power for devices such as duct smoke detectors, auxiliary relays, door holders, and notification appliances, etc. It shall contain a normal power LED, battery trouble LED and power supply trouble LED, all viewable on front of enclosure. Where power supplies are in separate or remote enclosures, they shall be supervised by the FACP for loss of AC power, battery fail, and ground fault, and each notification appliance circuit served shall be individually supervised.
  - f. Provide terminal connectors and harnesses for field connections of remote annunciators, or for the modules' auxiliary contacts. Each connector shall have provisions for at least sixteen (16) separate points and shall be fastened securely on the rack end.
  - g. Provide any and all modules and modifications including system programming to the fire alarm control panel necessary for proper system operation.
  - h. Remote Annunciators
    - 1) Modify the existing annunciators to provide capacity for the new fire alarm zones.
    - 2) Provide additional modules for zone annunciation to match existing.
  - i. Manual Fire Alarm Stations
    - 1) Match existing double action, semi-flush, non-coded stations shall be furnished where shown on Plans. A downward pull of the lever shall actuate a positive snap action switch. Station shall remain actuated until the station is reset by means of a key furnished with each station.
  - j. Thermal Detectors
    - 1) Furnish and install, where shown, the following low profile, matte white:
      - a) 135°F rate of rise fixed temperature type.

- b) 190°F fixed temperature type.
- k. Smoke Detectors
  - 1) Furnish and install, where indicated on the Plans, microprocessor-based analog/addressable photoelectric smoke detectors which match existing devices.
  - 2) Detectors shall be listed by Underwriters' Laboratories, Incorporated under the current standards for photoelectric type smoke detectors, UL 268.
  - 3) Each detector shall be designed to latch into alarm following a predetermined alarm verification time allowance. An alarm condition shall be indicated by a red LED indicator. Supervised remote LED alarm indicators shall be connected to detectors where shown on the Plans.
  - 4) For ease of maintenance and installation, detectors shall utilize a separate base assembly having screw terminals for external wire connections. The base assembly shall mount on a standard 4 inches (10.16cm) square or 4 inches (10.16cm) octagonal outlet box.
  - 5) Provide a base with each smoke detector, except for locations requiring auxiliary functions. Provide a base with integral auxiliary relay for those locations.
- l. Duct Mounted Smoke Detectors
  - 1) Furnish and install photoelectric air duct smoke detectors which match existing to operate directly from the fire alarm panel power supply. It shall have a detection chamber capable of being removed without breaking conduit connections or requiring an access panel in the duct. Each detector shall have a remote test and annunciating station. The detector shall have two associated programmable alarm relay contacts
- m. Programmable Modules
  - 1) Furnish and install addressable monitor modules to monitor waterflow, tamper or other related dry contact status inputs.
  - 2) Furnish and install addressable control modules to provide programmable auxiliary contact outputs from the system. Each contact shall be rated for 2 amps @24VDC or .5 amps @ 120VAC.
- n. Audio Visual Alarm Signals
  - 1) Furnish and install combination audio/visual alarm assemblies, except where noted.
  - 2) Audible signals shall match existing and produce a sound output of 85dba at 10 feet, or 15dba above ambient; whichever is greater.
  - 3) Provide xenon strobe visual signals with a minimum effective intensity of 15 candela or otherwise shown or required in accordance with UL1971, ADA and NFPA72.
- o. Low Frequency Alarm
  - 1) Provide Low Frequency sounders that operate within frequency range 520Hz +/-10% square wave tone per NFPA-72 code change in all sleeping rooms. If digital voice communicator (DVC) does not exist the Electrical Subcontractor shall provide DVC, all associated parts, panels and all related wiring as required.
- J. Installation
  - 1. Furnish and install, in accordance with manufacturer's instructions, all wiring, conduit and outlet boxes required for the installation of the complete system as specified and described herein and as shown on the Drawings. Ensure that any

new work or wiring performed within the new area shall in no way impair or adversely affect the performance of the existing building's fire alarm system in areas adjacent to the new area.

2. All wiring shall be of the same approved type as used for electric light and power wiring and shall meet the requirements of National Electric Codes. The sizes of the different wires shall be no smaller than #14 AWG. Color codes shall be used throughout. All wires shall be tagged at all junction points and shall test free from grounds or crosses between conductors. The wiring color code system shall be carried right through all equipment.
3. Final connections between the new equipment, the wiring system (and the existing equipment) shall be made under direct supervision of a Factory-Trained NICET 3 Manufacturer's Representative.

L. Manufacturer's Guarantee and Final Test

1. The Installing Electrical Subcontractor shall guarantee all equipment and wiring free from inherent mechanical and electric defects for a period of one (1) year from date of final test and acceptance form.
2. The manufacturing, supplying and servicing company of the previously specified system shall be a single responsibility. All equipment shall carry the original manufacturer's label, part number and UL/FM listing. Multiple suppliers will not meet the intent of a single responsibility for the total system concept.
3. The manufacturer of this equipment shall maintain local offices within fifty (50) miles of installation for prompt and efficient service when required. Manufacturers without local service facilities and equipped accordingly shall not be considered equal under these Specifications.
4. Provide a complete final test and recertification of the modified system if accordance with NFPA72 and UL procedures. The tests shall be witnessed and conducted under the direction of the local Authority Having Jurisdiction. A complete test report, riser diagram, address directory and as-built drawings and UL certificate shall be provided as part of the final as-built documentation.

## 2.9 FLOOR BOXES

- A. Recessed floor boxes shall be by Hubbell, Wiremold, or equal and shall have the following features:
- a. Large Capacity Multi Service Floor Boxes
    - i. Multi-Service Floor Box: Hubbell CFB6G30R Series with CFBS1R8CVR series cover and FBMP series internal device bracket(s) and appropriate HBL Series communication brackets to be coordinated with appropriate communications terminations. For on grade applications use CFB6G30RCR corrosion resistant series boxes.
- B. Installation
1. Disconnect power before installation. For installation in accordance with National Electric Code and any applicable local codes and standards.
  2. Do not interchange exposed metallic parts with exposed non-metallic parts.
  3. Exposed conductors at any wiring junction may cause short circuits, electrical shock or fire. Proper wiring practices must be followed.
  4. Provide adequate concrete thickness under the floor box to preserve the fire rating of the floor in accordance with national and/or local codes.
  5. Power and communications wiring not separated by a physical barrier is a code violation.
- C. Field Quality Control Testing and Inspection
- a. Verify layout and installation of system to contract drawing.

- b. Verify that all wiring junctions or connections have no exposed conductors prior to energizing circuits.
  - c. Verify that all bonding locations are code and standard compliant.
  - d. Verify that a physical barrier separates power and communication wiring.
- D. Verify type of communications jacks required with Owner and Telecommunications system installer.
- E. Verify type of audio/visual jacks required with Owner and Audio/Visual consultant's drawings and Audio/Visual system installer.
- F. Provide receptacles and technology outlets as indicated in floor box on Electrical and Technology drawings and provide conduit to above accessible ceiling from each individual technology outlet as indicated.
- G. Coordinate cover color and finish with Architect in field.

## 2.10 FUSES

- A. General
- 1. Furnish and install a complete set of fuses for all fusible equipment on the project as specified by the Electrical Drawings. Final tests and inspection shall be made prior to energizing the equipment. This shall include tightening all electrical connections and inspecting all ground conductors. Fuses shall be as manufactured by Mersen, Cooper Bussman, and Littelfuse, or equal.
- B. Mains, Feeders and Branch Circuits
- 1. Fused circuits rated 601 amperes and above shall be protected by current-limiting Class L A4BQ fuses. Fuses shall be time delay and shall hold 500% of rated current for a minimum of 4 seconds, clear 20 times rated current in .01 seconds or less and be UL listed and CSA certified with an interrupting rating of 200,000 RMS symmetrical amperes.
  - 2. Fused circuits rated 600 amperes or less shall be protected by current-limiting Class RK1 time delay A2D (250V) or A6D (600V) or Class J time delay AJT fuses. Fuses rated 8 amperes and above shall have the Smart Spot blown fuse indicator. This indicator shall provide guidance for ascertaining if the opening was caused by an overload or a short circuit. No holes are permitted in the fuse body for the indicator function. Fuses shall hold 500% of rated current for a minimum of 10 seconds (30A, 250V Class RK1 case size shall be a minimum of 8 seconds) and shall be UL listed and CSA certified with an interrupting rating of 200,000 RMS symmetrical amperes.
  - 3. Metal end caps of fuses rated 61 through 600 amperes shall be electrically connected to the fuse blades to facilitate safe voltage testing during OSHA required LOTO (lock out/tag out) procedures.
- C. Motors and Motor Controllers
- 1. Motor Protection
    - a. All individual motor circuits shall be protected by Class RK1, Class J, or Class L time delay fuses.
  - 2. Motors under 10 H.P.
    - a. ATDR fuses (Class CC) may be used on motors rated less than 10 H.P. at 480VAC and rated less than 5 H.P. at 240VAC. Fuse holders for Class CC fuses shall incorporate blown fuse indication.
    - b. Fuse sizes for motor protection shall be chosen from tables published for

the appropriate fuse. Heavy load and maximum fuse ratings are also shown for applications where typical ratings are not sufficient for the starting current of the motor.

**APPLICATION INFORMATION**

# LOW VOLTAGE FUSES FOR MOTOR PROTECTION

Three Phase Motor Fuse Selection UL Classes RK5, RK1, J, CC and L

MOTOR HP	FULL LOAD AMPERES	RECOMMENDED FUSE AMPERE RATING								
		MOTOR ACCELERATION TIMES								
		MINIMUM 2 SECS.	TYPICAL 5 SECS.	HEAVY LOAD OVER 5 SECS.	MINIMUM 2 SECS.	TYPICAL 5 SECS.	HEAVY LOAD OVER 5 SECS.	MINIMUM 2 SECS.	TYPICAL 5 SECS.	HEAVY LOAD OVER 5 SECS.
<b>460V</b>		<b>RK5-TRS (Tri-onic®)/RK1-A6D</b>			<b>J-AJT</b>			<b>UL CLASS CC ATDR</b>		
1/2	1.1	1-4/10	1-6/10	2	1-1/2	1-6/10	2	3	3-1/2	4-1/2
3/4	1.6	2	2-1/4	2-8/10	2	2-1/4	2-8/10	3-1/2	5	6-1/4
1	2.1	2-1/2	3-2/10	4	2-1/2	3-2/10	4	5	6-1/4	9
1-1/2	3	3-1/2	4-1/2	5-6/10	3-1/2	4-1/2	5-6/10	6	9	12
2	3.4	4	5	6	4	5	6	8	10	12
3	4.8	5-6/10	7	9	6	8	9	12	15	17-1/2
5	7.6	10	12	15	10	12	15	15	25	30
7-1/2	11	15	17-1/2	20	15	17-1/2	20	25	30	-
10	14	17-1/2	20	25	17-1/2	20	25	30	-	-
15	21	25	30	40	25	30	40	-	-	-
20	27	35	40	50	35	40	50	-	-	-
25	34	40	50	60	40	50	60	-	-	-
30	40	50	60	70	50	60	70	-	-	-
40	52	70	80	100	70	80	100	-	-	-
50	65	80	100	125	80	100	125	-	-	-
60	77	100	125	150	100	125	150	-	-	-
75	96	125	150	175	125	150	175	-	-	-
100	124	175	200	225	175	200	225	-	-	-
125	156	200	225	300	200	225	300	-	-	-
150	180	225	250	350	225	250	350	-	-	-
200	240	300	350	450	300	350	450	-	-	-
250	302	400	450	600	400	450	600	-	-	-
300	361	450	600	-	450	600	-	-	-	-
		<b>CLASS L-A4BT</b>								
300	360	-	601	650						
400	477	-	800	900						
500	590	-	1000	1100						

**Minimum** - This sizing is recommended if motor acceleration times do not exceed 2 seconds. Minimum sizing with RK1, RK5, and Class J fuses will provide overload relay back up protection but may not coordinate with some NEMA Class 20 overload relays. Minimum sizing is generally not heavy enough for motors with code letter G or higher.

**Typical** - Suggested for most applications. Will coordinate with NEMA Class 20 overload relays. Suitable for motor acceleration times up to 5 seconds.

**Heavy Load** - Maximum fuse size in accordance with Table 2. If this fuse size is not sufficient to start the load, RK1, RK5, and J time delay fuse size may be increased to a maximum of 225% of full load amperes. Class CC fuses may be increased to 400% of full load amperes. The Heavy Load column should be used for Design E and high efficiency Design B motor fuse sizing.

3. Motor Controllers
  - a. IEC style and NEMA style motor controllers shall be protected from short circuits by time delay fuses. Controllers and fuses shall be coordinated for Type 2 protection of the motor controllers based upon the motor controller manufacturer's published recommendations. The fuses shall be Class RK1 A2D (250V) or A6D (600V) or Class J AJT, Class CC ATDR or Class L A4BQ.
4. AC and DC Variable Speed Drives
  - a. AC and DC drives not internally protected by high speed fuses shall be provided branch circuit protection by High Speed Class J (HSJ) fuses. Class J time delay AJT fuses are an acceptable alternative to the HSJ in by-pass applications.

5. Motor Control Centers
    - a. To minimize arc flash incident energy, MCC's shall have fusible mains and maximum fuse ratings shall be as follows:
      - A4BQ1200 for bolted fault currents greater than 40,000A
      - A4BQ800 for bolted fault currents greater than 16,000A
      - AJT600 for bolted fault currents greater than 14,000A
      - AJT400 for bolted fault currents greater than 5,000A
- Unit inserts (buckets) shall be fusible and protected by current-limiting Class J time delay (AJT) or Class RK1 time delay (A2D, A6D) fuses selected for Type 2 protection of the motor controllers based upon the motor controller manufacturer's published recommendations.
- D. Other Equipment
    1. Lighting and control circuits rated 600VAC and less shall be protected by Class CC time delay ATDR or ATQR fuses, sized according to the Drawings.
    2. Switchboards, panelboards, and load centers shall utilize fully rated and listed components. Series rated overcurrent protective devices are not acceptable.
  - E. Labeling
    1. Industrial control panel labels shall include a SCCR (short circuit current rating) and shall specify the overcurrent protection device upon which this rating is based as per the National Electrical Code.
    2. Switchboards, panelboards, industrial control panels, and motor control centers shall include a label warning qualified personal of the potential arc flash hazard. The label shall be visible with equipment door closed.
  - F. Spares
    1. Spare fuses amounting to 10% (minimum three) of each type and rating shall be supplied. These shall be turned over to the Owner upon project completion. Fuses shall be contained and cataloged within the appropriate number of spare fuse cabinets (no less than one), located per Drawings. Spare fuse cabinets shall be equipped with a key lock handle, be dedicated for storage of spare fuses and shall be ATFC.
  - G. Execution
    1. To prevent mechanical damage to fuses; main, feeder, and branch circuit fuses are to be removed from equipment during transit and re-installed when equipment is to be energized.
    2. As installed Drawings, showing actual fuses installed, shall be submitted to the Engineer after completion of the project.
    3. Fuseholders capable of accepting Class H fuses are not acceptable.
  - H. Substitution
    1. Fuse sizes indicated on Drawings are based on fuse performance and selectivity ratios. Alternative submittals to furnish materials other than those specified shall be submitted to the Engineer along with short circuit, selective coordination, and arc flash hazard studies.
    2. Performance of any fuses submitted for substitution shall have:
      - a. Indication integral with the fuse so that it indicates the voltage transient when the fuse is opened. This is a relative measure of how severe the fault was and gives information to the maintenance people to make them more efficient. No holes are permitted in the fuse body for the installation of indicators.

- b. Only the listed UL categories must be used, in order to reduce the possibility of arc flash injuries. Class RK5 and Class H are prohibited and could cause major liability should an arc flash occur.
- c. All end-caps of fuses must be electrically connected to the fuse blades to prevent misreading of electrical testers during the required OSHA LOTO (Lock-Out Tag-Out) procedures. Misreading on the LOTO final voltage check could cause hazardous shock.

## 2.11 LIGHTING FIXTURES

- A. Furnish all labor, materials and equipment required for a complete installation of lighting equipment specified on the lighting fixture schedule. This shall include plaster frames for all recessed fixtures whether or not itemized or specified on lighting fixture schedule which appears on Drawings.
- B. Electrical Subcontractor shall assume all responsibility for the safe handling of all lighting fixtures which are furnished under this Section and other accessories and lamps until the final inspection has been made by the Architect.
- C. Special fittings and materials that may be required to support fixtures shall be supplied as well as supports or grounds required to secure surface or pendant mounted fixtures on suspended ceilings unless otherwise noted. Fixtures shall be supported from the Building structure, and shall be independent of ducts, pipes, ceilings and their supporting members. This support shall be in addition to regular fixture support bars, and saddles. Fixtures mounted in association with suspended or integrated ceiling systems shall be supported above ceiling by threaded 1/4" diameter continuous galvanized steel hanger rods or #12 jack chain. Each such fixture shall have two supports per fixtures. Where duct work, pipes, type of Building construction materials and structural framing members provide obstructions or difficult support means, hanger rods shall be used in association with horizontal sections of steel support channels in an approved manner. Steel support channels shall be Unistrut, Kindorf, Huskey Products, or equal. Rigid steel conduit may be used instead of steel support channels for size and method of support. Exact mounting height of all stem supported lighting fixtures shall be determined on the job by Architect.
- D. Fixtures, part or parts thereof (including lamps) determined defective upon completion of electrical installation shall be replaced by Electrical Subcontractor, at no cost to Owner.
- E. Consult with General Contractor regarding arrangement of framing members to permit centering of recessed fixtures.
- F. Consult with Ceiling Subcontractor and coordinate fixture locations and supports with suspended ceiling system.
- G. Electrical Subcontractor shall be responsible for furnishing the specified recessed fixtures with proper mounting arrangement to be compatible with the type of ceiling construction in which fixture is to be mounted. If necessary, the type mounting arrangement shall be changed from that specified or indicated on fixtures schedule to conform to this requirement, at no additional cost to Owner. Submission of Shop Drawings of such recessed fixtures shall be interpreted to indicate that Electrical Subcontractor has verified ceiling construction, type and material with the Architect for the various areas of the project in which these fixtures shall be mounted. Shop Drawings of such fixtures shall be accompanied by a written statement indicating Electrical Subcontractor has verified such mounting arrangements with Architect and the date verified.
- H. All suspended lighting fixtures shall be hung in association with improved aligner type

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hangers, except where noted.

- I. In addition to fixture supports, surface mounted lighting fixtures shall be secured to surface which they mount at a minimum of two points on fixture housing to prevent rotation or movement of fixture out of its normal position of alignment.
- J. After installation and lamping of permanent lighting fixtures and with approval of the Architect, these fixtures may be used for lighting, and will not require re-lamping prior to completion of project, except where lamps are faulty or burnt out.
- K. Lamping color temperature shall be as indicated on Drawings.
- L. Lighting fixtures with multi wattage ballasts and drivers shall be labeled from the factory for the wattage specified to ensure compliance with Energy Code calculations.
- M. All lighting fixtures that utilize LED (light emitting diodes) lamp sources shall be Energy Star rated or DLC (Designlights Consortium) qualified product listed, a kelvin temperature as scheduled having a color rendering index of 80 minimum and minimum L70 lifetime rating of 50,000 at 25°C ambient. LED array and driver packages shall have published IESNA LM-79 and LM-80 testing data as a standard manufactured offering. Individual component testing will not be accepted. LM-79 must be conducted at a laboratory listed in the U.S. Department of Energy's LED Lighting Facts approved testing laboratories list. Testing must be conducted within the accreditation effective and expiration dates detailed for a given laboratory. In-house LM-80 reporting of LED array from LED manufacturer will be accepted.
- N. Where lighting fixtures other than the specified products are provided, the Electrical Subcontractor shall provide light level calculations in accordance with IESNA standards to justify that substituted fixtures are of equal performance to the specified products (applies to all lighting fixtures in all spaces).

## 2.12 NAMEPLATES

- A. Nameplates shall be furnished and installed on the switchboard and switchboard circuit breakers, panelboards, junction boxes, cabinets for all special purpose switches, disconnect switches, starters, and other controls furnished under this Contract, to designate the equipment controlled and function.
- B. Nameplates shall be laminated white bakelite with 1/4" high black recessed letters. Nameplates shall be securely attached to the equipment with galvanized screws or rivets. Adhesives or cements will not be permitted.
- C. Power branch circuit junction boxes shall be identified with circuit's panel(s) origin and circuit number(s) by means of black fibre pen.
- D. All pull boxes and junction boxes shall be identified as to system and function by means of black fiber pen.
- E. Disconnecting means (disconnect switches and enclosed circuit breakers) nameplates shall indicate purpose and identification of the circuit source that supplies the disconnecting means.

## 2.13 OUTLET BOXES AND ACCESSORIES

- A. Outlet boxes and accessories shall be as manufactured by Steel City, Appleton, Raco, or

equal.

- B. Lighting outlets in concrete ceilings, walls and columns shall be 4" octagonal rings, 4" deep with round bottom plate. Where concrete slab is less than 5" thick, boxes shall be 2-1/2" deep.
- C. For wood framing and furred ceilings use 4" octagonal outlet boxes, bar hangers and covers. 4-11/16" boxes and covers shall be used where 1" conduit is involved.
- D. Where outlets occur in beams or ribs of pan type concrete construction, a 4" shallow pan outlet, 3/4" deep, shall be used with conduit entering the back of the box.
- E. All fixture outlet boxes shall have 3/8" solid make fixture studs and all auxiliary fixture stems shall be supported from 3/8" male fixture studs.
- F. All outlets in walls other than lighting outlets in concrete shall be Series 52171, 4" square boxes with single or 2-gang raised covers, Series 52C50, of the proper depth required for the particular wall construction and finish. Where the wall construction or finish will not permit a neat cut around the raised cover, Series GW235 boxes shall be used.
- G. Outlets in 2" partitions shall be 4" square, 1-1/4" deep, with raised cover.
- H. Outlet boxes for weatherproof concealed work and exposed rigid conduit work shall be suitable cast or malleable iron conduit fittings, Crouse-Hinds Company, Appleton, Killark, or equal, and shall have threaded conduit hubs.
- I. Outlet boxes recessed in exterior walls will be required to be sealed internally at the openings and seams and sealed to air/vapor barrier.
- J. Provide 100% airtight plastic switch and outlet boxes at exterior walls, unit demising walls, and at ceiling lighting fixture locations between units, equal to Thomas and Betts Nutek Airtight F-WSW, 2-FWSW, 3-FWSW, F-WOCT, FWSWBX and F-WRD Series.

#### 2.14 PANELBOARDS

- A. At each location indicated on the plans, furnish and install an appropriate panel of the ampacity and voltage rating shown on the Drawings.
- B. All panels shall be of the safety dead front circuit breaker type for service on three phase, four wire mains unless otherwise specified. All panels shall be of code gauge steel.
- C. Panels shall be surface or flush mounted, as indicated on the plans, and installed so that the top circuit breaker is no more than 6'-0" above the finished floor.
- D. The panelboards shall bear the Underwriters' Laboratories Label.
- E. All buses shall be copper. All panelboards shall have a circuit directory card mounted in a frame with plastic cover installed on the inside of the door. All directory cards shall be properly filled in, using a typewriter, and indicating areas and devices served by each circuit.
- F. All circuit breakers shall be of quick-make and quick-break type on manual operation, trip-free, and with inverse time characteristics and shall have bolted bus connections; plug-in circuit breakers will not be allowed.

- G. Panelboard trims shall have single doors. Trims and doors shall be made of code gauge, full finish sheet steel. The trim and doors shall be factory finished on both sides. All panelboards shall be keyed alike.
- H. Panelboards shall contain circuit breakers indicated on panelboard schedule on the Drawings. Two and three pole breakers shall be common trip type.
- I. All panelboards shall be equipped with a neutral bar having one solderless connector for each circuit as indicated and with all required knockouts.
- J. Panelboards requiring 200% neutrals and isolated ground shall be as indicated on the Drawings.
- K. Panelboards shall be Square D, Type NQOB for 120/208 volt, and I-Line for main distribution panelboards, Eaton/Cutler-Hammer, Siemens, or equal.
- L. Provide panelboards with Nema 4X enclosure in Kitchen, Seryery, and other wash down areas.
- M. Circuit breakers which are rated at 1200 amps or more shall have Arc Energy Reduction complying with National Electrical Code 240.87.
- N. Fully Rated equipment shall be provided; Series Rated equipment is not acceptable.

#### 2.15 POKE-THRUS

- A. Poke-thru device shall have been examined and tested by Underwriters Laboratories, Inc. to comply with UL514A and/or UL514C, as applicable and tested to Canadian Standard C22.2 and bear the "UL" mark. The poke-thru shall conform to the standards set in the National Electrical Code, Section 300.21.
- B. Poke-thru device shall be for use in 2-hour rated, unprotected reinforced concrete floors and 2-hour rated floors employing unprotected steel floor units and concrete toppings (D900 series designs) or concrete floors with suspended ceilings. Fire resistive designs with suspended ceilings shall have provisions for accessibility in the ceiling below the poke-thru device fittings.
- C. Poke-thru device shall have been evaluated by UL to meet the applicable U.S. and Canadian safety standards for scrub water exclusion when used on tile, terrazzo, wood, and carpet covered floors.
- D. Poke-thru device shall be suitable for use in air handling spaces in accordance with Section 300.22C of the National Electrical Code.
- E. Floor-mounted service fittings shall be assembled units suitable for carpet and tile floors and include scrub water finish flange.
- F. Fire-rated poke-through assemblies with recessed devices shall be with up two (2) 20A duplex receptacles and multiple center compartment ports capable of accepting voice, data and/or A/V outlets, (1) 3/4" power conduit/junction box, (1) 1-1/4" communications conduit stem, and (1) 2" communications conduit stem for voice, data and or A/V wiring in 8" hole; Hubbell System One S1R8 Series, Legrand "Evolution 8AT" Series, or equal.
- G. Verify type of communications jacks required with Owner and Telecommunications system installer.

- H. Verify type of audio/visual jacks required with Owner and Audio/Visual consultant's drawings and Audio/Visual system installer.
- I. Provide receptacles and technology outlets as indicated in poke thru on Electrical and Technology drawings and provide conduit to above accessible ceiling from each individual technology outlet as indicated.
- J. Coordinate cover color and finish with Architect in field.

#### 2.16 PULL BOXES, JUNCTION BOXES AND WIREWAYS

- A. Pull boxes shall be of code gauge galvanized steel with screw covers to match. Pull boxes and wireways shall be as shown on Drawings and/or comply with the National Electrical Code and/or job conditions, with steel barriers separating systems.
- B. Wireways shall be of code gauge steel, baked enamel manufactured standard sections and fittings, with combination hinged and screw covers, as manufactured by Square D "Square-Duct," Bee Line, Cope or equal.
- C. Conductors passing through pull boxes and wireways shall be identified to indicate their origin and termination. Provide nameplates for all pull boxes.
- D. Refer to Drawings for Handhole specifications.

#### 2.17 STARTERS

- A. Motor starters shall be furnished and installed by the Electrical Subcontractor except as noted otherwise in other Sections of this Specification.
- B. All motor starters shall be of the maintained contact type and have individual running overload protection in each phase and shall be provided with two sets of auxiliary contacts (one normally open and one normally closed).
- C. Starters shall be of size and type required for the particular motor horsepower and voltage.
- D. Locate starters adjacent to panel feeding same unless otherwise indicated on the Drawings.
- E. Manual starters shall be of the toggle mechanism type for full voltage starting.
- F. Magnetic starters shall be across-the-line type, with means for remote control, except maintained contact type starters shall be used only where noted for specific items of equipment.
- G. All starters shall have overload reset button, pilot light to indicate on or off and hand-off-auto switch in cover unless otherwise indicated.
- H. Starters shall be furnished in the enclosures called for on the Drawings and shall be grouped whenever possible.
- I. Motor starters, where grouped, shall be mounted on a new 3/4" thick exterior grade plywood mounting board finished to match starter enclosures.
- J. All starters and remote control stations furnished under this Section shall have laminated

plastic engraved nameplates designating the equipment controlled. Letters shall be 1/4" high.

- K. Motor starters and controls shall be Square D, General Electric, Siemens, or equal.
- L. All magnetic starters furnished under this Section which are connected to circuits operating at more than 120V shall have built-in control transformers with 120V secondary control supply.
- M. Thermal trips for all motor starters supplied under this Section shall be ambient temperature compensated.

#### 2.18 TELEPHONE, DATA, VIDEO OUTLET AND CONDUIT SYSTEM

- A. Furnish and install back boxes and conduits as called for on the Drawings.
- B. Refer to Drawings for back box requirements and locations.
- C. Where back boxes are located in environmental air plenum ceiling areas, the conduits shall be run to the nearest corridor located outside the environmental air plenum area.
- D. Actual back box locations and equipment shall be confirmed in the field with Architect and Owner before installation.
- E. Provide blank cover plate for each back box location.

#### 2.19 THERMAL SWITCHES

- A. Thermal switches shall be NEMA Type 1 toggle switch for normal duty with thermal overload relay. Switch enclosures shall be of a type approved for the location and atmosphere in which it is mounted. Thermal switches shall be installed where called for or where required by Code. Thermal switches shall be provided with pilot where called for on the Drawings.
- B. Thermal switches shall be as manufactured by Square D, Eaton, Siemens, or equal.

#### 2.20 TIME CLOCKS

- A. Provide time clocks where shown on the Drawings for the control of lighting.
- B. Time clocks shall be shall be Tork DLC400BP, Intermatic, Paragon, or equal.
  - 1. Provide a 4 zone lighting controller with photosensor input (Tork model EPC2 photosensor to be supplied with controller).
  - 2. Memory Module shall be capable of being programmed at any one location and inserted into DLC400BP (with memory module socket) in any other remote location.
  - 3. Optional programmer shall be available (Model MMP), capable of accomplishing Windows based settings on a PC for easy duplication of Memory Modules or individualized programs for multiple locations.
  - 4. Each zone shall be capable of independent, user settable turn On and Off light level set points ranging from 1 to 100 footcandles.
  - 5. Three position slide switches shall be provided for each of the 4 zones allowing for user settings based on
    - a. time of day or
    - b. combination time of day and light level or

- c. light level.
- 6. Controller shall provide 30 Amp general purpose isolated contacts (unpowered) for each zone as well as a 500 ma, 24VDC output.
- 7. Controller shall have 1 digital input per channel for:
  - a. remote contact closure which can be used to turn corresponding outputs On/Off outside of the normal control time or
  - b. remote timed override which can be accomplished for the corresponding outputs with the use of Tork model SSA200R-24.
- 8. Enclosure shall provide separate wiring compartments for power connections and auxiliary connections.
- 9. Controller shall be capable of local override On or Off to the next scheduled event using the keypad for each zone.
- 10. Each zone shall be capable of astronomic function, adjustable from 10-60 degrees Northern or Southern latitude. Each zone can additionally be offset +/- 1-299 minutes for both sunset and sunrise.
- 11. Controller shall provide automatic daylight saving time (which can be omitted). Leap year adjustment shall be compensated for automatically.
- 12. Controller shall have 365 day holiday capability with 24 single dates and 4 seasons of unlimited duration.
- 13. Controller shall be capable of 99 set points with separate scheduling for each day of the week.
- 14. Controller shall have back-up capability:
  - a. Schedule shall be retained for 40 years without power,
  - b. real time shall be retained for 6 months using a field replaceable 9V lithium battery.
- 15. Unit shall have a NEMA type 3, metal indoor/outdoor enclosure.

## 2.21 WIRE AND CABLE

- A. Wiring shall be a minimum of #12 AWG solid, except motor control circuit wiring and fire alarm system wiring may be #14 AWG. Wiring for 120V branch circuits which exceed a distance of 100' from the panel to the last outlet shall be #10 AWG, 190 ft. from the panel to the last outlet shall be #8 AWG and 280 ft. from the panel to the last outlet shall be #6 AWG minimum, wiring for 277V branch circuits which exceed a distance of 200' from the panel to the last outlet or light fixture shall be #10 AWG, and 300 ft. from the panel to the last outlet or light fixture shall be #8 AWG minimum. The Electrical Subcontractor shall be required to perform voltage drop calculations on all branch circuits in which the actual proposed routing of the circuit exceeds 100 ft. to insure a maximum voltage drop of 3% is not exceeded. Wire sizes shall be increased to maintain the maximum 3% voltage drop.
- B. Wires and cables shall be single conductor, except as otherwise specified or indicated on Drawings. Wires of sizes #8 AWG and larger shall be stranded, while wires of sizes smaller than #8 AWG shall be solid. In general, conductors shall be of soft drawn copper and shall have a conductivity of not less than 98% of the ANSI Standard for annealed copper, except as otherwise specified or indicated on Drawings. Aluminum conductors shall only be used where specifically indicated on the Drawings. Pressure type connectors shall be used at all terminals.
- C. Wire shall be Type THWN-2, XHHW or approved equal, rated 90 degrees C. minimum and suitable for wet and dry locations.
- D. MC cable may be used for branch circuit wiring only, where run concealed, where allowed by Code and approved by the Authority Having Jurisdiction. Type MC cable shall be supported and secured at intervals not exceeding six feet.

- E. Wire and cable shall be by one of the following: Phelps Dodge Copper Products Corp., General Cable Co., AFC Cable Systems, Triangle Conduit and Cable Co., or equal.
- F. Terminal lugs and splice connectors shall be of an ampacity equal to the circuit on which they are utilized.
- G. All wiring where run in environmental air plenums shall conform to Article 300-22 of the National Electrical Code.
- H. Wiring shall be supported from the Building structure, and shall be independent of ducts, pipes, ceilings and their supporting members.

## 2.22 WIRING DEVICE PLATES

- A. All device plates shall be Specification Grade, .032" thick, Type 430, stainless steel, brushed finish. Plates shall be of appropriate type and size for all wiring and control devices.
- B. Plates shall be set so that all edges are in contact with the mounting surface. Plaster fillings will not be allowed. Multi-device locations shall have one common device plate.
- C. Device plates shall be by the same manufacturer as devices.
- D. All receptacle device plates shall be labeled with circuit origination and circuit number. Letters/numbers shall be 1/4" high in black.
- E. Plates for surface type boxes shall not overlap boxes and shall be designed for use with surface boxes.
- F. Device plates for weatherproof receptacles shall be clear Polycarbonate "In-Use" type, pad lockable.
- G. Labels shall be provided via Brother P-Touch, or equal.

## 2.23 WIRING DEVICES

- A. Light Switches
  - 1. All local wall switches shall be of the flush quiet toggle type, as follows, or as manufactured by Pass and Seymour, Inc., Leviton Manufacturing Co., or equal.
  - 2. All switches shall be suitable for the control of tungsten filament lamps, and shall carry the proper marking of the Underwriters' Laboratories.
  - 3. Local switches shall be installed in such a position that they shall bear evenly and truly, and be secured on the axis of the supporting members.
  - 4. Under no circumstances are wooden wedges, shims or blocks to be used in truing up local switches. Should the outlet box in any case come too far back of the finished surface, recess boxes and screws of the proper length to reach the box shall be used of such a size as to form a shoulder at exactly the proper point to retain the switch in position.
  - 5. Switches shall be rated 20 amperes, 120 - 277 volts, equal to the following:
    - Single Pole Switches - Hubbell HBL1221
    - Double Pole Switches - Hubbell HBL1222
    - Three-Way Switches - Hubbell HBL1223
    - Four-Way Switches - Hubbell HBL1224
    - Switch with Pilot Light - Hubbell HBL1221PLKey switches shall be equal to corresponding switches above.

6. Refer to Drawings for Specification of Dimmer Switches.
  7. Color of switches shall be white, unless otherwise noted.
- B. Receptacles
1. Duplex receptacles shall be grounding type, rated 20 amperes, 125 volts. Receptacles shall be back and side wired with screw type terminals or pressure type, screwless terminals having suitable conductor release arrangement.
  2. Special receptacles for single equipment, where required, shall have additional grounding leg and shall be of capacity for the equipment to be connected.
  3. In general, convenience receptacle circuits shall be independent of lighting circuits and shall not be controlled by lighting circuit breaker switches or lighting switches, unless specifically indicated on the Drawings.
  4. Receptacles shall be as follows, or as manufactured by Pass and Seymour, Inc., Leviton Manufacturing Co., or equal:
    - a. All 20 ampere, 125 and 250 volt non-locking type receptacles shall be tamper resistant type. Tamper resistant normal circuit receptacles duplex receptacles – Hubbell HBL5362TR.
    - b. Tamper resistant receptacles with isolated ground - Hubbell IG5362TR – Color of receptacles shall be orange.
    - c. Tamper resistant computer circuit duplex receptacles – Hubbell HBL5362TR – Color of receptacles shall be gray. All receptacles circuited to “C” panelboards shall be gray.
    - d. GFCI duplex receptacles installed on the exterior of the Building shall be “Weather Resistant” type.
    - e. Tamper resistant duplex receptacles controlled by Digital Plug Load Room Controllers – Hubbell BR20C2TR.
  5. USB Charger Devices shall be as follows, or as manufactured by Pass and Seymour, Inc., Leviton Manufacturing Co., or equal:
    - a. 20 amp, 2 USB chargers and duplex tamper resistant receptacle (5.0 amp) – Hubbell USB20A5W.
    - b. 20 amp, 4 USB charger receptacle (5.0 amp) – USB4W.
  6. GFCI Receptacles
    - a. General Description: Straight blade, non-feed-through-type. Comply with NEMA WD 1, NEMA WD 6, UL 498, Federal Specification W-C-596, and UL943, Class A. Include indicator light that is lighted when device is tripped. Must have self-test feature (conducts an automatic test every three seconds, ensuring ground fault protection. If ground fault protection is compromised, power to the receptacle must be discontinued.
    - b. Tamper resistant duplex GFCI receptacles, rated 20 amperes, 125 volts. Receptacles shall be as follows, or as manufactured by Pass and Seymour, Inc., Leviton Manufacturing Co., or equal:
      - 1) Hubbell – GFTRST20.
  7. Color of receptacles shall be white, unless otherwise noted.

### PART 3 - EXECUTION

#### 3.1 CLEANING, ADJUSTING AND TESTING

- A. At the completion of the work, all parts of the installation shall be thoroughly cleaned. All devices, equipment, conduits, and fittings shall be completely cleaned of grease, metal cuttings, dirt which may have accumulated during construction, and protection covers. Any discoloration or damage to parts of the Building, its finish or furnishings due to failing to properly clean the electrical system shall be repaired by the Electrical Subcontractor without cost to the Owner.



- B. The Electrical Subcontractor shall test all work and equipment as directed by the Architect and by Authorities Having Jurisdiction, furnish all equipment, necessary personnel and the electrical power.
- C. The entire installation shall be tested for shorts, grounds and open circuits and all defects shall be corrected before acceptance of his work. All work shall be demonstrated to be in proper operating condition to the complete satisfaction of the Architect and Owner.
- D. Coordinate all start up, operation and testing activities with the Project Manager, General Contractor and the Commissioning Agent per Specification Section 01 91 00.
  - 1. Electrical Subcontractor tests shall be scheduled and documented in accordance with the commissioning requirements. Refer to Commissioning Specification, Section 01 91 00, for further details.
  - 2. System verification testing is part of the Commissioning Process. Verification testing shall be performed by the Electrical Subcontractor and witnessed and documented by the Commissioning Agent. Refer to Commissioning Specification, Section 01 91 00, for system verification tests and commissioning requirements.

### 3.2 CONDUIT WORK

- A. All wiring shall be installed in heavy wall rigid steel unless otherwise noted below and run concealed except as indicated on the Drawings. Branch circuit wiring in hung ceilings, furred spaces or exposed may be installed in electrical metallic tubing. Panelboard feeders may be run in electrical metallic tubing except panelboard feeders run underground or in concrete slabs shall be in heavy wall rigid steel conduit as specified above or PVC. All exposed conduit in spaces indicated as mechanical rooms and where installed exposed below the 8' level elsewhere on the project shall be rigid steel conduit. Conduit extensions in metal partitions may be made with flexible metal conduit, with grounding conductor.
- B. Connections to portable and permanently mounted motorized equipment and motors, as well as the equipment housing, shall be made with approved liquid tight flexible metal conduit. Flexible connections shall be a maximum of 18" long and with grounding conductor. Flexible connections shall be used prior to attachment to equipment housings.
- C. Conduit ends shall be cut square, threaded and reamed to remove burrs and sharp edges. Field threads shall be of the same type and have the same effective length as factory cut threads. Excessive exposed threads will not be allowed. Turns, wherever required in exposed conduit runs shall be made by the use of factory-made bends, or field made bends. Condulets, or in the event of a multiplicity of conduits making the same turn, a steel junction box with a removable steel cover may be used. Offsets and bends for changes in elevation of exposed conduit runs shall be made at walls or beams and not in open spaces between walls or beams. Conduits shall be routed so as not to interfere with the operation of maintenance of any equipment. The entire job shall be done in a neat and workmanlike manner. Steel supports or racks shall be galvanized steel channel and fittings, Unistrut, Kindorf, Husky Products Company, or equal.
- D. All conduit work shall be carefully cleaned and dried inside before the installation of conductors. Wire shall not be pulled into conduit system until Building is completed. Plug conduit ends to exclude dust, moisture, plaster or mortar while Building is under construction. No lubricants or cleaning agents which might have a deleterious effects on conductor coverings shall be used for Drawing conductors into raceways.
- E. Drawings, in relation to routing of conduits, are diagrammatic. The number and size of conduits and wire shall be furnished and installed as indicated by the Drawings. Conduits shall be routed in the field so as to be coordinated with the Building structure. Concealed

conduit shall be as short and direct as possible. Exposed conduit shall be run in straight lines parallel to walls, beams and columns and with right angle bends and threaded conduit fittings. All conduit in concrete slabs shall be run above bottom steel reinforcing, below top reinforcing and column ties. Conduits passing through floors, walls and beams shall be of such size, number and in such locations so as not to impair the strength of the construction. At time of roughing conduits in concrete slab area, prior to pouring of slab, the Electrical Subcontractor shall consult the Structural Engineer for coordination and approval of size, spacing and method of conduit installation in slabs and walls, as well as penetration of such. Particular attention shall be given to the installation of conduits at grouped areas, such as panelboard, cabinet and pull box entrances.

- F. All metal conduit buried in the earth or fill shall be coated with two coats of heavy asphalt paint over its entire length, including couplings.
- G. Raceways in ceiling spaces shall be routed in such an approved manner as to eliminate or minimize the number of junction boxes required, but also shall be routed in an orderly and organized manner. Support rods and clamps shall be furnished and installed as directed by the Architect. Support of conduits by use of wire is strictly prohibited. Conduits shall be supported and secured by conduit support devices.
- H. Where rigid metal conduit is threaded in the field, a standard conduit cutting die providing 3/4" taper per foot shall be employed. Threadless coupling shall not be used on rigid metal conduit except where specifically allowed by the Architect. Running threads shall not be used on rigid metal conduit.
- I. Conduit work shall be installed in such a manner to keep exposed threads to an absolute minimum, and in no case shall more than three threads be left exposed after the conduit work is made up tight. This requirement applies to all conduit work, including conduit buried in earth or fill or in concrete.
- J. Minimum size conduit shall be 1/2" nominal trade size.
- K. A minimum 3/16" diameter twisted nylon plastic type fish cord shall be furnished and installed in all empty raceways. Provide a tag on each end of fish cord indicating the location of the other end.

### 3.3 EQUIPMENT CONNECTIONS

- A. The Electrical Subcontractor shall provide all connections to all equipment requiring electrical service, including power cables, branch circuit extensions, fire alarm cables, motors, controllers, lighting fixtures and all other equipment and systems specified or shown on the Drawings.

### 3.4 FIRE STOPPING

- A. Electrical installations in hollow spaces, vertical shafts and ventilation or air handling ducts shall be so made that the possible spread of fire or products of combustion will not be substantially increased. Openings around electrical penetrations through fire-resistance rated walls, partitions, floors or ceilings shall be firestopped using approved methods to maintain the fire-resistance rating. Refer to Section 07 84 00 for Firestopping. All fire stopping material and installation will be by the Electrical Subcontractor.

### 3.5 GROUNDING

- A. Grounding methods shall be in accordance with the National Electrical Code Article 250

and Local Utility Company Regulations.

- B. The required equipment grounding conductors and straps shall be sized in compliance with National Electrical Code and shall be provided with green insulation equivalent to the insulation on the associated phase conductors.
- C. Flexible metallic conduit equipment connections utilized in conjunction with branch circuits shall be provided with suitable green insulated grounding conductors connected to approved grounding terminals at each end of the flexible conduit.
- D. The neutral conductor of all circuits shall have an identifying marking preferable a covering of white, readily distinguishable from the other conductors. This wire shall be unbroken from the distribution switch to the outlet.
- E. Each Electrical expansion fitting shall be provided with a bonding jumper.

### 3.6 HVAC WIRING

- A. Wiring for low voltage temperature control equipment is included under Section 23 00 00.

### 3.7 INSTALLATION OF OUTLETS

- A. If any discrepancy is found to exist between the electrical plans and any other Drawings associated with the project, notify the Architect at once and have location verified before outlets are installed. Any reasonable change in location of outlets and equipment prior to roughing shall not involve additional expense to the Owner.
- B. Consult with the Ceiling Subcontractor regarding the centering of outlets in ceiling tile.
- C. Whenever outlets of any system are installed in brick, masonry or concrete construction, furnish and install the necessary boxes and conduit in connection therewith so that the General Contractor may build them in as the work progresses. Box offsets shall be made at all outlets to provide for proper adjustment to finished surfaces.
- D. Through-wall boxes will not be permitted. Outlet boxes shall not be mounted back to back, but shall be staggered a minimum of 12" on center.
- E. Knockouts in any boxes shall not be left open and all boxes not having equipment mounted on them shall be provided with blank covers.
- F. Bar hanger type outlets shall be used in hollow framed partitions other than those of the masonry or construction block type, with bar hanger supported from two partition studs. Bar hangers shall be secured to metal type partition studs with self- threading metal screws, or drill through hangers with caddy (or equal) clips shall be used.

### 3.8 INSTALLATION REQUIREMENTS

- A. All equipment mentioned in these Specifications or those on the Drawings shall be furnished new except where noted and completely installed and adjusted and left in a clean, safe and satisfactory condition, ready for operation and all supplies, appliances, and connections of every sort and description necessary to the operation of the equipment shall be furnished and installed to the satisfaction of the Architect and Owner.
- B. The Owner will not be responsible for materials and equipment until they have been tested and accepted.

### 3.9 MOTOR AND CONTROL WIRING

- A. The Electrical Subcontractor shall provide all wiring, including conduit, wire, junction boxes, disconnecting switches, and overcurrent protection, to and between all motors, starters, control devices and related electrical equipment whether specified or shown under Section 26 00 00 or other Sections, except where such items are factory wired as well as factory mounted on the driven equipment.
- B. Unless otherwise specified, the Electrical Subcontractor shall mount and align all starters, control devices, safety switches, power factor correction capacitors and other related electrical equipment whether specified in this or other Divisions of this Specification, except where such items are factory mounted on the driven equipment. The Electrical Subcontractor shall determine the correct rotation of any equipment connected to a polyphase motor and connect motor for this rotation before equipment is started.
- C. Unless otherwise specified, all wiring to motors, control equipment and related electrical equipment shall run in rigid conduit or EMT, with flexible metal conduit connections or liquid-tight flexible connections where specified elsewhere. Conduits shall be large enough to accommodate motor branch circuits and grounding conductors whether or not so indicated on Drawings. Wire sizes shall be as shown or to comply with the National Electrical Code.

### 3.10 PROJECT CLOSEOUT

- A. A certificate of completion shall be issued by the Electrical Subcontractor indicating that the installation is in conformance with the Construction Documents and all applicable Local, State and Federal Statutes and Codes. Final inspection by the Engineer shall be conducted after receipt of the Certificate of Completion. At minimum, life safety items shall be 100% complete including emergency lighting systems, the fire alarm system, and the emergency standby system before the Electrical Subcontractor request for final inspection. If final inspection by the Engineer proves that the emergency lighting systems, the fire alarm system, and the emergency standby system are not 100% complete, the Engineer will backcharge the Electrical Subcontractor at his hourly rate for re-inspection.

### 3.11 SLEEVES, INSERTS AND SUPPORTS

- A. The Electrical Subcontractor shall lay out and install his work in advance of the pouring of concrete floors and walls.
- B. Furnish and install all inserts, conduit hangers, anchors and steel supports necessary for the support and installation of all electrical equipment.
- C. Where openings are required in walls and floors for the passing of raceways, ducts or busways, the Electrical Subcontractor shall furnish the General Contractor with the necessary information regarding dimensions and locations so that he may install suitable concrete stops to provide these openings. Such openings shall be by the General Contractor in such a manner so as not to interfere with the fireproof integrity of the Building.
- D. The Electrical Subcontractor will be held responsible for the location of and maintaining in proper position, sleeves, inserts and anchor bolts supplied and/or set in place by him. In the event that failure to do so requires cutting and patching of finished work, such work shall be done at the Electrical Subcontractor's expense by the General Contractor.

## 3.12 SPECIAL COORDINATION INSTRUCTIONS

- A. Coordination with the work of other trades is referred to within various parts of this Section. The following special instructions shall also be carefully noted:
1. The Electrical Subcontractor shall obtain from the HVAC Engineer copies of all Shop Drawing prints showing the ductwork installation as it will be put in place on the project. These Drawings shall be thoroughly checked by the Electrical Subcontractor and the routing of all conduits and installation of all outlets and electrical equipment shall be coordinated with the ductwork so as to prevent any installation conflict. Such coordination shall be done prior to roughing-in conduits, outlets and electrical equipment.
  2. Locations of all wall outlets shall be verified with the Architect prior to roughing in conduits. Refer to details and wall elevations on the Architectural Drawings; mounting heights indicated on these Architectural Drawings and/or specific dimensional information given to the Electrical Subcontractor by the Architect shall take precedence over such information indicated on the Electrical Drawings.
  3. Refer to all other Drawings associated with this project. Any equipment which requires an electrical supply circuit, switch, controls and connections, even though not indicated on the Electrical Drawings, shall be furnished and installed as directed by the Architect. Locations of lighting fixtures shall conform to the architectural reflected ceiling plans.
  4. Refer to Architectural Drawings for areas in which the concrete slab is poured on grade. In these areas a moisture proofing membrane will be installed on the grade fill or earth prior to pouring of slab. Electrical conduits shall be so installed, where possible, to avoid the necessity of penetrating this moisture proofing membrane. Such penetration of the membrane shall only be made when specifically allowed by the Architect, and shall be made only at locations directed by the Architect.

## 3.13 WIRE AND CABLE

- A. Wiring for all branch circuits and feeder circuits shall be color coded as follows:
1. 3-phase, 4-wire, 208Y/120 volts:
 

<u>Phase</u>	<u>Color</u>
A	Black
B	Red
C	Blue
Neutral	White
Equip. Ground	Green
  2. Connections to terminal shall be arranged Phase A, B, C from left to right.
  3. Signal system shall be color coded differently from electrical systems described above.
  4. For large size conductors available only in black, use colored plastic tape at all ends and where connections and splices are made for the specified color code identification. Tape shall be wrapped around the conductor three complete turns.
- B. In each case, the phase wires shall be connected to the phase supply mains in proper rotation to assure a balanced condition on the panel. The circuit numbers assigned on the Drawings are used for convenience only and need not designate the circuit on the panel to which that circuit may be connected. However, the circuit numbers and circuit description are required to be typewritten on the panelboard directory at the conclusion of the work, and shall represent the circuits as actually connected to the panelboard.
- C. Joints and splices shall be made in an approved manner and shall be equivalent, electrically and mechanically, to the conductor insulation. Solid conductors shall be spliced with approved wiring connectors. Conductors of Size No. 8 AWG and larger shall be

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connected by use of solderless pressure connectors; these joints and splices shall be taped with one wrap of varnish cambric tape and then a minimum of three wraps of No. 88 Scotchbranch (3M Company) all-weather vinyl plastic electrical tape, or equal Permacel or Plymouth Company. Each wrap of tape shall be half-lapped. Conductors of Size No. 4 AWG or larger shall have two coats of insulating varnish applied over the tape.

- D. Switch leg wiring shall be the same color as the phase conductor from which it is supplied.

### 3.14 ALTERNATES

- A. Refer to Alternates, Section 01 23 00, for alternates affecting the scope of work under this Section.
- B. The work of this Section, which is required by the scope of work as stated in the Alternates, Section 01 23 00, shall comply with the applicable quality and performance requirements for similar work under this Section.
- C. The alternates which effect the Electrical Sections are:
  - 1. Add Alternate No.1 – Science Classrooms 222, 302 (including HVAC), and Classroom 123 Ceiling.
    - a. Add Alternate Number 1: Refer to Drawings.

### 3.15 EXISTING WORK AND DEMOLITION

- A. The Electrical Subcontractor shall survey the existing electrical system and notify the Owner of any possible problems or issues pertaining to disconnection or removal of any existing electrical equipment, etc. Particular care shall be taken to avoid creating hazard or causing unnecessary disruption of services in adjoining areas.
- B. All electrical equipment, devices, lighting fixtures, etc., shall be disconnected and removed in any area scheduled for renovation by the Architect. All wiring associated with removed or disconnected equipment shall be removed back to next active outlet of panelboard. Raceways shall be capped at nearest coupling immediately outside of area to be renovated.
- C. The Electrical Subcontractor shall reroute and reconnect all existing circuiting which originates or passes through the renovated areas but serves other areas not being renovated. These circuits shall be extended as required to the existing panelboards.
- D. All equipment removed shall be turned over to the Owner unless indicated to be re-used or scrapped. All existing electrical equipment as designated by the Owner shall be stored at a location as directed by the Owner. All other equipment not to be retained by the Owner shall be removed from the premises in a legal and proper manner by the Electrical Subcontractor.
- E. Provide blank coverplates for all obsolete boxes that are to remain.
- F. Refer to Section 02 41 19 for Selective Demolition requirements.

Section 31 00 00  
EARTHWORK**PART 1 - GENERAL**

## 1.1 SUMMARY

- A. Drawings and General Provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
- B. Rhode Island Department of Transportation (RIDOT), Standard Specifications for Highways and Bridges, latest Edition with amendments, hereinafter referred to as the "Standard Specifications".
- C. Rhode Island Department of Transportation (RIDOT), Construction Standards, latest Edition with amendments hereinafter referred to as the "Construction Standards".
- D. The Contractor shall become thoroughly familiar with the site, consult records and drawings of adjacent structures and of existing utilities and their connections, and note all conditions which may influence the work of this Section.
- E. By submitting a bid, the Contractor affirms that he has carefully examined the site and all conditions affecting work under this Section. No claim for additional costs will be allowed because of lack of full knowledge of existing conditions.
- F. Coordinate work with that of all other trades affecting, or affected by work of this Section. Cooperate with such trades to assure a steady progress of work under this Contract.

## 1.2 SCOPE OF WORK

- A. Work covered by this specification includes the following but is not limited to:
  - 1. Excavation to obtain subgrade
  - 2. Proofrolling of exposed subgrade for fill, walks, pavements, field, lawns and grasses, and exterior plants
  - 3. Excavation for utilities
  - 4. Backfilling of excavations for pavements and landscaped areas with specified on-site and imported materials
  - 5. Placement of bedding, sub-base and base course layers
  - 6. Stabilization/mitigation of saturated or otherwise disturbed materials
  - 7. Final grading
  - 8. Excavation support, shoring or bracing as necessary
  - 9. Required materials testing frequency

## 1.3 DESCRIPTION

- A. The Contractor shall furnish all labor, material, tools and equipment necessary to excavate materials; segregate, track, handle, sample, analyze, and test excavated materials, backfill, and re-grade as indicated on the Drawings.
- B. The Contractor shall use suitable on-site soils and fill, and soil from off-site sources, as needed.
- C. The Contractor shall make excavations in such a manner and to such widths that will give suitable room for performing the Work .

- D. The Contractor shall provide labor and material for all pumping and draining, if necessary; and shall render the bottom of excavation firm and dry and in all respects acceptable. The Contractor shall collect and properly dispose of all discharge water from dewatering systems in accordance with local and State requirements and permits.
- E. The Contractor shall raise the Site to final grades and compact the subgrade and intermediate layers to the required criteria set forth within the Section.
- F. Routine monitoring of in-place excavation support system shall be provided.
- G. Contractor shall protect and moisture condition all on site and imported materials for proper installation, compaction and use. This includes covering, drying, and adding moisture in order to maintain suitable workability of the soil materials.

#### 1.4 INFORMATION

- A. Information on the Drawings and in the Specifications relating to subsurface conditions, natural phenomena, and existing utilities and structures is from the best sources presently available. Such information is furnished only for information and is not guaranteed.
- B. Site Information – Data on indicated subsurface conditions are not intended as representations or warrants of continuity of such conditions between soil borings. It is expressly understood that Owner will not be responsible for interpretations or conclusions drawn there by the Contractor. Data is made available for the convenience of the Contractor. The Owner, Architect and Engineer assume no responsibility for the accuracy of the data other than at the particular locations and at the time the explorations were made.
- C. The Contractor, at his/her own expense, may conduct additional subsurface testing for his/her own information after approval by the Owner.

#### 1.5 SUBSURFACE CONDITIONS AND SPECIAL SITE CONSIDERATIONS

- A. It is the responsibility of the Contractor under this Contract to do the necessary excavation, filling, grading and rough grading to bring the existing grades to subgrade and parallel to finished grades as specified herein and as shown on the Drawings for this Work. The Contractor shall visit the site prior to submitting a bid to become familiar with the extent of the work to be done under this Contract. The Contractor shall be responsible for determining the quantities of earth materials necessary to complete the work under this Section. All earth materials shall be included in the Contractor's base bid.

#### 1.6 PERMITS, CODES AND SAFETY REQUIREMENTS

- A. All work shall conform to the Drawings and Specifications and shall comply with applicable codes and regulations.
- B. Comply with the rules, regulations, laws and ordinances of the Town of Bedford, of the State of New Hampshire, appropriate agencies of the State of New Hampshire and all other authorities having jurisdiction. Coordinate all work done within Town and State rights of way with the appropriate agencies. All labor, materials, equipment and services necessary to make the work comply with such requirements shall be provided without additional cost to the Owner.



- C. Comply with the provisions of the Manual of Accident Prevention in Construction of the Associated General Contractors of America, Inc., and the requirements of the Occupational Safety and Health Administration (OSHA), United States Department of Labor whichever is more stringent.
- D. The Contractor shall procure and pay for all permits and licenses required for the complete work specified herein and shown on the Drawings.
- E. The Contractor shall so conduct his operations as to interfere as little as possible with the use ordinarily made of the athletic field and other lanes of the track near enough to the work to be affected hereby. The Contractor shall comply with the time limits established by the terms for trucking onto and off of the site.
- F. Any apparent conflict between the Drawings and Specifications and the applicable codes and regulations shall be referred to the Engineer in writing, for resolution before the work is started.
- I. The Contractor shall comply with all excavation, and trenching requirements of Occupational Safety and Health Administration (OSHA) excavation safety standards, 29 CFR Part 1926.650 through 1926.652.

#### 1.7 LAYOUTS AND GRADES

- A. All line and grade work not presently established at the site shall be laid out by a survey team under the supervision of a Land Surveyor or Professional Engineer registered in the State of New Hampshire and employed by the Contractor in accordance with Drawings and Specifications. Basic layout for the project is shown on the drawings. The Contractor shall supply all additional layout and grade control as necessary to properly implement and construct the work. The Contractor shall establish permanent bench marks and replace as directed any which are destroyed or disturbed.
- B. The words "finished grades" as used herein shall mean final grade elevations indicated on the Drawings. Spot elevations shall govern over proposed contours. Where not otherwise indicated, project site areas outside of the building shall be given uniform slopes between points for which finished grades are indicated or between such points and existing established grades.
- C. The word "subgrade" as used herein, means the surface or elevation remaining after completing excavation or top surface of a fill or backfill required surface of subsoil, borrow fill or compacted fill. This surface is immediately beneath the site improvements, fill materials as dimensioned on the Drawings, or other proposed surface material.

#### 1.8 DISPOSITION OF EXISTING UTILITIES

- A. Active utilities existing on the site and work areas 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 plotted on the record drawings as described in this Section and both Architect, Owner and Utility Owner notified in writing.
- B. Inactive or abandoned utilities encountered during construction operations shall be removed and suitably backfilled. The location of such utilities shall be noted on the record drawings and reported in writing to the Architect.
- C. The Contractor shall notify "Dig Safe" and local utility companies prior to the start of construction. The "Dig Safe" number shall be submitted by the Contractor in writing to the Engineer prior to construction.

## 1.9 DRAINAGE

- A. The Contractor shall control the grading in areas under construction on the site so that the surface of the ground will properly slope to prevent accumulation of water in excavated areas and adjacent properties.
- B. Should surface, rain or groundwater be encountered during the operations, the Contractor shall furnish and operate pumps or other equipment, and provide all necessary piping to keep all excavations clear of water at all times and shall be responsible for any damage to work or adjacent properties for such water. All piping exposed above ground surface for this use, shall be properly covered to allow foot traffic and vehicles to pass without obstruction.
- C. Presence of groundwater or stormwater in soil will not constitute a condition for which an increase in the contract price may be made. Under no circumstances place concrete fill, lay piping or install appurtenances in excavation containing free water. Keep utility trenches free of water until pipe joint material has hardened and backfilled to prevent flotation.

## 1.10 FROST PROTECTION/WORK IN FREEZING WEATHER

- A. Protect excavation bottoms and sides against freezing.
- B. A layer of fill shall not be left in an uncompacted state at the close of a day's operation when there is the potential for that layer to freeze.
- C. The Contractor shall not place any material on snow, ice, frozen soil, or soil that was permitted to freeze prior to compaction. Removal of these unsatisfactory materials will be at the Contractor's expense.
- D. Do not excavate to full indicated depth when freezing temperatures may be expected, unless work can be completed to subgrade, the materials installed, and the excavation backfilled the same day. Protect the excavation from frost if placing of materials or backfilling is delayed.
- E. The Contractor shall keep the operations under this Contract clear and free of accumulation of snow within the limits of Contract Lines as necessary to carry out the work.
- F. No materials shall be installed on frozen ground.

## 1.11 DISTURBANCE OF EXCAVATED AND FILLED AREAS DURING CONSTRUCTION

- A. The Contractor shall take the necessary steps to avoid disturbance of subgrade and underlying natural soils/compacted fill during excavation and filling operations. Methods of excavation and filling operations shall be revised as necessary to avoid disturbance of the subgrade and underlying natural soils/compacted fill, including restricting the use of certain types of construction equipment and their movement over sensitive or unstable materials. The Contractor shall coordinate with the Engineer or Soils Representative to modify his operations as necessary to minimize disturbance and protect bearing soils, based on the Engineer's or Soils Representative's observations.
- B. All excavated or filled areas disturbed during construction, all loose or saturated soil, and other areas that will not meet compaction requirements as specified herein shall be removed and replaced with compacted Sand Gravel Fill or Crushed Stone. Fill that cannot be compacted within 48 hours because of its saturated condition shall be removed and replaced with compacted Sand Gravel Fill or Crushed Stone. Costs of removal of disturbed material and replacement with Sand Gravel Fill or Crushed Stone shall be borne by the Contractor.

- C. If requested by the Engineer, the Contractor shall place a 6-inch layer of Crushed Stone or 12-inch layer of Granular Fill over natural underlying soil to stabilize areas disturbed during construction.
  - 1. The placement of the Crushed Stone layer or Granular Fill as well as material costs shall be borne by the Contractor.
- D. Material that is above or below optimum moisture for compaction of the particular material in place as determined by the Engineer or the Soils Representative and is disturbed by the Contractor during construction operations so that proper compaction cannot be reached shall be construed as unsuitable bearing materials. This material shall be removed and replaced with lean concrete, Sand Gravel Fill, or Crushed Stone as directed by the Engineer or Soils Representative at no additional cost to the Owner.

#### 1.12 SPECIAL REQUIREMENTS FOR SEQUENCE OF CONSTRUCTION OPERATIONS AND DRAINAGE AND EROSION CONTROL

- A. An initial procedure for sequencing of construction operations is specified under Section 31 25 00, EROSION CONTROL. This procedure shall be extended through earthwork operations as follows:
  - 1. Perform initial procedures as specified under Section 31 25 00, EROSION CONTROL – Initial Sequence of Construction Activities and Preliminary Drainage Control.
  - 2. Repair any broken or damaged Sections of the haybales or siltation fencing installed during site preparation and install any additional Sections necessary for proper erosion control.
  - 3. Throughout earthwork operations, in addition to drainage swales, check dams, siltation sumps, and other items shown on the Drawings, the Contractor shall take other necessary precautions, including installation of temporary drainage swales, siltation sumps, check dams, haybales, silt fencing and temporary pipe to direct and control drainage from disturbed areas on the site so that erosion and siltation is minimal. In addition, no erosion or discharge of silt or larger particles shall occur in water bodies or wetland areas to remain undisturbed or onto adjacent properties.
  - 4. Damaged or loose haybales and siltation fence shall be replaced as necessary to maintain their function of controlled erosion and siltation. Damaged or broken-down check dams and filtration dams shall be replaced immediately.
  - 5. Throughout construction, remove any accumulation of silt or soil build-up behind haybales, silt fences, check dams and filtration dams as it occurs. Remove accumulations of silt and build-up from the siltation pumps and silt traps when it is approximately 18 inches deep, or when it adversely affects the performance of the system. Remove silt sacks in catch basins when they have become clogged and replace to maintain their function.
  - 6. Remove temporary drainage swales, check dams, siltation sumps, haybales and other temporary drainage, erosion and siltation control measures when permanent drainage control measures have been installed, and grass is established in drainage areas and lawn areas. Do not remove the above items without approval of the Engineer. If, in the Engineer's opinion, these measures are still necessary, they shall stay in place.

#### 1.13 DEFINITIONS

- A. Backfill: Soil material used to fill an excavation.
  - 1. Initial Backfill: Backfill placed beside and over pipe in a trench, including haunches to support sides of pipe.
  - 2. Final Backfill: Backfill placed over initial backfill to fill a trench.
- B. Base Course: Course placed between the grade and hot-mix asphalt paving.
- C. Bedding Course: Course placed over the excavated subgrade in a trench before laying pipe.

- D. Borrow Soil: Satisfactory soil imported from off-site for use as fill or backfill.
- E. Compaction: The tamping and rolling of all backfill placed in uniform horizontal layers not exceeding a defined uncompacted lift thickness.
- F. Deleterious Material: Trash, debris, clay, topsoil, roots, organic material friable, glass, or otherwise degradable materials that compromise the strength and properties of soils.
- G. Excavation: Removal of material encountered above subgrade elevations and to lines and dimensions indicated. Excavation is unclassified.
  - 1. Authorized Additional Excavation: Excavation below subgrade elevations or beyond indicated lines and dimensions as directed by Engineer. Authorized additional excavation and replacement material will be paid for according to Contract provisions.
  - 2. Unauthorized Excavation: Excavation below subgrade elevations or beyond indicated lines and dimensions without direction by Engineer. Unauthorized excavation, as well as remedial work directed by Engineer, shall be without additional compensation.
- H. Fill: Soil materials used to raise existing grades or meet proposed grades.
- I. "In-the-dry": In-situ soil moisture content of no more than two percentage points above the optimum moisture content for that soil.
- J. Optimum Moisture Content: Determined by the ASTM standard specified to determine the maximum dry density for relative compaction.
- K. Prepared Ground Surface: The ground surface after clearing, grubbing, stripping, excavation, and scarification and/or compaction.
- L. Proof-rolling: The tamping and rolling of all subgrades.
- M. Relative Density: As defined by ASTM D4253 or D4254.
- N. Relative Compaction: The ratio, in percent, of the as-compacted field dry density to the laboratory maximum dry density as determined by ASTM D1557. Corrections for oversized material may be applied to either the as-compacted field dry density or the maximum dry density, as determined by the Engineer.
- O. State Standards: New Hampshire Highway Department Standard Specifications for Highways and Bridges.
- P. Subbase Course: Course placed between the subgrade and base course for hot-mix asphalt pavement, or course placed between the subgrade and a cement concrete pavement or a cement concrete or hot-mix asphalt walk.
- Q. Subgrade: Surface or elevation remaining after completing excavation, or top surface of a fill or backfill immediately below subbase, drainage fill, or topsoil materials.
- R. Unclassified Excavation: The nature of materials to be encountered has not been identified or described herein.

- S. Unsuitable material: Material containing vegetation or organic material, such as mulch, peat, organic silt, topsoil, sod, deleterious material, and/or particles greater than the maximum specified diameter for that materials specific application, that are not satisfactory for use as determined by the Engineer.
- T. Utilities: On-site underground pipes, conduits, ducts, and cables, as well as underground services within buildings.

#### 1.14 REFERENCES

- A. American Society of Testing and Materials Publications
- B. New Hampshire Highway Department Standard Specifications for Roads and Bridges.

#### 1.15 SUBMITTALS

- A. Product Data: For the following:
  - 1. Geotextile.
- B. Grain-size distribution analysis test data shall be delivered with the samples. The analysis shall be performed in accordance with ASTM D 422.
- C. The Contractor shall submit to the Engineer, under provisions of Section 01 33 00, manufacturer's literature and data on proposed compaction equipment.
- D. The Contractor shall provide to the Engineer, on a daily basis, copies of field records documenting the location of stockpiled material, and stockpile identification data.
- E. Material Test Reports: From a qualified testing agency indicating and interpreting test results for compliance of the following with requirements indicated:
  - 1. Classification according to ASTM D 2487 of each onsite and borrow soil material proposed for fill and backfill.
  - 2. Laboratory compaction curve according to ASTM D 1557 for each on-site and borrow soil material proposed for fill and backfill.
- F. Pre-excavation Photographs or Videotape: Show existing conditions of adjoining construction and site improvements, including finish surfaces that might be misconstrued as damage caused by earthwork operations. Submit before earthwork begins.
- G. Contractor shall submit designs for any required or anticipated temporary earth support and/or dewatering systems designed and stamped by a Professional Engineer registered in the State of New Hampshire.

#### 1.16 SAMPLING AND TESTING

- A. A 50-lb. Sample of each off-site material proposed for use, and of any on-site material when so requested by the Engineer or Soils Representative, shall be submitted for approval.
  - 1. Samples shall be delivered to the office of the Engineer or as directed.
  - 2. Samples required in connection with compaction tests will be taken and transported by the Soils Representative.
- B. Product Data: Submit location of pits for borrow material.

- C. Samples shall be representative of the source pit. If materials are found to vary once construction begins, the Contractor will be required to submit additional representative samples at his own cost.
- D. Materials imported to the site by the Contractor for on-site use shall not contain oil, hazardous waste, or deleterious materials.
  - 1. The Contractor shall be responsible for all costs incurred by the Owner as a result of the Contractor's action to import materials containing concentrations of oil and/or hazardous materials to the site.
  - 2. In the event that site characterization of off-site borrow sources indicates that soils are acceptable to the Architect or Engineer for use, then chemical testing will not be required. It is anticipated that chemical testing would not normally be required for material from customarily utilized commercial borrow sources.

No fill material from "urban areas" will be accepted for fill at the site, even if chemical testing indicates no exceedances of "Reportable Concentrations".

If requested by the Owner or Engineer, based on review of the borrow site characterization, the Contractor shall conduct testing on proposed fill material and submit results prior to delivery to the site, at no additional cost to the Owner. Testing shall be conducted by a DEP-certified testing laboratory and shall include, at a minimum, the following analytical test data.
    - a. Total Petroleum Hydrocarbons (EPA Method 418.1) every 100 yards
    - b. Volatile Organic Compounds (EPA Method 8420) every 500 yards
    - c. PCB and Pesticides (EPA Method 8080) every 500 yards
    - d. Total RCRA Metals (EPA Method 6000-7000 series) every 500 yards
    - e. Polynuclear Aromatic Hydrocarbons (EPA Method 8270) every 500 yards
    - f. TCLP for those total parameters which exceed twenty times the TCP criteria every 500 yards
    - g. Total cyanide (EPA 9020)
  - 3. Testing parameters and testing frequencies may be reduced, as directed by the Soils Representative.
  - 4. All sieve analyses for conformance of on-site and off-site fill materials to be used in the work shall be done by means of a mechanical wet sieve analysis and in accordance with ASTM D 422.

#### 1.17 QUALITY ASSURANCE

- A. The Engineer's duties do not include the supervision or direction of the actual work by the Contractor, his employees or agents. Neither the presence of the Engineer nor any observation and testing by the Engineer shall excuse the contractor from defects discovered in his Work at that time or subsequent to the testing.
- B. Subgrades shall be approved for compactness and material composition by the Engineer prior to placing subsequent lifts. If inspections indicate Work does not meet specified requirements, the Work shall be removed, replaced and compacted at no additional cost to the Owner or Engineer.
- C. Pre-excavation Conference: Conduct conference at Project site to comply with requirements in Division 1 Section "Project Management and Coordination."
- D. Contractor shall notify Engineer when excavations have reached required subgrade and provide a minimum notice of 24 hours prior to placement of backfill on exposed subgrade.

#### 1.18 PROJECT CONDITIONS

- A. Existing Utilities: Do not interrupt utilities serving facilities occupied by the owner or others unless permitted in writing by Engineer and then only after arranging to provide temporary utility services according to requirements indicated.
  - 1. Notify Engineer not less than two days in advance of proposed utility interruptions.
  - 2. Do not proceed with utility interruptions without Engineer's written permission.
  - 3. Contact a utility-locator service for the area where Project is located before excavating.
- B. Demolish and completely remove from site existing underground utilities indicated to be removed. Coordinate with utility companies and Town of Medfield to shut off services if lines are active.
- C. Subsurface investigations indicated the presence of fill material which contains organic matter. This material has limited reuse applications at the site.
- D. Subsurface investigations indicated the presence of sandy materials which will likely be easily disturbed due to construction activities. This material is also likely to require regular moisture conditioning to obtain required compaction requirements.

**PART 2 - PRODUCTS**

2.1 GENERAL

- A. Segregate excavated material based upon material type to enable reuse in appropriate locations based upon material type.
- B. Provide borrow soil materials when sufficient satisfactory soil materials are not available from excavations.

2.2 SOIL MATERIALS

- A. Satisfactory Soils: All soil shall be ASTM D 2487 Soil Classification Group SP, SW or a combination having gradations as specified herein in the following Sections.
- B. Common borrow material obtained from off-site borrow sources that have no known releases or disposal of oil and/or hazardous material shall be acceptable for use only when accompanied by documentation stating there has been no known releases or disposal of oil and/or hazardous materials at the off-site borrow site.

2.3 STRUCTURAL FILL

- A. Structural fill should have a plasticity index of less than 6, and should meet the gradation requirements shown below. Structural Fill should be compacted in maximum 9-inch loose lifts to at least 95 percent of the Modified Proctor maximum dry density (ASTM D1557), with moisture contents within ±2 percentage points of optimum moisture content.

Sieve Size	Percent Passing by Weight
3 inches	100
1 ½ inch	80 – 100
½ inch	50 – 100
No. 4	30 – 85
No. 20	15 – 60
No. 60	5 – 35
No. 200*	0 - 10

\*0 – 5 Under sidewalks

## 2.4 ORDINARY FILL

- A. Ordinary Fill should have a plasticity index of less than 6, and should meet the gradation requirements shown below. Ordinary Fill should be compacted in maximum 9-inch loose lifts to at least 95 percent of the Modified Proctor maximum dry density (ASTM D1557), with moisture content s within  $\pm 2$  percentage points of optimum moisture content.

Sieve Size	Percent Passing by Weight
6 inches	100
1 inch	50 – 100
No. 4	20 - 100
No. 20	10 - 70
No. 60	5 – 45
No. 200	0 - 20

## 2.5 COMMON BORROW

- A. Common Borrow material shall be soil containing no stone larger than 8 inches and shall be substantially free of organic loam, wood, trash, or other objectionable materials which may be decomposable, compressible or which cannot be properly compacted. Common Borrow materials shall not contain more than 30 percent by weight of silt and clay.
1. No Common Borrow shall be imported until available onsite Ordinary Fill has been utilized or with prior written approval from the Engineer.
  2. Common Borrow material from off-site borrow sources shall contain not detectable concentrations of asbestos.
  3. Common Borrow to be placed within 10 inches of athletic fields shall be soil containing no stone larger than 3 inches and shall meet all other requirements listed herein.

## 2.6 GRAVEL BORROW

- A. Granular Fill shall be onsite or imported material conforming to Item M1.03.0 type a or b of the State Standards.
- B. Sand Gravel Fill shall be onsite or imported material conforming to Item M1.03.0 type b of the State Standards.
- C. Gravel Borrow materials are not anticipated to be present onsite.

## 2.7 BEDDING MATERIAL

- A. Gravel Borrow Bedding Material shall be imported material conforming to Item M1.03.0 type c of the State Standards.
- B. Crushed Stone Bedding Material shall be imported material conforming to Item M2.01.3 of the State Standards.
- C. Coarse Sand Bedding Material shall be imported material conforming to Item M1.04.0 type A of the State Standards.
- D. Dense Grade Crushed Stone shall be imported material conforming to Item M2.01.7 of the State Standards.



2.8 CRUSHED STONE

- A. Crushed Stone shall be impacted durable material with maximum of 1 1/2" or 2" as specified in the Drawings. Stone used for drainage components shall be double washed. For all other applications fines shall be <1% unless otherwise noted. Crushed stone shall meet the following gradation:

Size (inches)	Percent Finer
1 1/2" - 2"	100%
1 1/4"	85% - 100%
3/4"	10% - 40%
1/2"	0% - 8%
#200	< 1%

- B. 3/4" Crushed Stone shall comply with State Standards M2.01.4.
- C. 1/4" to 3/8" Crushed Stone shall comply with State Standards M2.01.6.

2.9 PEA GRAVEL

- A. Clean naturally rounded aggregate with particle sizes no larger than 3/4 of an inch with no more than 5% passing the #8 sieve. The dry density shall be a minimum of 95 pounds per cubic foot.

2.10 ACCESSORIES

- A. Warning Tape: Acid- and alkali-resistant polyethylene film warning tape manufactured for marking and identifying underground utilities, 6 inches (150 mm) wide and 4 mils (0.1 mm) thick, continuously inscribed with a description of the utility; colored as follows:
- B. Detectable Warning Tape: Acid- and alkali-resistant polyethylene film warning tape manufactured for marking and identifying underground utilities, a minimum of 6 inches (150 mm) wide and 4 mils (0.1 mm) thick, continuously inscribed with a description of the utility, with metallic core encased in a protective jacket for corrosion protection, detectable by metal detector when tape is buried up to 30 inches (750 mm) deep; colored as follows:
  1. Red: Electric.
  2. Yellow: Gas, oil, steam, and dangerous materials.
  3. Orange: Telephone and other communications.
  4. Blue: Water systems.
  5. Green: Sewer systems.

**PART 3 – EXECUTION**

3.1 GENERAL

- A. Prior to commencing work, the Contractor shall establish property line locations and place construction control markers clearly visible and understandable to workers in the field. The Contractor shall exercise due care so as not to disturb adjacent structures and shall leave the Site in clean and orderly condition upon completion of the work.
- B. Unanticipated Soil Conditions:

1. If unsuitable bearing materials are encountered at the specified subgrade depths, the Contractor shall notify the Engineer. The Contractor shall carry excavation deeper and replace the excavated material with compacted fill or concrete as directed by the Engineer or Soils Representative.
  2. Removal of such material and its replacement as directed will be paid an extra compensation in quantity approved by the Engineer. Only changes in the work authorize in advance by the Engineer in writing shall constitute an adjustment in the Contract Price.
  3. Material that is above or below optimum moisture for compaction of the particular material in place as determined by the Engineer or the Soils Representative and is disturbed by the Contractor during construction operations so that proper compaction cannot be reached shall not be construed as unsuitable bearing materials. This material shall be removed and replaced with lean concrete or compacted Gravel Borrow as directed by the Engineer or Soils Representative at no additional cost to the Owner.
  4. The Contractor shall follow a construction procedure which permits visual identification of firm natural ground.
- C. Excessive Excavation: If any part of the general or trench excavation is carried, through error, beyond the depth and dimensions indicated on the Drawings or called for in the Specifications, the Contractor at his own expense, shall furnish and install compacted gravel fill, concrete, or take other remedial measures as directed by the Engineer to bring fill material up to the required level or dimension.
- D. Reuse of onsite material: Not all of the materials onsite will be suitable for reuse in all areas of the site. Imported materials are anticipated to meet all of the materials required as described above.
1. Samples and Testing:
  2. Excavated material taken directly from on-site cuts that will meet the Specifications may be used as fill provided the Contractor obtains written approval from the Engineer. No such fill material shall be put in place until approved for use by the Engineer in writing. Sand Gravel Fill is not anticipated to be found on the site.
  3. Testing of materials as delivered may be made from time to time. Materials in question may not be used, pending test results. Tests of compacted materials will be made regularly. Remove rejected materials and replace with new, whether in stockpiles or in place.
- E. Deficiency of Fill Material: Provide required additional fill material to complete the work if a sufficient quantity of suitable material is not available from the required excavation on the project site at no additional cost to the Owner.
- F. Surplus Fill Material: Surplus fill that is not required to fulfill the requirements of the Contract shall be removed from the site and legally disposed of.

### 3.2 PREPARATION

- A. The Contractor shall be deemed to have inspected the Site and satisfied himself/herself as to actual grades and levels and true conditions under which the Work will be performed.
- B. Areas required for execution of Work shall be cleared. The work area shall be free of standing water and shall be dry.
- C. All site health and safety controls shall be fully established and in operation prior to beginning any demolition, soil, and fill excavation. Site controls shall include but not be limited to work zones properly barricaded, wheel wash and decontamination facilities, and all support equipment and supplies including personal protective equipment. All site controls shall be reviewed by the Engineer in the field.

- D. The Contractor shall provide all layout field data, including ties, to the Engineer. The Contractor shall maintain all required field controls throughout the performance of the Work.
- E. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by earthwork operations.
- F. Preparation of subgrade for earthwork operations including removal of vegetation, topsoil, debris, obstructions, and deleterious materials from ground surface is specified in Section 31 10 00 Site and Preparation Clearing."
- G. Protect and maintain erosion and sedimentation controls, which are specified in Division 31 Section 31 10 00," during earthwork operations.
- H. Provide protective insulating materials to protect subgrades and foundation soils against freezing temperatures or frost.

### 3.4 PROOF COMPACTING

- A. Areas requiring excavation shall be excavated to subgrade and then proof compacted as specified in Section 1.2 of this Specification Section.
- B. Where soft zones are revealed by compaction efforts and where organic soil is exposed, the soft material or organic soil shall be removed and replaced with Structural Fill in utility trenches and Ordinary Fill in paved areas.

### 3.5 EXCAVATION, GENERAL

- A. The Contractor shall remain responsible for adequacy and safety of construction means, methods and techniques.
- B. The Contractor shall complete all excavations regardless of the type, nature or condition of the material encountered. The Contractor shall be solely responsible for making all excavations in a safe manner.
- C. The Engineer shall be notified of unexpected subsurface conditions. Work shall be discontinued in affected areas until notified to resume work by the Engineer.
- D. Displaced or loose soil shall be prevented from falling into any excavation. The stability of soil slopes shall be maintained in accordance with applicable local, state and federal regulations and guidelines.
- E. All loose material shall be removed from the bottom of the excavation so that the bottom shall be in an undisturbed condition. If removal of the loose material results in excavation beyond the work limits and over excavation has not been approved by the Engineer; the restoration of the excavation to grade shall be done at no additional cost to the Engineer.
- F. When the bottom of the excavation shall, by error of the Contractor, have been taken to a depth greater than the depth specified, or directed by the Engineer, said condition shall be corrected by refilling to the proper grade with granular fill or the design shall be altered in a fashion acceptable to the Engineer to compensate for said error. All measures taken to rectify conditions caused by over excavation shall have the Engineer's approval, and any increase in cost resulting from such measures shall be borne by the Contractor.

- G. Excavation shall not be performed when weather conditions or the conditions of the materials are such that, in the opinion of the Engineer, work cannot be performed satisfactorily.
- H. Appropriate measures shall be provided to retain excavation sidewalls and to ensure that persons working in or near the excavation are protected. Sheeting shoring or bracing may be used to support the walls of excavations. Method, design, construction and adequacy of any required bracing shall meet the OSHA requirements of 29 CFR Part 1926 and are the responsibility of the Contractor.
- I. All damage related to or caused by the excavation shall be repaired at the expense of the Contractor.
- J. Unclassified Excavation: Excavate to subgrade elevations regardless of the character of surface and subsurface conditions encountered. Unclassified excavated materials may include rock, soil materials, and obstructions. No changes in the Contract Sum or the Contract Time will be authorized for rock excavation or removal of obstructions.
  - 1. If excavated materials intended for fill and backfill include unsatisfactory soil materials and rock, replace with satisfactory soil materials.
  - 2. Remove rock to lines and grades indicated to permit installation of permanent construction without exceeding the following dimensions:
    - a. 6 inches beneath pipe in trenches, and
    - b. The greater of 18 inches wider than pipe or 36 inches wide.
- K. The Contractor shall excavate soil and fill to the limits necessary to achieve the required grades determined by the Engineer. The limits of excavation may not coincide with those areas indicated on the Drawings. The excavation areas shown on the Drawings are estimated areas only.
- L. If unanticipated bearing soils are encountered beyond the limits of excavation as specified on the Drawings and in the Specifications and at the specified subgrade depth, the Contractor shall notify the Owner's Representative in writing. The Contractor shall carry the excavation deeper and replace the excavated material with appropriate specified material or concrete as directed by the Engineer.
- M. Removal of topsoil, subsoil, rock, boulder, and organic silt, or silty sand as specified herein will not be considered as unanticipated, unsuitable soil conditions at an elevation above specified subgrade elevations. Similarly removal of these materials within paved areas as specified herein will not be considered unanticipated unsuitable soil conditions. Proposed overexcavation as shown on the plans will not be considered unanticipated soil conditions.

### 3.6 ROCK EXCAVATION

- A. Definitions and Classifications: The following classifications of excavation will be made only when rock excavation is required.
  - 1. "Earth Excavation" consists of removal and disposal of pavement and other obstructions visible on ground surface, underground structures and utilities indicated to be demolished and removed, material of any classification indicated in data on subsurface conditions, and other materials encountered that are not classified as rock excavation.
  - 2. "Rock Excavation" consists of removal and disposal of materials encountered that cannot be excavated without continuous and systematic drilling and blasting or continuous use of a ripper or other special equipment, except such materials that are classed as earth excavation. Typical of materials classified as rock excavation are as follows:

- a. Rock or stone in original ledge.
  - b. Hard shale in original ledge.
  - c. Boulders on site, outside trench limits, exceeding three cubic yards in volume.
  - d. Boulders within trench limits, exceeding one cubic yard in volume.
3. Should highly fractured or weathered bedrock be encountered during excavation, the following shall apply:
- a. When the material is encountered in trenching operations or under footings, it shall be excavated or ripped with a hydraulic backhoe equal to or larger than Caterpillar 225 backhoe, and will be classified as Earth Excavation. When it is demonstrated to the satisfaction of the Engineer and the Soils Representative that this material can no longer be removed with a hydraulic backhoe and requires drilling and blasting, this material shall be classified as Rock Excavation. For excavation procedures when this material is encountered under footings, refer to paragraph below.
  - b. When this material is encountered in open excavation, it shall be classified as earth excavation until drilling and blasting or continuous ripping is necessary as defined hereinabove.
4. Intermittent drilling and ripping performed to increase production and not necessary to permit excavation of material encountered will be classified as earth excavation.
5. Allowance for Rock Excavation: The Contractor shall carry in the Base Bid an allowance for 10 cubic yards of rock encountered in trench excavation removed from the site. The Contractor shall also carry in the Base Bid an allowance of 10 cubic yards of open rock excavation removed from the site. The Base Bid shall cover all costs relating to such rock excavation, including blasting, removal and placement of the excavated material, overhead and profit. No amount other than that herein specified will be paid by the Owner for excavation herein defined.
- a. If the total quantity of Rock Excavation, open and/or trench, exceeds the amount of Rock Excavation included in the Contract as listed above, the Owner shall pay the excess excavation at the unit price submitted in the Bid Form.
  - b. If the total quantity of Rock Excavation, open and/or trench, is less than the amount of Rock Excavation included in the Contract as listed above, the Contract sum will be decreased by the difference in Rock Excavation multiplied by the unit price submitted in the Bid Form.
- B. Measurements:
1. When, during the process of excavation, rock is encountered, such material shall be uncovered and exposed in such a manner that the unbroken ledge surface is clearly visible, and the Engineer shall be notified by the Contractor, before proceeding further. The areas in question shall then be cross-sectioned as hereinafter specified.
  2. Failure on the part of the Contractor to uncover such material and to notify the Engineer and proceeding by the Contractor with the rock excavation before cross-sections are taken, will forfeit the Contractor's right of claim towards the stated allowance or additional payment over and above the stated allowance at the quoted unit price.
  3. The Contractor shall employ and pay for a Professional Civil Engineer or Land Surveyor registered in the State of New Hampshire to take cross-sections of rock before removal and to make computations of volume of rock encountered within the Payment Lines. Cross-sections shall be taken in the presence of the Soils Representative and the computations approved by the Engineer. The Owner has the option to perform independent cross-sections and computation of rock quantities.
  4. Where removal of boulder or ledge is required outside the established payment lines, the extent of this removal and basis of payment shall be determined by the Engineer.
- C. Rock excavation for foundations outside of the Building Area: Remove rock to foundation or footing subgrade. All rock bottoms for foundations shall be carefully examined. Loose or shaken rock shall be removed to solid bearing, and the rock surface leveled, or shelved to a slope not exceeding one inch per two feet, or as directed.

- D. Excavate rock encountered in grading under paved areas, lawns and plant beds to subgrade as specified herein and shown on the Drawings. All boulders or protruding rock outcrops shall remain undisturbed at lawns and plant beds when so directed by the Engineer. Rock shall be fractured six inches below subgrade of paved areas but this six-inch layer shall remain in place. Rock in lawns and plant beds shall be similarly treated unless it is directed to remain.
- E. Prepared rock subgrades shall be compacted with at least four passes of a self-propelled vibratory roller such as Dyna Pac CA-30D (44,000 lbs. Centrifugal force) or equivalent. Rock subgrades in utility trenches shall be recompacted with at least four passes a walk-behind vibratory drum roller or other equivalent equipment having at least 10,000 pounds centrifugal force and sufficient to provide a firm, stable subgrade.
- F. If any part of the rock excavation at footings to be carried beyond the depth and the dimensions indicated on the Drawings or called for in the Specifications, the Contractor shall, at his own expense, furnish and install concrete of same strength as footings to the required subgrade level of the footings as shown on the Drawings. Dowelling or other corrective structural measures as directed by the Engineer may also be required to properly anchor or reinforce the concrete. If rock excavation is carried beyond the depth and dimensions to subgrade in other areas, the Contractor shall, at his own expense, furnish and install compacted gravel fill to subgrade as directed by the Engineer.
- G. Basis of Payment: The total amount of rock excavation will be based upon the in-situ volume of rock excavated within and/or above the lines referred to in the next paragraph as "Payment Lines". The payment lines are only to be used as a basis of payment, and are not to be used as limits of excavation. Limits of excavation area as shown on the Drawings and as specified herein.
- H. Payment Lines for Rock Excavation:
  - 1. Payment lines for manholes and catch basins shall be one-foot outside of the outer wall and six inches below subgrade beneath the structure.
  - 2. Payment lines for rock excavation under slabs on grade shall be six inches below the bottom elevation of the specified gravel base course outside of the building and 12 inches below subgrade for slabs within the building. Payment lines for rock excavation at plant beds shall be 12" at edge and full depth of required elevation for loam.
  - 3. Payment lines for rock excavation at paved areas and lawns shall be six inches below respective subgrades.
  - 4. Payment lines for rock excavation for utility trenches outside the building lines shall in no case be calculated as greater in width than the outside diameter of the pipe plus two feet for pipes up to 18 inches. For pipes 18 inches and larger payment lines shall in no case be calculated as greater in width than the outside diameter of the pipe plus three feet. Payment lines at bottom of all pipe and utility trenches shall be six inches below subgrade.

### 3.7 STORAGE OF SOIL MATERIALS - STOCKPILING

- A. The Contractor shall be responsible for managing and tracking any and all materials excavated and placed in stockpiles for testing.
- B. Materials shall be stockpiled on site at locations proposed by the Contractor and approved by the Engineer. Stockpiled materials shall be of sufficient quantities to meet project schedule and requirements
- C. Tracking of the stockpiles shall be performed in accordance with the approved Work Plan submitted by the Contract in accordance with Section 01 33 00.

- D. The temporary stockpiled fill must be removed from the Site in accordance with applicable regulatory deadlines however no later than the completion date of this contract or 90 days from the date the stockpile was created, whichever is encountered first.
- E. Stockpiles shall be securely barricaded and clearly labeled. Differing materials shall be separated with dividers or stockpiled apart to prevent mixing.
- F. The Contractor shall direct surface water away from stockpile site to prevent erosion or deterioration of materials. Soils shall be suitably dewatered prior to their relocation on Site or disposal off site.
- G. Stockpile soil materials away from edge of excavations. Do not store within drip line of remaining trees.

### 3.8 EXCAVATION FOR WALKS AND PAVEMENTS

- A. Excavate surfaces under walks and pavements to indicated lines, cross sections, elevations, and subgrades.

### 3.10 SUBGRADE INSPECTION, COMPACTION AND PROOF ROLLING

- A. Notify Engineer when excavations have reached required subgrade.
- B. Proof compact all subgrades in accordance with Subsection 1.2 of this Specification Section to identify soft pockets and areas of excess yielding. Do not proof compact wet or saturated subgrades.
  - 1. Completely proof compact subgrade in one direction repeating proof-rolling in direction perpendicular to first direction. Limit vehicle speed to 3 mph (5 km/h).
  - 2. Excavate soft spots, unsatisfactory soils, and areas of excessive pumping or rutting, as determined by Engineer and/or Soil Representative, and replace with compacted fill as directed.
  - 3. Proof compacting shall be completed utilizing a 20-Ton vibratory drum roller for granular soils. Should clay or other cohesive soils be encountered, sheep's foot roller shall be utilized. A total of 6 passes shall be considered complete.
- C. Reconstruct subgrades damaged by freezing temperatures, frost, rain, accumulated water, or construction activities, as directed by Engineer and/or soil representative, without additional compensation.

### 3.11 BACKFILL

- A. Place and compact backfill in excavations promptly, but not before completing the following:
  - 1. Construction below finish grade including, where applicable, subdrainage,
  - 2. Surveying locations of underground utilities for Record Documents.
  - 3. Testing and inspecting underground utilities.
  - 4. Removing concrete formwork.
  - 5. Removing trash and debris.
  - 6. Removing temporary shoring and bracing, and sheeting.
- B. If, through failure or neglect of the Contractor to conduct the excavation work in a proper manner, the surface of the subgrade is in an unsuitable condition for proceeding with construction, the Contractor shall, at his own expense, remove the unsuitable material and replace it. Failure of the Contractor to control surface or ground water adequately, premature excavation at the work site, or

other manifestations of the Contractor's neglect or improper conduct of the work, as determined by the Engineer, shall be grounds for requiring removal and replacement of unsuitable subgrade without additional compensation.

- C. Grading in the vicinity of backfilling shall be properly pitched to prevent water from running into the backfilled area. Work areas shall be kept free from water during performance of the work under this Contract at no expense to the Engineer. The Contractor shall build diversion berms and other devices necessary for this purpose.
- D. The Contractor shall not commence backfilling operations until the Engineer gives approval.
- E. After the subgrade has been prepared, fill material shall be placed and built-up in successive layers until the required elevations are reached. No fill shall be placed on a frozen surface, nor shall snow, ice, or other frozen material be included in fill. Wet materials containing moisture in excess of the amount necessary for satisfactory placement or compaction shall not be used.
- F. All fill shall be brought up in essentially level lifts and shall be placed in levels by standard methods. The method of placement shall not disturb or damage other work. Layers of fill shall not exceed twelve inches of uncompacted thickness before compaction, unless otherwise specified or as necessary for proper subgrade stabilization.
- G. Place backfill on subgrades free of mud, frost, snow, or ice.
- H. Filling operations shall continue until the fill has been brought up to the finished slopes, lines, and grades making proper allowances for thickness of surface treatment.
- I. The entire surface of the work shall be maintained free from ruts and in a condition that will permit construction equipment to travel readily over any Section. The top surface of each layer shall be made level or slightly sloped away from the center of the filled area. Fills should be graded to drain and compacted/sealed whenever precipitation is expected.
- J. Backfilling shall not be performed when weather conditions or the conditions of the material are such that, in the opinion of the Engineer, work cannot be performed satisfactorily.

3.12 ACCEPTABLE BACKFILL MATERIALS

- A. Backfill materials shall be placed in the areas as indicated in the table below:

Fill below the field base elevation	Structural Fill
Fill below pavement subgrade elevation	Ordinary Fill
Fill below sidewalk subgrade elevation	Ordinary Fill
Fill within utility trenches below pavement and sidewalk subgrade	Granular Fill
Fill below utility bedding	Granular Fill
Fill placed 6 inches below footings	Structural Fill
Fill placed 1 foot below slabs	Structural Fill
Fill placed in landscaped areas outside of the Influence Area	Common Borrow

3.14 SOIL FILL



- A. Plow, scarify, bench, or break up sloped surfaces steeper than 1 vertical to 4 horizontal so fill material will bond with existing material.
  - 1. Sequentially place and compact fill material in layers to required elevations.
- B. Place soil fill on subgrades free of mud, frost, snow, or ice.

### 3.16 SOIL MOISTURE CONTROL

- A. Uniformly moisten or aerate subgrade and each subsequent fill or backfill soil layer before compaction to within 2 percent of optimum moisture content.
  - 1. Do not place backfill or fill soil material on surfaces that are muddy, frozen, or contain frost or ice.
  - 2. Remove and replace, or scarify and air dry otherwise satisfactory soil material that exceeds optimum moisture content by +2 to -3 percent and is too wet to compact to specified dry unit weight.
  - 3. If, in the opinion of the Engineer, additional moisture is required, water shall be applied by sprinkler tanks or other uniform distribution devices. If excessive amounts of water or if rain should cause excessive wetness, the area shall be allowed to dry as provided above.

### 3.17 GRADING

- A. General: Uniformly grade areas to a smooth surface, free of irregular surface changes. Comply with compaction requirements and grade to cross Sections, lines, and elevations indicated. Grading shall be done by standard methods. Areas adjacent to structures and other areas inaccessible to heavy grading equipment shall be graded by manual methods. Embankments shall be graded at all times to ensure runoff of water.
  - 1. Provide a smooth transition between adjacent existing grades and new grades.
  - 2. Cut out soft spots, fill low spots, and trim high spots to comply with required surface tolerances.
  - 3. Provide proper drainage from the site, no grading shall be done to direct water to damage or potentially damage adjacent property or work executed under this contract.

### 3.18 FIELD QUALITY CONTROL

- A. Allow testing agency to inspect and test subgrades and each fill or backfill layer. Proceed with subsequent earthwork only after test results for previously completed work comply with requirements.
- B. Testing agency will test compaction of soils in place according to ASTM D 1556, ASTM D 2167, ASTM D 2922, and ASTM D 2937, as applicable. Tests will be performed in accordance with Subsection 1.7 of this Specification Section and:
  - 1. Paved Areas: At subgrade and at each compacted fill and backfill layer, at least 1 test for every **500 sq. ft.** or less of paved area, but in no case fewer than 3 tests.
  - 2. Trench Backfill: At each compacted initial and final backfill layer, at least 1 test for each **150 feet** or less of trench length, but no fewer than 2 tests.
- C. When testing agency reports that subgrades, fills, or backfills have not achieved degree of compaction specified, scarify and moisten or aerate, or remove and replace soil to depth required; recompact and retest until specified compaction is obtained.

### 3.19 COMPACTION REQUIREMENTS

- A. The following table lists minimum compactive efforts, which are required for all, fill materials. Compaction of each lift shall be completed before placement and compaction of the next lift is

started. The compaction equipment shall make an equal numbers of transverse and longitudinal coverages of each lift. The degree of compaction for fill placed in various areas shall be as follows:

- |                                       |     |
|---------------------------------------|-----|
| 1. Under concrete slabs and footings  | 95% |
| 2. In paved areas                     |     |
| Within aggregate base course          | 95% |
| Within aggregate subbase course       | 95% |
| Below subbase course                  | 92% |
| 3. In landscaped areas                | 90% |
| 4. Around and Above Utilities below   |     |
| Below Pavement subbase in paved areas | 92% |

\*Percentage of maximum dry density of the materials at optimum moisture content as determined by methods or tests for ASTM designation D1551 Method D.

- B. Compaction shall be accomplished by vibratory rollers, multiple wheel pneumatic tired rollers or other types of approved compacting equipment. Loaded trucks, low beds, water wagons and the like shall not be considered as acceptable compaction equipment unless specifically approved by the Engineer for a particular location. Equipment shall be of any such design that it will be able to compact the fill to the specified density in a reasonable length of time. All compaction equipment shall be subject to the approval of the Engineer.
- C. The Contractor shall compact all fills made during the day of work prior to leaving the project for the evening. The upper layer shall be pitched as necessary to provide positive drainage towards swales or interceptor ditches to minimize ponding and erosion should it rain.

### 3.20 COMPACTION TESTING

- A. The Contractor shall make all necessary excavations and preparations for testing. Excavations for density tests shall be backfilled with material similar to that excavated, and compacted to the specified density by the Contractor. Failure of the backfill material to achieve the specified density will be just cause for rejection of any or all portions of the excavation Section tested. The Contractor will not be granted an extension of time or additional compensation for testing or repair of backfill ordered by the Engineer.
- B. Field density tests will be made by the Owner's Inspection Agency in accordance with the Method of Test for ASTM Designation D1556 or D6938, to determine adequacy of compaction; the location and frequency of such field tests shall be at the Engineer's Inspection Agency's discretion.
- C. All field density tests results shall be reviewed by the Engineer prior to the placement of concrete.
- D. The Contractor shall notify the Inspection Agency when an area is ready for compaction testing. This notification shall be 48 hours in advance of placing or final compaction so that the Engineer Inspection Agency has adequate time to take compaction tests.
- E. Cooperate with the Engineer in obtaining field samples of in-place materials after compaction. Furnish incidental field labor in connection with these tests. The Contractor will be informed by the Engineer of areas of unsatisfactory density which may require improvements by removal and replacement, or by scarifying, aerating, sprinkling (as needed), and recompaction prior to the placement of the new lift. No additional compensation shall be paid for work required to achieve proper compaction.
- F. The Owner or Engineer's Inspection Agency's presence does not include supervision or direction of the actual work by the Contractor, his employees, or agents. Neither the presence of the Inspec-

tion Agency nor any observations and testing performed by him shall excuse the Contractor from defects discovered in his work.

3.21 PROTECTION

- A. Protecting Graded Areas: Protect newly graded areas from traffic, freezing, and erosion. Keep free of trash and debris.
  - 1. Repair and reestablish grades to specified tolerances where completed or partially completed surfaces become eroded, rutted, settled, or where they lose compaction due to subsequent construction operations or weather conditions.
- B. Scarify or remove and replace soil material to depth as directed by Engineer; reshape and recompact.
  - 1. Where settling occurs before Project correction period elapses, remove finished surfacing, backfill with additional soil material, compact, and reconstruct surfacing.
  - 2. Restore appearance, quality, and condition of finished surfacing to match adjacent work, and eliminate evidence of restoration to greatest extent possible.

3.22 DISPOSAL OF SURPLUS AND WASTE MATERIALS

- A. Disposal: Remove surplus satisfactory soil and waste material, including unsatisfactory soil, trash, and debris, and legally dispose of it off Project property.

3.23 REMOVAL OF EROSION CONTROL MEASURES

- A. Remove temporary drainage swales, check dams, siltation sumps, hay bales, siltation fencing and other temporary drainage, erosion and siltation control measures when permanent drainage control measures have been installed and grass is established in drainage areas leading to siltation sumps. Contractor shall excavate and remove all sediments from siltation sumps prior to backfilling the sumps. Remove erosion control measures when approved by the Engineer.

END OF SECTION

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Section 32 13 13  
CONCRETE PAVING**PART 1 - GENERAL**

## 1.1 GENERAL PROVISIONS

- A. Drawings and General Provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
- B. Rhode Island Department of Transportation (RIDOT), Standard Specifications for Highways and Bridges, latest Edition with amendments, hereinafter referred to as the "Standard Specifications".
- C. Rhode Island Department of Transportation (RIDOT), Construction Standards, latest Edition with amendments hereinafter referred to as the "Construction Standards".
- D. Related Sections: The following Sections contain requirements that relate to this Section:
  - 1. Section 03 00 00 – Cast-In-Place Concrete
  - 2. Section 31 00 00 – Earthwork

## 1.2 DESCRIPTION OF WORK

- A. Work included: Provide all labor, materials, equipment, and transportation necessary to complete the placement of concrete. Such work includes, but is not limited to, the following:
  - 1. Broom finish concrete walkways at the locations shown on the Plans and specified herein.

## 1.3 SUBMITTALS

- A. General: Refer to Division 01 Submittals provisions and procedures.
  - 1. Provide product data for all materials and items, including reinforcement and forming accessories, aggregates, admixtures, joint systems, curing compounds and sealants.
  - 2. Material Certificates: Provide copies of materials certificates signed by material producer and Contractor, certifying that each material item complies with, or exceeds, specified requirements.
  - 3. Plant mix design for concrete.
- B. The Contractor shall provide a shop drawing indicating pouring sequence based on the Plans.
- C. The Contractor shall fabricate in the field one mock-up of the broom finish concrete paving in a single pour measuring 10' long x 5' wide x 4" thick for approval by the Landscape Architect. The sample shall demonstrate the final surface finishes, texture, each joint type, sealant and color that will be provided uniformly throughout the project.

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1. If the sample is approved, it may become part of the final work and shall be the basis of workmanship for all other broom finish concrete paving.

- D. Provide all qualification data listed in Section 1.4 of this specification

#### 1.4 QUALITY ASSURANCE

- A. Qualifications: The foreman and labors shall be thoroughly trained and experienced in the skills required to complete concrete flatwork, be completely familiar with the design and application of the work, be present at all times during the work and perform the work. The foreman and labors shall have no less than five years minimum proven experience in the required paving techniques and desired results. Submit list of installations, indicating location, Owner, Architect/Engineer, date of installation, Contractor, and setting bed, for approval by the Architect.

#### 1.5 REFERENCE STANDARDS

- A. ASTM: American Society for Testing and Material.
- B. AASHTO: American Association of State Highway and Transportation Officials.
- C. ACI: American Concrete Institute.
- D. All ramps and curb ramps shall comply with American Disabilities Act Accessibility Guidelines

#### 1.6 TESTING, CONTROL AND INSPECTION

- A. The Contractor will retain the services of a qualified independent testing agency, approved by the Architect, to test aggregate and to prepare a mix design for each strength of concrete specified; and shall submit such mix designs and test results to the Architect for approval. Mix designs may also be based on proven current designs accompanied by test results. The costs of all such preliminary services shall be borne by the Contractor.
  1. Testing equipment will be provided by and tests performed by the testing laboratory. Upon request by the Architect, the testing laboratory shall provide such auxiliary personnel and services needed to accomplish the testing work.
  2. Concrete test cylinder tests shall be taken for each 50 cubic yards of concrete placed, but at least one set for each day of concrete placements.
  3. Testing required because of changes requested by the Contractor in materials, sources of materials or mix proportions, and extra testing of concrete or materials because of failure to meet the Specification requirements shall be paid by the Contractor.
  4. Concrete shall be sampled and tested for quality control as follows:
    - a. Sampling fresh concrete: ASTM C172
    - b. Concrete test specimens: ASTM C31
    - c. Slump: ASTM C143. – Slump shall be one to three inches, or five to seven inches with Super plasticizer.
    - d. Air Content: ASTM C231
    - e. Compressive strength: ASTM C39 – Concrete shall be 4000 psi at 28 days

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- f. Unit Weight: ASTM C29

## 1.7 NOTIFICATION OF RELATED TRADES

- A. Notify all other trades responsible for installing chases electrical handholes, conduit, when ready for such installation, and for final checking immediately before concrete is placed. Cooperate with such trades to obtain proper installation.

## 1.8 PRE-INSTALLATION CONFERENCE

- A. Installer of the Work of this Section is required to attend pre-installation conference specified under this Specification.
- B. Contractor shall request in writing an on-site meeting with the Owner's Representative, the General Contractor and Site Contractor, the Landscape Architect and the Civil Engineer to review the scope of work prior to any work taking place to review the site conditions. Any deficiencies in the site conditions shall be remedied by the Contractor and approved by the Owner prior to commencing any work.

## 1.9 SUSTAINABILITY LANGUAGE IF APPLICABLE

## PART 2 - PRODUCTS

### 2.1 FORMS

- A. Form Materials: Plywood, metal, metal-framed plywood, or other acceptable panel-type materials to provide full-depth, continuous, straight, smooth exposed surfaces.
  - 1. Use flexible or curved forms for all radii indicated on the Plans.
- B. Form Release Agent: Provide commercial formulation form-release agent with a maximum of 350 g/L volatile organic compounds (VOCs) that will not bond with, stain, or adversely affect concrete surfaces and will not impair subsequent treatments of concrete surfaces.

### 2.2 REINFORCING MATERIALS

- A. Reinforcing Steel Bars: Shall be newly rolled billet steel conforming to ASTM A615 (Grade 60 unless noted). Bars shall be bent cold. Reinforcing bars being welded shall conform to ASTM A706, Grade 60.
- B. Joint Dowel Bars: Stainless steel bars, ASTM A955. Cut bars true to length with ends square and free of burrs.
- C. Welded Wire Mesh shall be welded plain cold-drawn steel wire fabric, ASTM A 185 and shall be supplied in sheets.
- D. Supports for Reinforcement: Chairs, spacers, dowel bar supports and other devices for spacing, supporting, and fastening reinforcing bars, welded wire fabric, and dowels in place. Use wire bar-type supports complying with CRSI specifications.

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1. Use supports with sand plates or horizontal runners where base material will not support chair legs. Concrete bricks may be used to support reinforced steel where application allows.

## 2.3 CONCRETE MATERIALS

- A. The Contractor shall insure that the final appearance of the sidewalks is consistent throughout the whole project. Any differences in color, texture, or finish will not be accepted by the Landscape Architect.
  1. Any portion of sidewalk or walkway that does not match the color, texture, or finish of previously constructed sidewalks will be removed and replaced with a sidewalk that matches the recently poured sidewalks at the expense of the Contractor.
- B. Portland Cement: ASTM C 150, Type I for resistance to salt and ice melt chemicals.
  1. Use one brand of cement throughout Project.
- C. Natural Aggregates:
  1. Fine Aggregate for Concrete: Shall be natural sand consisting of clean, hard, durable, uncoated particles, conforming to ASTM C33. Organic content shall be determined according to ASTM C40. Allow no frozen or partially frozen aggregate in the mix.
  2. Coarse Aggregate for Concrete: For regular weight concrete use crushed stone or gravel from approved source conforming to ASTM C33. Coarse aggregate shall not contain greater amounts of deleterious material than specified in table III, ASTM C33.
- D. Water from approved source, potable, clean and free of oils, salt, alkali, organic matter and other deleterious material.

## 2.4 ADMIXTURES

- A. Provide concrete admixtures that contain not more than 0.1 percent chloride ions.
- B. Air-Entraining Admixture: ASTM C 260, certified by manufacturer to be compatible with other required admixtures.
- C. Water-Reducing Admixture: ASTM C 494, C494M, Type D.
- D. High-Range Water-Reducing Admixture: ASTM C 494, C494M, Type F
- E. Water-Reducing and Accelerating Admixture: ASTM C 494, Type E.
- F. Water-Reducing and Retarding Admixture: ASTM C 494, C494M, Type D.

## 2.5 CONCRETE ADA ACCESSIBLE CURB CUTS

- A. Contractor shall install concrete ADA accessible curb cuts at all locations shown on plans. Curb cut configurations shall be as detailed on the Drawings.
  1. All concrete curb cuts shall be isolated from surrounding concrete pavement when applicable.
  2. Curb cuts shall be built with cut curbstone to match concrete curb cut slopes.

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- B. Curb cuts shall not exceed:
  - 1. Cross-slopes at front and back of curb cuts: 1.5% max.
  - 2. Curb cuts: 7.5% max
- C. All planes of the finished curb cuts shall be field checked for slopes using a two-foot electronic "smart" level.
  - 1. Curb cuts that do not comply with the slope requirements shall be cut out in their entirety and completely rebuilt.

## 2.6 ADA DETECTABLE WARNING TILES

- A. Provide cast iron wet set ADA tactile tiles with detectable warning surface that comply with the detectable warnings on walking surfaces section of the Americans with Disabilities Act. Detectable warning tiles as manufactured the following:
  - 1. Tuf-Tile Cast Iron
  - 2. Duralast Cast Iron
  - 2. Neenah Foundary Cast Iron
  - 3. or approved equivalent.
- B. Detectable warning tiles shall be manufactured and installed to the sizes and dimensions indicated on the Contract Documents.
  - 1. Tile sizes will vary to meet various locations shown on Plans with beveled top edges. **Tiles shall have the ability to meet radial layouts as shown on the Plans.**
  - 2. Tile thickness shall be as shown the plans.
  - 3. Width and thickness shall not vary by greater than 1/16 inch.
  - 4. The finish shall be non-slip texture.
  - 5. Tile shall be cast iron and shall provide a 60% color contrast from the abutting curb ramp pavement color, as required by the Americans with Disabilities Act.

## 2.7 CONCRETE RAMPS

- A. All ramps to comply with ADA Accessibility Guidelines.
- B. All ramps shall be sloped no greater than 1:12.
- C. Ramps shall have level landings at bottom and top of each ramp and each ramp run. Landings shall have the following features:
  - 1. The landing shall be at least as wide as the ramp run leading to it.
  - 2. The landing length shall be a minimum of 60 in (1525 mm) clear.
  - 3. If ramps change direction at landings, the minimum landing size shall be 60 in by 60 in (1525 mm by 1525 mm).

## 2.8 JOINTS AND JOINT SEALANTS

- A. Joint Material: Preformed polyethylene foam expansion joint material. Joint material shall be flexible, lightweight, non-staining, polyethylene, closed-cell joint filler. Joint material shall come pre-scored with a removable strip.

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- B. Joint Sealant: Sealant shall be a single component, Type HL1, self-leveling, premium-grade polyurethane sealant. Color shall match adjacent pavements.

## 2.9 CONCRETE CURING AND SEALING COMPOUND

- A. Concrete curing and sealing compound shall be non-yellowing, solvent based curing and sealing compound design to cure new concrete. A ready-to-use, acrylic curing and sealing compound shall conform to:  
ASTM C 1315, Type 1 Class A and ASTM C 309, Type 1 Class A & B.  
AASHTO Specification M 148, Type 1, Class A & B
  - 1. Basis of Design Product:
    - a) Euclid Chemical Company (The); Super Diamond Clear<sup>350</sup>  
[www.euclidchemical.com](http://www.euclidchemical.com)
  - 2. Manufacturer shall have ISO 9001 Quality Certification.
  - 3. Note: Paraffin based coatings or latex based surface coatings, or curing agents shall not be used or approved for this application.
- B. Absorptive Cover: Burlap cloth made from jute or kenaf, weighing approximately 9oz. 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. White burlap-polyethylene sheet.
- D. Evaporation Control: Monomolecular film-forming compound applied to exposed concrete lab surfaces for temporary protection from rapid moisture loss.
- E. Contractor shall use the same manufacturer for the curing compound and sealer.

## PART 3 - EXECUTION

### 3.1 CONCRETE MIX

- A. Prepare design mixes for each type and strength of normal-weight concrete by either laboratory trial batch or field experience methods as specified in ACI 301. For the trial batch method, use a qualified independent testing agency for preparing and reporting proposed mix designs.
  - 1. Do not use the Owner's field quality-control testing agency as the independent testing agency.
- B. Proportion mixes according to ACI 211.1 and ACI 301 to provide normal-weight concrete with the following properties:
  - 1. Compressive Strength (28-Day), ASTM C39: 4000 psi.
  - 2. Maximum Water-Cement Ratio at Point of Placement: 0.45.
  - 3. Slump Limit at Point of Placement, ASTM C143: 3 inches maximum.
    - a. Slump limit for concrete containing high-range water-reducing admixture (superplasticizer): Not more than 8 inches after adding admixture to site-verified 2-to-3-inch slump concrete.

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- C. Add air-entraining admixture, ASTM C231, at manufacturer's prescribed rate to result in concrete at point of placement having an air content as follows with a tolerance of plus or minus 1-1/2 percent:
  - 1. Air Content: 5.5 percent for 1-1/2-inch maximum aggregate.
  - 2. Air Content: 6.0 percent for 1-inch maximum aggregate.
  - 3. Air Content: 6.0 percent for 3/4-inch maximum aggregate.
  - 4. Air Content: 7.0 percent for 1/2-inch maximum aggregate.
  - 5. Air Content: 2.5 to 4.5 percent.
- D. Addition of Synthetic Reinforcement: None.
- E. Adjustment to Concrete Mixes: Contractor may request to the Architect Mix design adjustments when characteristics of materials, project conditions, weather, test results, or other circumstances warrant.

### 3.2 CONCRETE MIXING

- A. Ready-mixed concrete shall be mixed and transported in accordance with specification for Ready-Mixed Concrete" ASTM C94, Alt. No. 3 and ACI Standard 304, "Recommended Practice for Measuring, Mixing, Transporting and Placing Concrete.

### 3.3 SURFACE PREPARATION

- A. Proof-roll prepared subbase surface to check for unstable areas and verify need for additional compaction. Do not begin paving work until such conditions have been corrected and are ready to receive paving. Note: Contractor shall confirm that all compaction requirements of the base course have been met.
- B. Remove loose material from compacted subbase surface immediately before placing concrete.

### 3.4 INSTALLATION OF EMBEDDED ITEMS

- A. Conform to requirements of ACI 318, Chapter 6 "Conduits and Pipes Embedded in Concrete", and as specified below.
- B. Installation if inserts required by other trades shall be coordinated with or shall be installed prior to placing of reinforcing steel. All inserts to be supplied by the respective trade and installed by the General Contractor.

### 3.5 EDGE FORMS AND SCREED CONSTRUCTION

- A. Set, brace, and secure edge forms, bulkheads, and intermediate screed guides for paving to required lines, grades, and elevations. Install forms to allow continuous progress of work and so that forms can remain in place at least 24 hours after concrete placement.
- B. Check completed formwork and screeds for grade and alignment to following tolerances:
  - 1. Top of Forms: Not more than 1/8 inch in 10 feet.
  - 2. Vertical Face on Longitudinal Axis: Not more than 1/4 inch in 10 feet.

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- C. Clean forms after each use and coat with form release agent ensuring separation from concrete without damage.

### 3.6 PLACING OF CONCRETE

- A. Notify the Inspection: Before placing concrete, inspect and complete formwork installation, reinforcing steel, and items to be embedded or cast in. Notify other trades to permit installation of their work. Notify the Architect at least 48 hours prior to each placement.
- B. Do not place concrete until conduit, catch basin frame and grates, manhole frames and covers, granite curing and other work to receive the concrete have been inspected and approved by the Architect and all other trades concerned.
- C. Remove snow, ice, or frost from subbase surface and reinforcing before placing concrete. Do not place concrete on surfaces that are frozen.
- D. Moisten subbase to provide a uniform dampened condition at the time concrete is placed. Do not place concrete around manholes or other structures until they are at the required finish elevation and alignment.
- E. Conveying: Concrete shall be handled from the mixer to the place of final deposit as rapidly as practicable by methods that will prevent separation or loss of ingredients and in a manner which will assure that the required quality of the concrete is retained.
- F. Depositing: Delivery and placement of concrete shall be programmed so that the time lapse between batching and placement shall not exceed 1-1/2 hours. Concrete shall not be allowed a free fall over 4 feet. Concrete shall be deposited as nearly as practicable in its final position to avoid segregation due to rehandling or flowing.
- G. Concrete shall be deposited continuously, in horizontal layers of such thickness (not deeper than 18 inches) that no concrete will be deposited on concrete which has hardened sufficiently to cause the formation of seams or planes of weakness within the Section. Placing shall be carried out at such a rate that the concrete, which is being integrated, with fresh concrete is still plastic. Concrete which is partially hardened or which has been contaminated with foreign materials shall not be deposited.
- H. Deposit and spread concrete in a continuous operation between transverse joints. Do not push or drag concrete into place or use vibrators to move concrete into place.
  - 1. When concrete placing is interrupted for more than 1/2 hour, place a construction joint.
- I. Use a bonding agent at locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.
- J. Consolidate concrete by mechanical vibrating equipment supplemented by hand-spading, rodding, or tamping. Use equipment and procedures to consolidate

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concrete complying with ACI 309R.

1. Consolidate concrete along face of forms and adjacent to transverse joints with an internal vibrator. Keep vibrator away from joint assemblies, reinforcement, or side forms. Use only square-faced shovels for hand-spreading and consolidation. Consolidate with care to prevent dislocating reinforcing, dowels, and joint devices.
- K. Screed paved surfaces with a straightedge and strike off. Use bull floats or darbies to form a smooth surface plane before excess moisture or bleed water appears on the surface. Do not further disturb concrete surfaces prior to beginning finishing operations.
1. Place concrete in two operations; strike off initial pour for entire width of placement and to the required depth below finish surface. Lay welded wire fabric or fabricated bar mats immediately in final position. Place top layer of concrete, strike off, and screed.
  2. Remove and replace portions of bottom layer of concrete that have been placed more than 15 minutes without being covered by top layer or use bonding agent if acceptable to Architect.
- L. When adjoining pavement lanes are placed in separate pours, do not operate equipment on concrete until pavement has attained 85 percent of its 28-day compressive strength.
- M. Cold-Weather Placement: Comply with provisions of ACI 306R and as follows. Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing actions, or low temperatures. Note to Contractor that exposed aggregate concrete flatwork shall not be done under extreme cold conditions.
1. When air temperature has fallen to or is expected to fall below 40 deg F (4 deg C), uniformly heat water and aggregates before mixing to obtain a concrete mixture temperature of not less than 50 deg F (10 deg C) and not more than 80 deg F (27 deg C) at point of placement.
  2. Do not use frozen materials or materials containing ice or snow.
  3. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators unless otherwise accepted in mix designs.
- N. Hot-Weather Placement: Comply with provisions of ACI 305R and as follows when hot weather conditions exist.
1. Cool ingredients before mixing to maintain concrete temperature at time of placement to below 90 deg F (32 deg C). Mixing water may be chilled or chopped ice may be used to control temperature, provided water equivalent of ice is calculated to total amount of mixing water. Using liquid nitrogen to cool concrete is Contractor's option.
  2. Cover reinforcing steel with water-soaked burlap if it becomes too hot, so that steel temperature will not exceed the ambient air temperature immediately before embedding in concrete.
  3. Fog spray forms, reinforcing steel, and subgrade just before placing concrete. Keep subgrade moisture uniform without standing water, soft spots, or dry areas.

### 3.7 JOINTS

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- A. General: Construct contraction, construction and isolation joints true to line with faces perpendicular to surface plane of concrete. Construct transverse joints at right angles to building corners and changes in pavement direction unless indicated otherwise on the Plans.
1. When joining existing paving, place transverse joints to align with previously placed joints, unless indicated otherwise on the Plans.
  2. Contractor shall sequence paving operations in logical order based on the plan layout and approved shop drawings.
  3. Contractor shall coordinate with Landscape Architect if there are any discrepancies on the Plans or if there are specific questions regarding joint placement.
- B. Contraction or Control Joints: Provide weakened-plane contraction or control joints off of all building corners, columns, changes in pavement directions and as shown on the Drawings. Construct contraction or control joints for a depth equal to at least 1/3 of the concrete thickness, as follows:
1. Sawn Joints: Sawcut contraction joints shall be as indicated on the Plans with power saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut 1/8-inch-wide joints into hardened concrete when cutting action will not tear, abrade, or otherwise damage surface and before development of random contraction cracks.
  2. Formed or Tooled Joints: Formed contraction joints shall be as indicated on the Plans and with a grooving tool before concrete sets.
  3. Joints perpendicular to walls may be less than required depth within 6 inches of the wall, and may stop 2 inches from the wall.
  4. If a wet saw is used, all surrounding surfaces need to be washed to remove all slurry and fines caused by the wet saw.
- C. Construction Joints: Set construction joints at side and end terminations of paving and at locations where paving operations are stopped for more than ½ hour, unless paving terminates at isolation joints. Construction joints should be planned so that they coincide with contraction joint spacing to eliminate extra joints.
1. Construction Joint support: Contractor shall provide sleeved round steel dowels or haunched keyways at construction joints as shown on the Plans.
  2. Contractor shall manually insert dowel bars into the construction joints a minimum of 48" on center or two per joint.
  3. Continue reinforcement across construction joints unless indicated otherwise. Do not continue reinforcement through sides of strip paving unless indicated.
- D. Isolation Joints: Form isolation joint material and sealant.
1. Isolation joints shall generally be located where there is a need to isolate flatwork from other paving material where there is a need for the concrete to expand and contract such as edges of buildings and structures, columns, manholes, footings, roadway curbing and changes in material and as specifically shown on the Plans.
  2. Extend polyethylene foam joint fillers to full width and depth of joint.
  3. Furnish polyethylene foam joint fillers in one-piece lengths. Where more than one length is required, lace or clip polyethylene foam joint filler sections together.

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4. Contractor shall manually insert dowel bars into the isolation joints a minimum of 48" on center or two per joint.
5. After concrete is poured, top perforated portion of polyethylene foam joint filler shall be removed.
6. Joint Sealant shall be applied in isolation joint after perforated portion of polyethylene foam joint filler is removed. Sealant color shall match concrete color and **Shall Not be Bright White**.

### 3.8 CONCRETE PROTECTION, CURING AND SEALING

- A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Comply with the recommendations of ACI 306R for cold weather protection and ACI 305R for hot weather protection during curing.
- B. Evaporation Control: In hot, dry, and windy weather, protect concrete from rapid moisture loss before and during finishing operations with an evaporation-control material. Apply according to manufacturer's instructions after screeding and bull floating, but before floating.
- C. Begin curing after finishing concrete but not before free water has disappeared from concrete surface.
- D. Curing Methods: Cure concrete by moisture curing, moisture-retaining-cover curing, curing compound, or a combination of these as follows:
  1. Moisture Curing: Keep surfaces continuously moist for not less than 7 days with the following materials:
    - a. Water.
    - b. Continuous water-fog spray.
    - c. Absorptive cover, water saturated, and kept continuously wet. Cover concrete surfaces and edges with a 12-inch lap over adjacent absorptive covers.
  2. Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least 12 inches, and sealed by waterproof tape or adhesive. Immediately repair any holes or tears during curing period using cover material and waterproof tape.
  3. Curing Compound: Apply uniformly in continuous operation by power spray or roller according to manufacturer's directions. Recoat areas subjected to heavy rainfall within 3 hours after initial application. Maintain continuity of coating and repair damage during curing period.
- E. Sealer: Apply uniformly in 2 coats in continuous operations according to manufacturer's written instructions. Allow first coat to dry before applying second coat.
  1. Begin sealing dry surface no sooner than 14 days after concrete placement. Apply sealer at a uniform coverage rate in accordance with manufacturer's instructions.

### 3.9 FIELD QUALITY CONTROL TESTING

- A. Employ a qualified independent testing and inspection agency to sample materials, perform tests, and submit test reports during concrete placement as follows:

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- B. The Owner will employ a qualified testing and inspection agency to sample materials, perform tests, and submit test reports during concrete placement. Sampling and testing for quality control may include the following:
1. Sampling Fresh Concrete: ASTM C 172, except modified for slump to comply with ASTM C 94.
    - a. Slump: ASTM C 143; one test at point of placement for each compressive- strength test but no less than one test for each day's pour of each type of concrete. Additional tests will be required when concrete consistency changes.
    - b. Air Content: ASTM C 231, pressure method; one test for each compressive- strength test but no less than one test for each day's pour of each type of air-entrained concrete.
    - c. Concrete Temperature: ASTM C 1064; one test hourly when air temperature is 40 deg F (4 deg C) and below and when 80 deg F (27 deg C) and above, and one test for each set of compressive-strength specimens.
    - d. Compression Test Specimens: ASTM C 31; one set of four standard cylinders for each compressive-strength test, unless directed otherwise. Mold and store cylinders for laboratory-cured test specimens except when field-cured test specimens are required.
    - e. Compressive-Strength Tests: ASTM C 39; one set for each day's pour of each concrete class exceeding 5 cu. yd. but less than 25 cu. yd., plus one set for each additional 50 cu. yd. Test one specimen at 7 days, test two specimens at 28 days, and retain one specimen in reserve for later testing if required.
  2. When frequency of testing will provide fewer than five strength tests for a given class of concrete, conduct testing from at least five randomly selected batches or from each batch if fewer than five are used.
  3. When total quantity of a given class of concrete is less than 50 cu. yd., Architect may waive strength testing if adequate evidence of satisfactory strength is provided.
  4. 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.
  5. Strength level of concrete will be considered satisfactory if averages of sets of three consecutive strength test results equal or exceed specified compressive strength and no individual strength test result falls below specified compressive strength by more than 500 psi.
- C. Test results will be reported in writing to Architect, concrete manufacturer, and Contractor within 24 hours of testing. Reports of compressive strength tests shall contain the Project identification name and number, date of concrete placement, name of concrete testing agency, concrete type and class, location of concrete batch in paving, design compressive strength at 28 days, concrete mix proportions and materials, compressive breaking strength, and type of break for both 7-day and 28-day tests.
- D. 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.

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- E. Additional Tests: The testing agency will make additional tests of the concrete when test results indicate slump, air entrainment, concrete strengths, or other requirements have not been met. Testing agency may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C 42.

### 3.10 REPAIRS AND PROTECTION

- A. Remove and replace concrete paving that is broken, damaged, or defective, or does not meet the requirements of this Section. Concrete workmanship that has crumbled and broken edges will not be accepted.
- B. Drill test cores where directed by Architect when necessary to determine magnitude of cracks or defective areas. Fill drilled core holes in satisfactory pavement areas with Portland Cement Concrete bonded to paving with epoxy adhesive.
- C. Protect concrete from damage. Exclude traffic from paving for at least 14 days after placement. When construction traffic is permitted, maintain paving as clean as possible by removing surface stains and spillage of materials as they occur.
- D. Maintain concrete paving free of stains, discoloration, dirt, and other foreign material. Sweep concrete paving not more than 2 days prior to date scheduled for Substantial Completion inspections.

END OF SECTION 32 13 13

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Section 32 13 14  
EXPOSED AGGREGATE CONCRETE PAVING**PART 1 - GENERAL**

## 1.1 RELATED DOCUMENTS

- A. Drawings and General Provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
- B. Standard Specifications for Highways and Bridges or Rhode Island Department of Transportation (RIDOT) Standard Specifications for Road and Bridge Construction, latest Edition with amendments, hereinafter referred to as the "Standard Specifications".
- C. Rhode Island Department of Transportation (RIDOT) Standard Construction Details, latest Edition with amendments hereinafter referred to as the "Construction Standards".
- D. Related Sections: The following Sections contain requirements that relate to this Section:
  - 1. Section 03 00 00 – Cast-In-Place Concrete
  - 2. Section 31 00 00 – Earthwork
  - 3. Section 32 13 12 – Broom Finish Concrete Sidewalk Paving

## 1.2 DESCRIPTION OF WORK

- A. This Section includes exterior exposed aggregate concrete paving for the following:
  - 1. Exposed Aggregate walkways at the locations shown on the Plans and specified herein.

## 1.3 SUBMITTALS

- A. General: Refer to Division 01 Submittals provisions and procedures.
  - 1. Provide product data for all materials and items, including reinforcement and forming accessories, aggregates, admixtures, joint systems, curing compounds and sealants.
  - 2. Material Certificates: Provide copies of materials certificates signed by material producer and Contractor, certifying that each material item complies with, or exceeds, specified requirements.
  - 3. Plant mix design for concrete.
- B. The Contractor shall submit a one (1) gallon sample of the aggregate for review and approval by the Landscape Architect.

- C. The Contractor shall provide a shop drawing indicating pouring sequence based on the Plans.
- D. The Contractor shall fabricate in the field one sample of the exposed aggregate concrete paving in a single pour measuring 20' long x 6' wide x 4" thick for approval by the Landscape Architect. The sample shall demonstrate the final surface finishes, texture, each joint type and color that will be provided uniformly throughout the project.
  - 1. If the sample is approved, it may become part of the final work and shall be the basis of workmanship for all other exposed aggregate concrete paving.
- E. Provide all qualification data listed in Section 1.4 of this specification

#### 1.4 QUALITY ASSURANCE

- A. Qualifications: The foreman and labors shall be thoroughly trained and experienced in the skills required to complete exposed aggregate flatwork, be completely familiar with the design and application of the work, be present at all times during the work and perform the work. The foreman and laborers shall have no less than 5 years minimum proven experience in the required paving techniques and desired results. Submit list of installations, indicating location, Owner, Architect/Engineer, date of installation, Contractor, and setting bed, for approval by the Architect.

#### 1.5 REFERENCE STANDARDS

- A. ASTM: American Society for Testing and Material.
- B. AASHTO: American Association of State Highway and Transportation Officials.
- C. ACI: American Concrete Institute.
- D. All ramps and curb ramps shall comply with American Disabilities Act Accessibility Guidelines

#### 1.6 TESTING, CONTROL AND INSPECTION

- A. The Contractor will retain the services of a qualified independent testing agency, approved by the Architect, to test aggregate and to prepare a mix design for each strength of concrete specified; and shall submit such mix designs and test results to the Architect for approval. Mix designs may also be based on proven current designs accompanied by test results. The costs of all such preliminary services shall be borne by the Contractor.
  - 1. Testing equipment will be provided by and tests performed by the testing laboratory. Upon request by the Architect, the testing laboratory shall provide such auxiliary personnel and services needed to accomplish the testing work.
  - 2. Concrete test cylinder tests shall be taken for each 50 cubic yards of concrete placed, but at least one set for each day of concrete placements.

3. Testing required because of changes requested by the Contractor in materials, sources of materials or mix proportions, and extra testing of concrete or materials because of failure to meet the Specification requirements shall be paid by the Contractor.
4. Concrete shall be sampled and tested for quality control as follows:
  - a. Sampling fresh concrete: ASTM C172
  - b. Concrete test specimens: ASTM C31
  - c. Slump: ASTM C143. – Slump shall be one to three inches, or five to seven inches with Super plasticizer.
  - d. Air Content: ASTM C231
  - e. Compressive strength: ASTM C39 – Concrete shall be 4000 psi at 28 days
  - f. Unit Weight: ASTM C29

#### 1.7 NOTIFICATION OF RELATED TRADES

- A. Notify all other trades responsible for installing chases electrical handholes, conduit, when ready for such installation, and for final checking immediately before concrete is placed. Cooperate with such trades to obtain proper installation.

#### 1.8 PRE-INSTALLATION CONFERENCE

- A. Installer of the Work of this Section is required to attend pre-installation conference specified under this Specification.
- B. Contractor shall request in writing an on-site meeting with the Owner's Representative, the General Contractor and Site Contractor, the Landscape Architect and the Civil Engineer to review the scope of work prior to any work taking place to review the site conditions. Any deficiencies in the site conditions shall be remedied by the Contractor and approved by the Owner prior to commencing any work.

### **PART 2 - PRODUCTS**

#### 2.1 FORMS

- A. Form Materials: Plywood, metal, metal-framed plywood, or other acceptable panel-type materials to provide full-depth, continuous, straight, smooth exposed surfaces.
  1. Use flexible or curved forms for curves of a 100-foot or less radius.
- B. Form Release Agent: Provide commercial formulation form-release agent with a maximum of 350 g/L volatile organic compounds (VOCs) that will not bond with, stain, or adversely affect concrete surfaces and will not impair subsequent treatments of concrete surfaces.

#### 2.2 REINFORCING MATERIALS

### **EXPOSED AGGREGATE CONCRETE PAVING**

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- A. Reinforcing Steel Bars: Shall be newly rolled billet steel conforming to ASTM A615 (Grade 60 unless noted). Bars shall be bent cold. Reinforcing bars being welded shall conform to ASTM A706, Grade 60.
- B. Joint Dowel Bars: Stainless steel bars, ASTM A955. Cut bars true to length with ends square and free of burrs.
- C. Welded Wire Mesh shall be welded plain cold-drawn steel wire fabric, ASTM A 185 and shall be supplied in sheets.
- D. Supports for Reinforcement: Chairs, spacers, dowel bar supports and other devices for spacing, supporting, and fastening reinforcing bars, welded wire fabric, and dowels in place. Use wire bar-type supports complying with CRSI specifications.
  - 1. Use supports with sand plates or horizontal runners where base material will not support chair legs. Concrete bricks may be used to support reinforced steel where application allows.
- E. Synthetic Reinforcement: Shall not be used for Exposed Aggregate Concrete.

## 2.3 CONCRETE MATERIALS

- A. The Contractor shall insure that the final appearance of the sidewalks is consistent throughout the whole project. Any differences in color, texture, or finish will not be accepted by the Landscape Architect.
  - 1. Any portion of sidewalk or walkway that does not match the color, texture, or finish of previously constructed sidewalks will be removed and replaced with a sidewalk that matches the recently poured sidewalks at the expense of the Contractor.
- B. Portland Cement: ASTM C 150, Type I for resistance to salt and ice melt chemicals.
  - 1. Use one brand of cement throughout Project.
- C. Aggregate: Shall be hard, sound, durable, **native, rounded and oval** and free of all deleterious materials and staining qualities. **Angular stone will not be accepted.**
  - 1. Aggregate shall be thoroughly washed so that it is free of dust, dirt, and clay particles.
  - 2. All Aggregate shall be from same source throughout project.
  - 3. Aggregate - Aggregate size shall be 1/2" – 3/4" nominal.
  - 4. **Aggregate shall be in a color range of warm tones: tan, gray, brown, buff.**
- D. Water: Shall be from an approved source, potable, clean and free of oils, salts, alkali, organic matter and other deleterious material.

## 2.4 ADMIXTURES

- A. Provide concrete admixtures that contain not more than 0.1 percent chloride ions.
- B. Air-Entraining Admixture: ASTM C 260, certified by manufacturer to be compatible with other required admixtures.
- C. Water-Reducing Admixture: ASTM C 494, C494M, Type D.
- D. High-Range Water-Reducing Admixture: ASTM C 494, C494M, Type F
- E. Water-Reducing and Accelerating Admixture: ASTM C 494, Type E.
- F. Water-Reducing and Retarding Admixture: ASTM C 494, C494M, Type D.

## 2.5 CURING MATERIALS

- A. Absorptive Cover: Burlap cloth made from jute or kenaf, weighing approximately 9oz. per sq. yd., complying with AASHTO M 182, Class 2.
- B. Moisture-Retaining Cover: One of the following, complying with ASTM C 171.
  - 1. Waterproof paper.
  - 2. Polyethylene film.
  - 3. White burlap-polyethylene sheet.
- C. Clear Solvent-Borne Liquid Membrane-Forming Curing Compound: ASTM C 309, Type I, Class A or B, wax free.
- D. Clear Waterborne Membrane-Forming Curing Compound: ASTM C 309, Type I, Class B.
  - 1. Provide material that has a maximum volatile organic compound (VOC) rating of 350g/L.
- E. Evaporation Control: Monomolecular film-forming compound applied to exposed concrete lab surfaces for temporary protection from rapid moisture loss.
- F. Contractor shall use the same manufacturer for the curing compound, retarder and sealer.

## 2.8 CHEMICAL SURFACE RETARDER

- A. Chemical Surface Retarder must be a water-soluble, liquid-set retarder with color dye, for horizontal concrete surface application, capable of temporarily delaying final hardening of concrete depth of 1/8 to 1/4 inch. The chemical surface retarder must be approved by the Engineer before beginning construction of sidewalks.
- B. Contractor shall use the same manufacturer for the curing compound, retarder and sealer.

## 2.9 CONCRETE SEALER

- A. Sealer shall be a water-based acrylic low sheen product that is non-yellowing and has good blush resistance such as Everclear VOX by Euclid Chemicals.
- B. The following manufacturers are also acceptable:
  - 1. BASF
  - 2. WR Meadows
  - 3. Or equivalent
- C. Contractor shall use the same manufacturer for the curing compound, retarder and sealer.

## 2.10 JOINTS AND SEALANTS

- A. Joint Material: Preformed polyethylene foam expansion joint material. Joint material shall be flexible, lightweight, non-staining, polyethylene, closed-cell joint filler. Joint material shall come pre-scored with a removable strip.
- B. Sealant: Sealant shall be a single component, Type HL1, self-leveling, premium-grade polyurethane sealant. Color shall match adjacent pavements.

## PART 3 - EXECUTION

### 3.1 CONCRETE MIX

- A. Prepare design mixes for each type and strength of normal-weight concrete by either laboratory trial batch or field experience methods as specified in ACI 301. For the trial batch method, use a qualified independent testing agency for preparing and reporting proposed mix designs.
  - 1. Do not use the Owner's field quality-control testing agency as the independent testing agency.
- B. Proportion mixes according to ACI 211.1 and ACI 301 to provide normal-weight concrete with the following properties:
  - 1. Compressive Strength (28-Day), ASTM C39: 4000 psi.
  - 2. Maximum Water-Cement Ratio at Point of Placement: 0.45.
  - 3. Slump Limit at Point of Placement, ASTM C143: 3 inches maximum.
    - a. Slump limit for concrete containing high-range water-reducing admixture (superplasticizer): Not more than 8 inches after adding admixture to site-verified 2-to-3-inch slump concrete.
- C. Add air-entraining admixture, ASTM C231, at manufacturer's prescribed rate to result in concrete at point of placement having an air content as follows with a tolerance of plus or minus 1-1/2 percent:
  - 1. Air Content: 5.5 percent for 1-1/2-inch maximum aggregate.
  - 2. Air Content: 6.0 percent for 1-inch maximum aggregate.
  - 3. Air Content: 6.0 percent for 3/4-inch maximum aggregate.
  - 4. Air Content: 7.0 percent for 1/2-inch maximum aggregate.
  - 5. Air Content: 2.5 to 4.5 percent.
- D. Addition of Synthetic Reinforcement:



1. Fiber reinforcement shall be added to the batched concrete at the batch plant. Unless otherwise noted on the drawings or elsewhere herein fibers shall be added to the mix at the ratio of 1.0 pound of fiber per batched yard of concrete.
  2. Fibers shall be added to the mix prior to transport.
- E. Adjustment to Concrete Mixes: Contractor may request to the Architect Mix design adjustments when characteristics of materials, project conditions, weather, test results, or other circumstances warrant.

### 3.2 CONCRETE MIXING

- A. Ready-Mixed Concrete shall be mixed and transported in accordance with specification for Ready-Mixed Concrete ASTM C94, Alt. No. 3 and ACI Standard 304, "Recommended Practice for Measuring, Mixing, Transporting and Placing Concrete.

### 3.3 SURFACE PREPARATION

- A. Proof-roll prepared subbase surface to check for unstable areas and verify need for additional compaction. Do not begin paving work until such conditions have been corrected and are ready to receive paving. **Note: Contractor shall confirm that all compaction requirements of the base course have been met.**
- B. Remove loose material from compacted subbase surface immediately before placing concrete.

### 3.4 INSTALLATION OF EMBEDDED ITEMS

- A. Conform to requirements of ACI 318, Chapter 6 "Conduits and Pipes Embedded in Concrete", and as specified below.
- B. Installation of inserts required by other trades shall be coordinated with or shall be installed prior to placing of reinforcing steel. All inserts to be supplied by the respective trade and installed by the General Contractor.

### 3.5 EDGE FORMS AND SCREED CONSTRUCTION

- A. Set, brace, and secure edge forms, bulkheads, and intermediate screed guides for paving to required lines, grades, and elevations. Install forms to allow continuous progress of work and so that forms can remain in place at least 24 hours after concrete placement.
- B. Check completed formwork and screeds for grade and alignment to following tolerances:
1. Top of Forms: Not more than 1/8 inch in 10 feet.
  2. Vertical Face on Longitudinal Axis: Not more than 1/4 inch in 10 feet.

- C. Clean forms after each use and coat with form release agent ensuring separation from concrete without damage.

### 3.6 JOINTS

- A. General: Construct contraction, construction and isolation joints true to line with faces perpendicular to surface plane of concrete. Construct transverse joints at right angles to building corners and changes in pavement direction unless indicated otherwise on the Plans.
  - 1. When joining existing paving, place transverse joints to align with previously placed joints, unless indicated otherwise on the Plans.
  - 2. Contractor shall sequence paving operations in logical order based on the plan layout and approved shop drawings.
  - 3. Contractor shall coordinate with Landscape Architect if there are any discrepancies on the Plans or if there are specific questions regarding joint placement.
- B. Contraction or Control Joints: Provide weakened-plane contraction or control joints off of all building corners, columns, changes in pavement directions and as shown on the Drawings. Construct contraction or control joints for a depth equal to at least 1/3 of the concrete thickness, as follows:
  - 1. Sawed Joints: Sawcut contraction joints shall be as indicated on the Plans with power saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut 1/8-inch-wide joints into hardened concrete when cutting action will not tear, abrade, or otherwise damage surface and before development of random contraction cracks.
  - 2. Formed or Tooled Joints: Formed contraction joints shall be as indicated on the Plans and with a grooving tool before concrete sets.
  - 3. Joints perpendicular to walls may be less than required depth within 6 inches of the wall, and may stop 2 inches from the wall.
  - 4. If a wet saw is used, all surrounding surfaces need to be washed to remove all slurry and fines caused by the wet saw.
- C. Construction Joints: Set construction joints at side and end terminations of paving and at locations where paving operations are stopped for more than 1/2 hour, unless paving terminates at isolation joints. Construction joints should be planned so that they coincide with contraction joint spacing to eliminate extra joints.
  - 1. Construction Joint support: Contractor shall provide sleeved round steel dowels or haunched keyways at construction joints as shown on the Plans.
  - 2. Contractor shall manually insert dowel bars into the construction joints a minimum of 48" on center or two per joint.
  - 3. Continue reinforcement across construction joints unless indicated otherwise. Do not continue reinforcement through sides of strip paving unless indicated.
- D. Isolation Joints: Form isolation joint material and sealant.
  - 1. Isolation joints shall generally be located where there is a need to

isolate flatwork from other paving material, edges of buildings and structures, columns, manholes, footings and changes in material and as specifically shown on the Plans.

2. Extend polyethylene foam joint fillers to full width and depth of joint.
3. Furnish polyethylene foam joint fillers in one-piece lengths. Where more than one length is required, lace or clip polyethylene foam joint filler sections together.
4. Contractor shall manually insert dowel bars into the isolation joints a minimum of 48" on center or two per joint.
5. After concrete is poured, top perforated portion of polyethylene foam joint filler shall be removed.
6. Joint Sealant shall be applied in isolation joint after perforated portion of polyethylene foam joint filler is removed. Sealant color shall match concrete color and **Shall Not be Bright White.**

### 3.7 CONCRETE PLACEMENT

- A. Inspection: Before placing concrete, inspect and complete formwork installation, reinforcing steel, and items to be embedded or cast in. Notify other trades to permit installation of their work.
- B. Remove snow, ice, or frost from subbase surface and reinforcing before placing concrete. Do not place concrete on surfaces that are frozen.
- C. Moisten subbase to provide a uniform dampened condition at the time concrete is placed. Do not place concrete around manholes or other structures until they are at the required finish elevation and alignment.
- D. Deposit and spread concrete in a continuous operation between transverse joints. Do not push or drag concrete into place or use vibrators to move concrete into place.
  1. When concrete placing is interrupted for more than 1/2 hour, place a construction joint.
- E. Use a bonding agent at locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.
- F. Consolidate concrete by mechanical vibrating equipment supplemented by hand-spading, rodding, or tamping. Use equipment and procedures to consolidate concrete complying with ACI 309R.
  1. Consolidate concrete along face of forms and adjacent to transverse joints with an internal vibrator. Keep vibrator away from joint assemblies, reinforcement, or side forms. Use only square-faced shovels for hand-spreading and consolidation. Consolidate with care to prevent dislocating reinforcing, dowels, and joint devices.
- G. Screed paved surfaces with a straightedge and strike off. Use bull floats or darbies to form a smooth surface plane before excess moisture or bleed water appears on the surface. Do not further disturb concrete surfaces prior to

beginning finishing operations.

1. Place concrete in two operations; strike off initial pour for entire width of placement and to the required depth below finish surface. Lay welded wire fabric or fabricated bar mats immediately in final position. Place top layer of concrete, strike off, and screed.
2. Remove and replace portions of bottom layer of concrete that have been placed more than 15 minutes without being covered by top layer or use bonding agent if acceptable to Architect.

- H. When adjoining pavement lanes are placed in separate pours, do not operate equipment on concrete until pavement has attained 85 percent of its 28-day compressive strength.
- I. Cold-Weather Placement: Comply with provisions of ACI 306R and as follows. Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing actions, or low temperatures. **Note to Contractor that exposed aggregate concrete flatwork shall not be done under extreme cold conditions.**
1. When air temperature has fallen to or is expected to fall below 40 deg F (4 deg C), uniformly heat water and aggregates before mixing to obtain a concrete mixture temperature of not less than 50 deg F (10 deg C) and not more than 80 deg F (27 deg C) at point of placement.
  2. Do not use frozen materials or materials containing ice or snow.
  3. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators unless otherwise accepted in mix designs.
- J. Hot-Weather Placement: Comply with provisions of ACI 305R and as follows when hot weather conditions exist.
1. Cool ingredients before mixing to maintain concrete temperature at time of placement to below 90 deg F (32 deg C). Mixing water may be chilled or chopped ice may be used to control temperature, provided water equivalent of ice is calculated to total amount of mixing water. Using liquid nitrogen to cool concrete is Contractor's option.
  2. Cover reinforcing steel with water-soaked burlap if it becomes too hot, so that steel temperature will not exceed the ambient air temperature immediately before embedding in concrete.
  3. Fog spray forms, reinforcing steel, and subgrade just before placing concrete. Keep subgrade moisture uniform without standing water, soft spots, or dry areas.

### 3.8 EXPOSED AGGREGATE FINISH

- A. Adjacent planting areas shall be protected prior to aggregate exposure.
- B. In accordance with manufacturer's recommendations, a set retarder shall be sprayed or brushed over the concrete surface. The rate of the application of the retarder shall be sufficient so that the depth of mortar paste removed, on exposing the aggregate, shall be no more than 1/8-inch. The surface treated

with retarder shall be protected by covering with polyethylene sheeting or paper to prevent drying out. The retarded mortar paste shall be removed within 12 hours after placement. The use of a set retarder may be waived by the Architect, provided assurance is guaranteed that all of the exposed aggregate surface finish is uniform in exposure and appearance.

- C. The exposing of the aggregate shall be accomplished by simultaneously brushing and hosing of the mortar with water. Care shall be exercised not to overexpose or dislodge the aggregate.
- D. After the exposing of aggregate has been completed, the residue of the work shall be removed and legally disposed of, and any existing surface or facility splattered or stained shall be thoroughly cleaned.

### 3.9 CONCRETE PROTECTION, CURING AND SEALING

- A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Comply with the recommendations of ACI 306R for cold weather protection and ACI 305R for hot weather protection during curing.
- B. Evaporation Control: In hot, dry, and windy weather, protect concrete from rapid moisture loss before and during finishing operations with an evaporation-control material. Apply according to manufacturer's instructions after screeding and bull floating, but before floating.
- C. Begin curing after finishing concrete but not before free water has disappeared from concrete surface.
- D. Curing Methods: Cure concrete by moisture curing, moisture-retaining-cover curing, curing compound, or a combination of these as follows:
  - 1. Moisture Curing: Keep surfaces continuously moist for not less than 7 days with the following materials:
    - a. Water.
    - b. Continuous water-fog spray.
    - c. Absorptive cover, water saturated, and kept continuously wet. Cover concrete surfaces and edges with a 12-inch lap over adjacent absorptive covers.
  - 2. Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least 12 inches, and sealed by waterproof tape or adhesive. Immediately repair any holes or tears during curing period using cover material and waterproof tape.
  - 3. Curing Compound: Apply uniformly in continuous operation by power spray or roller according to manufacturer's directions. Recoat areas subjected to heavy rainfall within 3 hours after initial application. Maintain continuity of coating and repair damage during curing period.
- E. Sealer: Apply uniformly in 2 coats in continuous operations according to manufacturer's written instructions. Allow first coat to dry before applying second coat.

1. Begin sealing dry surface no sooner than 14 days after concrete placement.
2. **6 months after initial sealing, the Contractor shall clean and reseal all exposed aggregate surfaces according to this specification.**

### 3.10 FIELD QUALITY CONTROL TESTING

- A. Employ a qualified independent testing and inspection agency to sample materials, perform tests, and submit test reports during concrete placement as follows:
- B. The Owner will employ a qualified testing and inspection agency to sample materials, perform tests, and submit test reports during concrete placement. Sampling and testing for quality control may include the following:
  1. Sampling Fresh Concrete: ASTM C 172, except modified for slump to comply with ASTM C 94.
    - a. Slump: ASTM C 143; one test at point of placement for each compressive- strength test but no less than one test for each day's pour of each type of concrete. Additional tests will be required when concrete consistency changes.
    - b. Air Content: ASTM C 231, pressure method; one test for each compressive- strength test but no less than one test for each day's pour of each type of air-entrained concrete.
    - c. Concrete Temperature: ASTM C 1064; one test hourly when air temperature is 40 deg F (4 deg C) and below and when 80 deg F (27 deg C) and above, and one test for each set of compressive-strength specimens.
    - d. Compression Test Specimens: ASTM C 31; one set of four standard cylinders for each compressive-strength test, unless directed otherwise. Mold and store cylinders for laboratory-cured test specimens except when field-cured test specimens are required.
    - e. Compressive-Strength Tests: ASTM C 39; one set for each day's pour of each concrete class exceeding 5 cu. yd. but less than 25 cu. yd., plus one set for each additional 50 cu. yd. Test one specimen at 7 days, test two specimens at 28 days, and retain one specimen in reserve for later testing if required.
  2. When frequency of testing will provide fewer than five strength tests for a given class of concrete, conduct testing from at least five randomly selected batches or from each batch if fewer than five are used.
  3. When total quantity of a given class of concrete is less than 50 cu. yd., Architect may waive strength testing if adequate evidence of satisfactory strength is provided.
  4. 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.
  5. Strength level of concrete will be considered satisfactory if averages of sets of three consecutive strength test results equal or exceed specified

compressive strength and no individual strength test result falls below specified compressive strength by more than 500 psi.

- C. Test results will be reported in writing to Architect, concrete manufacturer, and Contractor within 24 hours of testing. Reports of compressive strength tests shall contain the Project identification name and number, date of concrete placement, name of concrete testing agency, concrete type and class, location of concrete batch in paving, design compressive strength at 28 days, concrete mix proportions and materials, compressive breaking strength, and type of break for both 7-day and 28-day tests.
- D. 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.
- E. Additional Tests: The testing agency will make additional tests of the concrete when test results indicate slump, air entrainment, concrete strengths, or other requirements have not been met. Testing agency may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C 42.

### 3.11 REPAIRS AND PROTECTION

- A. Remove and replace concrete paving that is broken, damaged, or defective, or does not meet the requirements of this Section.
- B. Drill test cores where directed by Architect when necessary to determine magnitude of cracks or defective areas. Fill drilled core holes in satisfactory pavement areas with Portland Cement Concrete bonded to paving with epoxy adhesive.
- C. Protect concrete from damage. Exclude traffic from paving for at least 14 days after placement. When construction traffic is permitted, maintain paving as clean as possible by removing surface stains and spillage of materials as they occur.
- D. Maintain concrete paving free of stains, discoloration, dirt, and other foreign material. Sweep concrete paving not more than 2 days prior to date scheduled for Substantial Completion inspections.
- E. Refer to 3.9, E herein for resealing operations.

END OF SECTION

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Section 32 14 00  
UNIT PAVERS

**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 32 13 13 – Site Concrete
  - 2. Section 31 00 00 – Earthwork

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. Unit Paver Type A

1.3 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 of all materials listed in Part 2 herein showing texture, finish and range of colors of all materials. Samples will establish the standard by which materials provided will be judged.

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- E. Submit drawings and instructions of manufacturers/fabricators installation requirements.
- F. Submit material test reports from a qualified testing agency indicating and interpreting test results for compliance with requirements indicated herein, based on comprehensive testing of current materials.
- G. Submit list of materials used in constructing mockups including generic product names together with manufacturers, manufacturers' product names, sources of supply, and other information as required to identify materials used. Include mix proportions for mortar and source of aggregates.
  - 1. Submittal is for information only. Neither receipt of list nor approval of mockups constitutes approval of deviations from the Contract Documents unless such deviations are specifically brought to the attention of Landscape Architect and approved in writing.

1.4 MOCK-UPS

- A. Paving Mock-ups: The Contractor shall fabricate in the field one sample using all unit pavers specified including specified base material for approval by the Landscape Architect. Mockups shall be sized to meet mock up detail in Plans. The sample shall set quality standards for materials and execution and demonstrate the final surface finish, texture, each joint type and color that will be provided uniformly throughout the project. If the sample is approved, it may become part of the final work and shall be the basis of workmanship for all other unit paver work.

1.5 QUALITY ASSURANCE

- A. Source Limitations: Obtain each type of unit paver, joint material, and setting material from one source with resources to provide materials and products of consistent quality in appearance and physical properties.
- B. Preconstruction Compatibility and Adhesion Testing: Submit to latex-additive manufacturer, for testing indicated below, samples of paving materials that will contact or affect mortar and grout that contain latex additives.
  - 1. Use manufacturer's standard test methods to determine whether mortar and grout materials will obtain optimum adhesion with, and will be non staining to, installed pavers and other materials constituting paver installation.

1.6 PRE-INSTALLATION CONFERENCE

- A. Installer of the Work of this Section is required to attend pre-installation conference specified under this Specification.
- B. Contractor shall request in writing an on-site meeting with the Owner's Representative, the General Contractor and Site Contractor, the Landscape Architect and the Civil Engineer to review the scope of work prior to any work taking place to review the site conditions. Any deficiencies in the site conditions shall be remedied by the Contractor and approved by the Owner prior to commencing any work.

1.7 DELIVERY, STORAGE, AND HANDLING

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- 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. Store pavers on elevated platforms in a dry location. If units are not stored in an enclosed location, cover tops and sides of stacks with waterproof sheeting, securely tied.
- C. Store cementitious materials on elevated platforms, under cover, and in a dry location. Do not use cementitious materials that have become damp.
- D. Store aggregates where grading and other required characteristics can be maintained and contamination avoided.
- E. Store liquids in tightly closed containers protected from freezing.
- F. Store asphalt cement and other bituminous materials in tightly closed containers.

#### 1.8 PROJECT CONDITIONS

- A. Cold-Weather Protection: Do not use frozen materials or materials mixed or coated with ice or frost. Do not build on frozen subgrade or setting beds. Remove and replace unit paver work damaged by frost or freezing.

### **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 UNIT PAVER TYPE A

- A. Unit Paver Type C shall be concrete unit pavers with linear or plank sizing similar to Unilock Promenade Plank Paver. Widths shall be 4". Lengths shall vary from 12" to 16". Thickness shall be 3 3/8". Color selections shall be a range of two standard colors to be reviewed and approved. There shall be a 50/50 mix of each color in each size.
- B. Acceptable Manufacturers for Type C pavers include the following:
  - 1. Unilock
  - 2. Hanover
  - 3. Belgard
  - 4. Techo-Bloc
  - 5. Or equivalent.

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## 2.3 SETTING-BED MATERIALS

- A. Structural Fill: Shall comply with requirements in Section 31 00 00 – Earthwork.
- B. Concrete Base: Shall comply with 32 13 13 – Site Concrete
- C. Sand for Leveling Course: Sound, sharp, washed, natural sand complying with gradation requirements in ASTM C 33 for fine aggregate.
- D. Geotextile or Filter Fabric: Shall comply with requirements in Section 31 00 00 – Earthwork.
- E. Peastone: Shall comply with requirements in Section 31 00 00 – Earthwork.
- F. Polymeric Sand for Paver Joints:
  - 1. Polymeric Sand for paving joints 1" or less - manufactured graded sand (ASTM-C144) with integral clear polymer binders. **Portland Cement binding agent is not acceptable. Color shall be gray.**
  - 2. Polymeric Sand for large paving joints up to 4" – manufactured graded sand (ASTM-C144) with integral clear polymer binders specifically formulated for natural stone with large joints. **Portland Cement binding agent is not acceptable. Color shall be gray.**
  - 3. Color samples shall be approved by Landscape Architect for each type.

## 2.4 EDGING

- A. Edging for pavers shall be a Commercial Grade Heavy Duty Plastic Paver Restraint, color black. Similar to Sure-Loc #P18PE or approved equivalent.

## 2.5 FLATNESS TOLERANCES

- A. A 4-foot dimension in any direction on the surface shall determine variation from true plane, or flat surfaces. The maximum variation from true plane shall not exceed 1/8 inch per 12 inches or 1/8 of the specified joint width, whichever is greater.

## PART 3 – EXECUTION

### 3.1 EXAMINATION

- A. Perform pre-installation conference as specified in Part 1.
- B. Examine areas indicated to receive paving, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance.
  - 1. Proceed with installation only after unsatisfactory conditions have been corrected.
  - 2. Where pavers are to be installed over waterproofing, examine waterproofing installation, with waterproofing Installer present, for protection from paving

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operations. Examine areas where waterproofing system is turned up or flashed against vertical surfaces and horizontal waterproofing. Proceed with installation only after protection is in place.

### 3.2 PREPARATION

- A. Remove substances from base surface and/or concrete substrates that could impair mortar bond, including curing and sealing compounds, form oil, and laitance.
- B. Clean concrete substrates to remove dirt, dust, debris, and loose particles.
- C. Rigid Base: Prepare rigid concrete base per Specification 32 13 13 Site Concrete Paving. Check all sub base elevations to meet all finish grade requirements.
- D. Flexible Base: Proof-roll prepared subgrade according to requirements in Specification 31 20 00 Earth Moving to identify soft pockets and areas of excess yielding. Proceed with unit paver installation only after deficient subgrades have been corrected and are ready to receive setting bed for unit pavers.

### 3.3 INSTALLATION GENERAL

- A. Do not use unit pavers with chips, cracks, voids, discolorations, and other defects that might be visible in finished work.
- B. Mix pavers from several pallets or cubes, as they are placed, to produce uniform blend of colors and textures.
- C. Cut unit pavers with motor-driven masonry saw equipment to provide clean, sharp, un-chipped 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. **Unit Paver Type C shall be set with joint spacing to not allow for any longitudinal cuts. End cuts are acceptable to meet running bond pattern. All cut edges shall be eased for natural look.**
- D. Tolerances: Do not exceed 1/32-inch unit-to-unit offset from flush (lippage) nor 1/8 inch in 10 feet from level, or indicated slope, for finished surface of paving.
- E. Isolation and Control Joints: Where applicable provide control joints in the concrete base. Provide Isolation joints around other materials or structures. Refer to Specification 32 13 12, Section 3.4 Joints.

### 3.4 SETTING-BED APPLICATIONS

- A. Compact soil subgrade uniformly to at least 95 percent of ASTM D 698 laboratory density.
- B. Proof-roll prepared subgrade to identify soft pockets and areas of excess yielding. Excavate soft spots, unsatisfactory soils, and areas of excessive pumping or rutting and replace with compacted backfill.

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- C. Place pavers on sand leveling course, laid over fully cured concrete base, compact by tamping with plate vibrator, and screed to depth indicated.
- D. Where applicable core drill 2" holes in concrete rigid base for drainage as indicated in plans.
- E. Place drainage geotextile over drill holes after filling with crushed peastone.
- F. Place leveling course and screed to a thickness as indicated on the Plans, taking care of that moisture content remains constant and density is loose and constant until pavers are set and compacted.
- G. Set pavers with a joint width as indicated on the Plans, being careful not to disturb leveling base. If pavers have spacer bars, place pavers hand tight against spacer bars. Use string lines to keep straight lines. Fill gaps between units that exceed 3/8 inch with pieces cut to fit from full-size unit pavers.
  - 1. When installation is performed with mechanical equipment, use only unit pavers with spacer bars on sides of each unit.
- H. Vibrate pavers into leveling course with a low-amplitude plate vibrator capable of a 3500- to 5000-lbf compaction force at 80 to 90 Hz. Perform at least three passes across paving with vibrator. Vibrate under the following conditions:
  - 1. After edge pavers are installed and there is a completed surface or before surface is exposed to rain.
  - 2. Before ending each day's work, fully compact installed concrete pavers to within 36 inches of the laying face. Cover pavers that have not been compacted, and leveling course on which pavers have not been placed, with non-staining plastic sheets to protect them from rain.
- I. Spread and broom dry polymeric sand and fill joints immediately after vibrating pavers into leveling course. Repeat adding and compacting polymeric sand until joints are completely filled to the chamfer or shoulders of the pavers. Clean paver areas thoroughly remove all excess sand. with leaf blower or similar equipment without removing sand from joints. Wet the paved area lightly on "shower". Allow joints to dry for 5 to 10 minutes and re-water up to 3 or 4 times in order to fully activate the polymeric sand. Jointing shall be done in workable areas to ensure completion within a work day.
  - 1. Jointing work shall not occur if rain is in the forecast. Weather shall be clear for several days. Pavers shall be completely dry prior jointing work.
  - 2. Temperature shall be above 35 degrees F in order for jointing work to commence.
  - 3. Clean paved surfaces with a leaf blower or similar equipment to ensure removal of all excess sand from paver surfaces.
  - 4. Joints shall be watered 2/3 depth of joint. Test for water depth by digging out sand in a small area to check moisture. Replace sand. Overwatering or washing sand out of the joints are not allowed.
- J. Do not allow traffic on installed pavers until sand has been vibrated into joints.
- K. Repeat joint-filling process 30 days later.

### 3.5 REPAIRING, POINTING, AND CLEANING

#### UNIT PAVERS

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- A. Remove and replace unit pavers that are loose, chipped, broken, stained, or otherwise damaged or that do not match adjoining units. Provide new units to match adjoining units and install in same manner as original units, with same joint treatment and with no evidence of replacement.
- B. Pointing: When applicable, when tooling of joints, enlarge voids or holes and completely fill with grout. Point up joints at sealant joints to provide a neat, uniform appearance, properly prepared for sealant application.
- C. Cleaning: Remove excess sand, dirt, debris, mortar or grout from exposed paver surfaces; wash and scrub clean.

END OF SECTION

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Section 32 31 14  
BLACK VINYL CHAIN LINK FENCING AND GATES**PART 1 - GENERAL**

## 1.1 RELATED DOCUMENTS

- 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 include the following:
  - 1. Section 03 00 00 - Cast in Place Concrete
  - 2. Section 31 00 00 – Earthwork

## 1.2 DESCRIPTION OF WORK

- A. Provide all materials, equipment and labor necessary to complete the work as indicated on the drawings or as specified herein.
- B. The principal work of this section includes, but may not be limited to, the following:
  - 1. Installation of fences, gates, framework, fabric, and accessories.
  - 2. Excavation for post bases.

## 1.3 REFERENCES

- A. ASTM Standards:
  - 1. A392 – Zinc coated fence fabric (Class –1)
  - 2. A491 – Aluminum Coated (Table 3)
  - 3. F668 – PVC Coating (Class - 2a)
  - 4. F934 – Color Black
- B. Federal Standard (FS) RR-F-191 - Fencing, Wire and Post, Metal.

## 1.4 QUALITY ASSURANCE

- A. Installation: ASTM F567
- B. Qualifications: The foreman and laborers shall be thoroughly trained and experienced in the skills required to complete fence and gate, be completely familiar with the design and application of the work, be present at all times during the work and perform the work. The foreman shall have no less than 5 years minimum proven experience in the required installation techniques and desired results. Submit list of installations, indicating location, Owner, Architect/Engineer, date of installation, Contractor, and setting bed, for approval by the Architect.

## 1.5 SUBMITTALS

- A. Submit shop drawings and product data under provisions of Division 01. Submit shop drawings for fence and gates and for all of their components.
- B. Include layout, spacing of components, accessories, fittings, anchorages, and schedule of components.
- C. Submit manufacturer's installation instructions under provisions of Division 01.
- D. Under provisions of Division 01, submit sample of fence fabric finish, color and gauges. Sample size to be 6" x 12" minimum.

## **PART 2 – PRODUCTS**

### **2.1 GENERAL**

- A. Fabric, posts, gate frames, braces, rails, stretcher bars, truss rods, and tension wire shall be of steel. Gate hinges, post caps, stretcher bar bands, and other parts shall be of steel, malleable iron, ductile iron, or equal except that post tops and rails ends may be of aluminum. The manufacturer shall supply a notarized mill certification that all materials used have been tested and fully comply with the guidelines specified herein.
- B. Temporary Construction Fence shall be 6' ht chain link fence. Powder coating or painting is NOT required.

### **2.2 FRAMEWORK AND POSTS**

- A. Framework and posts shall be Type 2 round post, steel pipe cold-formed and welded per ASTM F1043, Group IC, with a minimum yield strength of 50,000 psi. The external zinc coating shall be Type B, zinc with polymer film, 0.90 oz/sq. ft. minimum zinc coating with a chromate conversion and a verifiable polymer film. The internal coating shall be Type B, zinc 0.90 oz./sq.ft. minimum or Type D, zinc pigmented, 81% nominal coating with 0.30 mils minimum thickness. Gate framework joints shall be welded and coated in accordance with Practice A780, employing zinc-rich paint.
- B. Framework and posts shall be sized as follows:
  - 1. End, Corner, and Pull Post. Galvanized steel, minimum pipe sizes and weights as follows:
    - a. Up to 6-foot fabric height: 2.375 – inch OD pipe, 3.12 lbs/lin. Ft. minimum.
    - b. 7 and 8-foot fabric heights: 2.875-inch OD pipe, 4.64-lbs/lin. Ft. minimum.
    - c. Maximum spacing 10'-0" On Center.
    - d. 10-foot to 12-foot heights: 4-inch OD pipe, 6.56 lb/linear foot.
  - 2. Line Posts. Galvanized steel, minimum pipe sizes and weights as follows:
    - a. Up to 6-foot fabric height: 1.90-inch OD steel pipe, 2.28-lbs./lin. Ft. minimum.

- b. 7 and 8- foot fabric height: 2.375-inch OD steel pipe, 3.12 lbs./lin. Ft. minimum
- c. Maximum Spacing 10'-0" On Center.
- d. 10-foot to 12-foot heights: 2.875-inch OD pipe, 4.64 lb/linear foot.
- 3. Gate Posts. Galvanized steel, nominal gate widths, minimum pipe sizes and weights as follows:
  - a. Up to and including 6 feet height with up to 4 foot gate leaves: 2.375 OD pipe minimum.
  - b. Up to and including 6 feet height with over 4 foot up to 10 foot gate leaves: 2.875 inch OD pipe minimum.
  - c. Up to and including 6 feet height with over 10 feet up to 18 foot gate leaves: 4" OD pipe minimum.
  - d. Over 6 feet up to 12 feet height with up to 6 foot gate leaves: 2.875" OD pipe minimum.
  - e. Over 6 feet up to 12 feet height with over 6 feet up to 12 foot gate leaves: 4" OD pipe minimum.
  - f. Over 6 feet up to 12 feet height with over 12 feet up to 18 foot gate leaves: 6.625" OD pipe minimum.
- 4. Rails (Top, middle, and bottom rails): galvanized steel, manufacturer's longest lengths joined by seven (7") long sleeves, rail shall run continuously along top of fence. Bottom rail shall be joined at line posts with boulevard clamps. Minimum pipe sizes and weights as follows:
  - a. 1.66-inch OD pipe, 1.84 lbs. /lin. Ft. minimum.

### 2.3 FITTINGS

- A. All fittings to be PVC thermally fused color coated having a minimum thickness of 0.006" per ASTM F626. PVC color to match fabric and framework. Moveable parts, nuts and bolts to be field coated with PVC liquid touch up after installation.
  - 1. Couplings: Expansion type, approximately six inches (6") long, install one sleeve for each 500 foot run. Standard couplings are installed at each rail end to form one continuous top rail.
  - 2. Attaching Devices: Provide fittings for attaching top rail securely to each gate corner pull and end post.
  - 3. Sleeves: Galvanized steel pipe not less than six inches (6") long and with inside diameter not less than ½ inch greater than outside diameter of the post pipe. Provide steel plate closure welded to bottom of sleeve of width and length not less than one inch (1") greater than outside diameter of sleeve.
  - 4. Post Brace assembly: Manufacturer's standard adjustable braces at end of gateposts and at both sides of corner and pull posts. Provide horizontal brace located at mid-height of fabric. Use same material as top rail for brace and truss to line posts with 3/8 inch diameter galvanized steel truss rods and adjustable tightener.
  - 5. Post Caps: Galvanized steel, weather-tight closure cap for each tubular post. Furnish caps with openings to permit passages of top rail.
  - 6. Rail ends: Galvanized pressed steel per ASTM F626, for connection of rails to post using a brace band.
  - 7. Tension Bars: galvanized steel, one-piece lengths equal to full height of

- fabric, with minimum cross-section of 3/16 inch x 3/4 inch per ASTM F626. Provide tension bar for each gate and end post, and two for each corner and pull post. Stretcher Bar Bands will be manufacturer's standards.
8. Gate Cross-Bracing: 3/8 inch diameter galvanized steel truss rods and adjustable tightener.
  9. Wire ties: 9 gauge galvanized steel tie wire for attachment of fabric to line posts and rails. Pre-formed hog ring ties to be 9 gauge galvanized steel or aluminum for attachment of fabric to tension wire. Tie wire and hog rings PVC coated and in compliance with ASTM F626. Color to match fabric color.
  10. Truss rod assembly: Galvanized steel minimum 5/16" diameter truss rod with pressed steel tightener, in accordance with ASTM F626.
  11. Carriage bolts and nuts: Galvanized of commercial quality

## 2.4 FABRIC

- A. All general site fence fabric shall consist of No. 9 gauge (0.148 inch core), 2-inch diamond mesh except for the following: **Six (6) gauge wire for backstop fencing; Eleven (11) gauge wire, 1 3/4" diamond mesh for Tennis Court Fencing. All fabric shall receive top and bottom knuckled selvage.** Public side of fabric shall be installed in accordance with the owner's directions. Tennis fabric shall be installed on the court side. The height of the fabric shall be one piece.
  1. Galvanized/Aluminum Coated Fabric: All materials used shall conform to the requirements of ASTM A 392 Class 2, or ASTM A491. Except aluminum alloy items, shall conform to ASTM-B211, B221 and B429.
  2. Polyvinyl Chloride (PVC) Coated Fabric: fence fabric shall be zinc coated in accordance ASTM A392 Class 1 or aluminum-coated in accordance with ASTM A 491 (Table 3). PVC coating shall be applied in accordance with ASTM F668 Class 2a. The color of the fabric shall be black and in accordance with ASTM F934.

## 2.5 SWING GATES

- A. Fabricate chain link swing gates in accordance with ASTM F900. Gate frame to be of welded construction. Weld areas to be protected with zinc-rich paint per ASTM A780 then over coated with liquid PVC to match frame. The gate frame members are to be spaced no greater than 8' 0" apart horizontally or vertically. Exterior members to be 1.900" OD pipe, interior members when required shall be 1.660" OD pipe. Framing and chain link fabric shall match specification of fence system. Fabric to be stretched tightly and secured to vertical outer frame members using tension bar and tension bands spaced 12" on center and tied to the horizontal and interior members using 9 gauge galvanized steel ties.
- B. Hinges, hot dip galvanized pressed steel or malleable iron, structurally capable of supporting gate leaf and allow opening and closing without binding. Non-lift-off type hinge design shall permit gate to swing 180 degrees.

- C. Latch: Galvanized forked type capable of retaining gate in closed position and have provision for padlock. Latch shall permit operation from either side of gate.
- D. Double gates: Provide galvanized drop rod with center gate stop pipe or receiver to secure inactive leaf in the closed position. Provide galvanized pressed steel locking latch, requiring one padlock for locking both gate leaves, accessible from either side.
- E. Keeper to secure open leaves: Provide galvanized gate hold back keeper for each gate leaf over 5' wide. Gate keeper shall consist of mechanical device for securing free end of gate when in full open position.
- F. Latch, hinges, moveable parts may be field coated with liquid PVC.

## 2.6 CHAIN LINK INTERNAL TRACK ALUMINUM CANTILEVER SLIDE GATE

- A. Aluminum cantilever slide gates shall be of the internal roller design per ASTM F1184 Type II Class 2. Cantilever slide gate to be constructed of PVC color coated ASTM B221 aluminum members welded and designed for maximum structural integrity. Vertical external and internal members minimum 2" square spaced maximum 8'-0" on center. Gates having fabric greater than 8'-0" in height require a horizontal member. The top horizontal member shall be a one-piece precision extruded structural member having an integral enclosed track. Bottom horizontal member to be minimum 2" x 4". Adjustable diagonal trusses shall be installed in each gate panel to transfer the alternating forces as the gate slides. The gate opening portion shall be filled with chain link fabric stretched taut and secured to the frame members. Chain link fabric shall match the fence system specification. The overall gate structure shall be a minimum of 40% larger than the gate opening to support the cantilevered portion of the gate in the closed position with minimum deflection per ASTM F1184. The minimum 40% back frame does not require fence fabric. Single leaf cantilever design for openings larger than 30'-0" up to 40'-0" shall be fabricated by welding together two horizontal top structural/track members creating a dual track system. Single track gates up to 30'-0" opening require two support posts and two internal truck assemblies. Dual track gates over 30'-0" up to 40'-0" require two sets of dual posts and four internal truck assemblies.
- B. Internal truck assemblies shall be capable of swiveling to accommodate gate movement and ensure full contact of the four support wheels and two guide wheels to the internal track surface. The galvanized steel truck assembly post bracket, truck assembly vertical support axle as well as the support wheels shall be designed to handle static and dynamic forces required to support and operate the gate. The truck assembly, support axle and internal wheels shall be comprised of stainless steel or galvanized steel components.
- C. Galvanized steel bottom guide roller brackets containing two 3" rubber wheels shall be supplied to keep the bottom of the gate plumb and in proper alignment.

- D. Single gates shall be supplied with a galvanized steel latch mechanism capable of securing the gate with a padlock accessible from either side. Double gates to have galvanized drop rod to hold inactive leaf and a latch mechanism capable of securing the gate with a padlock accessible from either side. Provide drop rod stop pipe or receiver to engage center drop rod.
- E. Cantilever gate posts shall be 4" OD PVC coated. Single leaf cantilevers up to 30'-0" require three 4" OD posts, dual track single leaf cantilevers over 30'-0" up to 40'-0" require two sets of pre-fabricated dual 4" OD support posts and a 4" OD latch post. The gate is supported in the center of the dual posts.

## 2.7 POST SETTING MATERIALS

- A. Concrete: As specified in Section 03 30 00.
- B. Drive Anchors: Galvanized ASTM A36 steel drive anchor angle blades, 1.25" x 1.25" x 30" long secured to post with a pressed steel galvanized shoe clamp.

## PART 3 – EXECUTION

### 3.1 FENCE INSTALLATION:

- A. Install new fabric, as indicated on drawings; accessories in accordance with ASTM F567.
- B. Provide dimensions as shown and space line posts at intervals indicated.
- C. Excavation: Excavate holes for concrete with vertical sides in cylindrical form.
- D. Setting Posts:
  - 1. Remove loose and foreign materials from sides and bottom of holes, and moisten soil prior to placing concrete.
  - 2. Center and align posts.
  - 3. Place concrete around posts in a continuous pour, and vibrate or tamp for consolidation.
  - 4. Check each post for vertical and top alignment, and hold in position during placement.
  - 5. Trowel tops of footings, and slope or dome to direct water away from posts.
  - 6. Keep exposed concrete surfaces moist for at least seven (7) days after placement.

- E. Concrete Strength:
1. Allow concrete to attain at least 75 percent of its minimum 28 day strength before rails, tension wire, and fabric are installed.
  2. Do not, in any case, install such items in less than seven (7) days after placement of concrete.
  3. Do not stretch and tension fabric and wire until concrete has attained its full design strength.
  4. Provide top rail through line post tops and splice with six inch (6") long rail sleeves.
- F. Chain link fence shall have continuous top and bottom rails. Top and bottom edge of fence fabric shall have knuckled edges. Fabric shall be stretched uniformly taut and tight as possible, true to line and grade and complete in all details. Install tension bars at corners.
- G. All chain link fence fabric shall be fastened on the outside of the posts unless directed otherwise by the Owner or otherwise indicated in this specification. The fabric shall be properly stretched and securely fastened to the posts, and between posts the top and bottom of the fabric shall be fastened to end and corner posts with tension bars and stretcher bars bands spaced at one (1) foot intervals.
- H. All fabric shall be aligned so that top row of the fabric mesh is tied to the top rail twelve inches (12") on center and so that the bottom of the fabric mesh stand two inches (2") maximum above finish grade or as indicated on plans, and that the bottom row of the fabric mesh is tied to the bottom rail every twelve inches (12") on center. When applicable, all fabric shall be tied to the middle rail at twelve inches (12") on center.
- I. All fabric shall be fastened to all line posts and horizontal rails with 0.020" thickness, 200/300 series stainless steel 1/2" wide bands, with a minimum breaking strength of 850 lbs., 1/2" band capacity ear-lokt design buckles to be manufactured with 0.050" thick material, 201/301 series stainless steel. All bands shall be pulled tight and raw ends of steel bands shall be secured in buckle by folding ear tabs around steel bands as per manufacturer's recommended installation procedure. No sharp edges shall protrude from band-it buckles. Band will be PVC coated, color to match fabric and framework.
- J. Perimeter Fencing and Gates: Install fabric 1-inch above finished grade.
- K. Touch up any nicks or scratches of the PVC color coating with liquid PVC paint.
- L. Touch up any nicks or scratches on the posts or rails with a manufacturers approved paint.

### 3.2 GATE INSTALLATION

- A. Install gates plumb, level, and secure for full opening without interference. Install ground-set items in concrete for anchorage, as recommended by fence

manufacturer. Adjust hardware for smooth operation and lubricate where necessary.

END OF SECTION