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END OF SECTION

SECTION 01 50 00 - TEMPORARY FACILITIES AND CONTROLS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Temporary sanitary facilities.
- B. Temporary Controls: Fencing.
- C. Project identification sign.
- D. Field offices.

1.2 REFERENCE STANDARDS

- A. 29 CFR 1926 - Safety and Health Regulations for Construction Current Edition.

1.3 TEMPORARY SANITARY FACILITIES

- A. Provide and maintain required facilities and enclosures for Contractor's and subcontractor's use as well as Owner's, Engineer's and other Project visitors use. Provide at time of project mobilization.
- B. Maintain daily in clean and sanitary condition.
- C. Comply with 29 CFR 1926.

1.4 FENCING

- A. Construction: Commercial grade chain link fence.
- B. Provide 6 foot high fence around construction site; equip with vehicular and pedestrian gates with locks.

1.5 PROJECT IDENTIFICATION

- A. Provide project identification sign of design and construction indicated on drawings.
- B. Erect on site at location indicated.
- C. No other signs are allowed without Owner permission except those required by law.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

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SECTION 01 57 13 – TEMPORARY EROSION AND SEDIMENTATION CONTROL

PART 1 - GENERAL

1.1 Related Documents

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions, RIDOT Standard Specification for Road and Bridge Construction, RI Soil Erosion and Sediment Control Handbook and Division 1 Specification Sections, apply to this Section.

1.2 Summary

- A. This Section includes furnishing, placing, and maintaining sedimentation control measures as shown on the Drawings, as directed by the Engineer and/or Owner, and where necessary to reduce sediment content of runoff. Control measures are to remain in place until after completion of construction. Measures include the following:
 - 1. Inlet Protection.
 - 2. Compost Filter Sock
 - 3. Erosion Control Bales
 - 4. Temporary seeding and mulching.
 - 5. Dust control.

1.3 Related Sections

- A. Section 31 10 00 "Site Clearing."
- B. Section 31 20 00 "Earth Moving."
- C. Section 32 92 00 "Loam and Seeding"

1.4 Submittals

- A. Product data and manufacturer's installation instructions: For the following:
 - 1. Inlet Protection.
 - 2. Compost Filter Sock
 - 3. Erosion Control Bales

1.5 Quality Assurance

- A. Where "RIDOT Standard Specifications" is used, it shall mean "Rhode Island Department of Transportation Standard Specifications for Road and Bridge Construction, Amended March 2018" and issued supplements.

- B. Sedimentation and erosion control measures shall be installed and maintained in accordance with the most recent version of the “Rhode Island Soil Erosion and Sediment Control Handbook” by the Rhode Island State Conservation Committee, Rhode Island Department of Environmental Management, Rhode Island Coastal Resources Management Council, Rhode Island Department of Transportation, and The University of Rhode Island.

1.6 Project Conditions:

- A. All erosion and sedimentation control work shall comply with the regulatory and permitting requirements.
- B. Contractor shall submit 24-hour contact name and number for response to situations that may require immediate response.

PART 2 - PRODUCTS

2.1 Inlet Protection

- A. Woven polypropylene that meets the following:

<u>Properties</u>	<u>Requirement</u>	<u>Unit</u>
Grab Tensile Strength (ASTM D4632):	300	Lbs
Grab Tensile Elongation (ASTM D4632):	15	Percent
Puncture Strength (ASTM D4833):	120	Lbs
Mullen Burst (ASTM D3786):	800	PSI
Trapezoid Tear (ASTM D4533):	90	Lbs
Flow Rate (ASTM D4491):	40	Gal/Min/Sq.Ft
Permittivity (ASTM D4491)	0.55	Sec-1
UV Resistance(at 500 hours)	80	Percent
(Retained strength) (ASTM D4355):		
Apparent Opening Size (ASTM D4751):	#40	US Sieve

- 1. Manufacturer: Siltsack™ as manufactured by ACF Environmental, or approved equal.

2.2 Compost Filter Sock

- A. Tubular Mesh Sleeve: High density polyethylene mesh that meets the following:
 - 1. Material Characteristic: Photodegradable
 - 2. Comply with AASHTO Designation: MP 9-06 (Latest Revision).
 - 3. Tensile Strength (ASTM D5035) 26 psi.
 - 4. UV Resistance (at 100 hours) (Retained strength) (ASTM G155) 23%.
 - 5. Mesh Opening Size: Minimum 3/8 inch.
- B. Compost Filter Material: Weed-free from well-decomposed source of organic matter conforming to the following:
 - 1. Comply with AASHTO Designation: MP 9-06 (Latest Revision).
 - 2. PH: 5.0 – 8.0.

3. Maximum Moisture Content: 60%
 4. Particle Size:
 5. 2-inch: 100% passing
 6. 3/8-inch: 0-40% passing
- C. Hardwood Stakes:
1. For compost filter socks 18 inches or less in diameter, wooden stakes shall be 1 inch by 1 inch, at 10-foot intervals on center, and of a length that shall project into the soil 1 foot leaving 3 inches to 4 inches protruding above the filter sock.
 2. For compost filter socks greater than 18 inches in diameter, wooden stakes shall be 2 inches by 2 inches at 10-foot intervals on center, and of a length that shall project into the soil 1 foot, leaving 3 inches to 4 inches protruding above the filter sock.

2.3 Erosion Control Bales

- A. Bales: Air dry, rectangular hay or straw bales, weighing 40 to 120 pounds per bale.
1. Bindings: Wire or string, around long dimension.
- B. Bale Stakes: One of the following, minimum 3 feet long:
1. Wood, 2 by 2 inches in cross section.

2.4 Temporary Seeding and Mulching

- A. Fresh, viable, re-cleaned pure quality seed of the latest crop, delivered in original unopened packages, bearing guaranteed analysis tags and name of the supplier.
- B. Temporary Seed Mixture: Perennial Ryegrass
- C. Temporary mulching shall include straw, wood fiber, hydromulch, bonded fiber matrix (BFM) and flexible growth medium (FGM). If hydromulches are used, use hydromulch with a minimum blend of 70% wood fibers.
1. Cellulose Fiber: Cellulose fiber mulch shall conform to M.18.08.1 of RIDOT's Standard Specifications.
 2. Wood Chips: Wood chips shall conform to M.18.08.2 of RIDOT's Standard Specifications.
 3. Pine Bark Mulch: Pine bark mulch shall conform to M.18.08.3 of RIDOT's Standard Specifications.
 4. Adhesive Mulch Stabilizer: Adhesive mulch stabilizer shall conform to M.18.08.4 of RIDOT's Standard Specifications.

2.5 Dust Control

- A. Water: Potable.
- B. Crushed Stone: See Section 31 20 00 "Earth Moving" for gradation of crushed stone to be used for dust control applications.

PART 3 - EXECUTION

3.1 General

- A. Install erosion and sediment control measures prior to clearing, demolition or construction.
- B. Attend a preconstruction meeting with the Engineer and/or Owner, to review permit conditions and construction methods.
- C. Implement and maintain the erosion and sediment controls in accordance with the Erosion & Sediment Control Plan, Details and Erosion Control Notes included within the Contract Drawings. Inform parties engaged on the construction site of the requirements and objectives of this Plan.
- D. Control dust to prevent a hazard to traffic on adjacent transportation corridors. Dust control includes, but is not limited to, sprinkling of water, mulch and/or crushed stone on exposed soils and haul roads.
- E. Inspect site weekly and prior to anticipated rain events. Ensure that erosion controls are properly maintained and functioning.
- F. Install additional control measures if deemed necessary by the Engineer or Owner.
- G. Do not discharge directly into drainage systems, wetlands or watercourses where dewatering is necessary. Utilize methods and devices as permitted by authorities having jurisdiction and appropriate regulations to minimize and retain suspended solids including pumping water into a temporary sedimentation bowl, providing surge protection at inlet and outlet of pumps, floating pump intake.
 - 1. If pumping operation results in turbidity problems, stop pumping until means of controlling turbidity are determined and implemented.

3.2 Stockpiles

- 1. Stockpile Side Slopes: 2:1 maximum.
- 2. Surround stockpiles by perimeter erosion control measure.
- 3. Stabilize stockpiles not to be used within 30 days with temporary vegetation and mulch immediately after formation of stockpile.

3.3 Compost Filter Sock

- A. Install in accordance with the Contract Drawings, Section 206.03.4 of the RIDOT Standard Specifications, and/or manufacturer's written instructions.

3.4 Erosion Control Bales

- A. Install in accordance with the Contract Drawings, Section 206.03.1 of the RIDOT Standard Specifications, and/or manufacturer's written instructions.

3.5 Catch Basin Inlet Protection

- A. Install in accordance with manufacturer's written instructions and the Contract Drawings.

3.6 Temporary Seeding and Mulching

- A. Within seven (7) days of completing slope construction, stabilize slopes with vegetation or matting to minimize exposure.
- B. If final grading is delayed 30 days, stabilize soils with temporary vegetation or mulch. Refer to Section 32 92 00 "Loam and Seeding" for recommended seeding dates.
- C. Areas to Be Left Bare Prior to Finished Grading and Seeding
 - 1. Within Planting Seasons
 - a. Temporarily seed with Temporary Seed Mixture.
 - b. Apply at a rate of 2 pounds per 1000 sq. ft. at a depth of 1/2 inch.
 - c. Where grass predominates, fertilize according to a soil test at a minimum application rate of one pound per acre.
 - 2. Outside of Planting Seasons
 - a. Apply mulch, free of coarse matter.
 - b. Apply at a rate listed on the Contract Drawings.

3.7 Dust Control

- A. Apply water, and/or crushed stone uniformly over the surface when dust becomes a nuisance or when directed by the Engineer. Provide shut-off valve in convenient location on water truck, to allow for regulating water flow such that discharged water does not cause excessive ponding or erosive runoff.
- B. Keep adjacent roadways free of sediment at all times throughout the construction period at no additional cost to the owner. Wet sweep roadways to remove any tracked sediment with mechanical vacuum-assisted equipment. Do not use blowers or similar methods that may disperse dust and debris. If tracking of sediment becomes an issue, the Engineer and/or Owner shall require additional methods or systems to control dust, such as construction access, more frequent water application, and sweeping.

3.8 Maintenance

- A. Inspect all erosion controls according to the requirements in the Contract Drawings, local and state regulations, and the manufacturer's recommendations.
- B. Remove and dispose of accumulated sediments when sediment reaches approximately one-half the height of the control system, or when directed by the Engineer.

- C. Replace control system promptly if fabric decomposes or system becomes ineffective prior to the expected usable life.
- D. Maintain or replace system until no longer necessary for the intended purpose.
- E. Contractor shall be responsible to fix and/or replace all damaged erosion control systems damaged by storm events promptly as needed or to the satisfaction of the Engineer or Owner.

3.9 Removal

- A. Remove and dispose of temporary erosion control systems after respective up-gradient areas are stabilized with stable growth and a satisfactory stand of vegetation as directed by the Engineer and/or Owner.

END OF SECTION

SECTION 04 01 00 - MAINTENANCE OF MASONRY

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Repointing tower masonry at locations and criteria indicated on the Drawings and as directed by Architect. Include repointing of all indicated SF on each facade plus an allowance for 50 additional square feet at locations to be agreed in field.
- B. Cut out and dry pack crack areas up to 12" deep into the wall, working from each side in sequence, bottom up.
- C. Roofing and masonry trades shall utilize the same exterior scaffolding. Interior staging for crack repair is also required.

1.02 RELATED REQUIREMENTS

- A. Section 04 05 11 – Mortar.

1.03 REFERENCES

- A. Definitions:
 - 1. Existing mortar: Mortar currently in joint, including original setting mortar and pointing mortar, and subsequent repair mortar.
 - 2. Dry pack: Deep mortar replacement after removal of old pointing mortars and loose sand without binder 4 to 12" deep. Typical replacement will remove small stones for better access and reset.
 - 3. Rake out mortar joint: Removal of hardened mortar from joint.
 - 4. Repointing: Process of raking out mortar joint to specified depth and placing fresh mortar; also called tuckpointing.
 - 5. Thumbprint hard: Mortar that has reached initial set. Time required to achieve initial set varies based on masonry characteristics, weather conditions, and mortar composition.
 - 6. Low-pressure water spray: 100 to 400 pounds per square inch; 4 to 6 gallons per minute.
 - 7. Very-low-pressure water spray: less than 100 pounds per square inch.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordinate Work to ensure that adjacent areas are not adversely affected. Coordinate:
 - 1. With Owner's Representative.
 - 2. With other restoration and cleaning work.
 - 3. With other trades:
 - a. To ensure that work done by other trades is complete and ready for repointing Work.
 - b. To avoid or minimize work in immediate vicinity of repointing Work in progress.
 - c. To ensure that subsequent work will not adversely affect repointed surfaces.
- B. Scheduling:
 - 1. Order materials at earliest possible date, to avoid delaying completion of Work.
 - 2. Order sand for repointing mortar immediately after approval of mockups. Take delivery of and store at Site a sufficient quantity of sand to complete Project.

1.05 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Repointing Subcontractor Qualifications: Evidence that Subcontractor's existing company has minimum ten years of continuous experience in similar repointing work list of at least five representative, successfully-completed projects of similar scope and size, including:
 - 1. Project name.
 - 2. Owner's name.
 - 3. Owner's Representative name, address, and telephone number.
 - 4. Description of repointing work.
 - 5. Project supervisor.

6. Total cost of repointing work and total cost of project.
7. Completion date.

1.06 QUALITY ASSURANCE

- A. Repointing Subcontractor Qualifications: Experienced firm that has successfully completed repointing Work similar in material, design, and extent to that indicated for the Project. Must have successful construction with specified materials in local area in use for minimum of five years.
 1. Employ foreman with minimum five years of experience as foreman on similar projects, who is fluent in English, to be on Site at all times during the Work. Do not change foremen during the course of the Project except for reasons beyond the control of Subcontractor; inform Architect in advance of any changes.
 2. Employ masons with minimum two years of experience in placement of repointing mortar. Fully supervise apprentices with experienced masons.
 3. Comply with The Masonry Society standards (TMS).

1.07 MOCK-UP

- A. Mockups: Each mason to rake out joints in wall area to demonstrate surface preparation, execution quality, and aesthetic effect.
 1. Prepare mockup for each type of repointing required, under same weather conditions anticipated during Work. Include dry pack crack repair and repointed exterior face joints in separate mock-ups.
 2. Include cleaning mortar from masonry units adjacent to joints in separate mockup.
 3. Allow mockups to cure 14 days minimum prior to inspection by Owner's Representative and Architect.
 4. If Owner's Representative or Architect determines mockup does not comply with requirements, modify mockup or construct new mockup until mockup is approved.
 5. Approved mockups will be standard for judging completed Work.
 6. Approved mockups may become part of completed Work if undisturbed at time of Substantial Completion.

1.08 DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, and handle materials according to manufacturer's recommendations and in such a manner as to prevent damage to materials or structure.
- B. Deliver materials to Site in original packages with seals unbroken, labeled with manufacturer's name, product brand name and type, date of manufacture, lot number, and directions for storing and mixing with other components.
- C. Keep materials dry and do not allow materials to be exposed to moisture during transportation, storage, handling, and installation. Reject and remove from Site new materials which exhibit evidence of moisture during application, or have been exposed to moisture.
- D. Store materials in original, undamaged containers in clean, dry, protected location on raised platforms with weather-protective coverings.
- E. Limit stored materials on structures to safe loading capacity of structure at time materials are stored, and to avoid permanent deck deflection.
- F. Conspicuously mark damaged or opened containers or containers with contaminated materials, and remove from Site as soon as possible.
- G. Remove and replace materials that cannot be applied within stated shelf life.

1.09 PROJECT CONDITIONS

- A. Verify existing dimensions and details prior to start of repointing Work. Notify Architect of conditions found to be different than those indicated in the Contract Documents. Architect will review situation and inform Contractor and Repointing Subcontractor of changes.
- B. Comply with Owner's limitations and restrictions for Site use and accessibility.
- C. Environmental Limitations:

1. Place mortar in joints only when substrate and ambient temperatures are above 40 degrees F and predicted to remain so for at least seven days after completion of Work, unless procedures and precautions approved by Architect are used in response to lower temperatures.
 2. Place mortar in joints only when substrate and ambient temperatures are at or below 90 degrees F and predicted to remain so for at least seven days after completion of Work, unless procedures and precautions approved by Architect are used in response to higher temperatures.
- D. Handle and install materials in strict accordance with safety requirements required by material manufacturers; GHS or Material Safety Data Sheets; and local, state, and federal rules and regulations, including dust and noise restrictions. Maintain GHS or Material Safety Data Sheets with materials in storage area and available for ready reference on Site.

1.10 CHANGES IN WORK

- A. A. During rehabilitation work, existing conditions may be encountered which are not known or are at variance with the Contract Documents. Such conditions may interfere with the Work and may consist of damage or deterioration of the substrate or surrounding materials that could jeopardize the integrity or performance of the Work. Notify Architect and Owner immediately if such conditions are encountered.

PART 2 PRODUCTS

2.01 MORTAR MATERIALS

- A. Mortar: Type O; Section 04 05 11.
- B. Aggregate: ASTM C144: washed aggregate consisting of natural sand or crushed stone; maximum size not more than 1/3 joint width.
- C. Water: Clean and potable; free from deleterious amounts of acids, alkalis, or organic materials.
- D. Admixtures: Do not use admixtures unless otherwise specified, including:
1. Calcium chloride or admixtures containing calcium chloride.
 2. Air-entraining admixtures or material containing air-entraining admixtures.
 3. Antifreeze compounds.

2.01 ACCESSORY MATERIALS

- A. Bonding Slurry: Slurry mix of lime, Portland cement, and water applied to crack stones prior to dry pack application.
- B. Cleaning Solution: 1:5 mix of Prosoco Restoration Cleaner or other approved material. Submit for Architect's review and approval.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Examine substrates and conditions for compliance with requirements and other conditions affecting installation or performance of repointing Work.
1. Ensure that work done by other trades is complete and ready for repointing Work.
 2. Verify that areas and conditions under which repointing Work is to be performed permit proper and timely completion of Work.
 3. Notify Architect in writing of conditions which may adversely affect installation or performance of repointing Work and recommend corrections.
 4. Do not proceed with repointing Work until adverse conditions have been corrected and reviewed by Architect.
 5. Commencing repointing Work constitutes acceptance of Work surfaces and conditions.

3.02 PROTECTION

- A. Take precautions to ensure safety of people, including building users, passers-by, and workmen, and animals, and protection of property, including adjacent building elements, landscaping, and motor vehicles.
- B. Comply with all silicosis regulations, including use of HEPA-vac equipped grinding equipment. Silica dust must be captured on this project. Protect workers and building occupants from stray dust.
- C. Prevent construction debris and other materials from coming into contact with pedestrians, motor vehicles, landscaping, buildings, and other surfaces that could be harmed by such contact.
- D. Protect paving and sidewalks, and adjacent building areas from mechanical damage due to scaffolding and other equipment.
- E. Limit access to Work areas.
- F. Erect temporary protective canopies, as necessary, over walkways and at points of pedestrian and vehicular access that must remain in service during Work.
- G. Assume responsibility for injury to persons or damage to property due to Work, and remedy at no cost to Owner.
- H. Prevent mortar from staining face of surrounding masonry and other surfaces.
 - 1. Cover sills, ledges, and projections to protect from mortar droppings. Do not extend coverings into mortar joints.
 - 2. Keep wall area wet below rebuilding and repointing Work to discourage mortar from adhering.

3.03 REPOINTING

- A. Attend a pre-construction meeting during which time the Architect will review wall surfaces with masonry crew from scaffolding and mark and agree upon areas to be repointed within the allowed bid SF.
- B. Rake out and repoint mortar joint areas as selected with the Architect during pre-installation meeting after scaffolding is in place.
 - 1. Do not rake out and repoint joints where not required.
- C. Rake out and repoint mortar joints with the following deterioration when agreed to with Architect:
 - 1. Missing mortar, holes in mortar, mortar that can be easily removed by hand.
 - 2. Cracks that are at least 1/8 inch wide or that can be penetrated at least 1/4 inch by knife blade 0.027 inch thick.
 - 3. Joints that sound hollow when tapped by metal object or are worn back at least 1/4 inch from surface.
 - 4. Joints, other than those indicated as sealant-filled joints, which are filled with substances other than mortar.
 - 5. Linear crack identified on drawings, both inside and outside faces.
- D. Rake out joints as demonstrated in approved mockup:
 - 1. Remove mortar from joints to depth of at least 3/4 inch from face of unit, to expose sound, unweathered mortar. If unsound mortar extends more than 1 inch from face of units, stop Work and notify Architect.
 - 2. Remove mortar to provide reveals with square backs and to expose clean masonry surfaces. Do not leave half moons.
 - 3. Use power tools only as noted on drawings and with approval of Architect.
 - a. Demonstrate ability of operators to use tools without damaging masonry.
 - b. Submit quality control program with provisions for supervising performance and preventing damage due to worker fatigue.
 - c. Width of power tool blade should not exceed 1/3 the width of the joints.

4. Cut out center of mortar bed joints using angle grinders with diamond-impregnated metal blades. Remove remaining mortar by hand with chisel and mallet.
 - a. Strictly adhere to written quality control program. Quality control program shall include provisions for demonstrating ability of operators to use tools without damaging masonry, supervising performance, and preventing damage due to worker fatigue.
 - b. Width of power tool blade should not exceed 1/3 the width of the joints.
 - c. Square off rounded backs created by grinders.
5. Do not spall edges of masonry units or widen joints. Replace damaged masonry units as directed by Architect.
6. Remove sealant from joints.
7. Brush, vacuum, or flush joints with water to remove dirt and loose debris.
- E. Notify Architect of unforeseen detrimental conditions including voids in mortar joints, cracks, loose units, rotted wood, rusted metal, and other deteriorated items.
- F. Cover wall in ground-out areas that have not yet been fully repointed when Work is not in progress.
 1. Extend cover 24 inches minimum beyond ground-out area.
 2. Hold cover securely in place.
- G. Masonry units adjacent to repair areas that are damaged during Work shall be removed and replaced at Contractor's expense and to acceptance of Architect and Owner's Representative.
- H. Repoint joints:
 1. Blow loose mortar and dust out prepared joints with compressed air, or vacuum joints.
 2. Rinse joint surfaces with very-low-pressure water spray to remove residual dust and mortar particles. Time rinsing so joint surfaces are damp but free of standing water at time of repointing. If joint surfaces dry, dampen before repointing.
 3. Place mortar in areas with greater removal depths than surrounding areas, until uniform depth is achieved.
 - a. Place in layers not greater than 1/4 inch
 - b. Fully compact each layer and allow to become thumbprint hard before applying next layer.
 4. After deeper removal areas have been filled, place mortar in joints.
 - a. Place in layers not greater than 1/4 inch.
 - b. Fully compact each layer and allow to become thumbprint hard before applying next layer.
 - c. Where existing masonry has worn or rounded edges, slightly recess finished mortar surface from face of masonry to avoid wider joints.
 - d. Take care not to spread mortar onto exposed masonry surfaces or to featheredge mortar.
 5. When mortar is thumbprint hard, tool joints to match original appearance of joints. Remove excess mortar from edges of joints by brushing.
- I. Cure mortar by maintaining in damp condition for at least 72 hours, including weekends and holidays.
 1. Acceptable curing methods include covering with wet burlap and plastic sheeting; periodic hand misting; or periodic mist spraying using system of pipes, mist heads, and timers.
 2. Adjust curing method to ensure that repointing mortar is damp throughout its depth without eroding surface mortar.
- J. Do not begin cleaning work until mortar has cured at least 28 days.

3.04 FIELD QUALITY CONTROL

- A. Owner may retain Architect or qualified independent inspection agency to observe the progress and quality of Work and prepare inspection reports.
- B. Allow inspector use of lift devices and scaffolding to access Work areas.

- C. Notify inspector at least 48 hours in advance of times when lift devices and scaffolding will be relocated.

3.05 CLEANING

- A. Immediately after completing repointing Work in a work area, remove mortar from exposed masonry and other surfaces.
 - 1. Wipe excess mortar from masonry surfaces adjacent to mortar joints with damp sponge or cloth.
 - a. Use only sponge or cloth that is damp, not wet or saturated. When tightly squeezed, water should not run from damp sponge or cloth. Surface of masonry shall not have visible accumulation of water immediately following cleaning.
 - b. Do not touch or disturb newly-installed repointing mortar during cleaning.
 - c. Clean until mortar and mortar haze are removed from adjacent masonry surfaces.
 - 2. Wash adjacent woodwork and other non-masonry surfaces with detergent and soft brushes or cloths.
- B. After mortar has fully cured, thoroughly rinse wall surfaces affected by repointing Work to remove dust and other surface residue resulting from repointing Work. Use very-low-pressure water spray.
 - 1. Remove excess mortar and foreign matter from exposed masonry surfaces with wood scrapers, stiff-nylon or fiber brushes, and water spray.
 - a. Do not use metal scrapers or brushes.
 - b. Do not use acidic or alkaline cleaners unless specified herein or approved by Architect.
- C. Clean mortar splatters from scaffolding at the end of the day.
- D. Patch anchor holes as scaffolding is removed.
- E. Remove debris from Work from roof, gutters, and downspouts. Rinse off roof and flush gutters and downspouts.
- F. Clean debris, refuse, and surplus materials and dispose of legally. Sweep and rake adjacent pavement and grounds to remove debris from Work. Where necessary, pressure wash surfaces to remove mortar, dust, dirt, and stains.
- G. At conclusion of repointing Work, remove scaffolding and equipment used in Work.

END OF SECTION

SECTION 04 05 11 - MORTAR

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Mortar for masonry repointing and crack repair.

1.02 RELATED REQUIREMENTS

- A. Section 04 01 00 - Maintenance of Masonry: Bedding and pointing mortar for masonry restoration work. Crack dry pack and bonding agent application.

1.03 REFERENCE STANDARDS

- A. ASTM C144 - Standard Specification for Aggregate for Masonry Mortar; 2018.
- B. ASTM C150/C150M - Standard Specification for Portland Cement; 2021.
- C. ASTM C207 - Standard Specification for Hydrated Lime for Masonry Purposes; 2018.
- D. ASTM C270 - Standard Specification for Mortar for Unit Masonry; 2019.
- E. ASTM C780 - Standard Test Method for Preconstruction and Construction Evaluation of Mortars for Plain and Reinforced Unit Masonry; 2020.
- F. TMS 402/602 - Building Code Requirements and Specification for Masonry Structures; 2016.

1.04 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data and Design Mixes: Include design mixes and indicate whether the Proportion or Property specification of ASTM C270 is to be used. Also include required environmental conditions and admixture limitations.
- C. Samples: Submit two samples of mortar, illustrating mortar color and color range.
- D. Reports: Submit reports on mortar indicating compliance of mortar to property requirements of ASTM C270 and test and evaluation reports per ASTM C780.
- E. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.
- F. Manufacturer's Installation Instructions: Submit packaged dry mortar manufacturer's installation instructions.

1.05 QUALITY ASSURANCE

- A. Comply with provisions of TMS 402/602, except where exceeded by requirements of Contract Documents.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, and handle materials according to manufacturer's recommendations and in such a manner as to prevent damage to materials or structure.
- B. Deliver materials to Site in original packages with seals unbroken, labeled with manufacturer's name, product brand name and type, date of manufacture, and lot number.
- C. Keep materials dry and do not allow materials to be exposed to moisture during transportation, storage, handling, and installation. Reject and remove from Site new materials which exhibit evidence of moisture during application, or have been exposed to moisture.
- D. Store materials in original, undamaged containers in clean, dry, protected location on raised platforms with weather-protective coverings, within temperature range required by manufacturer. Protect stored materials from direct sunlight.
 - 1. Store aggregates where grading and other required characteristics can be maintained and contamination avoided.
- E. Limit stored materials on structures to safe loading capacity of structure at time materials are stored, and to avoid permanent deck deflection.

- F. Conspicuously mark damaged or opened containers or containers with contaminated materials, and remove from Site as soon as possible.
- G. Remove and replace materials that cannot be applied within stated shelf life.

1.07 PROJECT CONDITIONS

- A. A. Handle and install materials in strict accordance with safety requirements required by material manufacturer; GHS or Material Safety Data Sheets; and local, state, and federal rules and regulations. Maintain GHS or Material Safety Data Sheets with materials in storage area and available for ready reference on Site.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Cementitious Materials:
 - 1. Portland Cement: ASTM C150/C150M, Type I or II, except Type III may be used for cold-weather construction. Provide natural color or white cement as required to produce mortar color to match un-repointed original mortar.
 - 2. Hydrated Lime: ASTM C207, Type S.
 - 3. Do not use masonry cement.
- B. Aggregate:
 - 1. Mortar: ASTM C144: washed aggregate consisting of natural sand or crushed stone.
 - a. White-Mortar Aggregate: Natural white sand or crushed white stone.
 - b. Colored-Mortar Aggregate: Natural sand or crushed stone of color necessary to produce required mortar color.
 - 2. Aggregate shall contain no more than 50 parts per million of chloride ions and shall be free of organic contaminants.
- C. Water: Clean and potable; free from deleterious amounts of acids, alkalis, or organic materials.
- D. Admixtures: Do not use admixtures without written approval, unless otherwise specified, including:
 - 1. Calcium chloride or admixtures containing calcium chloride.
 - 2. Air-entraining admixtures or material containing air-entraining admixtures.
 - 3. Antifreeze compounds.
- E. Mortar Pigment: Natural and synthetic iron oxides and chromium oxides, compounded for use in mortar mixes. Use only pigments with record of satisfactory performance in masonry mortar.
 - 1. Use one of the following or approved equal:
 - a. Bayferrox iron oxide pigments manufactured by Lanxess Corporation.
 - b. True Tone Sweet 16 Mortar Colors manufactured by Davis Colors, Inc.
 - c. SGS Mortar Colors manufactured by Solomon Colors, Inc.

2.02 MORTAR MIXES

- A. Mortar: ASTM C270; proportioned by volume as follows:
 - 1. Type O, for use in repointing masonry and cracks. Mix with minimal moisture for dry pack applications.
 - 2. Aggregate: Not less than 2 1/4 and not more than 3 times sum of volumes of portland cement and hydrated lime.
 - 3. Water: Maximum amount consistent with optimum workability.
 - 4. Color: Match color of mortar to existing adjacent white mortar joint top pointing when doing repointing work.
 - 5. Colored Mortar: Produce required mortar color by using colored aggregate and approved color additives, natural color or white cement as necessary."
 - a. Mix to match Design Agent's sample, subject to approval of Owner's Representative and Design Agent.

PART 3 EXECUTION

3.01 SITE MIXING

- A. Develop batching and mixing operations so that quality control is assured.
- B. Follow TMS hot or cold weather procedures when conditions apply.
- C. Designate one or two individuals to batch and mix mortar. Fully instruct these individuals on batching and mixing procedures. No other persons shall batch or mix mortar without prior notification to Design Agent.
- D. Maintain accurate mix proportions. Batch materials by volume with containers of known volume. Do not measure materials by shovel.
 - 1. Incorporate admixtures into mix in manner recommended by manufacturer and approved by Design Agent. Measure with accuracy of +/-3 percent. Add each admixture separately.
- E. Combine and mix materials in appropriate drum-type batch machine mixer to uniform consistency.
 - 1. Mix mortar for three to five minutes after materials are in mixer.
 - 2. Provide sufficient number of mixers, including reserve mixers, so that mortar placement operations will proceed uninterrupted.

3.02 MORTAR MIXING

- A. Pre-hydrate mortar:
 - 1. Thoroughly mix ingredients except water.
 - 2. Continue mixing, adding only enough water to produce damp workable mix which will retain its form when pressed into ball.
 - 3. Maintain mortar in dampened condition for 1 to 1 1/2 hours.
- B. For repointing, add sufficient water to bring mortar to proper consistency; that is, somewhat drier than conventional masonry mortars.
- C. For dry-pack use, add only enough water to bring the mortar to a ball state. Should be moldable by hand with no slump.

3.03 LIMITATIONS

- A. Mortar, including repointing mortar:
 - 1. If mortar begins to stiffen, it may not be retempered.
 - 2. Discard mortar not placed within 2 1/2 hours after initial mixing.

END OF SECTION

SECTION 04 43 16 - STONE FABRICATIONS

PART 1 – GENERAL

1.1 SECTION INCLUDES

- A. Fabricated Granite Entry Pillars

1.2 RELATED REQUIREMENTS

- A. Section 32 05 23 - Cement and Concrete for Exterior Improvements - Cast-in-place concrete footing.

1.3 REFERENCE STANDARDS

- A. ASTM C119 - Standard Terminology Relating to Dimension Stone 2020.
- B. ASTM C615/C615M - Standard Specification for Granite Dimension Stone 2018, with Editorial Revision.
- C. ASTM C1528/C1528M - Standard Guide for Selection of Dimension Stone 2020.
- D. NBGQA (SPEC) - Specifications for Architectural Granite, Version 18-1 2018.

1.4 SUBMITTALS

- A. Product Data: Provide data on each stone type, mortar products, and sealant products.
- B. Shop Drawings: Indicate fabrication details, layout, pertinent dimensions, anchorages, and jointing methods.
 - 1. Include large scale details of decorative surfaces and inscriptions.
- C. Samples: Submit two stone samples 6 by 6 inches in size, indicating color range and texture, markings, surface finish.
- D. Installation Instructions: Submit stone fabricator's installation instructions and field erection or setting drawings; indicate stone identifying marks and locations on setting drawings.
- E. Stone fabricator's qualification statement.
- F. Installer's qualification statement.

1.5 QUALITY ASSURANCE

- A. Granite: Perform work in accordance with NBGQA (SPEC).
- B. Stone Fabricator: Company specializing in fabricating stone with minimum ten years of documented experience.

- C. Installer Qualifications: Company specializing in performing work of the type specified and with at least three years of documented experience.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Store stone on planks, pallets, or timbers, clear of soil and soil splash.
- B. Protect stone from discoloration.

PART 2 – PRODUCTS

2.1 FABRICATED ITEMS

- A. Entry Pillars: Granite.
 - 1. Size, Shape, and Configuration: As indicated on drawings.

2.2 STONE

- A. Granite; complying with ASTM C615/C615M.
 - 1. Color: Match existing granite block wall along Washington Street as closely as possible, and as acceptable to the Landscape Architect.
 - 2. Surface Finish: Rock-face; as described in ASTM C119 and ASTM C1528/C1528M.

2.3 STONE FABRICATION

- A. Fabricate stone elements in sizes and shapes as necessary and in compliance with requirements indicated on drawings and in specifications.
- B. Finish exposed faces and edges of stones in compliance with indicated requirements for finish under each type and application of stone required and to match approved samples and mock-ups.
- C. Fabricate units for uniform coloration between adjacent units and over the full area of the installation.
- D. Inspect finished stone units at fabrication plant for compliance with requirements for appearance, material, and fabrication. Replace defective units.

PART 3 – EXECUTION

3.1 EXAMINATION

- A. Verify that support work and site conditions are ready to receive work of this section.
- B. Verify that built-in items are properly located and sized.

3.2 PREPARATION

- A. Clean stone prior to erection. Do not use wire brushes or implements that will mark or damage exposed surfaces.

3.3 INSTALLATION

- A. Erect stone in accordance with stone supplier's instructions and erection drawings.

3.4 TOLERANCES

- A. Positioning of Elements: Maximum 1/4 inch from true position.
- B. Maximum Variation from Plumb: 1/4 inch per story noncumulative; 1/2 inch in any two stories.

3.5 CUTTING AND FITTING

- A. Obtain approval prior to cutting or fitting any item not so indicated on drawings.
- B. Do not impair appearance or strength of stone work by cutting.

3.6 CLEANING

- A. Clean soiled surfaces with cleaning solution.
- B. Use nonmetallic tools in cleaning operations.

END OF SECTION 04 43 16

SECTION 07 61 10 - COPPER ROOFING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Flat locked and soldered (flat seam soldered) roofing.
 - 2. Standing-seam copper roofing.
 - 3. Batten-seam copper roofing.
 - 4. Scaffolding for roof work must be erected all 4 sides and be coordinated with mason for that crew's access as well.
- B. Related Requirements:
 - 1. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
 - 2. Division 06 and 05 Sections for structural framing.
 - 3. Section 07 62 15 - Copper Flashing and Trim: Flashing and other trim not part of roofing.
 - 4. Division 07 Section "Joint Sealants" for field-applied panel sealants.
 - 5. Wood framing and decking is specified in a Division 06 Section.

1.2 COORDINATION

- A. Coordinate copper roofing with rain drainage work, flashing, gutters, downspouts, trim and construction of decks, parapets, walls, and other adjoining work to provide permanently watertight, secure, and noncorrosive installation.

1.3 PERFORMANCE REQUIREMENTS

- A. Installation Requirements: Fabricator is responsible for installing system, including anchorage to substrate and necessary modifications to meet specified and drawn requirements and maintain visual design concepts in accordance with Contract Documents and following installation methods as stipulated in the "Copper in Architecture" handbook published by the Copper Development Association Inc. (CDA)
 - 1. Drawings are diagrammatic and are intended to establish basic dimension of units, sight lines, and profiles of units.
 - 2. Make modifications only to meet field conditions and to ensure fitting of system components.
 - 3. Obtain Architect's approval of modifications.
 - 4. Provide concealed fastening wherever possible.
 - 5. Attachment considerations: Account for site peculiarities and expansion and contraction movements so there is no possibility of loosening, weakening and fracturing connection between units and building structure or between components themselves.
 - 6. Obtain Architect's approval for connections to building elements at locations other than indicated in Drawings.
 - 7. Accommodate building structure deflections in system connections to structure.
- B. Performance Requirements:
 - 1. System shall accommodate movement of components without buckling, failure of joint seals, undue stress on fasteners, or other detrimental effects when subjected to seasonal temperature changes and live loads.
 - 2. Design system capable of withstanding building code requirements for negative wind pressure.
- C. Interface With Adjacent Systems:
 - 1. Integrate design and connections with adjacent construction.
 - 2. Accommodate allowable tolerances and deflections for structural members in installation.

1.4 SUBMITTALS

- A. General: Submit the following in accordance with Conditions of Contract and Division 01 Specification Sections.

- B. Product data including metal manufacturer's specifications, installation instructions, and general recommendations for roofing applications. Include certification or other data substantiating that materials comply with requirements.
- C. Shop drawings showing manner of forming, joining, and securing copper roofing, and pattern of seams. Show expansion joint details and waterproof connections to adjoining work and at obstructions and penetrations.
- D. Samples consisting of 6-inch (150 mm) or 12-inch (300 mm) square specimens of specified copper roofing material.
- E. Certificates: Fabricator's certification that products furnished for Project meets or exceeds specified requirements.

1.5 CLOSEOUT SUBMITTALS

- A. Provide maintenance data in Operations and Maintenance manual for maintaining applied coatings on copper panels.

1.6 QUALITY ASSURANCE

- A. Fabricator's Qualifications: Company specializing in copper sheet metal roofing work with three years experience in similar size and type of installations.
- B. Installer: A firm with 3 years of successful experience with installation of copper roofing of type and scope equivalent to Work of this Section.
- C. Industry Standard: Except as otherwise shown or specified, comply with applicable recommendations and details of the "Copper in Architecture" handbook published by the Copper Development Association (CDA). Conform to dimensions and profiles shown.
- D. Wind Uplift: Provide roof assemblies meeting wind uplift ratings as required by code.
- E. Mock-Up: Before proceeding with final purchase of materials and fabrication of copper roofing components, prepare a mock-up of work. Incorporate materials and methods of fabrication and installation identical with project requirements. Install mock-up at roof area location directed by Architect. Retain accepted mock-up as quality standard for acceptance of completed copper roofing. If accepted, mock-up may be incorporated as part of copper roofing work.
 - 1. Mock-up area is indicated on Drawings.
 - 2. Provide mock-up of sufficient size and scope to show typical pattern of seams, fastening details, edge construction, and finish texture and color.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Packing, Shipping, Handling, and Unloading: Protect finish panel faces.
- B. Acceptance at Site: Examine each panel and accessory as delivered and confirm that finish is undamaged. Do not accept or install damaged panels.
- C. Storage and Protection:
 - 1. Stack pre-formed material to prevent twisting, bending, and abrasions.
 - 2. Provide ventilation.
 - 3. Prevent contact with materials which may cause discoloration or staining.

1.8 WARRANTY

- A. Warrant installed system and components to be free from defects in material and workmanship for period of 2 years.
- B. Include coverage against leakage and damages to finishes.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering materials that may be incorporated in the Work include, but are not limited to, the following:

- B. Manufacturers: Subject to compliance with requirements, provide materials by one of the following:
1. Hussey Copper, Ltd.
 2. KME America
 3. Aurubis Buffalo, Inc.
 4. PMX Industries Inc.
 5. Revere Copper Products, Inc.

2.2 MATERIALS

- A. Copper Roofing Sheets: Cold-rolled copper sheet complying with ASTM B370 temper H00, unless otherwise indicated, and as follows:
1. Weight: 16 oz. per sq. ft. (0.0216-inch thick) (0.55 mm) unless otherwise indicated.
 2. Batten Caps: 20 oz. per sq. ft.
- B. Miscellaneous Materials: Provide materials and types of fasteners, solder, protective coatings, separators, sealants and accessory items as recommended by copper sheet manufacturer for copper roofing work, except as otherwise indicated.
- C. Accessories: Except as indicated as work of another specification Section, provide components required for a complete roof system, including trim, copings, fascias, ridge closures, cleats, seam covers, battens, flashings, gutters, louvers, sealants, gaskets, and closure strips. Match materials and finishes of roof.
1. Sealing Tape: Pressure-sensitive 100 percent solids polyisobutylene compound sealing tape with release paper backing. Provide permanently elastic, nonsag, nontoxic, nonstaining tape.
 2. Joint Sealant: One-part, copper compatible silicone rubber sealant as tested by sealant manufacturer for copper substrates. Refer to Division 07.
 3. Cleats
 - a. Concealed type as indicated in the "Copper in Architecture" handbook published by the Copper Development Association (CDA) for flat-seam [flat lock seam, standing seam, and batten seam spaced on 12 inch (300 mm) centers.
 - b. Fabricate cleats to allow thermal movement of copper roof panels while preventing copper panel distortion due to wind uplift forces.
 4. Trim, Closure Pieces, and Accessories:
 - a. Same material, thickness and finish as adjacent copper roof panels, brake formed to required profiles.
 - b. Comply with standards conforming to recognized industry standard sheet metal practice.
- D. Bituminous Coating: SSPC - Paint 12, Cold-Applied Asphalt Mastic (Extra Thick Film), nominally free of sulfur, compounded for 15-mil dry film thickness per coat.
- E. High Temperature Grade Water Barrier Underlayment: Cold applied, self-adhering membrane composed of a high density, cross laminated polyethylene film coated on one side with a layer of butyl rubber or high temperature asphalt adhesive. Provide primer when recommended by water barrier manufacturer.
1. Minimum Thickness: 30 mil.
 2. Tensile Strength: ASTM D412 (Die C Modified); 250 psi.
 3. Membrane Elongation: ASTM D412 (Die C Modified); 250%
 4. Permeance (Max): ASTM E96; 0.05 Perms.
 5. Acceptable Products:
 - a. Blueskin PE 200 HT, Henry.
 - b. Ultra, W.R. Grace Company.
 - c. CCW MiraDRI WIP 300 High Temperature, Carlisle Coatings and Waterproofing.
- F. Roofing Felt Underlayment: Asphalt saturated felt weighing not less than 30 lbs per 100 square feet.
- G. Paper Slip Sheet: Minimum 4-lb. red rosin-sized building paper.
- H. Batten Bars and Strips: If size is not indicated, provide battens of nominal 2-inch (50 mm) by 2 inch (50 mm) size [1-1/2-inch (38 mm) by 1-1/2-inch (38 mm) minimum].

1. Copper Batten Caps: 20-ounce cold-rolled copper.
2. Wood Batten Strips: Fabricated to size indicated from lumber complying with requirements of Division 06 Section "Rough Carpentry" and preservative treated by pressure process using a chemical solution that is nonhygroscopic and noncorrosive to type of copper roofing.
- I. Nails for Wood Substrates: Copper or hardware bronze, 0.109 inch minimum not less than 7/8-inch (22 mm) long barbed with large head.
- J. Screws & Bolts: Copper, bronze, brass, or passivated stainless steel (300 Series) of sufficient size and length to sustain imposed stresses.
- K. Cleats: 16 or 20 oz ounce cold rolled copper, as required to sustain loads 2-inch (50 mm) wide x 3-inch (75 mm) long.
- L. Solder: ASTM B32; Provide 50-50 tin/lead or lead free alternative of similar or greater strength solder.
- M. Flux: Muriatic acid neutralized with zinc or approved brand of soldering flux.
- N. Rivets:
 1. Pop Rivets: 1/8-inch (3 mm) to 3/16-inch (4.5 mm) diameter, with solid brass mandrels.
 2. Provide solid copper rivet (tinner's rivets) where structural integrity of seam is required.

2.3 FABRICATION

- A. General Metal Fabrication: Shop-fabricate work to greatest extent possible. Comply with details shown and with applicable requirements of the "Copper in Architecture" handbook published by the Copper Development Association (CDA) and other recognized industry practices. Fabricate for waterproof and weather-resistant performance with expansion provisions for running work, sufficient to permanently prevent leakage, damage, or deterioration of the work. Form work to fit substrate. Comply with material manufacturer's instructions and recommendations for forming material. Form exposed copper work without excessive oil-canning, buckling, and tool marks, true to line and levels indicated, with exposed edges folded back to form hems.
 1. Fabricate to allow for adjustments in field for proper anchoring and joining.
 2. Form sections true to shape, accurate in size, square, free from distortion and defects.
 3. Cleats: Fabricate cleats and starter strips of same material as sheet, interlockable with sheet in accordance with CDA recommendations.
 4. Tin edges of copper sheets and cleats at soldered joints for flat lock and soldered system.
 5. Flat Locked and Soldered (Flat Seam Soldered) Panel Seams:
 - a. Fabricate flat seams for solid soldered joints.
 - b. Fabricate flat seam roofing from pans 18 inches (450 mm) by 24 inches (600 mm) in size.
 - c. Fold two adjacent edges over 180 degrees for width of 3/4 inch and other two adjacent edges under 3/4 inch (19 mm). Refer to CDA "Copper in Architecture Handbook".
 - d. Tin edges of panels at least 1 1/2 inch prior to forming seams, and as soon as possible prior to installation.
 - e. Fabricate seams for panels to be installed in overlapped, interlocking shingle manner for locked down engaged seams.
 6. Standing Seam Panels:
 - a. Fabricate pans to interlock standing seam with center to center seam spacing to match original or as indicated on Drawings or 16" OC if not indicated or observable.
 - b. Fabricate interlocking seams to heights and patterns indicated.
 - c. Form overlapping and interlocking transverse joints.
 7. Batten Seam Panels:
 - a. Fabricate pans to create center to center standing and batten seam spacing as indicated on Drawings.
 - b. Fabricate battens to sizes indicated.
 - c. Form overlapping and interlocking transverse joints.
 - d. Provide 1/2 inch (13 mm) single lock seam at batten caps.
- B. Seams: Fabricate nonmoving seams in copper sheet with flat-lock seams. Tin edges and cleats to be soldered, form seams, and solder.

- C. Expansion Provisions: Where lapped or bayonet-type expansion provisions in work cannot be used, or would not be sufficiently water/weatherproof, form expansion joints of intermeshing hooked flanges, not less than 1-inch (25 mm) deep, filled with mastic sealant (concealed within joints).
- D. Sealant Joints: Where movable, non-expansion-type joints are indicated or required for proper performance of work, form copper to provide for proper installation of elastomeric sealant, in compliance with the "Copper in Architecture" handbook published by the Copper Development Association (CDA).
- E. Separations: Provide for separation of copper from noncompatible metal or corrosive substrate by coating concealed surfaces at locations of contact, with bituminous coating or other permanent separation as recommended by manufacturer/fabricator.
- F. Solder:
 - 1. Solder and seal non-moving copper joints on slopes up to 3:12, except those indicated or required to be expansive type joints.
 - 2. After soldering, remove flux. Wipe and wash solder joints clean. Refer to CLEANING Article in PART 3.

2.4 FINISHES

- A. Natural weathering mill finished copper. No applied finish.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. General: Examine conditions and proceed with work when substrates are ready.
- B. Confirm that substrate system is even, smooth, sound, clean, dry, and free from defects.
- C. Verify roof openings, pipes, sleeves, ducts, and vents through roof are solidly set, cant strips and reglets in place, and nailing strips located.

3.2 PREPARATION

- A. Clean surfaces to receive copper roofing. Substrate to be smooth and free of defects. Drive all projecting nails or other fasteners flush with substrate.
- B. Water Barrier Underlayment at hips and transitions to vertical elements only:
 - 1. Install high temperature grade water barrier on clean, dry roof substrate
 - 2. Remove dust, dirt, and loose fasteners.
 - 3. Remove protrusions from the deck area.
 - 4. Verify substrate has no voids, damaged, or unsupported areas.
 - 5. Repair voids or unacceptable areas before installing membrane.
 - 6. Prime substrates with manufacturer's approved primer if required for proper installation of membrane over substrate.
 - 7. Install membrane in strict accordance with manufacturer's printed application procedures, precautions, and limitations.
 - 8. Start application at low points and lap membrane shingle fashion to prevent water penetration.
 - 9. Membrane Underlayment: Apply horizontally, lapping preceding layer not less than 4 inches (100 mm). End lap membrane not less than 6 inches (150 mm).
 - a. Maximize adhesion to substrate by brooming or rolling membrane in place after placement.
 - b. Center membrane at valleys, hips, and ridges.
- C. Roofing Felt Underlayment for entire roof area:
 - 1. Install underlayment over solid substrates with horizontal overlaps and endlaps staggered.
 - 2. Lay parallel to ridge line with 2-1/2 inch (63 mm) sidelaps and 6 inch (150 mm) endlaps.
 - 3. Start application at low point, working up deck laying plies in shingle fashion.

4. Fasten underlayment with copper roofing nails spaced on 12 inch (300 mm) centers maximum.
- D. Install underlayment and paper slip sheet on substrate under copper roofing to greatest extent possible unless otherwise recommended by manufacturer of sheet metal. Paper slip sheets must be installed over the underlayment. Use adhesive for temporary anchorage, where possible, to minimize use of mechanical fasteners under copper roofing. Lap joints 2 inch (50 mm) minimum.

3.3 INSTALLATION

- A. Manufacturer's Recommendations: Except as otherwise shown or specified, comply with recommendations and instructions of manufacturer of copper being fabricated and installed.
- B. General:
 1. Separate dissimilar metals by painting each metal surface in area of contact with a bituminous coating, by applying rubberized asphalt or butyl underlayment to each metal surface, or by other permanent separation as recommended by manufacturers of dissimilar metals.
 2. Form and fabricate sheets, seams, strips, cleats, valleys, ridges, edge treatments, integral flashings, and other components of copper roofing to profiles, patterns, and drainage arrangements shown and as required for permanently leakproof construction. Provide for thermal expansion and contraction of the work, as indicated. Seal joints as shown and as required for leakproof construction. Shop-fabricate materials to greatest extent possible.
 3. Sealant-Type Joints: Where sealant-filled joints are used, embed hooked flanges of joint members not less than 1-inch (25 mm) into sealant. Form joints to conceal sealant completely. When ambient temperature is moderate at time of installation, 40 degrees to 70 degrees F (4 degrees to 21 degrees C), set joint members for 50 percent movement either way. Adjust setting proportionately for installation at higher or lower ambient temperatures. Do not install sealant-type joints at temperatures below 40 degrees F (4 degrees C). Comply with requirements of Division 07 "Joint Sealant" Sections for handling and installing sealants.
 4. Fabricate and install work with lines and corners of exposed units true and accurate. Form exposed faces flat and free of buckles, excessive waves, and avoidable tool marks considering temper and reflectivity of metal. Provide uniform, neat seams with minimum exposure of solder, and sealant. Except as otherwise shown, fold back sheet metal to form a hem on concealed side of exposed edges.
 5. Conceal fasteners and expansion provisions where possible in exposed work, and locate so as to minimize possibility of leakage. Cover and seal fasteners and anchors as required for a tight installation.
 6. Tin uncoated copper surfaces and cleats at edges of flat seam panel sheets to be soldered, for a width of 1-1/2 inch (38 mm), using solder recommended for copper work.
- C. Flat Lock Soldered ("Flat Seam Soldered") Seam Roofing:
 1. Install copper work in accordance with CDA "Copper in Architecture Handbook".
 2. Flat Seam Metal Roof Panels: Fasten system to substrate with concealed metal cleats and screws at spacings required by fabricator to resist code required wind uplift.
 3. Align, level, and plumb system with structure.
 4. Fasten cleats or nails using cleats mated to folded flat seams and fastener pattern to resist design loads with screws or barbed nails of sufficient length to penetrate substrate.
 5. Tin and prepare panels as described in specification Section 2.3 "Fabrication".
 6. Only install the number of panels in a day that can be field soldered before the end of the day's work. Install overnight protection on the unsoldered tinned edges of panel seams to prevent contamination before the start of the next work day.
 7. Fully seat adjacent panel to on two sides to achieve continuous engagement of seam joint.
 8. Mallet or dress down engaged seams.
 9. Apply flux and fully sweat seams with solder to achieve watertight installation.
 10. Install expansion battens at 25 to 30 feet (7500 mm to 9000 mm) in both directions.
- D. Standing Seam Roofing:

1. Fold lower end of each pan under 3/4 inch (19 mm). Slit fold one inch (25 mm) away from corner to form tab where pan turns up to make standing seam. Fold upper end of each pan over 2 inches (50 mm). Hook fold on lower end of upper pan into fold on upper end of underlying pan.
 2. Apply pans beginning at eaves. Loose lock pans to valley flashing and edge strips at eaves and gable rakes.
 3. Finish standing seams one inch (25 mm) [one and a half inch (38mm)] high. Bend up one side edge 1-1/2 inch (38 mm) [2 inch (50mm)] and other 1-3/4 inch (44 mm) [2-1/4 (66mm)]. Make first fold 1/4 inch (6 mm) wide single fold and second fold 1/2 inch (13 mm) wide, providing locked portion of standing seam with 5 plies in thickness. Fold lower ends of seams at eaves over at 45 degree angle. Terminate standing seams at ridge and hips by turning down in tapered fold.
 4. Form valleys of sheets not exceeding 10'-0" (3000 mm) in length. Lap joints 8 inches (200 mm) in direction of drainage. Extend valley sheet minimum 6 inches (150 mm) under roofing sheets. At valley, double fold valley and roofing sheets and secure with cleats spaced 12 inch (300 mm) centers.
- E. Batten Seam Roofing at hips:
1. Turn up sides of sheets to extend above top of battens 1/2 inch (13 mm). Turn this 1/2 inch (13 mm) at right angles to battens.
 2. Form cross seams with 3/4 inch (19 mm) fold under on lower end and 2 inch (50 mm) fold over on upper end. Slit folds in cross seams at each corner one inch (25 mm) in from batten to form tab. Hook fold on lower end of pan into fold on upper end of underlying pan.
 3. Apply pans beginning at eaves.
 4. Place cover strips over battens, locking edges with flanges of pan malletted down against sides of battens. Cover batten ends with cap folded and locked into extensions of batten covers and vertical legs of pans.
 5. At intersections of roof slope with ridge and hip battens, turn up edges of roof pans against sides of battens and terminate in 1/2 inch (13 mm) flange at top of battens. Install cover strips over top of hip and ridge battens.
 6. Form valleys of sheets not exceeding 10'-0" (3000 mm) in length. Lap joints 8 inches (200 mm) in direction of drainage. Extend valley sheet minimum 6 inches (150 mm) under roofing sheets. At valley, double fold valley and roofing sheets and secure with cleats spaced 12 inch (300 mm) centers.
 7. At eaves without gutters, hook pan over edge strip. Extend edge strip up under metal roofing 4 inches (100 mm) and secure with nails at 3 inch (75 mm) centers, at one inch (25 mm) from upper end.
 8. Install batten flush with gable. Extend batten cover down exterior face and lock into edge strip.
- F. Coordinate installation of panels with adjacent construction to ensure watertight enclosure.

3.4 CLEANING

- A. Upon completion of each area of soldering, carefully remove flux and other residue from surfaces. Neutralize acid flux by washing with baking soda solution, and then flushing clear water rinse. Use special care to neutralize and clean crevices.
- B. Clean exposed metal surfaces of substances that would interfere with uniform oxidation and weathering.

3.5 PROTECTION

- A. Provide final protection to ensure that copper roofing is without damage or deterioration at time of Substantial Completion.

END OF SECTION

SECTION 07 62 15 - COPPER FLASHING AND TRIM

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes shop and field formed copper accessories and trim, such as:
 - 1. Counterflashing and base flashing.
 - 2. Wall flashing.
 - 3. Copings.
 - 4. Cap and hatch covers and flashing.
 - 5. Exposed trim/fascia units.
 - 6. Miscellaneous accessories.
- B. Related Requirements:
 - 1. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to work of this Section.
 - 2. Section 07 61 10 – Copper Roofing.
 - 3. Sealants are generally specified in Division 07 Section, "Joint Sealants."

1.2 COORDINATION

- A. Coordinate work of this section with interfacing and adjacent work for proper sequencing. Ensure weather resistance and durability of work and protection of materials and finishes.

1.3 PERFORMANCE REQUIREMENTS

- A. Installation Requirements: Fabricator is responsible for installing system, including anchorage to substrate and necessary modifications to meet specified and drawn requirements and maintain visual design concepts in accordance with Contract Documents and following installation methods as stipulated in the "Copper in Architecture" handbook published by the Copper Development Association (CDA) and/or "Copper and Common Sense" published by Revere.
 - 1. Drawings are diagrammatic and are intended to establish basic dimension of units, sight lines, and profiles of units.
 - 2. Make modifications only to meet field conditions and to ensure fitting of system components.
 - 3. Obtain Architect's approval of modifications.
 - 4. Provide concealed fastening wherever possible.
 - 5. Attachment considerations: Account for site peculiarities and expansion and contraction movements so there is no possibility of loosening, weakening and fracturing connection between units and building structure or between components themselves.
 - 6. Obtain Architect's approval for connections to building elements at locations other than indicated in Drawings.
 - 7. Accommodate building structure deflections in system connections to structure.
- B. Performance Requirements:
 - 1. System shall accommodate movement of components without buckling, failure of joint seals, undue stress on fasteners, or other detrimental effects when subjected to seasonal temperature changes and live loads.
 - 2. Design system capable of withstanding building code requirements for negative wind pressure.

1.4 SUBMITTALS

- A. General: Submit the following in accordance with Conditions of Contract and Division 01 Specification Sections.
- B. Product data for flashing, metal, and accessories: Manufacturer's technical product data, installation instructions and general recommendations for each specified sheet material and fabricated product.

- C. Shop drawings showing layout, profiles, methods of joining, and anchorage details, including major counterflashings, copings, trim/fascia units, and gravel stops systems. Provide layouts at 1/4 inch (1:50) scale and details at 3-inch (1:4) scale.
- D. Samples of the following flashing, sheet metal, and accessory items:
 - 1. 6-inch (150 mm) or 12-inch (300 mm) square samples of specified sheet materials to be exposed as finished surfaces.
 - 2. 6-inch (150 mm) or 12-inch (300 mm) long samples of fabricated products exposed as finished work. Provide complete with specified finish.

1.5 QUALITY ASSURANCE

- A. Fabricator's Qualifications: Company specializing in copper flashing and trim work with three years experience in similar size and type of installations.
- B. Installer: A firm with 3 years of successful experience with installation of copper flashing and trim work of type and scope equivalent to Work of this Section.
- C. Industry Standard: Except as otherwise shown or specified, comply with applicable recommendations and details of the "Copper in Architecture" handbook published by the Copper Development Association (CDA). Conform to dimensions and profiles shown.
- D. Mock-Up: Before proceeding with final purchase of materials and fabrication of copper flashing and trim work components, prepare a mock-up of work. Incorporate materials and methods of fabrication and installation identical with project requirements. Install mock-up at location directed by Architect. Retain accepted mock-up as quality standard for acceptance of completed copper work. If accepted, mock-up may be incorporated as part of copper work.
 - 1. Mock-up area is 24" length of shaped cornice assembly including brackets and ogee form and it's connection to flat-seamed copper work.
 - 2. Mock-up shall show typical pattern of seams, fastening details, edge construction, and finish texture and color.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Packing, Shipping, Handling, and Unloading: Protect finish metal faces.
- B. Acceptance at Site: Examine each component and accessory as delivered and confirm that material and finish is undamaged. Do not accept or install damaged materials.
- C. Storage and Protection:
 - 1. Stack pre-formed material to prevent twisting, bending, and abrasions.
 - 2. Provide ventilation.
 - 3. Prevent contact with materials which may cause discoloration or staining.

1.7 WARRANTY

- A. Warrant installed flashing, copings, gravel stops, and trim components to be free from defects in material and workmanship for period of 2 years.
- B. Include coverage against leakage and damages to finishes.

PART 2 - PRODUCTS

2.1 FLASHING AND TRIM MATERIALS

- A. Copper: ASTM B370; temper H00 (cold-rolled) except where temper 060 is required for forming;
 - 1. 16 oz. per sq. ft. (0.0216-inch thick) (0.55 mm) except as otherwise indicated.

2.2 ACCESSORIES

- A. Solder: ASTM B32; Provide 50-50 tin/lead or lead free alternative of similar or greater strength solder.
- B. Flux: Muriatic acid neutralized with zinc or approved brand of soldering flux.
- C. Fasteners: Same metal as flashing/sheet metal or other non-corrosive metal as recommended by sheet manufacturer. Match finish of exposed heads with material being fastened.

- D. Bituminous Coating: SSPC - Paint 12, Cold-Applied Asphalt Mastic (Extra Thick Film), nominally free of sulfur, compounded for 15-mil dry film thickness per coat.
- E. Joint Sealant: One-part, copper compatible elastomeric silicone rubber sealant as tested by sealant manufacturer for copper substrates. Refer to Division 07.
- F. Adhesives: Type recommended by flashing sheet manufacturer for waterproof/weather-resistant seaming and adhesive application of and compatibility with flashing sheet.
- G. High Temperature Grade Water Barrier Underlayment: Cold applied, self-adhering membrane composed of a high density, cross laminated polyethylene film coated on one side with a layer of butyl rubber or high temperature asphalt adhesive. Provide primer when recommended by water barrier manufacturer.
 - 1. Minimum Thickness: 30 mil.
 - 2. Tensile Strength: ASTM D412 (Die C Modified); 250 psi.
 - 3. Membrane Elongation: ASTM D412 (Die C Modified); 250%
 - 4. Permeance (Max): ASTM E96; 0.05 Perms.
 - 5. Acceptable Products:
 - a. Blueskin PE 200 HT, Henry.
 - b. Ultra, W.R. Grace Company.
 - c. CCW MiraDRI WIP 300 High Temperature, Carlisle Coatings and Waterproofing.
- H. Roofing Felt Underlayment: Asphalt saturated felt weighing not less than 30 lbs per 100 square feet.
- I. Paper Slip Sheet: Minimum 4-lb. red rosin-sized building paper.
- J. Reglets: Units of type and profile indicated, compatible with copper, noncorrosive.
- K. Metal Accessories: Provide cleats, straps, anchoring devices, and similar accessory units as required for installation of work, noncorrosive, size and gauge required for performance.
- L. Roofing Cement: ASTM D2822, asphaltic.
- M. Rivets:
 - 1. Pop Rivets: 1/8-inch (3 mm) to 3/16-inch (4.5 mm) diameter, with solid brass mandrels.
 - 2. Provide solid copper rivet (tinner's rivets) where structural integrity of seam is required.

2.3 FABRICATION

- A. General Metal Fabrication: Shop-fabricate work to greatest extent possible. Comply with details shown and with applicable requirements of Copper Development Association (CDA) "Copper in Architecture" handbook and other recognized industry practices. Fabricate for waterproof and weather-resistant performance, with expansion provisions for running work, sufficient to permanently prevent leakage, damage, or deterioration of the work. Form work to fit substrates. Comply with material manufacturer instructions and recommendations for forming material. Form exposed copper work without excessive oil-canning, buckling, and tool marks, true to line and levels indicated, with exposed edges folded back to form hems.
 - 1. Fabricate to allow for adjustments in field for proper anchoring and joining.
 - 2. Form sections true to shape, accurate in size, square, free from distortion and defects.
 - 3. Cleats: Fabricate cleats of same material as sheet, interlockable with sheet in accordance with CDA recommendations.
 - 4. Fabricate corners from one piece with minimum 18 inch (450 mm) long legs; solder for rigidity if required; seal non-soldered weather joints with sealant.
- B. Seams: Fabricate nonmoving seams with flat-lock seams where possible. Tin edges and cleats to be seamed, form seams, and solder. Where soldered flat-lock seams are not possible, use soldered riveted lap seams joints for additional strength.
- C. Expansion Provisions: Where lapped or bayonet-type expansion provisions in work cannot be used or would not be sufficiently water/weatherproof, form expansion joints of intermeshing hooked flanges, not less than 1-inch (25 mm) deep, filled with mastic sealant (concealed within joints).

- D. Sealant Joints: Where movable, nonexpansion type joints are indicated or required for proper performance of work, form metal to provide for proper installation of elastomeric sealant, in compliance with CDA standards.
- E. Separations: Provide for separation of metal from noncompatible metal or corrosive substrates by coating concealed surfaces at locations of contact, with bituminous coating or other permanent separation as recommended by manufacturer/fabricator.
- F. Solder
 - 1. Solder and seal metal joints except those indicated or required to be expansive type joints.
 - 2. Tin edges of copper sheets and cleats at soldered joints.
 - 3. After soldering, carefully remove flux and other residue from surfaces. Neutralize acid flux by washing with baking soda solution, and then flushing clear water rinse. Wipe and wash solder joints clean.
- G. Seams:
 - 1. Provide following seam types unless noted or detailed otherwise.
 - 2. Flat: Flat lock soldered.
 - 3. Corner: Double lock corner.
 - 4. Standing: Double lock standing lap seam.
- H. Copper Thickness: Comply with CDA recommendations for copper size and shape. 16 oz. unless noted otherwise.
- I. Flashing and Counter Flashing:
 - 1. Fabricate as indicated on Drawings and in accordance with the CDA "Copper in Architecture" handbook.
 - 2. Hem exposed flashings on underside 1/2 inch (13 mm); miter and seam corners.
 - 3. Fabricate vertical faces with bottom edge formed outward 1/4 inch (6 mm) and hemmed to form drip.
 - 4. Fabricate flashings to allow toe to extend minimum 2 inches (50 mm) over wall surfaces.
- J. Coping: As indicated on Drawings and in accordance with the CDA "Copper in Architecture" handbook.
- K. Corner caps and roof hatch: As indicated on Drawings and in accordance with the CDA "Copper in Architecture" handbook.
- L. Hip Flashing:
 - 1. Fabricate flashing according to details and specified requirements.
 - 2. Fabricate metal flashings at hips with a minimum 1 inch (25 mm) high standing rib at center of hip.

2.4 FINISHES

- A. Natural weathering mill finished copper. No applied finish.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. General: Examine conditions and proceed with work when substrates are ready.
- B. Confirm that substrate system is even, smooth, sound, clean, dry, and free from defects.

3.2 INSTALLATION

- A. General: Except as otherwise indicated, comply with manufacturer's installation instructions and recommendations and with the "Copper in Architecture" handbook published by the Copper Development Association (CDA). Anchor units of work securely in place by methods indicated, providing for thermal expansion of units; conceal fasteners where possible, and set units true to line and level as indicated. Install work with laps, joints, and seams that will be permanently watertight and weatherproof.
 - 1. Install units plumb, level, square, and free from warp or twist while maintaining dimensional tolerances and alignment with surrounding construction.

2. Apply asphalt mastic on copper surfaces of units in contact with dissimilar metals.
 3. Fit flashings tight in place. Make corners square, surfaces true and straight in planes, and lines accurate to profiles.
 4. Miter, lap seam and close corner joints with solder. Seal seams and joints watertight.
 5. Install expansion joints at frequency recommended by CDA. Do not fasten moving seams such that movement is restricted.
 6. Coordinate with installation of roofing system and roof accessories.
- B. Underlayment: Where installation is to be directly on cementitious or wood substrates, install red rosin paper slip sheet over layer of asphalt saturated felt.
- C. Bed flanges of work in a thick coat of bituminous roofing cement where required for waterproof performance.
- D. Install reglets to receive counterflashing in manner and by methods indicated. Where shown in concrete, furnish reglets to trades of concrete work for installation as work of Division 03 sections. Where shown in masonry, furnish reglets to trades of masonry work, for installation as work of Division 04 sections.
- E. Counterflashing and Reglets:
1. Fabricate counterflashings and reglets as 2 piece assemblies to permit installation of counterflashing after base flashings are in place.
 2. Fabricate reglets of same metal and thickness as counterflashings.
 3. Overlap roof base flashing 4 inches (100 mm) minimum.
 4. Install bottom edge tight against base flashing.
 5. Lap seam vertical joints 3 inches (75 mm) minimum and apply sealant.
- F. Install counterflashing in reglets, either by snap-in seal arrangement, lock seal in accordance with the "Copper in Architecture" handbook published by the Copper Development Association (CDA), or by soldering in place for anchorage and filling reglet with mastic or elastomeric sealant, as indicated and depending on degree of sealant exposure.
- G. Fasten flashing to curb nailers at maximum spacing of 3 inches (75 mm) O.C. Fabricate seams at joints between units with minimum 4-inch (100 mm) overlap, to form continuous, waterproof system in accordance with the "Copper in Architecture" handbook published by the Copper Development Association (CDA).
- H. Coping and Corner Caps:
1. Lock exterior edges over continuous cleats to secure to substrate.
 2. Slope towards inside of parapet, 1/2 inch (13 mm) minimum, unless indicated otherwise.
 3. Lock interior edges to substrate with cleats spaced at 12 inch (300) mm centers.
 4. Provide drainage system at seams to prevent water infiltration.

3.3 CLEANING

- A. Remove protective film (if any) from exposed surfaces of copper promptly upon installation. Strip with care to avoid damage to finishes.
- B. Clean exposed copper surfaces, removing substances that might cause abnormal discoloration of metal.
- C. Upon completion of each area of soldering, carefully remove flux and other residue from surfaces. Neutralize acid flux by washing with baking soda solution, and then flushing with clear water rinse. Use special care to neutralize and clean crevices.
- D. Clean exposed metal surfaces of substances that would interfere with normal oxidation and weathering.

3.4 PROTECTION

- A. Advise Contractor of required procedures for surveillance and protection of flashings and sheet metal work during construction to ensure that work will be without damage or deterioration other than natural weathering at time of Substantial Completion.

END OF SECTION

SECTION 07 92 00 - JOINT SEALANTS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Nonsag gunnable joint sealants.
- B. Joint backings and accessories.

1.02 REFERENCE STANDARDS

- A. ASTM C920 - Standard Specification for Elastomeric Joint Sealants; 2018.
- B. ASTM C1193 - Standard Guide for Use of Joint Sealants; 2016.
- C. ASTM C1248 - Standard Test Method for Staining of Porous Substrate by Joint Sealants; 2018.
- D. ASTM C1330 - Standard Specification for Cylindrical Sealant Backing for Use with Cold Liquid-Applied Sealants; 2018.

1.03 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements for submittal procedures.
- B. Product Data for Sealants: Submit manufacturer's technical data sheets for each product to be used, that includes the following.
 - 1. Physical characteristics, including movement capability, VOC content, hardness, cure time, and color availability.
 - 2. List of backing materials approved for use with the specific product.
 - 3. Substrates that product is known to satisfactorily adhere to and with which it is compatible.
 - 4. Substrates the product should not be used on.
 - 5. Substrates for which use of primer is required.
 - 6. Installation instructions, including precautions, limitations, and recommended backing materials and tools.
 - 7. Sample product warranty.
- C. Product Data for Accessory Products: Submit manufacturer's technical data sheet for each product to be used, including physical characteristics, installation instructions, and recommended tools.
- D. Color Cards for Selection: Where sealant color is not specified, submit at least two manufacturer's color cards with actual sealant samples showing standard colors available for selection.
- E. Manufacturer's qualification statement.
- F. Installer's qualification statement.

1.04 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.
- B. Installer Qualifications: Company specializing in performing the work of this section and with at least three years of documented experience.

1.05 WARRANTY

- A. See Section 01 78 00 - Closeout Submittals for additional warranty requirements.
- B. Correct defective work within a five year period after Date of Substantial Completion.
- C. Warranty: Include coverage for installed sealants and accessories that fail to achieve watertight seal, exhibit loss of adhesion or cohesion, or do not cure.

PART 2 PRODUCTS

2.01 NONSAG JOINT SEALANTS

- A. Non-Staining Silicone Sealant: ASTM C920, Grade NS, Uses M and A; not expected to withstand continuous water immersion or traffic.
 - 1. Movement Capability: Plus and minus 50 percent, minimum.
 - 2. Non-Staining to Porous Stone: Non-staining to light-colored natural stone when tested in accordance with ASTM C1248.
 - 3. Dirt Pick-Up: Reduced dirt pick-up compared to other silicone sealants.
 - 4. Color: To be selected by Architect from manufacturer's standard range.
 - 5. Manufacturers:
 - a. Dow; DOWSIL 790 Silicone Building Sealant: www.dow.com/#sle.
 - b. Pecora Corporation; Pecora 890 NST (Non-Staining Technology): www.pecora.com/#sle.
 - c. Sika Corporation; Sikasil WS-290: www.usa.sika.com/#sle.
 - d. Tremco Commercial Sealants & Waterproofing; Spectrem 3: www.tremcosealants.com/#sle.
 - e. Substitutions: See Section 01 6000 - Product Requirements.

2.02 ACCESSORIES

- A. Backer Rod: Cylindrical cellular foam rod with surface that sealant will not adhere to, compatible with specific sealant used, and recommended by backing and sealant manufacturers for specific application.
 - 1. Type for Joints Not Subject to Pedestrian or Vehicular Traffic: ASTM C1330; Type O - Open Cell Polyurethane.
 - 2. Open Cell: 40 to 50 percent larger in diameter than joint width.
 - 3. Manufacturers:
 - a. ADFAST Corporation; ADSEAL BR-2600 (Backer Rod): www.adfastcorp.com/#sle.
 - b. Substitutions: See Section 01 6000 - Product Requirements.
- B. Backing Tape: Self-adhesive polyethylene tape with surface that sealant will not adhere to and recommended by tape and sealant manufacturers for specific application.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that joints are ready to receive work.
- B. Verify that backing materials are compatible with sealants.
- C. Verify that backer rods are of the correct size.

3.02 PREPARATION

- A. Remove loose materials and foreign matter that could impair adhesion of sealant.
- B. Clean joints, and prime as necessary, in accordance with manufacturer's instructions.
- C. Perform preparation in accordance with manufacturer's instructions and ASTM C1193.
- D. Mask elements and surfaces adjacent to joints from damage and disfigurement due to sealant work; be aware that sealant drips and smears may not be completely removable.

3.03 INSTALLATION

- A. Perform work in accordance with sealant manufacturer's requirements for preparation of surfaces and material installation instructions.
- B. Perform installation in accordance with ASTM C1193.
- C. Measure joint dimensions and size joint backers to achieve width-to-depth ratio, neck dimension, and surface bond area as recommended by manufacturer, except where specific dimensions are indicated.
- D. Install bond breaker backing tape where backer rod cannot be used.

- E. Install sealant free of air pockets, foreign embedded matter, ridges, and sags, and without getting sealant on adjacent surfaces.
- F. Do not install sealant when ambient temperature is outside manufacturer's recommended temperature range, or will be outside that range during the entire curing period, unless manufacturer's approval is obtained and instructions are followed.
- G. Nonsag Sealants: Tool surface concave, unless otherwise indicated; remove masking tape immediately after tooling sealant surface.

END OF SECTION

SECTION 09 91 13 - EXTERIOR PAINTING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Surface preparation.
- B. Field application of paints.
- C. Scope: Paint previously painted stone walls at base of Tower, exterior door and frame all sides at Tower base, and masonry arch over door. Bring wall paint to uniform level height around base sufficient to cover all old paint.

1.02 DEFINITIONS

- A. Comply with ASTM D16 for interpretation of terms used in this section.

1.03 REFERENCE STANDARDS

- A. 40 CFR 59, Subpart D - National Volatile Organic Compound Emission Standards for Architectural Coatings; U.S. Environmental Protection Agency; current edition.
- B. ASTM D16 - Standard Terminology for Paint, Related Coatings, Materials, and Applications; 2019.
- C. MPI (APSM) - Master Painters Institute Architectural Painting Specification Manual; Current Edition.
- D. SSPC-SP 1 - Solvent Cleaning; 2015, with Editorial Revision (2016).

1.04 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide complete list of products to be used, with the following information for each:
 - 1. Manufacturer's name, product name and/or catalog number, and general product category (e.g. "alkyd enamel").
 - 2. Manufacturer's installation instructions.
 - 3. If proposal of substitutions is allowed under submittal procedures, explanation of substitutions proposed.
- C. Certification: By manufacturer that paints and finishes comply with VOC limits specified.
- D. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
 - 1. See Section 01 60 00 - Product Requirements, for additional provisions.
 - 2. Extra Paint and Finish Materials: 1 gallon (4 L) of each color; from the same product run, store where directed.
 - 3. Label each container with color in addition to the manufacturer's label.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Deliver products to site in sealed and labeled containers; inspect to verify acceptability.
- B. Container Label: Include manufacturer's name, type of paint, brand name, lot number, brand code, coverage, surface preparation, drying time, cleanup requirements, color designation, and instructions for mixing and reducing.
- C. Paint Materials: Store at minimum ambient temperature of 45 degrees F (7 degrees C) and a maximum of 90 degrees F (32 degrees C), in ventilated area, and as required by manufacturer's instructions.

1.06 FIELD CONDITIONS

- A. Do not apply materials when surface and ambient temperatures are outside the paint product manufacturer's temperature ranges.

- B. Follow manufacturer's recommended procedures for producing best results, including testing of substrates, moisture in substrates, and humidity and temperature limitations.
- C. Do not apply exterior paint and finishes during rain or snow, or when relative humidity is outside the humidity ranges required by the paint product manufacturer.
- D. Minimum Application Temperatures for Latex Paints: 50 degrees F (10 degrees C) for exterior; unless required otherwise by manufacturer's instructions.
- E. Provide lighting level of 80 ft candles (860 lx) measured mid-height at substrate surface.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Provide paints and finishes used in any individual system from the same manufacturer; no exceptions.

2.02 PAINTS AND FINISHES - GENERAL

- A. Paints and Finishes: Ready-mixed.
 - 1. Provide paints and finishes of a soft paste consistency, capable of being readily and uniformly dispersed to a homogeneous coating, with good flow and brushing properties, and capable of drying or curing free of streaks or sags.
 - 2. Supply each paint material in quantity required to complete entire project's work from a single production run.
 - 3. Do not reduce, thin, or dilute paint or finishes or add materials unless such procedure is described explicitly in manufacturer's product instructions.
- B. Volatile Organic Compound (VOC) Content:
 - 1. Provide paints and finishes that comply with the most stringent requirements specified in the following:
 - a. Architectural coatings VOC limits of the State in which the Project is located.
 - 2. Determination of VOC Content: Testing and calculation in accordance with 40 CFR 59, Subpart D (EPA Method 24), exclusive of colorants added to a tint base and water added at project site; or other method acceptable to authorities having jurisdiction.
- C. Sheens: Provide the sheens specified; where sheen is not specified, sheen will be selected later by Architect from the manufacturer's full line.
- D. Colors: To be selected from manufacturer's full range of available colors.
 - 1. Selection to be made by Architect after award of contract.
 - 2. Allow for minimum of three colors: one for stone wall field, one for door frame, and third for door itself, without additional cost to Owner.

2.03 PAINT SYSTEMS - EXTERIOR

- A. Paint E-OP - Exterior Surfaces to be Painted: Previously painted stone walls at base of Tower, exterior door and frame, all sides at Tower base.
 - 1. One top coat and one coat primer at repaired areas, plus one coat Anti-graffiti coating.
 - 2. Top Coat: Exterior Latex; MPI #10, 11, 15, 119, or 214.
 - a. Products:
 - 1) Behr Marquee Exterior Semi-Gloss Enamel [No. 5450]. (MPI #11)
 - 2) PPG Paints Speedhide Exterior Latex, 6-900XI Series, Semi-Gloss. (MPI #11)
 - 3) Sherwin-Williams Pro Industrial Acrylic, Semi-Gloss.
 - 4) Substitutions: Section 01 60 00 - Product Requirements.

2.04 ACCESSORY MATERIALS

- A. Accessory Materials: Provide primers, sealers, cleaning agents, cleaning cloths, sanding materials, and clean-up materials as required for final completion of painted surfaces.
- B. Sacrificial Anti-Graffiti Coating: Clear, wax emulsion for coating porous or painted surfaces; capable of being removed from substrate with only hot water.
 - 1. Products:

- a. DryWired; Anti-Graffiti: www.drywired.com/#sle.
 - b. Tex-Cote LLC; Sacrificial Graffiti Gard System: www.texcote.com/#sle.
 - c. Substitutions: Section 01 60 00 - Product Requirements.
- C. Patching Material: Pointing mortar for stone voids.
- D. Fastener Head Cover Material in door and frame: Latex filler.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that surfaces are ready to receive work as instructed by the product manufacturer.
- B. Examine surfaces scheduled to be finished prior to commencement of work. Report any condition that may potentially effect proper application.
- C. Test existing paint for compatibility with subsequent cover materials.
- D. Measure moisture content of surfaces using an electronic moisture meter. Do not apply finishes unless moisture content of surfaces are below the following maximums:
 - 1. Masonry: 12 percent.

3.02 PREPARATION

- A. Clean surfaces thoroughly and correct defects prior to application.
- B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.
- C. Remove or repair existing paints or finishes that exhibit surface defects.
- D. Remove or mask surface appurtenances, including electrical plates, hardware, light fixture trim, escutcheons, and fittings, prior to preparing surfaces for finishing.
- E. Seal surfaces that might cause bleed through or staining of topcoat.
- F. Remove mildew from impervious surfaces by scrubbing with solution of tetra-sodium phosphate and bleach. Rinse with clean water and allow surface to dry.
- G. Masonry:
 - 1. Remove efflorescence and chalk. Do not coat surfaces if moisture content or alkalinity of surfaces or if alkalinity of mortar joints exceed that permitted in manufacturer's written instructions. Allow to dry.
 - 2. Prepare surface as recommended by top coat manufacturer.
- H. Ferrous Metal:
 - 1. Solvent clean according to SSPC-SP 1.
 - 2. Remove rust, loose mill scale, and other foreign substances using methods recommended in writing by paint manufacturer without blast cleaning. Protect from corrosion until coated.
- I. Metal Doors to be Painted: Prime metal door top and bottom edge surfaces.

3.03 APPLICATION

- A. Apply products in accordance with manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual".
- B. Do not apply finishes to surfaces that are not dry. Allow applied coats to dry before next coat is applied.
- C. Apply each coat to uniform appearance.
- D. Vacuum clean surfaces of loose particles. Use tack cloth to remove dust and particles just prior to applying next coat.
- E. Reinstall electrical cover plates, hardware, light fixture trim, escutcheons, and fittings removed prior to finishing.

3.04 CLEANING

- A. Collect waste material that could constitute a fire hazard, place in closed metal containers, and remove daily from site.

3.05 PROTECTION

- A. Protect finishes until completion of project.
- B. Touch-up damaged finishes after Substantial Completion.

END OF SECTION

SECTION 31 00 00 – EARTH MOVING

PART 1 - GENERAL

1.1 Related Documents

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions, RIDOT Standard Specification for Road and Bridge Construction, and Division 1 Specification Sections, apply to this Section.

1.2 Summary

- A. Section Includes:
 - 1. Preparing subgrades for pavement.
 - 2. Clean fill testing
 - 3. Dewatering.
 - 4. Imported soil products including, but not limited to:
 - a. Materials used for new work.
- B. Related Sections:
 - 1. Section 01 57 13 “Temporary Erosion and Sediment Control”
 - 2. Section 31 10 00 “Site Clearing”

1.3 Definitions

- A. ASTM: American Society for Testing and Materials
- B. Backfill: Soil material used to fill an excavation or trench.
 - 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.
- C. Base Course: Aggregate layer placed between the subbase course and hot-mix asphalt pavement or cement concrete pavement.
- D. Bedding Course: Aggregate layer placed over the excavated subgrade in a trench before laying pipe.
- E. Common Borrow: Satisfactory soil imported from off-site for use as fill or backfill.
- F. Clean Soil: Soils excavated with no visual or olfactory evidence of contamination, or with chemical test results at or below RIDEM Method 1 R-DEC.

- G. Excavation: Removal of material encountered above subgrade elevations and to lines and dimensions indicated.
 - 1. Additional Excavation: Excavation below subgrade elevations or indicated dimensions as directed by Engineer.
 - 2. Boulders and detached rock fragments which have a volume of less than 1 cubic yard are considered "Earth Excavation."
 - 3. Unauthorized Excavation: Excavation below subgrade elevations or beyond indicated lines and dimensions as indicated on the Drawings. Unauthorized excavation shall be without additional compensation.
- H. Fill: Soil materials used to raise existing grades.
- I. Final Backfill: Shall be as indicated on the Contract Drawings and consist of suitable native or imported material conforming to Class I or II and installed as required in ASTM D2321, latest edition.
- J. Gravel Borrow: Imported bank run sand and gravel or plant-processed, crushed or uncrushed gravel with fine aggregate added as filler.
- K. Hazardous Soil: Soils known to contain contaminants at characteristically hazardous concentrations. Soil with chemical or physical analytical testing results greater than the USEPA hazardous waste criteria as defined by 40 CFR Part 261.
- L. Initial Backfill: Shall be as indicated on the Contract Drawings and consist of suitable imported material conforming to Class I or II and installed as required in ASTM D2321, latest edition.
- M. RIDEM: Rhode Island Department of Environmental Management.
- N. Rock: Rock in definite ledge formation; boulders, or the portion of boulders; and unknown masonry or concrete structures 1 cubic yard or more in volume.
- O. Rock in Trenches: Rock in definite ledge formation; boulders, or the portion of boulders; and unknown masonry or concrete structures 1/2 cubic yard or more in volume.
- P. Satisfactory Soils: Free of debris, waste, frozen materials, vegetation, clay and other deleterious matter; adequately graded for satisfactory compaction.
 - 1. On-Site Material: Native soil additionally free of organic matter, roots, and stones larger than 3 inches in any dimension, subject to approval by the Engineer.
 - 2. Borrow: Free of rock or gravel larger than 3 inches in any dimension; and meeting Standard Specification Section M.01.01.
- Q. Structures: Buildings, footings, foundations, retaining walls, slabs, tanks, curbs, mechanical and electrical appurtenances, or other man-made stationary features constructed above or below the ground surface.

- R. Subgrade: Uppermost surface of an excavation or the top surface of a fill or backfill immediately below subbase, drainage fill, drainage course, or topsoil materials.
- S. Utilities: On-site underground pipes, conduits, ducts, and cables, as well as underground services within buildings.

1.4 Informational Submittals

- A. Testing Agency: Provide qualifications of an independent geotechnical engineering testing agency that is certified in the State of Rhode Island and familiar with RIDOT geotechnical and pavement testing procedures.
 - 1. Geotechnical Testing Agency Qualifications: Qualified according to ASTM E 329 and ASTM D 3740 for testing indicated.
- B. Pre-excavation Photographs or Videotape: Show existing conditions of adjoining construction and site improvements, including finish surfaces, which might be misconstrued as damage caused by earth moving operations. Submit before earth moving begins.

1.5 Action Submittals

- A. Material Test Reports: From a qualified testing agency indicating and interpreting test results for compliance of the following with requirements indicated.
 - 1. All Fill Materials
 - a. Gradation analysis according to ASTM D 6913, prior to delivery to the site and one per 500 CY delivered.
 - b. For each fill material type, and for each variation within material type (to be determined by the Engineer), laboratory compaction test results according to ASTM D 1557, prior to delivery to the site and one per 2,000 CY delivered.
 - c. Field Compaction Test results according to ASTM D 6938, one per 1,000 square feet of lift, or one per lift if lift is less than 1,000 square feet.
 - B. Compaction testing results shall be provided for testing completed as specified herein.
 - C. Soil/Material Origin: Provide a description for each originating off-site location or project from which imported soil/material is obtained, including known historical activities occurring on the site, and any possible releases that have occurred.
 - 1. The following are not acceptable:
 - a. Soils/materials originating from sites subject to any Federal or State remediation program.
 - b. Soils/materials that have undergone any treatment process for one or more chemical constituents listed within the RIDEM Remediation Regulations.
 - D. Clean Soil Testing Results.
 - E. Product Data: For each type of the following manufactured products required:
 - 1. Geotextiles.
 - 2. Detectable warning tapes.

- F. Field Test Data Reports: For the following:
 - 1. Material Weight Slips: Submit weight slips verifying the quantities of the following materials imported the Project Site:
 - a. All Material Transported Off Site (tons)
 - b. Clean Soil (cubic yards)

1.6 Quality Assurance

- A. Where "RIDOT Standard Specifications" is used, it shall mean "Rhode Island Department of Transportation Standard Specifications for Road and Bridge Construction" as amended in 2018 and issued supplements.
- B. Geotechnical Testing Agency Qualifications: Qualified according to ASTM E 329 and ASTM D 3740 for testing indicated.
- C. Materials shall be tested using the following standards:
 - 1. ASTM D 1557: Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort
 - 2. ASTM D 6913: Grain Size Analysis
 - 3. ASTM D 6938: Nuclear Density Testing
- D. Perform excavation operations in accordance with OSHA Regulations 1926.651 and 1926.652.
- E. Pre-excavation Conference: Conduct conference at Project site.

1.7 Project Conditions

- A. Traffic: Minimize interference with adjoining roads, streets, walks, and other adjacent occupied or used facilities during earth moving operations.
 - 1. Do not close or obstruct streets, walks, or other adjacent occupied or used facilities without permission from Owner and authorities having jurisdiction.
- B. Utility Locator Service: Notify "Dig Safe".
- C. Do not commence earth moving operations until temporary erosion- and sedimentation-control measures, specified in Section 01 57 13 "Temporary Erosion and Sediment Control" are in place.
- D. Extent of excavated areas shall be within the Limits of Disturbance shown on the Contract Drawings.
- E. Place excavated material, backfill and equipment a minimum of 2 feet from edge of excavation. Cast excavated material so as not to interfere with ordinary use of the traveled way.
- F. Remove and immediately dispose of unsuitable excavated material.

PART 2 - PRODUCTS

2.1 Soil Materials

- A. General: Provide imported common borrow soil materials.
- B. Bedding Sand: Bedding Sand shall be natural or manufactured material conforming to the grading requirement of ASTM C33.
- C. Common Borrow: Shall meet the requirements of Satisfactory Soils and shall conform to subsection M.01.01 of the RIDOT Standard Specifications.
- D. Crushed Stone: Crushed Stone shall consist of material conforming to Subsection M.01.09, Table I, Column II of RIDOT's Standard Specifications.
- E. Final Backfill: Native or imported gravels having a gradation in accordance with Section M.01.09, Table I, Column I of the RIDOT Standard Specifications.
- F. Gravel Borrow: Gravel Borrow shall consist of bank run sand and gravel or plant processed, crushed or uncrushed gravel with fine aggregate added as filler conforming to Subsection M.01.09, Table I, Column 1a or 1b of RIDOT's Standard Specifications.
- G. Gravel Borrow Base Course: Shall meet the requirements of Gravel Borrow for Subsection M.01.09, Table I, Column 1a of RIDOT's Standard Specifications.
- H. Initial Backfill: Native or imported gravels having a gradation in accordance with Section M.01.09, Table I, Column I of the RIDOT Standard Specifications. Initial backfill shall be free of particles larger than 1 1/2 inches in any dimension
- I. Processed Aggregate Base: Coarse and fine aggregates shall be combined and mixed by approved methods so that the resulting material shall meet the following gradation requirements:

Square Mesh Sieves	Percent Passing by Weight
Pass 2 1/2 inches	100
Pass 2 inches	95-100
Pass 3/4 inch	50-75
Pass 1/4 inch	25-45
Pass No. 40	5-20
Pass No. 100	2-12

- J. Suitable Subbase Course: Shall meet the requirements of Subsection M.01.09; Gradation of Aggregates, Table I, Column Ia of the RIDOT's Standard Specifications.
- K. Topsoil: Refer to Section 32 90 00 Loam and Seed.

2.2 Geotextiles

- A. Filter Fabric: Nonwoven geotextile, specifically manufactured as a drainage geotextile; made from polyolefins, polyesters, or polyamides; and with the following minimum properties determined according to ASTM D4759 and referenced standard test methods:
1. Minimum Grab Tensile Strength: 150 lbf; ASTM D4632/D4632M.
 2. Minimum Tear Strength: 50 lbf; ASTM D4533/D4533M.
 3. Minimum Puncture Resistance: 100 lbf; ASTM D4833/D4833M.
 4. Minimum Water Flow Rate: 75 gpm per sq. ft.; ASTM D4491/D4491M.
 5. Maximum Apparent Opening Size: No. 80; ASTM D4751.

2.3 Clean Soil Testing Requirements

- A. Clean Soil testing shall be conducted in accordance with the requirements of the RAWP and this Section. All imported soil material to be used at the Project Site shall not contain compounds at concentrations equal to or exceeding the RIDEM Method 1 Residential Direct Exposure Criteria as published in the RIDEM "Rules and Regulations for the Investigation and Remediation of Hazardous Materials Releases."

2.4 ACCESSORIES

- A. Detectable Warning Tape: Acid- and alkali-resistant polyethylene film warning tape manufactured for marking and identifying underground utilities, minimum 6 inches wide and 4 mils thick, continuously in-scribed with a description of utility, with metallic core encased in a protective jacket for corrosion protection, detectable by metal detector when tape is buried up to 30 inches deep.
1. Identifying Colors for Utilities:
 - a. Red: Electric.
 - b. Yellow: Gas, oil, steam, and dangerous materials.
 - c. Orange: Telephone and other communications.
 - d. Blue: Water systems.
 - e. Green: Sewer systems.

PART 3 - EXECUTION

3.1 Preparation

- A. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by earth moving operations.
- B. Protect and maintain erosion and sedimentation controls during earth moving operations.
- C. Protect subgrades and foundation soils from freezing temperatures and frost. Remove temporary protection before placing subsequent materials.

3.2 Explosives

- A. Explosives: Do not use explosives.

3.3 Excavation, General

- A. Excavate to subgrade elevations regardless of the character of surface and subsurface conditions encountered. Unclassified excavated materials may include soil materials. Classified excavated materials may include Rock if encountered.
 - 1. Do not remove rock without approval of the Owner or Engineer.
 - 2. If excavated materials intended for fill and backfill include unsatisfactory soil materials and rock, replace with satisfactory soil materials.
- B. Excavate trenches to indicated gradients, lines, depths, and elevations. Prepare finished bottom of excavation accurately with hand tools.
 - 1. Trench shoring and bracing located below the narrow limit of trench must be left-in-place until backfilling occurs.
- C. Excavate to indicated elevations and dimensions within a tolerance of plus or minus 1 inch. If applicable, extend excavations a sufficient distance from structures for placing and removing concrete formwork, for installing services and other construction, and for inspections.
 - 1. Excavations for Footings and Foundations: Do not disturb bottom of excavation. Excavate by hand to final grade just before placing concrete reinforcement. Trim bottoms to required lines and grades to leave solid base to receive other work.

3.4 Excavation For Pavements, Sidewalks, and Wheelchair Ramps

- A. Excavate surfaces under sidewalks, wheelchair ramps, and pavements to indicated lines, cross sections, elevations, and subgrades.

3.5 Subgrade Inspection

- A. Remove debris, roots, branches, stones, in excess of 1 inch in size. Remove soil contaminated with petroleum products.
- B. Subgrade preparation should be followed immediately by fill placement, or the intended construction. Deterioration of the subgrade between excavation and initial fill placement shall be the responsibility of the Contractor and shall be repaired at the Contractor's expense.
- C. All subgrades must be inspected by the Geotechnical Testing Agency prior to fill placement.
- D. If Geotechnical Testing Agency determines that unsatisfactory soil is present, continue excavation and replace with compacted backfill or fill material as directed.
- E. Proof-roll subgrade below areas of full-depth pavement reconstruction with a pneumatic-tired and loaded 10-wheel, tandem-axle dump truck weighing not less than 15 tons to identify soft pockets and areas of excess yielding. Do not proof-roll wet or saturated subgrades.

1. Completely proof-roll subgrade in one direction. Limit vehicle speed to 3 mph.
 2. Excavate soft spots, unsatisfactory soils, and areas of excessive pumping or rutting, as determined by Geotechnical Testing Agency, and replace with compacted backfill or fill as directed.
- F. Prior to fill placement, the subgrade should be compact, dry, and free from debris, ice, and snow. Fill placement will not be allowed over frozen subgrade.
- G. Reconstruct subgrades damaged by freezing temperatures, frost, rain, accumulated water, or construction activities, as directed by Engineer, without additional compensation.

3.6 Unauthorized Excavation

- A. Fill unauthorized excavation beneath bottom limits of excavation with gravel fill, sand, bedding material, or concrete as directed by Engineer at no additional cost.

3.7 Storage Of Soil Materials

- A. Stockpile common borrow soil materials without intermixing with other materials. Place, grade, and shape stockpiles to drain surface water. Cover to prevent windblown dust.
1. Stockpile soil materials 2 feet minimum away from edge of excavations. Do not store within drip line of remaining trees.
 2. When excavating in or near a road or walk, place excavated material so as not to interfere with ordinary use of traveled way.
 3. The contractor shall stockpile excavated existing soil materials.

3.8 Backfill, General

- A. Place and compact backfill in excavations promptly, but not before completing the following:
1. Construction below finish grade.
 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.
 7. Installing permanent or temporary horizontal bracing on horizontally supported walls.
- B. Place backfill on subgrades free of mud, frost, snow, or ice.

3.9 Stormwater Drainage Trench Backfill

- A. Place backfill on subgrades free of mud, frost, snow, or ice.
- B. Place and compact bedding course on trench bottoms and where indicated. Shape bedding course to provide continuous support for bells, joints, and barrels of pipes and for joints, fittings, and bodies of conduits.

- C. Backfill voids with satisfactory soil while removing shoring and bracing (if used).
- D. Bedding shall be placed in layers not exceeding six (6) inches in loose depth, and each layer shall be compacted by at least two (2) passes of an approved plate-type vibratory compactor
- E. Bedding shall be graded, compacted and shaped so that the full length of pipe barrel has complete and uniform bearing for the bottom quadrant of each pipe. Bell holes and depressions for joints shall be dug after the sand bedding has been graded and compacted, and shall be the proper clearance for jointing of pipes. Bedding shall be placed to a minimum height approximately equivalent with the center of the pipe, for the entire trench width, per Drawings.
- F. Place and compact initial backfill material to a minimum height of over the pipe or conduit as indicated on the Contract Drawings.
 - 1. Carefully compact initial backfill evenly up on both sides and along the full length of piping or conduit to avoid damage or displacement of piping or conduit
- G. Place and compact final backfill of satisfactory soil to finished grade.

3.10 Soil Fill

- A. Delivery and compaction of fill material shall be made during the presence of the Engineer's representative and shall be subject to his approval. This inspection by no means absolves the Contractor from responsibility to properly compact the fill as specified.
- B. Plow, scarify, bench, or break up sloped surfaces steeper than 1 vertical to 4 horizontal so fill material will bond with existing material.
- C. Place and compact fill material in layers to required elevations.
- D. Fill shall be placed in a continuous manner. Deterioration of fill surfaces due to freezing and thawing, precipitation, excessive drying, etc. shall be repaired by and at the expense of the Contractor to the satisfaction of the Engineer prior to placement of additional fill materials.
- E. Crush Stone to be placed shall be inspected prior to placement by the Geotechnical Testing Agency for signs of contamination by finer grained foreign soil material.
- F. Fill placement shall not be allowed on top of frozen ground or during weather conditions which do not allow for proper moisture and density controls.
- G. Place soil fill on subgrades free of mud, frost, snow, or ice.
- H. Temporary dewatering structures (sumps, berms, ditches, etc) are to be removed in their entirety and backfilled under dry conditions. Temporary sumps are to be backfilled promptly after removing the pumps or any associated drainage material to reduce the potential for disturbance from the phreatic surface.

3.11 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 percent and is too wet to compact to specified dry unit weight.
- B. If fill is too wet, the Contractor shall use approved methods and equipment to assist the drying of the fill until suitable for compaction. If fill is too dry, the Contractor shall provide approved means to add moisture to the fill until suitable for compaction.
- C. Jetting, flooding, or other similar method of compaction will not be allowed.

3.12 Compaction of Soil Backfills And Fills

- A. Fill that is too wet for proper compaction shall be discarded, harrowed, or otherwise dried to a proper moisture content for compaction to the required density.
- B. Fill that is too dry for proper compaction shall receive water uniformly applied over the surface of the loose layer. Sufficient water shall be added to allow for compaction to the required density.
- C. The Engineer's presence does not include supervision or direction of the actual work by the Contractor, his employees, or agents. Neither the presence of the Engineer nor any observations and testing performed by them shall excuse the Contractor from defects discovered in his work.
- D. Under pavements and structures, place backfill and fill soil materials in layers not more than 8 inches in loose depth for material compacted by heavy compaction equipment, and not more than 4 inches in loose depth for material compacted by hand-operated tampers.
- E. Place backfill and fill soil materials evenly on all sides of structures to required elevations, and uniformly along the full length of each structure.
- F. Compact soil materials to not less than the following percentages of maximum dry unit weight according to ASTM D 1557:
 - 1. Under structures and pavements(including sidewalks and wheelchair ramps), scarify and re-compact top 12 inches of existing subgrade and each layer of backfill or fill soil material at 95 percent of the maximum Modified Proctor dry density.
 - 2. Under turf or unpaved areas, scarify and re-compact top 6 inches below subgrade, and compact each layer of backfill or fill soil material at 90 percent.
 - 3. For utility trenches, compact each layer of initial and final backfill soil material at 95 percent of the maximum Modified Proctor dry density.
- G. For compacting backfill, use equipment specifically designed for compaction purposes, and which provides satisfactory results as approved by the Engineer.

3.13 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.
 - 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.

- B. Site Rough Grading: Slope grades to direct water away from buildings and to prevent ponding. Finish subgrades to required elevations within the following tolerances:
 - 1. Turf or Unpaved Areas: Plus or minus 1 inch.
 - 2. Walks: Plus or minus 1 inch.
 - 3. Pavements: Plus or minus 1/2 inch

3.14 Subbase And Base Courses Under Pavements

- A. Place subbase course and base course on subgrades free of mud, frost, snow, or ice.

- B. On prepared subgrade, place subbase course and base course under pavements and walks as follows:
 - 1. Subbase course installation shall conform to Sections 301.03.2, 302.03.1 and 302.03.2 of the RIDOT Standard Specifications for Road and Bridge Construction.
 - 2. Compaction of each layer shall continue until a density of not less than 95 percent of the maximum Modified Proctor dry density determined in accordance with AASHTO T180 has been achieved. The surface of each layer shall be maintained during the compaction operations in such a manner that a reasonable uniformity is produced. The compacted surface shall have a tolerance of 1/2-inch, plus-or-minus, to the grades shown on the Plans or as directed. However, no plus or minus deviation may continue for more than 100 feet in any direction.

3.15 Field Quality Control

- A. Testing Agency: Contractor will engage a qualified geotechnical engineering testing agency to perform tests and inspections.

- B. Allow testing agency to inspect and test subgrades and each fill or backfill layer. Proceed with subsequent earth moving only after test results for previously completed work comply with requirements.

- C. Testing agency will test compaction of soils in place according to ASTM D 1557, ASTM D 2167, ASTM D 2922, and ASTM D 2937, as applicable. Tests will be performed at the following locations and frequencies:
 - 1. Trench Backfill for Storm Drain and Utilities: At each compacted initial and final backfill layer, at least one test for every 150 feet or less of trench length, but no fewer than two tests.

2. Paved and Sidewalk Areas: At subgrade and at each compacted fill and backfill layer, at least one test for every 2000 square feet or less of paved or sidewalk area, but in no case fewer than three tests.
 3. Steel Sheeting Area: Compaction tests will be performed at a frequency of one per 1,000 square feet of lift, or one per lift if lift is less than 1,000 square feet.
- D. 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 materials to depth required; re-compact and retest until specified compaction is obtained at no additional cost.

3.16 Protection

- A. Protecting Graded Areas: Protect newly graded areas from traffic, freezing, and erosion. Keep free of trash and debris.
- B. 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.
 1. Scarify or remove and replace soil material to depth as directed by Engineer; reshape and re-compact.
- C. Where settling occurs before Project correction period elapses, remove finished surfacing, backfill with additional soil material, compact, and reconstruct surfacing.
 1. Restore appearance, quality, and condition of finished surfacing to match adjacent work, and eliminate evidence of restoration to greatest extent possible.

3.17 Disposal Of Surplus and Waste Materials

- A. Remove surplus satisfactory soil and waste materials, including unsatisfactory soil, trash, and debris, and legally dispose of them off Owner's property.
- B. Transport surplus satisfactory soil to designated storage areas on Owner's property. Stockpile or spread soil as directed by Engineer.
 1. Remove waste materials, including unsatisfactory soil, trash, and debris, and legally dispose of them off Owner's property.

END OF SECTION

SECTION 31 10 00 - SITE CLEARING

PART 1 - GENERAL

1.1 Related Documents

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions, RIDOT Standard Specification for Road and Bridge Construction and Division 1 Specification Sections, apply to this Section.

1.2 Summary

- A. This Section Includes the following:
 - 1. Clearing and grubbing.
 - 2. Removing above- and below-grade site improvements.
 - 3. Removing and reinstalling existing site improvements.
 - 4. Protecting site improvements and utilities to remain.
- B. Limits of Work: Minimize disturbance within limit of disturbance. Limits of disturbance shown on Contract Drawings indicates the furthest extent allowed. Perform only as much clearing as required to complete the Work. Proposed features may be adjusted as approved by the Engineer in order to preserve trees, landscaping and other existing site features to remain. Trees greater than 6" caliper to be removed shall be approved by the Engineer.
 - 1. Work areas are in close proximity to private property. Work shall remain within the City owned parcels and shall not disturb private property, except as indicated on the Contract Drawings. Where private property is disturbed, the disturbed area shall be restored to existing conditions as approved by the property owner.
- C. Related Sections:
 - 1. Section 01 57 13 "Temporary Erosion and Sediment Control".

1.3 Definitions

- A. Existing to Remain: Existing items of construction that are not permanently removed and that are not otherwise indicated to be removed, removed and disposed, remove and relocated, or removed and stockpiled.
- B. Remove and Dispose: Detach items from existing construction and legally dispose of them off-site.
- C. Remove and Relocate: Carefully detach from existing construction in a manner to prevent damage, prepare for reuse, and reinstall where indicated.

- D. Remove and Stockpile: Carefully detach from existing construction in a manner to prevent damage, prepare for reuse, and reuse where indicated. Dispose of excess salvaged materials.
- E. Subsoil: All soil beneath the topsoil layer of the soil profile, and typified by the lack of organic matter and soil organisms.
- F. Site Improvements: Miscellaneous structures and site elements including pavement, curbing, fences, fire hydrants, signs, property line markers, pipes, poles, wires, etc..
- G. Surface Soil: Soil that is present at the top layer of the existing soil profile at the Project site. In undisturbed areas, the surface soil is typically topsoil; but in disturbed areas such as urban environments, the surface soil can be subsoil.
- H. Topsoil: Top layer of the soil profile consisting of existing native surface topsoil or existing in-place surface soil and is the zone where plant roots grow. Its appearance is generally friable, pervious, and black or a darker shade of brown, gray, or red than underlying subsoil; reasonably free of subsoil, clay lumps, gravel, and other objects more than 2 inches in diameter; and free of subsoil and weeds, roots, toxic materials, or other non-soil materials.
- I. Vegetation: Trees, shrubs, groundcovers, grass, and other plants.

1.4 Material Ownership

- A. Except for materials indicated to remain or be returned to the Owner on the Contract Drawings, cleared materials shall become Contractor's property and shall be removed from Project site for proper disposal. Existing site features not shown on the Plans shall be coordinated with the Owner and shall be salvaged or removed as directed by the Owner.

1.5 Informational Submittals

- A. Existing Conditions: Documentation of preconstruction conditions, including adjoining construction and site improvements, that establishes preconstruction conditions that might be misconstrued as damage caused by site clearing.
 - 1. Submit a sufficiently detailed video and photographs prior to start of site clearing.
 - 2. Include Drawings and notations to indicate specific wounds and damage conditions of each item designated to remain.
- B. Record Drawings: Identifying and accurately showing locations of capped utilities and other subsurface structural, electrical, and mechanical conditions.

1.6 Quality Assurance

- A. Where "RIDOT Standard Specifications" is used, it shall mean "Rhode Island Department of Transportation Standard Specifications for Road and Bridge Construction, Amended March 2018 and issued supplements.

- B. Preconstruction Meeting: Conduct meeting with Engineer, Owner, and on-site supervisor to review the following:
 - 1. Limits of disturbance and clearing.
 - 2. Driven sheet pile installation and outfall modification.

1.7 Project Conditions

- A. Traffic: Minimize interference with adjoining roads, streets, walks, and other adjacent occupied or used facilities during site-clearing operations.
 - 1. Do not close or obstruct streets, walks, or other adjacent occupied or used facilities without permission from Owner and authorities having jurisdiction and without notifying occupants affected by blocking access to residences or businesses.
 - 2. Provide alternate routes around closed or obstructed traffic ways if required by Owner or authorities having jurisdiction.
- B. Reusable Improvements: Carefully remove items indicated to be stockpiled or relocated and store on Owner's premises. The Contractor shall coordinate with the City/Owner to determine an acceptable location to store reusable items.
- C. Protect-In-Place Existing Site Improvements: Support and protect in place existing site improvements. Restore items promptly; do not leave until end of construction.
- D. Utility Locator Service: Notify Dig Safe of Project area prior to site clearing.
- E. Do not commence site clearing operations until temporary erosion- and sedimentation-control as well as tree and shrub -protection measures are in place.
- F. Do not direct vehicle or equipment exhaust towards protected vegetation.
- G. Restore items and surfaces damaged by construction operations to existing condition or better.
- H. Equipment Operations
 - 1. On paved surfaces, do not operate equipment with tracks, treads, or wheels that cut or otherwise damage paved surfaces to remain.
 - 2. Operate equipment with care to prevent injury to trees and overhanging branches and limbs.
- I. Prohibit heat sources, flames, ignition sources, and smoking near protected vegetation.
- J. Soil Stripping, Handling, and Stockpiling: Perform only when the topsoil is dry or slightly moist.

1.8 Protecting Existing Structures

- A. Support and protect in place existing site improvements designated by the Engineer to be preserved in place.

1. Restore items damaged by the Contractor, at a minimum, to the condition in which the item was found immediately before beginning the Work. Restore items promptly; do not leave until end of construction.

PART 2 - PRODUCTS

2.1 Materials

- A. Satisfactory Soil Material: Requirements for satisfactory soil material are specified in Section 31 20 00 "Earth Moving."
 1. Obtain approved borrow soil material off-site when satisfactory soil material is not available on-site.

PART 3 - EXECUTION

3.1 General

- A. Minimize soil export by reusing on-site suitable soil as soil fill.

3.2 Preparation

- A. Document conditions for the following:
 1. Existing surface conditions within limit of disturbance where improvements are proposed.
 2. Existing features within the project area including trees, shrubs, fences, signs, walls, drainage structures, headwalls, monuments, site furnishings, batting cage, scoreboard, sheds, foundations, and walks.
- B. Protect and maintain benchmarks and survey control points from disturbance during construction.
- C. Protect existing site improvements to remain from damage during construction.
- D. Restore damaged improvements to their original condition or better, as acceptable to Owner.

3.3 Tree And Plant Protection

- A. General: Protect trees and plants remaining on-site.
 1. Install tree protection fencing.
 2. Locate and clearly identify trees, shrubs, and other vegetation to remain. Wrap a 1-inch blue vinyl tie tape flag around each tree trunk at 54 inches above the ground.
- B. Repair or replace trees, shrubs, and other vegetation indicated to remain or be relocated that are damaged by construction operations, in a manner approved by Engineer.

3.4 Utilities

- A. Existing Utilities: Do not interrupt utilities unless authorized under the following conditions and then only after arranging to provide temporary utility services according to requirements indicated:
 - 1. Notify utility owner and Engineer not less than ten days in advance of proposed utility interruptions.
 - 2. Notify utility owner with advance notice required by the utility owner. Contact utility owner prior to construction to determine coordination requirements.
 - 3. Do not proceed with utility interruptions without utility owner and Engineer's written permission.

3.5 Clearing And Grubbing

- A. Remove obstructions to permit installation of new construction. Removal includes digging out stumps and obstructions, and grubbing roots. Promptly dispose of material off-site in accordance with State disposal regulations.
 - 1. Do not remove trees, shrubs, and other vegetation to remain or to be relocated.
 - 2. Cut minor roots and branches of trees to remain in a clean and careful manner where such roots and branches obstruct installation of new construction.
 - 3. Use only hand methods for grubbing within drip line of remaining trees.
- B. Fill depressions caused by clearing and grubbing operations with satisfactory soil material, unless further excavation or earthwork is indicated.
 - 1. Place imported fill material in horizontal layers not exceeding 8-inch loose depth, and compact each layer to a density equal to adjacent original ground.

3.6 TOPSOIL STRIPPING

- A. Remove sod and grass before stripping topsoil.
- B. Strip topsoil to a depth as to prevent intermingling with underlying subsoil or other waste materials. Stockpile this topsoil in the area designated on the plans as directed by the Engineer. Do not mix this topsoil with imported topsoil stockpiles.
 - 1. Screen existing topsoil material with a 1 inch screen. Remove subsoil and nonsoil materials from topsoil, including trash, debris, weeds, roots, and other waste materials.
- C. Stockpile topsoil materials away from edge of excavations without intermixing with subsoil. Grade and shape stockpiles to drain surface water. Cover to prevent windblown dust and erosion by water.
 - 1. Limit height of topsoil stockpiles to 72 inches when not surrounded by a temporary construction fence. Provide a temporary construction fence surrounding stockpiles greater than 72 inches in height.
 - 2. Do not stockpile topsoil within tree protection zones.
 - 3. Stockpile surplus topsoil to allow for re-spreading deeper topsoil.

3.7 Site Improvements

- A. Remove existing above- and below-grade improvements as indicated and necessary to facilitate new construction.
- B. Remove slabs, paving, curbs, gutters, and aggregate base as indicated.
 - 1. Unless existing full-depth joints coincide with line of demolition, neatly saw-cut along line of existing pavement to remain before removing adjacent existing pavement. Saw-cut faces vertically.
 - a. Do not mix excavated pavement with other excavated materials.

3.8 Restoration

- A. Repair or restore existing site improvements and vegetation to remain, which is damaged by construction operations, to existing condition or better as determined by the Engineer, at no additional cost to the Owner.

3.9 Disposal Of Surplus And Waste Materials

- A. Remove surplus soil material, unsuitable topsoil, obstructions, demolished materials, and waste materials including trash and debris, and legally dispose of them off Owner's property.

END OF SECTION

SECTION 32 05 23 - CEMENT AND CONCRETE FOR EXTERIOR IMPROVEMENTS

PART 1 – GENERAL

2.1 SECTION INCLUDES

- A. Concrete formwork.
- B. Concrete site walls.
- C. Concrete reinforcement.
- D. Joint devices associated with concrete work.
- E. Concrete curing.

2.2 RELATED REQUIREMENTS

- A. Section 31 23 00 - Earthwork: Concrete base materials.
- B. Section 32 13 13 - Concrete Paving: Sidewalks and curbs.

2.3 REFERENCE STANDARDS

- A. 10 CFR 431, Subpart K - Energy Efficiency Program for Certain Commercial and Industrial Equipment - Distribution Transformers Current Edition.
- B. ACI 117 - Specification for Tolerances for Concrete Construction and Materials 2010 (Reapproved 2015).
- C. ACI 211.1 - Standard Practice for Selecting Proportions for Normal, Heavyweight, and Mass Concrete 1991 (Reapproved 2009).
- D. ACI 301 - Specifications for Concrete Construction 2020.
- E. ACI 302.1R - Guide to Concrete Floor and Slab Construction 2015.
- F. ACI 304R - Guide for Measuring, Mixing, Transporting, and Placing Concrete 2000 (Reapproved 2009).
- G. ACI 306R - Guide to Cold Weather Concreting 2016.
- H. ACI 308R - Guide to External Curing of Concrete 2016.
- I. ACI 318 - Building Code Requirements for Structural Concrete 2019, with Errata (2021).
- J. ACI 347R - Guide to Formwork for Concrete 2014 (Reapproved 2021).

- K. ASTM A615/A615M - Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement 2022.
- L. ASTM A1064/A1064M - Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete 2018a.
- M. ASTM C1602/C1602M - Standard Specification for Mixing Water Used in the Production of Hydraulic Cement Concrete 2018.
- N. ASTM C33/C33M - Standard Specification for Concrete Aggregates 2018.
- O. ASTM C39/C39M - Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens 2021.
- P. ASTM C94/C94M - Standard Specification for Ready-Mixed Concrete 2022.
- Q. ASTM C143/C143M - Standard Test Method for Slump of Hydraulic-Cement Concrete 2020.
- R. ASTM C150/C150M - Standard Specification for Portland Cement 2022.
- S. ASTM C171 - Standard Specification for Sheet Materials for Curing Concrete 2020.
- T. ASTM C173/C173M - Standard Test Method for Air Content of Freshly Mixed Concrete by the Volumetric Method 2016.
- U. ASTM C260/C260M - Standard Specification for Air-Entraining Admixtures for Concrete 2010a (Reapproved 2016).
- V. ASTM C309 - Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete 2019.
- W. ASTM C494/C494M - Standard Specification for Chemical Admixtures for Concrete 2019, with Editorial Revision (2022).
- X. ASTM C618 - Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete 2022.
- Y. ASTM C979/C979M - Standard Specification for Pigments for Integrally Colored Concrete 2016.
- Z. ASTM D1751 - Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types) 2018.
- AA. ASTM D1752 - Standard Specification for Preformed Sponge Rubber, Cork and Recycled PVC Expansion Joint Fillers for Concrete Paving and Structural Construction 2018.
- BB. ASTM D3963/D3963M - Standard Specification for Fabrication and Jobsite Handling of Epoxy-Coated Steel Reinforcing Bars 2021.

2.4 SUBMITTALS

- A. Product Data: Submit manufacturers' data on manufactured products showing compliance with specified requirements and installation instructions.
 - 1. For curing compounds, provide data on method of removal in the event of incompatibility with floor covering adhesives.
- B. Mix Design: Submit proposed concrete mix design.
 - 1. Indicate proposed mix design complies with requirements of ACI 301, Section 4 - Concrete Mixtures.
 - 2. Indicate proposed mix design complies with requirements of ACI 318, Chapter 5 - Concrete Quality, Mixing and Placing.
- C. Samples for Initial Selection: For each type of product, ingredient, or admixture requiring color, pattern, or texture selection.
- D. Samples for Pigment Color Selection: Submit manufacturer's complete sample chip set, including pigment number and required dosage rate for each color.
- E. Samples for Verification: For each type of exposed color, pattern, or texture indicated
- F. Test Reports: Submit report for each test or series of tests specified.
- G. Manufacturer's Installation Instructions: For concrete accessories, indicate installation procedures and interface required with adjacent construction.
- H. Project Record Documents: Accurately record actual locations of embedded utilities and components that will be concealed from view upon completion of concrete work.
- I. Warranty: Submit manufacturer warranty and ensure forms have been completed in Owner's name and registered with manufacturer.

2.5 QUALITY ASSURANCE

- A. Perform work of this section in accordance with ACI 301 and ACI 318.
- B. Follow recommendations of ACI 306R when concreting during cold weather.
- C. Testing Agency Qualifications: Qualified according to ASTM C 1077 and ASTM E 329 for testing indicated.
 - 1. Personnel conducting field tests shall be qualified as ACI Concrete Field Testing Technician, Grade 1, according to ACI CP-1 or an equivalent certification program.
- D. Concrete Testing Service: Engage a qualified testing agency to perform material evaluation tests and to design concrete mixtures.

PART 2 – PRODUCTS

3.1 FORMWORK

- A. Formwork Design and Construction: Comply with guidelines of ACI 347R to provide formwork that will produce concrete complying with tolerances of ACI 117.
- B. Form Materials: Contractor's choice of standard products with sufficient strength to withstand hydrostatic head without distortion in excess of permitted tolerances.
 - 1. Form Facing for Exposed Finish Concrete: Contractor's choice of materials that will provide smooth, stain-free final appearance.
 - 2. Earth Cuts: Do not use earth cuts as forms for vertical surfaces. Natural rock formations that maintain a stable vertical edge may be used as side forms.
 - 3. Form Coating: Release agent that will not adversely affect concrete or interfere with application of coatings.
 - 4. Form Ties: Cone snap type that will leave no metal within 1-1/2 inches of concrete surface.

3.2 REINFORCEMENT MATERIALS

- A. Reinforcing Steel: ASTM A615/A615M, Grade 60 (60,000 psi).
 - 1. Type: Deformed billet-steel bars.
 - 2. Finish: Unfinished, unless otherwise indicated.
- B. Steel Welded Wire Reinforcement (WWR): Plain type, ASTM A1064/A1064M.
- C. Reinforcement Accessories:
 - 1. Tie Wire: Annealed, minimum 16 gage, 0.0508 inch.
 - 2. Chairs, Bolsters, Bar Supports, Spacers: Sized and shaped for adequate support of reinforcement during concrete placement.

3.3 CONCRETE MATERIALS

- A. Cement: ASTM C150/C150M, Type I/II Portland type.
- B. Fine and Coarse Aggregates: ASTM C33/C33M.
- C. Fly Ash: ASTM C618, Class C or F.
- D. Calcined Pozzolan: ASTM C618, Class N.
- E. Water: ASTM C1602/C1602M; clean, potable, and not detrimental to concrete.

- A. Color Additive: Pure, concentrated mineral pigments specifically intended for mixing into concrete and complying with ASTM C979/C979M.
 - 1. Color: As indicated on drawings.

2.4 ADMIXTURES

- A. Do not use chemicals that will result in soluble chloride ions in excess of 0.1 percent by weight of cement.
- B. Air Entrainment Admixture: ASTM C260/C260M.
- C. High Range Water Reducing and Retarding Admixture: ASTM C494/C494M Type G.
- D. High Range Water Reducing Admixture: ASTM C494/C494M Type F.
- E. Water Reducing and Retarding Admixture: ASTM C494/C494M Type D.
- F. Retarding Admixture: ASTM C494/C494M Type B.
- G. Water Reducing Admixture: ASTM C494/C494M Type A.

2.5 BONDING AND JOINTING PRODUCTS

- A. Slab Isolation Joint Filler: 1/2 inch thick, height equal to slab thickness, with removable top section that will form 1/2 inch deep sealant pocket after removal.
 - 1. Material: ASTM D1751, cellulose fiber.
 - 2. Material: ASTM D1752, sponge rubber (Type I).

2.6 CURING MATERIALS

- A. Evaporation Reducer: Liquid thin-film-forming compound that reduces rapid moisture loss caused by high temperature, low humidity, and high winds; intended for application immediately after concrete placement.
- B. Curing Compound, Naturally Dissipating: Clear, water-based, liquid membrane-forming compound; complying with ASTM C309.
- C. Curing Compound, Non-dissipating: Liquid, membrane-forming, clear, non-yellowing acrylic; complying with ASTM C309.
- D. Moisture-Retaining Sheet: ASTM C171.
- E. Water: Potable, not detrimental to concrete.

2.7 CONCRETE MIX DESIGN

- A. Proportioning Normal Weight Concrete: Comply with ACI 211.1 recommendations.

- B. Concrete Strength: Establish required average strength for each type of concrete on the basis of field experience or trial mixtures, as specified in ACI 301.
 - 1. For trial mixtures method, employ independent testing agency acceptable to Engineer for preparing and reporting proposed mix designs.
- C. Admixtures: Add acceptable admixtures as recommended in ACI 211.1 and at rates recommended or required by manufacturer.
- D. Color Pigment: Add color pigment to concrete mixture according to manufacturer's written instructions and to result in hardened concrete color consistent with approved mockup.
- E. Normal Weight Concrete:
 - 1. Fly Ash Content: Maximum 20 percent of cementitious materials by weight.
 - 2. Calcined Pozzolan Content: Maximum 10 percent of cementitious materials by weight.
 - 3. Total Air Content: 6 percent, plus or minus 1 percent, determined in accordance with ASTM C173/C173M.
 - 4. Maximum Slump: 4 inches, plus or minus 1 inch.
 - 5. Maximum Aggregate Size: 3/4 inch.

2.8 MIXING

- A. Transit Mixers: Comply with ASTM C94/C94M.
- B. Adding Water: If concrete arrives on-site with slump less than suitable for placement, do not add water that exceeds the maximum water-cement ratio or exceeds the maximum permissible slump.

2.9 MOCK-UP

- A. Construct and erect mock-up panel for concrete surfaces indicated to receive special treatment or finish as result of formwork.
 - 1. Panel Size: Sufficient to illustrate full range of treatment.
 - 2. Number of Panels: Two.
 - 3. Locate where directed.
- B. Accepted mock-up panel is considered basis of quality for the finished work. Keep mock-up exposed to view for duration of concrete work.
- C. Mock-up may remain as part of the Work.

PART 3 – EXECUTION

3.1 EXAMINATION

- A. Verify lines, levels, and dimensions before proceeding with work of this section.

3.2 PREPARATION

- A. Formwork: Comply with requirements of ACI 301. Design and fabricate forms to support all applied loads until concrete is cured, and for easy removal without damage to concrete.
- B. Verify that forms are clean and free of rust before applying release agent.
- C. Coordinate placement of embedded items with erection of concrete formwork and placement of form accessories.
- D. In locations where new concrete is doweled to existing work, drill holes in existing concrete, insert steel dowels and pack solid with non-shrink grout.

3.3 INSTALLING REINFORCEMENT AND OTHER EMBEDDED ITEMS

- A. Fabricate and handle epoxy-coated reinforcing in accordance with ASTM D3963/D3963M.
- B. Comply with requirements of ACI 301. Clean reinforcement of loose rust and mill scale, and accurately position, support, and secure in place to achieve not less than minimum concrete coverage required for protection.
- C. Install welded wire reinforcement in maximum possible lengths, and offset end laps in both directions. Splice laps with tie wire.
- D. Verify that anchors, seats, plates, reinforcement and other items to be cast into concrete are accurately placed, positioned securely, and will not interfere with concrete placement.

3.4 PLACING CONCRETE

- A. Place concrete in accordance with ACI 304R.
- B. Notify Engineer not less than 24 hours prior to commencement of placement operations.
- C. Maintain records of concrete placement. Record date, location, quantity, air temperature, and test samples taken.
- D. Ensure reinforcement, inserts, waterstops, embedded parts, and formed construction joint devices will not be disturbed during concrete placement.
- E. Place concrete continuously without construction (cold) joints wherever possible; where construction joints are necessary, before next placement prepare joint surface by removing

laitance and exposing the sand and sound surface mortar, by sandblasting or high-pressure water jetting.

3.5 SLAB JOINTING

- A. Locate joints as indicated on drawings.
- B. Anchor joint fillers and devices to prevent movement during concrete placement.
- C. Isolation Joints: Use preformed joint filler with removable top section for joint sealant, total height equal to thickness of slab, set flush with top of slab.
- D. Saw Cut Contraction Joints: Saw cut joints before concrete begins to cool, within 4 to 12 hours after placing; use 3/16 inch thick blade and cut at least 1 inch deep but not less than one quarter (1/4) the depth of the slab.
- E. Grooved Contraction Joints: Form contraction joints after initial floating by grooving and finishing each edge of joint to a radius of 1/8 inch (3.2 mm) and cut at least 1 inc (25 mm) deep but not less than one quarter (1/4) the depth of the slab. Repeat grooving of contraction joints after applying surface finishes. Eliminate groover tool marks on concrete surfaces.

3.6 CONCRETE FINISHING

- A. Repair surface defects, including tie holes, immediately after removing formwork.
- B. Unexposed Form Finish: Rub down or chip off fins or other raised areas 1/4 inch or more in height.
- C. Exposed Form Finish: Rub down or chip off and smooth fins or other raised areas 1/4 inch or more in height. Provide finish as follows:
 - 1. Sandblast finish: Apply to exposed to view concrete surfaces where indicated on the drawings.
- D. Concrete Slabs: Finish to requirements of ACI 302.1R, and as follows:
 - 1. Float Finish: Consolidate surface with power-driven floats or by hand floating if area is small or inaccessible to power driven floats. Restraighten, cut down high spots, and fill low spots. Repeat float passes and restraightening until surface is left with a uniform, smooth, granular texture.
 - a. Apply float finish to surfaces to receive broom finish.
 - 2. Broom Finish: Apply a broom finish to exterior concrete slabs, steps, ramps, and elsewhere as indicated.

- a. Immediately after float finishing, slightly roughen trafficked surface by brooming with fiber-bristle broom perpendicular to main traffic route. Coordinate required final finish with Engineer before application.

3.7 CURING AND PROTECTION

- A. Comply with requirements of ACI 308R. Immediately after placement, protect concrete from premature drying, excessively hot or cold temperatures, and mechanical injury.
- B. Maintain concrete with minimal moisture loss at relatively constant temperature for period necessary for hydration of cement and hardening of concrete.
- C. Formed Surfaces: Cure by moist curing with forms in place for full curing period.
- D. Surfaces Not in Contact with Forms:
 1. Initial Curing: Start as soon as free water has disappeared and before surface is dry. Keep continuously moist for not less than three days by water ponding, water-saturated sand, water-fog spray, or saturated burlap.
 2. Final Curing: Begin after initial curing but before surface is dry.
 - a. Moisture-Retaining Sheet: Lap strips not less than 3 inches and seal with waterproof tape or adhesive; secure at edges.
 - b. Curing Compound: Apply in two coats at right angles, using application rate recommended by manufacturer.

3.8 FIELD QUALITY CONTROL

- A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.
- B. Submit proposed mix design of each class of concrete to inspection and testing firm for review prior to commencement of concrete operations.
- C. Compressive Strength Tests: ASTM C39/C39M, for each test, mold and cure three concrete test cylinders. Obtain test samples for every 100 cubic yards or less of each class of concrete placed.
- D. Take one additional test cylinder during cold weather concreting, cured on job site under same conditions as concrete it represents.
- E. Perform one slump test for each set of test cylinders taken, following procedures of ASTM C143/C143M.

3.9 DEFECTIVE CONCRETE

- A. Test Results: The testing agency shall report test results in writing to Engineer and Contractor within 24 hours of test.

- B. Defective Concrete: Concrete not complying with required lines, details, dimensions, tolerances, or specified requirements.
- C. Repair or replacement of defective concrete will be determined by the Engineer. The cost of additional testing shall be borne by Contractor when defective concrete is identified.
- D. Do not patch, fill, touch-up, repair, or replace exposed concrete except upon express direction of Engineer for each individual area.

END OF SECTION 32 05 23

SECTION 32 12 16 - ASPHALT PAVING

PART 1 - GENERAL

1.1 Related Documents

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions, RIDOT Standard Specification for Road and Bridge Construction and Division 1 Specification Sections, apply to this Section

1.2 Summary

- A. Section includes all hot-mix asphalt paving for full-depth bikeway construction and raised pedestrian crosswalk.
- B. Related Requirements:
 - 1. Section 31 1 00 "Site Clearing" for demolition and removal of existing asphalt pavement.
 - 2. Section 31 20 00 "Earth Moving" for subgrade preparation, fill material, and gravel borrow base courses.

1.3 Definitions

- A. Bituminous Concrete Roadway Surface Course (Class 9.5 HMA Surface Course): The asphalt-aggregate top course of a bituminous concrete pavement, sometimes called a wearing course.
- B. RIDOT: Rhode Island Department of Transportation.

1.4 Action Submittals

- A. Product Data: Include technical data and tested physical and performance properties.
 - 1. Job-Mix Designs: For each job mix proposed for the Work

1.5 Informational Submittals

- A. Qualification Data: For manufacturer and testing agency.
- B. Material Certificates: For each paving material. Include statement that mixes containing recycled materials will perform equal to mixes produced from all new materials.
- C. Material Test Reports: For each paving material, by a qualified testing agency.

1.6 Quality Assurance

- A. Where "RIDOT Standard Specifications" is used, it shall mean "Rhode Island Department of Transportation Standard Specifications for Road and Bridge Construction, Amended March 2018 and issued supplements.
- B. Supplier Qualifications: A qualified supplier registered with and approved by RIDOT.
- C. Regulatory Requirements: Comply with the RIDOT Standard Specifications for bituminous concrete paving work.
- D. Asphalt-Paving Publication: Comply with AI MS-22, "Construction of Hot Mix Asphalt Pavements," unless more stringent requirements are indicated.
- E. Pre-installation Conference: Conduct conference at Project Site.
 - 1. Review methods and procedures related to hot-mix asphalt paving including, but not limited to, the following:
 - a. Review proposed sources of paving materials, including capabilities and location of plant that will manufacture hot-mix asphalt.
 - b. Review condition of subgrade and preparatory work.
 - c. Review requirements for protecting paving work, including restriction of traffic during installation period and for remainder of construction period.
 - d. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.

1.7 Delivery, Storage, and Handling

- A. Transport bituminous concrete mixture in tight body trucks that have been previously cleaned of foreign material.
 - 1. Tightly cover trucks with waterproof canvas or other suitable covers.
- B. Deliver mixture within 25 deg F of approved job mix formula temperature.

1.8 Field Conditions

- A. Environmental Limitations: Do not apply asphalt materials if subgrade is wet or excessively damp, if rain is imminent or expected before time required for adequate cure, or if the following conditions are not met:
 - 1. Tack Coat: Minimum surface temperature of 60 degrees F.
 - 2. Asphalt Binder Course: Minimum surface temperature of 40 degrees F and rising at time of placement.
 - 3. Asphalt Surface Course: Minimum surface temperature of 60 degrees F at time of placement.

PART 2 - PRODUCTS

2.1 Bituminous Concrete

- A. Dense graded hot mix asphalt (HMA) pavement shall conform to Section 401 of the RIDOT Standard Specifications. The HMA shall be composed of a mixture of aggregate, PGAB, and filler if required. The aggregate shall be sized, graded and combined in such proportions that the resulting mixture meets the gradation requirements of the job mix formula (JMF).
- B. Performance-Graded Asphalt Binder (PGAB): All grades shall conform to AASHTO M 320 and R29. The PGAB shall meet the requirements of PG 64S-28 with the exception of both Class 19.0 and mixes designated as “Base Course” which shall incorporate PG 64S-22 for mixes with less than 15% RAP. Both Class 19.0 and “Base Course” mixes with 15 to 25 percent RAP shall incorporate PG 58S-28. Should a class of HMA be designated as “Modified”, the binder shall meet the requirements of PG 64E-28 and shall incorporate at least 2.0% SBS polymer. The non-recoverable creep compliance versus percent recovery of the binder shall be plotted and must fall above the curve in Figure X1.1 in Appendix X1 of AASHTO M 332.
- C. Aggregate: Shall be in conformance with Subsection M.03.02.2 of the RIDOT Standard Specifications and AASHTO M 323.
- D. Filler: Shall be in conformance with Subsection M.03.02.3 of the RIDOT Standard Specifications.

2.2 Asphalt Emulsion Tack Coat

- A. Asphalt Emulsion Tack Coat: Shall conform to Section M.03; Materials and Section 403; Asphalt Emulsion Tack Coat of the Standard Specifications.

2.3 Bituminous Concrete Mixes

- A. Bituminous Concrete Mix Design: Shall conform to shall conform to Section 401 of the RIDOT Standard Specifications. The following mixes shall be used:

- 1. Class 12.5 HMA for binder course used in rubberized play surfacing.

Each mix shall meet the gradation requirements listed within the table below:

	Class 19.0	Class 12.5	Class 9.5	Class 4.75
25.0mm (1")	100%	100%	100%	100%
19.0mm (3/4")	90% - 100%	100%	100%	100%
12.5mm (1/2")	90% max	90% - 100%	100%	100%
9.5mm (3/8")	-	90% max	90% - 100%	95% - 100%
4.75mm (#4)	-	-	90% max	85% - 100%
2.36mm (#8)	± 5% from design	± 5% from design	± 5% from design	-
1.18mm (#16)	-	-	-	±5% from design
0.075mm (#200)	≥2%	≥2%	≥2%	≥2%
Control Sieve	2.36mm (#8)	2.36mm (#8)	2.36mm (#8)	1.18mm (#16)

PART 3 - EXECUTION

3.1 Examination

- A. Verify that subgrade is dry and in suitable condition to begin paving.
- B. Proof-roll subgrade below pavements with heavy pneumatic-tired equipment to identify soft pockets and areas of excess yielding. Do not proof-roll wet or saturated subgrades.
 - 1. Completely proof-roll subgrade in one direction, repeating proof-rolling in direction perpendicular to first direction. Limit vehicle speed to 3 mph
 - 2. Proof roll with a loaded 10-wheel, tandem-axle dump truck weighing not less than 15 tons.
 - 3. Excavate soft spots, unsatisfactory soils, and areas of excessive pumping or rutting, as determined by Engineer, and replace with compacted backfill or fill as directed.
- C. Proceed with paving only after unsatisfactory conditions have been corrected.

3.2 Surface Preparation

- A. General: Immediately before placing bituminous concrete, remove loose and deleterious material from substrate surfaces. Ensure that prepared subgrade is ready to receive paving.
 - 1. Sweep loose granular particles from surface of unbound-aggregate base course. Do not dislodge or disturb aggregate embedded in compacted surface of base course.
- B. Tack Coat: Apply uniformly to surfaces of existing pavement at a rate of 0.05 to 0.15 gal./sq. yd.
 - 1. Allow tack coat to cure undisturbed before applying hot-mix asphalt paving.
 - 2. Avoid smearing or staining adjoining surfaces, appurtenances, and surroundings. Remove spillages and clean affected surfaces.

3.3 Bituminous Concrete Placing

- A. Machine place hot bituminous concrete on prepared surface, spread uniformly, and strike off. Place by hand to areas inaccessible to equipment in a manner that prevents segregation of mix. Place each course to required grade, cross section, and thickness when compacted.
 - 1. Spread mix at minimum temperature of 265 deg F.
 - 2. Regulate paver machine speed to obtain smooth, continuous surface free of pulls and tears in bituminous concrete paving mat.
 - 3. In areas inaccessible to pavers, use staked forms to maintain indicated line and grade. Prevent segregation of mix when placing mix by hand.
- B. Place paving in consecutive strips not less than 10 feet wide unless infill edge strips of a lesser width are required.
 - 1. After first strip has been placed and rolled, place succeeding strips and extend rolling to overlap previous strips.

- C. Promptly correct surface irregularities in paving course behind paver. Use suitable hand tools to remove excess material forming high spots. Fill depressions with hot bituminous concrete to prevent segregation of mix; use suitable hand tools to smooth surface.

3.4 Joints

- A. Construct joints to ensure a continuous bond between adjoining paving sections. Construct joints free of depressions, with same texture and smoothness as other sections of hot-mix asphalt course.
 - 1. Clean contact surfaces and apply tack coat to joints.
 - 2. Offset longitudinal joints, in successive courses, a minimum of 6 inches.
 - 3. Offset transverse joints, in successive courses, a minimum of 24 inches.
 - 4. Construct transverse joints at each point where paver ends a day's work and resumes work at a subsequent time. Construct these joints using either "bulkhead" or "papered" method according to AI MS-22, for both "Ending a Lane" and "Resumption of Paving Operations."
 - 5. Compact joints as soon as hot-mix asphalt will bear roller weight without excessive displacement.
 - 6. Compact asphalt at joints to a density within 2 percent of specified course density.

3.5 Compaction

- A. Roadways: Compaction shall be in accordance with Subsection 401.03.6; Compaction of RIDOT's Standard Specifications.

3.6 Installation Tolerances

- A. Thickness: Shall conform to Subsection 401.03.10; Thickness Requirements of the RIDOT Standard Specifications.
- B. Surface Smoothness: Shall conform to Subsection 401.03.9; Surface Tolerances of the RIDOT Standard Specifications.
- C. Variation from Design Elevation: 1/4 inch.

3.7 Weather Limitations

Weather Limitations: shall conform to Subsection 401.03.11; Weather Limitations and Subsection 401.03.12; Cold Weather Paving of RIDOT's Standard Specifications.

3.8 Field Quality Control

- A. Testing Agency: The Contractor will be responsible for retaining the testing agency for required testing.
 - 1. Testing agency will conduct and interpret tests and state in each report whether tested Work complies with or deviates from specified requirements.
- B. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

- C. Thickness: In-place compacted thickness of bituminous concrete courses will be determined according to ASTM D 3549.
- D. Surface Smoothness: Finished surface of each bituminous concrete course will be tested for compliance with smoothness tolerances.
- E. In-Place Density: Testing agency will take samples of uncompacted paving mixtures and compacted pavement according to AASHTO T 168.
 - 1. Reference maximum theoretical density will be determined by averaging results from four samples of bituminous concrete mixture delivered daily to site, prepared according to AASHTO T 209, and compacted according to job-mix specifications.
 - 2. In-place density of compacted pavement will be determined by nuclear method according to ASTM D2950 and correlated with ASTM D1188 or ASTM D2726. In-place density shall be a minimum of 95 percent of Marshall density as determined at the plant.
 - a. One test shall be performed for every 1000 sq. yd. or less of installed pavement.
- F. Remove and replace or install additional bituminous concrete where test results or measurements indicate that it does not comply with specified requirements.

3.9 Waste Handling

- A. Except for material indicated to be recycled, remove excavated materials from Project site and legally dispose of them in an approved landfill if not stockpiled in Contractor's yard.
 - 1. Do not allow excavated materials to accumulate on-site.

END OF SECTION

SECTION 32 13 13 - CONCRETE PAVING

PART 1 - GENERAL

1.1 Related Documents

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions, RIDOT Standard Specification for Road and Bridge Construction and Division 1 Specification Sections, apply to this Section

1.2 Summary

- A. Section Includes:
 - 1. Concrete Sidewalks.
 - 2. Concrete Curbs.
 - 3. Concrete Pavements.
- B. Related Sections:
 - Section 31 20 00 "Earth Moving".

1.3 Definitions

- A. Cementitious Materials: Portland cement alone or in combination with one or more of blended hydraulic cement, fly ash and other pozzolans, and ground granulated blast-furnace slag.
- B. Detectable Warning Panels: Panels with truncated domes in an arrayed pattern that is compliant with Americans with Disabilities Act (ADA) warning and directional systems for the visually impaired.
- C. Concrete Sidewalk: Concrete sidewalk consisting of a 5-inch thick layer of reinforced Portland cement concrete. It is not anticipated that these areas of sidewalk could be impacted by the turning movements of larger sized delivery vehicles.

1.4 Action Submittals

- A. Product Data: Provide data on joint filler, admixtures, and curing compound.
- B. Design Mixtures: For each concrete paving mixture. Include alternate design mixtures when characteristics of materials, Project conditions, weather, test results, or other circumstances warrant adjustments.
 - 1. Prepare in accordance with ACI 301.
 - 2. Provide specific aggregate analysis for recycled aggregates proposed for use in concrete mixes.
 - 3. Fly-Ash Content Submittal: If any fly ash or ground granulated blast furnace slag is used in mix designs to replace Portland cement, submit the total volume of concrete cast in place,

mix design(s) used showing the quantity of Portland cement replaced, reports showing successful cylinder testing, and temperature on day of pour if cold weather mix is used.

1.5 Informational Submittals

- A. Qualification Data: For qualified installer of detectable warnings, ready-mix concrete manufacturer, and testing agency.
- B. Material Certificates: For the following, from manufacturer:
 - 1. Cementitious materials.
 - 2. Steel reinforcement/wire fabric and reinforcement accessories.
 - 3. Admixtures.
 - 4. Curing compounds.
 - 5. Bonding agent or epoxy adhesive.
 - 6. Joint fillers.
- C. Material Test Reports: Provide Sieve Analysis for each of the following:
 - 1. Aggregates.
- D. Field quality-control reports.

1.6 Quality Assurance

- A. Where "RIDOT Standard Specifications" is used, it shall mean "Rhode Island Department of Transportation Standard Specifications for Road and Bridge Construction, Amended March 2018 and issued supplements.
- B. Ready-Mix-Concrete Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C 94/C 94M requirements for production facilities and equipment.
- C. Testing Agency Qualifications: Qualified according to ASTM C 1077 and ASTM E 329 for testing indicated.
 - 1. Personnel conducting field tests shall be qualified as ACI Concrete Field Testing Technician, Grade 1, according to ACI CP-1 or an equivalent certification program.
- D. Concrete Testing Service: Engage a qualified testing agency to perform material evaluation tests and to design concrete mixtures.
- E. ACI Publications: Comply with ACI 301 unless otherwise indicated.
- F. Preinstallation Conference: Conduct conference at Project location.
 - 1. Review methods and procedures related to concrete paving, including but not limited to, the following:
 - a. Concrete mixture design.
 - b. Quality control of concrete materials and concrete paving construction practices.
 - c. Standard versus heavy-duty cement concrete sidewalk locations.

- G. Regulatory Requirements: Comply with materials, workmanship, and other applicable requirements of the State of Rhode Island Department of Transportation Standard Specifications for Road and Bridge Construction, 2004 Edition (Amended March 2018)” and issued supplements. This document will be referred to, herein, as the “RIDOT Standard Specifications.”

1.7 Project Conditions

- A. Maintain ambient temperature of 50 degrees F minimum.

PART 2 - PRODUCTS

2.1 Forms

- A. Form Materials: Wood or metal in accordance with Section 905.03.3 of RIDOT’s Standard Specifications. Form materials shall provide for a full-depth, continuous, straight, and smooth exposed surface.
 - 1. Use flexible or uniformly curved forms for curves with a radius of 100 feet (30.5 m) or less. Do not use notched and bent forms.
- B. Form-Release Agent: Commercially formulated form-release agent that will not bond with, stain, or adversely affect concrete surfaces and that will not impair subsequent treatments of concrete surfaces.

2.2 Steel Reinforcement

- A. Welded Wire Fabric: Section M.05.02.1 of the RIDOT Standard Specifications.
- B. Epoxy-Coated, Joint Dowel Bars: Dowel bars shall be #5 epoxy coated bars, 24 inches long.

2.3 Concrete Materials

- A. Portland Cement Concrete: Portland cement shall conform to the requirements of Section M.02 of the RIDOT Standard Specifications and be listed on the Department’s Approved Materials List.
- B. Coarse and Fine Aggregate shall conform to the requirements of Subsections M.02.03 and M.02.02 of the RIDOT’ Standard Specifications, respectively.
- C. Water: Potable and complying with ASTM C 94/C 94M. Water shall not contain any impurities in sufficient amounts to cause discoloration of the concrete or produce etching of the surface.
- D. Chemical Admixtures: Calcium Chloride in any form shall not be used in any Portland cement concrete. No chemical admixtures shall be used in the work unless they are approved by the Engineer. Chemical admixtures shall be those listed on the Department's Approved Materials List and shall conform to the requirements below:
 - 1. Chemical Admixtures - AASHTO M194
 - 2. Air-entraining Admixtures - AASHTO M154.

- E. Vibrators: Vibrators, for full width vibration of concrete paving, may be either the surface pan type or the internal types with either immersed tube or multiple spuds. They may be attached to the spreader or the finishing machine, or may be mounted on a separate carriage to accommodate either slip form or side form paving methods. They shall not come in contact with the joint, load transfer devices, subgrade, reinforcing, or side forms.
 - 1. The frequency of the surface vibrators shall not be less than 3,500 impulses per minute and the frequency of the internal type shall not be less than 5,000 impulses per minute for tube vibrators and not less than 7,000 impulses per minute for spud vibrators.
 - 2. Vibrators shall be rubber tipped to prevent damage to epoxy-coated reinforcing steel.

2.4 BONDING AND JOINTING PRODUCTS

- A. Slab Isolation Joint Filler: 1/2 inch thick, height equal to slab thickness, with removable top section that will form 1/2 inch deep sealant pocket after removal.
 - 1. Material: ASTM D1751, cellulose fiber.
 - 2. Material: ASTM D1752, sponge rubber (Type I).
- B. Joint Sealant: Self-leveling sealer that matches the color of the concrete.

2.5 Curing Materials

- A. Burlap Cloth: Burlap cloth made from jute or Kenaf shall conform to the requirements of AASHTO M182 Class 2 or 4. Burlap shall be clean and free from cuts, tears, uneven weaving and contaminants.
- B. Sheet Materials for Curing Concrete: The use of waterproof paper is not allowed as a curing medium for Portland cement concrete.
 - 1. Moisture-Retaining Cover: ASTM C 171, polyethylene film.
 - 2. Plastic coated fiber Blanket: White plastic coated fiber blankets or white plastic coated absorbent synthetic fiber blankets shall conform to the test requirements of AASHTO M171, for white-burlap polyethylene sheets, for moisture loss and reflectance.
- C. Liquid Membrane Curing Compound: White plastic coated fiber blankets or white plastic coated absorbent synthetic fabric blankets shall conform to the test requirements of AASHTOM171, Table 1, for white-burlap polyethylene sheets, for moisture loss and reflectance.

2.6 Concrete Mixtures

- A. Shall be Class XX min and have a minimum 28-day compressive strength of 4,000 psi in accordance with Section 601 of the RIDOT Standard Specifications.
 - 1. Maximum Aggregate Size: 3/4 inch.

2.7 Admixtures

- A. Chemical Admixtures: Calcium Chloride in any form shall not be used in any Portland cement concrete. No chemical admixtures shall be used in the work unless they are approved by the

Engineer. Chemical admixtures shall be those listed on the Department's Approved Materials List and shall conform to the requirements below:

1. Chemical Admixtures - AASHTO M194
2. Air-entraining Admixtures - AASHTO M154.

2.8 Detectable Warning Panels

- A. Plastic Tactile and Detectable Warning Tiles: ADA Standards compliant, glass fiber and carbon fiber reinforced, exterior grade, matte finish polyester sheet with truncated dome pattern, solid color throughout, internal reinforcing of sheet and of truncated domes, integral radius cut lines on back face of tile; with factory-applied removable protective sheeting.
 1. Installation Method: Cast in place.
 2. Pattern: In-line pattern of truncated domes complying with ADA Standards.
 3. Color: Dark Gray.
 4. Products:
 - a. ADA Solutions, a division of SureWerx USA; Cast in Place (Wet-Set):
www.adatale.com/

PART 3 - EXECUTION

3.1 Examination

- A. Examine exposed subgrades and subbase surfaces for compliance with requirements for dimensional, grading, and elevation tolerances. The alignment and grade elevations of the forms shall be checked and corrections made by the Contractor before placing the concrete. When any form has been disturbed or any grade has become unstable, the form shall be reset and rechecked.
- B. Proof-roll prepared subbase surface below concrete paving to identify soft pockets and areas of excess yielding.
 1. Completely proof-roll subbase in one direction and repeat in perpendicular direction. Limit vehicle speed to 3 mph.
 2. Proof-roll with a pneumatic-tired and loaded, 10-wheel, tandem-axle dump truck weighing not less than 15 tons.
 3. Correct subbase with soft spots and areas of pumping or rutting exceeding depth of 1/2 inch according to requirements in Section 31 20 00 "Earth Moving."
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 Preparation

- A. Remove loose material from compacted subbase surface immediately before placing concrete.
- B. When side forms have been securely set to grade, the subgrade or base course shall be brought to proper cross section.
 1. High areas shall be trimmed to proper elevation.

2. Low areas may be filled and compacted to a condition similar to that of surrounding grade, or filled with concrete integral with the pavement.
3. The finished grade shall be maintained in a smooth and compacted condition until the pavement is placed.

3.3 Concrete Mixing, Delivery, and Discharge

- A. Concrete may be mixed at the site of construction, at a central point, or in transit mixers, all in accordance with these Specifications.
 1. Equipment - Mixers and Agitators. Mixers may be stationary mixers or truck mixers. Agitators may be truck mixers or truck agitators.
 - a. Stationary mixers shall be equipped with a metal plate or plates on which are plainly marked the mixing speed of the drum or paddles, and the maximum capacity in terms of the volume of mixed concrete. When used for the complete mixing of concrete, stationary mixers shall be equipped with an acceptable timing device that will not permit the batch to be discharged until the specified mixing time has elapsed.
 - b. Each truck mixer or agitator shall have attached thereto in a prominent place a metal plate or plates on which are plainly marked the gross volume of the drum, the capacity of the drum or container in terms of the volume of the mixed concrete, and the minimum and maximum mixing speeds of rotation of the drum, blades, or paddles. When the concrete is truck-mixed the volume of concrete mixed per batch shall not exceed the mixer's nominal capacity as shown on the manufacturer's standard rating plate on the mixer, except that an overload up to 10 percent above the mixer's nominal capacity may be permitted, provided concrete test data for strength, segregation, and uniform consistency are satisfactory, and provided no spillage of concrete takes place.
 - c. Truck mixers and agitators shall be equipped with means by which the number of revolutions of the drum, blades, or paddles may be readily verified. Truck mixers must also have a means of measuring the amount of water added during retempering such as a water meter or other method approved by the Engineer.
 - d. All stationary and truck mixers shall be capable of combining the ingredients of the concrete within the specified time or number of revolutions specified herein into a thoroughly mixed and uniform mass and of discharging the concrete so that no less than 5 of the 6 requirements shown in AASHTO M157-93 Table A1 shall have been met.
 - e. The agitator shall be capable of maintaining the mixed concrete in a thoroughly mixed and uniform mass and of discharging the concrete with a satisfactory degree of uniformity as defined by AASHTO M157-93 Annex A1.
 - f. Slump tests of individual samples taken after discharge of approximately 15 percent and 85 percent of the load may be made for a quick check of the probable degree of uniformity. These two samples shall be obtained within an elapsed time of not more than 15 minutes. If these slumps differ more than that specified in AASHTO M157-93 Annex A1, the mixer or agitator shall not be used unless the condition is corrected.
 - g. Mixers and agitators shall be examined or weighted routinely as frequently as necessary to detect changes in condition due to accumulations of hardened concrete or mortar and examined to detect wear of blades. When such changes are extensive

enough to affect the mixer performance, the proof-tests described in AASHTO M157-93 Annex A1 shall be performed to show whether the correction of deficiencies is required.

- B. Mixing and Delivery. Ready-mixed concrete shall be mixed and delivered to the point designated by the Engineer by means of one of the following combinations of operations, central mixed and truck-mixed concrete. 6-13 Agitators and non-agitating equipment shall only be used for delivering pre-mixed concrete. Mixers and agitators shall be operated within the limits of capacity and speed of rotation designated by the manufacturer of the equipment. 1.
1. Central Mixed Concrete. Concrete that is mixed completely in a stationary mixer and transported to the point of delivery either in a truck agitator, or a truck mixer operating at agitating speed, or in non-agitating equipment approved by the Engineer and meeting the requirements specified herein shall conform to the following:
 - a. The mixing time shall be counted from the time all the solid materials are in the drum.
 - b. The batch shall be so charged into the mixer that some water will enter in advance of the cement and aggregate, and all water shall be in the drum by the end of the first one-fourth of the specified mixing time.
 2. Where no mixer performance tests are made, the acceptable mixing time for mixers having capacities of 1 cubic yard or less shall not be less than 1 minute. For mixers of greater capacity, this minimum shall be increased 15 seconds for each cubic yard or fraction thereof of additional capacity. For mixer performance refer to AASHTO M157-93 Annex A1. 2.
- C. Truck Mixed Concrete is that which is completely mixed in a truck mixer, 70 to 100 revolutions at the mixing speed designated by the manufacturer, to produce the uniformity of concrete indicated in AASHTO M157-93 Annex A1.
1. Concrete uniformity tests shall be made in accordance with AASHTO M157-93 and if requirements for uniformity of concrete indicated in AASHTO M157-93 Annex A1 are not met with 100 revolutions of mixing, after all ingredients, including water, are in the drum, that mixer shall not be used until the condition is corrected.
 2. When satisfactory performance is found in one truck mixer, the performance of mixers of substantially the same design and condition of blades may be regarded as satisfactory. Additional revolutions of the mixer beyond the number found to produce the required uniformity of concrete shall be at a designated agitating speed.
- D. Use of Non-agitating Equipment.
1. Central-mixed concrete may be transported in suitable non-agitating equipment approved by the Engineer. The proportions of the concrete shall be approved by the Engineer and the following limitations shall apply:
 2. Bodies of non-agitating equipment shall be smooth, watertight, metal containers equipped with gates that will permit control of the discharge of the concrete. Covers shall be provided for protection against the weather when required by the Engineer.
 3. The concrete shall be delivered to the site of the work in a thoroughly mixed and uniform mass and discharged with a satisfactory degree of uniformity as prescribed in AASHTO M157-93 Annex A1.
- E. Discharge

1. Time and Rate.
 - a. The time elapsing from the time water is added to the mix until the concrete is in the forms at the site of the work shall not exceed 90 minutes when hauled in truck mixers or truck-agitators, or 30 minutes when concrete is hauled by non-agitating equipment. Concrete not discharged into its final place within 90 minutes (30 minutes when using non-agitating 6-14 equipment) after batching shall be wasted at no additional expense to the State, even if a retarder is used. The rate of discharge of mixed concrete from transit mixers or agitators shall be controlled by the speed of rotation of the drum in the discharge direction with the discharge gate fully open. These limits shall not be exceeded. If the discharge of concrete is accomplished by tilting
2. Retempering.
 - a. Retempering concrete by adding water or by other means will not be permitted until after arrival on the job site and only when delivered in truck mixers. Additional water or admixtures may be added to the batch materials and additional mixing performed to increase the slump or air content to meet the specified requirements, if permitted by the Engineer, and provided that:
 - 1) All these operations are performed within 60 minutes after the initial mixing operation
 - 2) The maximum water-cement ratio is not exceeded,
 - 3) The admixture dosages do not exceed manufacturer's recommendations. If additional water is to be incorporated into the concrete, the drum shall be revolved not less than 30 revolutions at mixing speed immediately after retempering the concrete and before discharge is commenced.
 - 4) All admixtures shall be added at the plant. The Engineer may approve chemical admixture (superplasticizers, air entrainment, etc.) adjustments at the job site by means of a metered, pressurized wand with the exception of silica fume.
 - 5) The manufacturer's recommended dosage shall not be exceeded. If additional admixtures are incorporated into the concrete, the drum shall be revolved not less than 30-to-60 revolutions at mixing speed immediately after retempering the concrete and before discharge is commenced.
 - 6) Concrete that is not within the specified slump or air content limits at the time of placement shall not be used. The Contractor shall assume the responsibility of any concrete retempering at the site as permitted by the Engineer.
 - 7) Retempering with admixtures will be permitted only with the approval of the Engineer or when specifically provided for in the Contract.

3.4 Edge Forms And Screed Construction

- A. Set, brace, and secure edge forms, bulkheads, and intermediate screed guides to required lines, grades, and elevations. Install forms to allow continuous progress of work and so forms can remain in place at least 24 hours after concrete placement.
- B. Clean forms after each use and coat with form-release agent to ensure separation from concrete without damage.

3.5 Joints

- A. General: Construct joints true to line with faces perpendicular to surface plane of concrete.
- B. Joint Fillers: These joints shall consist of load transfer devices, poured joint seal, and expansion joint filler.
 - 1. Upon proper curing concrete sidewalks fill joints with self-leveling sealer that matches the color of the concrete

3.6 Concrete Placement

- A. Before placing concrete, inspect and complete formwork installation, steel reinforcement, and items to be embedded or cast-in. Concrete shall not be placed on soft, muddy, or frozen subgrade or subbase. Also, concrete shall not be placed when subgrade is frozen under adjacent pavement which is to remain in place. Remove snow, ice, or frost from subbase surface and steel reinforcement before placing concrete. Do not place concrete on frozen surfaces.
- B. Moisten subbase to provide a uniform dampened condition at time concrete is placed. Do not place concrete around manholes or other structures until they are at required finish elevation and alignment.
- C. Comply with ACI 301 requirements for measuring, mixing, transporting, and placing concrete.
- D. The concrete shall be deposited on the grade in such manner as to require as little re-handling as possible. Unless truck mixers, truck agitators, or non-agitating hauling equipment are equipped with means for discharge of concrete without segregation of the materials, the concrete shall be unloaded into an approved spreading device and mechanically spread on the grade in such manner to prevent segregation of the materials.
- E. Placing shall be continuous between transverse joints without the use of intermediate bulkheads. Necessary hand spreading shall be done with shovels, not rakes. 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.
- F. Workmen shall not be allowed to walk in the freshly mixed concrete with boots or shoes coated with earth or foreign substances. Where concrete is to be placed adjoining a previously constructed lane of pavement and mechanical equipment will be operated upon the existing lane of pavement, that pavement shall meet the minimum flexural strength of 525 pounds per square inch when tested by the third-point method in accordance with AASHTO T97.
- G. If only finishing equipment is carried on the existing lane, paving in adjoining lanes may be permitted after three days. Concrete shall be thoroughly consolidated against and along the faces of all forms and along the full length and on both sides of all joint assemblies, by means of internal vibrators inserted in the concrete.
- H. Consolidate concrete according to ACI 301 by mechanical vibrating equipment supplemented by hand spading, rodding, or tamping.

1. Consolidate concrete along face of forms and adjacent to transverse joints with an internal vibrator. Keep vibrator away from joint assemblies or side forms. Use only square-faced shovels for hand spreading and consolidation. Consolidate with care to prevent dislocating dowels and joint devices.
- I. Vibrators shall not be permitted to come in contact with a joint assembly, the grade, reinforcement, or a side form. In no case shall the vibrator be operated longer than 10 seconds in any one location. The vibration shall be of sufficient duration to thoroughly consolidate the concrete but not so long as to produce segregation. Concrete shall be deposited as near to expansion and contraction joints as possible without disturbing them, but shall not be dumped from the discharge bucket or hopper onto a joint assembly unless the hopper is well centered on the joint assembly. Should any concrete materials fall on or be worked into the surface of a completed slab, they shall be removed immediately by approved methods.
 - J. Screed paving surface with a straightedge and strike off.
 - K. Commence initial floating using bull floats or darbies to impart an open-textured and uniform surface plane before excess moisture or bleed water appears on the surface. Do not further disturb concrete surfaces before beginning finishing operations or spreading surface treatments.
 - L. Do not add water to concrete during delivery or at Project site. Do not add water to fresh concrete after testing.
 - M. Cold-Weather Placement: Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing, or low temperatures. Comply with ACI 306.1 and the following:
 1. When air temperature has fallen to or is expected to fall below 40 deg F uniformly heat water and aggregates before mixing to obtain a concrete mixture temperature of not less than 50 deg F and not more than 80 deg F 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 specified and approved in design mixtures.
 - N. Hot-Weather Placement: Comply with ACI 301 and as follows when hot-weather conditions exist:
 1. Cool ingredients before mixing to maintain concrete temperature below 90 deg F at time of placement. Chilled mixing water or chopped ice may be used to control temperature, provided water equivalent of ice is calculated in total amount of mixing water. Using liquid nitrogen to cool concrete is Contractor's option.
 2. Cover steel reinforcement with water-soaked burlap so steel temperature will not exceed ambient air temperature immediately before embedding in concrete.
 3. Fog-spray form, steel reinforcement, and subgrade just before placing concrete. Keep subgrade moisture uniform without standing water, soft spots, or dry areas.

3.7 PAVING TOLERANCES

- A. Comply with tolerances in ACI 117 and as follows:
 1. Elevation: 3/4 inch (19 mm).
 2. Thickness: Plus 3/8 inch (10 mm), minus 1/4 inch (6 mm).

3. Surface: Gap below 10-foot- (3-m-) long, unlevelled straightedge not to exceed 1/2 inch (13 mm).
4. Alignment of Tie-Bar End Relative to Line Perpendicular to Paving Edge: 1/2 inch per 12 inches (13 mm per 300 mm) of tie bar.
5. Lateral Alignment and Spacing of Dowels: 1 inch (25 mm).
6. Vertical Alignment of Dowels: 1/4 inch (6 mm).
7. Alignment of Dowel-Bar End Relative to Line Perpendicular to Paving Edge: 1/4 inch per 12 inches of dowel.
8. Joint Spacing: 3 inches.
9. Contraction Joint Depth: Plus 1/4 inch, no minus.
10. Joint Width: Plus 1/8 inch, no minus.

3.8 Finishing

- A. General: Do not add water to concrete surfaces during finishing operations.
- B. Float Finish: Begin the second floating operation when bleed-water sheen has disappeared and concrete surface has stiffened sufficiently to permit operations. Float surface with power-driven floats or by hand floating if area is small or inaccessible to power units. Finish surfaces to true planes. Cut down high spots and fill low spots. Refloat surface immediately to uniform granular texture.
 1. Medium-to-Fine-Textured Broom Finish: Draw a soft-bristle broom across float-finished concrete surface perpendicular to line of traffic to provide a uniform, fine-line texture.

3.9 Concrete Protection and Curing

- A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures.
- B. Comply with ACI 306.1 for cold-weather protection.
- C. Evaporation Retarder: Apply evaporation retarder to concrete surfaces if hot, dry, or windy conditions cause moisture loss approaching 0.2 lb/sq. ft. x h before and during finishing operations. Apply according to manufacturer's written instructions after placing, screeding, and bull floating or darbying concrete but before float finishing.
- D. Begin curing after finishing concrete but not before free water has disappeared from concrete surface.
- E. Curing Methods: Cure concrete by moisture curing, curing compound or a combination of these as follows:
 1. Moisture Curing: Keep surfaces continuously moist for not less than seven 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 12-inch lap over adjacent absorptive covers.

3.10 Field Quality Control

- A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.
- B. Testing Services: Testing of composite samples of fresh concrete obtained according to ASTM C 172 shall be performed according to the following requirements:
 1. Testing Frequency: Obtain at least one composite sample for each 100 cu. yd. or fraction thereof of each concrete mixture placed each day.
 2. Slump: ASTM C 143/C 143M; one test at point of placement for each composite sample, but not less than one test for each day's pour of each concrete mixture. Perform additional tests when concrete consistency appears to change.
 3. Air Content: ASTM C 231, pressure method; one test for each composite sample, but not less than one test for each day's pour of each concrete mixture.
 4. Concrete Temperature: ASTM C 1064/C 1064M; one test hourly when air temperature is 40 deg F and below and when it is 80 deg F and above, and one test for each composite sample.
 5. Compression Test Specimens: ASTM C 31/C 31M; cast and laboratory cure one set of three standard cylinder specimens for each composite sample.
 6. Compressive-Strength Tests: ASTM C 39/C 39M; test one specimen at seven days and two specimens at 28 days.
 - a. A compressive-strength test shall be the average compressive strength from two specimens obtained from same composite sample and tested at 28 days.
- C. Testing: Documentation from an independent laboratory certifying that the aggregate is non-expansive and innocuous must be submitted to the Engineer. An acceptable independent testing laboratory shall conduct each test.
- D. Strength of each concrete mixture will be satisfactory if average of any three consecutive compressive-strength tests equals or exceeds specified compressive strength and no compressive-strength test value falls below specified compressive strength by more than 500 psi.
- E. Test results shall be reported in writing to Engineer, concrete manufacturer, and Contractor within 48 hours of testing. Reports of compressive-strength tests shall contain date of concrete placement, name of concrete testing and inspecting agency, location of concrete batch in Work, design compressive strength at 28 days, concrete mixture proportions and materials, compressive breaking strength, and type of break for both 7- and 28-day tests.
- F. Additional Tests: Testing and inspecting agency shall make additional tests of concrete when test results indicate that slump, air entrainment, compressive strengths, or other requirements have not been met, as directed by Engineer.
- G. Concrete paving will be considered defective if it does not pass tests and inspections.

- H. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.
- I. Prepare test and inspection reports.

3.11 Repairs And Protection

- A. Remove and replace concrete paving that is broken, damaged, or defective or that does not comply with requirements in this Section. Remove work in complete sections from joint to joint unless otherwise approved by Engineer.
- B. Drill test cores, where directed by Engineer, when necessary to determine magnitude of cracks or defective areas. Fill drilled core holes in satisfactory paving areas with Portland cement concrete bonded to paving with epoxy adhesive.
- C. Protect concrete paving 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 paving not more than two days before date scheduled for Substantial Completion inspections.

3.12 Detectable Warning Panels

- A. Panels shall be set flush into fresh unset concrete at the required line and grade to match the running grade and cross slope of the ADA accessible ramp or blended transition that warranted the installed panel. The Contractor shall ensure that the alignment of the panel will match line and grade of the ramp such that the panel is flush with the ramp, and there is no physical conflict with other castings, fittings, structures, foundations or appurtenance thereof.

END OF SECTION

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SECTION 32 16 00 - CURBING

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.

1.2 Summary

- A. This Section includes the following:
 - 1. Granite Curbing.
- B. Related Sections include the following:
 - 1. Section 31 20 00 "Earth Moving"

1.3 Submittals

- A. Material Certification:
 - 1. For granite curb, certifying material meets the Specification requirements.

1.4 Quality Assurance

- A. Where "Standard Specifications" is used, it shall mean "Rhode Island Department of Transportation Standard Specifications for Road and Bridge Construction, Amended March 2018" and issued supplements.

PART 2 - PRODUCTS

2.1 General

- A. All material shall be new and provided by the Contractor unless otherwise stated herein or approved by the Owner or Engineer.

2.2 Materials

- A. Granite Curb:
 - 1. In accordance with Subsection M.09.01 of the Standard Specifications.
 - 2. Top surface to be dressed by saw. Remainder to be quarry split.
 - 3. Exposed edges to have 1/2" chamfer.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

- A. Excavate, prepare foundation, set curb, and point joints in accordance with Subsection 906.03.1 of the Standard Specifications and Section 31 20 00 "Earth Moving".
 - 1. Install gravel borrow subbase in accordance with Section 31 20 00 "Earth Moving".
 - 2. Install curbing as indicated on the Contract Drawings and as recommended by manufacturer.
 - 3. Provide transition curbing for driveways and handicap ramps, and where indicated on the Contract Drawings.
 - 4. Curb reveal to match curb reveal of adjacent curbing.

- B. Granite curbing:
 - 1. The contractor may cut existing curb sections where old curbing is being reused.

3.2 INSTALLATION TOLERANCES

- A. Curb Alignment:
 - 1. 1/4-inch maximum, as determined by using a 10-foot straight edge along front face of curb.

END OF SECTION

SECTION 32 18 16 - PLAYGROUND RUBBERIZED SURFACING

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.

1.2 Summary

- A. Section Includes:
 - 1. Poured in place rubberized seamless surfacing.
- B. Related Sections:
 - 1. Section 31 00 00 "Earth Moving" for filling and grading and subbase courses].
 - 2. Section 33 42 11 "Stormwater Gravity Piping" for playground subdrainage system.
 - 3. Section 32 12 16 "Asphalt Paving" for substrate adhering

1.3 Definitions

- A. Critical Height: Standard measure of shock attenuation. According to CPSC No. 325, this means "the fall height below which a life-threatening head injury would not be expected to occur."
- B. SBR: Styrene-butadiene rubber.

1.4 Performance Requirements

- A. Impact Attenuation: According to ASTM F 1292.
- B. Accessibility of Surface Systems: According to ASTM F 1951.
- C. Minimum Characteristics for Organic Loose-Fill Surfaces: According to ASTM F 2075.

1.5 Action Submittals

- A. Product Data: Submit manufacturer's product data and installation instructions.
- B. Shop Drawings: For each playground surface system, include materials, plans, cross sections, drainage, installation, and edge termination. Shop Drawings to include patterns made by varying colors of surfacing. Include details of graphics.
- C. Samples for Initial Selection:

1. Include similar Samples of playground surface system and accessories involving color selection.
- D. Samples for Verification: For each type of playground surface system indicated.
 1. Minimum 9-by-9-inch Sample of rubberized playground surfacing and color.
- E. Certification of Installer: Submit certification of qualifications of playground surfacing installer.

1.6 Informational Submittals

- A. Coordination Drawings: Plans, drawn to scale, on which the following items are shown and coordinated with each other, using input from Installers of the items involved:
 1. Extent of surface systems and use zones for equipment.
 2. Critical heights for playground surfaces and fall heights for equipment.
- B. Qualification Data: For qualified testing agency.
- C. Material Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for each loose-fill playground surface system.
- D. Product Certificates: For each type of unitary synthetic playground surface system, from manufacturer.
- E. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for each unitary synthetic playground surface system.
- F. Field quality-control reports.
- G. Warranty: Sample of special warranty.

1.7 Closeout Submittals

- A. Maintenance Data: For playground surface system to include in maintenance manuals.

1.8 Quality Assurance

- A. Installer Qualifications: Utilize an installer approved and trained by the manufacturer of the playground surfacing system, having experience with other projects of the scope and scale of the work described in this section.
- B. B. Certifications: Certification by manufacturer that installer is an approved applicator of the playground surfacing system
- C. Source Limitations: Obtain playground surface system materials, including primers and binders, from single source from single manufacturer.

1. Provide secondary materials including adhesives, primers, geosynthetics, and repair materials of type and from source recommended by manufacturer of playground surface system materials.
- D. Standards and Guidelines: Comply with CPSC No. 325, "Handbook for Public Playground Safety"; ASTM F 1292; and ASTM F 1487.

1.9 Project Conditions

- A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit playground surface system installation to be performed according to manufacturers' written instructions and warranty requirements.

1.10 Warranty

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of playground surface system that fail in materials or workmanship within specified warranty period.
 1. Failures include, but are not limited to, the following:
 - a. Reduction in impact attenuation.
 - b. Deterioration of surface and other materials beyond normal weathering.
 2. Warranty Period: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 POURED IN PLACE RUBBERIZED PLAY SURFACING

- A. Surface System: Poured-in-place, two-layer system with wearing course over cushion course. Provide manufacturer's standard thickness for each layer as required for overall thickness indicated, tested for impact attenuation according to ASTM F 1292 and for accessibility according to ASTM F 1951.
 1. Products: Subject to compliance with requirements, provide the following or approved equal:
 - a. Surface America Incorporated; Play Bound Poured-in-Place or approved equal.
 - 1) Cheektowaga NY 1-800-999-0555 www.surfaceamerica.com
 2. Wearing Course: Formulation of EPDM rubber particles, with minimum of 20 percent and maximum of 26 percent of ethylene propylene-diene-saturated polymethylene main chain along with other organic and inorganic components.
 3. Cushion Course: Manufacturer's standard formulation of SBR particles and polyurethane, site mixed and applied.
 4. Binder: Weather-resistant, UV-stabilized, flexible, nonhardening, 100 percent solids polyurethane complying with requirements of authorities having jurisdiction for nontoxic and low VOC content.

5. Lacquer Top Coat: Manufacturer's standard polyurethane-based formulation.
 6. Critical Height: Per manufacturer's play equipment
 7. Overall Thickness: Not less than as required for critical height indicated] per playground equipment manufacturer.
 8. Primer/Adhesive: Manufacturer's standard primer and weather-resistant, moisture-cured polyurethane adhesive suitable for unit, substrate, and location indicated.
 9. Wearing Course Color(s): As selected by Engineer from manufacturer's full range of colors
 - a. Color and Pattern : As indicated on Drawings.
- B. Leveling and Patching Material: Portland cement-based grout or epoxy- or polyurethane-based formulation suitable for exterior use and approved by playground surface system manufacturer.

PART 3 - EXECUTION

3.1 Examination

- A. Examine substrates and conditions, with Installer present, for compliance with requirements for maximum moisture content, subgrade and substrate conditions, drainage, and other conditions affecting performance of the Work.
- B. Hard-Surface Substrates: Verify that substrates are satisfactory for unitary playground surface system installation and that substrate surfaces are dry, cured, and sloped to drain within recommended tolerances according to playground surface system manufacturer's written requirements for cross-section profile.
 1. Asphalt Substrates: Verify that substrates are dry, sufficiently cured to bond with adhesive, free from surface defects, and free of dust, dirt, loose particles, grease, oil, and other contaminants incompatible with playground surface system or that may interfere with adhesive bond.
 2. Concrete Substrates: Verify that substrates are dry, free from surface defects, and free of laitance, glaze, efflorescence, curing compounds, form-release agents, hardeners, dust, dirt, loose particles, grease, oil, and other contaminants incompatible with playground surface system or that may interfere with adhesive bond. Determine adhesion, dryness, and acidity characteristics by performing procedures recommended in writing by playground surface system manufacturer.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 Preparation

- A. General: Prepare substrates to receive surfacing products according to playground surface system manufacturer's written instructions. Verify that substrates are sound and without high spots, ridges, holes, and depressions.

- B. Asphalt Substrates: Provide sound surface free of laitance, efflorescence, curing compounds, and other contaminants incompatible with playground surface system.
 - 1. Repair unsatisfactory surfaces and fill holes and depressions.
 - 2. Mechanically scarify or otherwise prepare concrete substrates to achieve recommended degree of roughness.
 - 3. Saw cut asphalt for terminal edges of playground surface systems as indicated.
 - 4. Treat control joints and other nonmoving substrate cracks to prevent telegraphing through playground surface system.

3.3 Installation, General

- A. General: Comply with playground surface system manufacturer's written installation instructions. Install playground surface system over area and in thickness indicated.

3.4 Installation Of Poured in Place Rubberized Playground Surface Systems

- A. Seamless Surface: Mix and apply components of playground surface system according to manufacturer's written instructions to produce a uniform, monolithic wearing surface and impact-attenuating system of total thickness indicated.
 - 1. Substrate Primer: Apply over prepared substrate at manufacturer's standard spreading rate for type of substrate.
 - 2. Poured Cushion Course: Spread evenly over primed substrate to form a uniform layer applied at manufacturer's standard spreading rate in one continuous operation, with a minimum of cold joints.
 - 3. Intercoat Primer: Over cured cushion course, apply primer at manufacturer's standard spreading rate.
 - 4. Wearing Course: Spread over primed base course to form a uniform layer applied at manufacturer's standard spreading rate in one continuous operation and, except where color changes. Finish surface to produce manufacturer's standard wearing-surface texture.
 - a. Where colored pattern and graphic indicated, place adjacent colored material as soon as placed colored material is sufficiently cured, using primer or adhesive if required by manufacturer's written instructions.
 - 5. Lacquer Topcoat: Spray or roller applied at manufacturer's standard coating rate in one continuous operation.
 - 6. Edge Treatment: As indicated. Fully adhere edges to substrate with full coverage of substrate. Maintain fully cushioned thickness required to comply with safety performance requirements.

3.5 Field Quality Control

- A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.

- B. Testing Services: Testing and inspecting of completed applications of playground surface system shall take place according to ASTM F 1292.
- C. Remove and replace applications of playground surface system where test results indicate that it does not comply with requirements.
- D. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with requirements.

3.6 Protection

- A. Prevent traffic over system for not less than 48 hours after installation.

END OF SECTION

SECTION 32 31 19 – DECORATIVE METAL FENCE

PART 1 - GENERAL

1.1 Related Documents

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 Summary

- B. Section Includes:
 - 1. Decorative Metal Fence
- C. Related Requirements:
 - 1. Section 31 00 00 “Earthwork”.
 - 2. Section 32 05 23 “Cement and Concrete for Exterior Improvements”
 - 3. Section 32 16 00 “Curbing”

1.3 Action Submittals

- A. Product Data: Provide manufacturer's standard catalog details for specified products demonstrating compliance with referenced standards. Provide list of fittings being provided with descriptions and either photographs or drawings for each type.
- B. Shop Drawings: Submit Shop Drawings for fabrication and installation. Include the following:
 - 1. Plans, elevations, and detail sections showing sizes, critical dimensions, panel layout constraints and details and locations of accessories.
 - 2. Indicate materials, methods, finishes, fittings, fasteners, anchorages, and accessory items.

1.4 Quality Assurance

- A. Installer Qualifications: Fabricator of products.
- B. Mockups: Build mockups to verify selections made under Sample submittals, to demonstrate aesthetic effects, and to set quality standards for fabrication and installation.
 - 1. Include 6-foot length of fence complying with requirements.
 - 2. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.5 Delivery, Storage and Handling

- A. Protect materials from damage. Store panels flat. Provide edge protection when strapping is used. Do not apply loads to panel edges.
- B. Inspect products upon delivery in order to submit timely freight claim for any damaged materials.
- C. Store products in manufacturer's packaging until ready for installation.
- D. Handle and store products according to manufacturer's recommendations. Leave products wrapped or otherwise protected and under clean and dry storage conditions until required for installation.
- E. Exercise care not to scratch, mark, dent or bend metal components during delivery, storage and installation.

1.6 Project Conditions

- A. Verify actual openings by field measurements before fabrication; show recorded measurements on shop drawings.
- B. Coordinate field measurements and fabrication schedule with construction progress to avoid construction delays.

PART 2 - PRODUCTS

2.1 Decorative Metal Fence

- A. Decorative Metal Fence
 - 1. Material: Steel
 - 2. Manufacturer:
 - a. Ameristar Perimeter Security, Tulsa, OK Phone: 1-888-333-3422
web: ameristarperimeter.com, Or Approved Equal.
 - 3. Style: Montage Plus Majestic
 - 4. Height: 48"
 - 5. Pickets: ¾ Inch square
 - 6. Post Cap: Manufacturer's standard
 - 7. Finish: Manufacturer's standard galvanized steel with two-coat epoxy powder coating.
 - a. Color: Black
- B. Fasteners: Manufacturer's standard concealed fastening system.

2.2 Miscellaneous Products

- A. Non-shrink Grout: Factory-packaged, non-staining, noncorrosive, nongaseous waterproof grout complying with ASTM C 1107 / C 1107M and specifically recommended by manufacturer for exterior applications.

PART 3 - EXECUTION

3.1 Examination

- A. Examine areas and conditions, with Installer present, for compliance with requirements for site clearing, earthwork, pavement work, construction layout, and other conditions affecting performance of the Work.
- B. Do not begin installation before final grading is completed unless otherwise permitted by Engineer.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 Preparation

- A. Mark locations of fence lines and terminal posts.

3.3 Decorative Metal Fence Installation

- A. Install fences according to manufacturer's written instructions
- B. Install fences by setting posts as indicated and fastening rails and infill panels to posts. Peen threads of bolts after assembly to prevent removal.
- C. Post Excavation: Drill post holes at specified spacing in concrete seat wall.
- D. Post Setting: Set posts in post holes.
 - 1. Verify that posts are set plumb, aligned and hold in position during setting.
 - 2. Non-shrink Grout: Evenly place non-shrink grout around posts.

3.4 Adjusting and Cleaning

- A. Remove temporary coverings and protection of adjacent work areas. Clean installed products in accordance with manufacturer's instructions before Owner's acceptance.
- B. Do not use abrasive cleaners.
- C. Remove from project site and legally dispose of construction debris associated with this work.

3.5 Protection

- A. Protect installed products until completion of Project.

- B. Touch-up, repair or replace damaged products before Substantial Completion.
- C. Protect installed products and finished surfaces from damage during construction.
- D. Replace defective or damaged components as directed by Landscape Architect.

END OF SECTION

SECTION 32 33 00 – SITE FURNISHINGS

PART 1 - GENERAL

1.1 Summary

- A. Section Includes:
 - 1. Site Bench-Add Alt
 - 2. Curvilinear Playground Bench
 - 3. Café Table with Seats
- B. Related Requirements:
 - 1. Section 31 00 00 “Earthwork”.
 - 2. Section 32 05 23 “Cement and Concrete for Exterior Improvements”
 - 3. Section 32 13 13 “ Concrete Paving”

1.2 Action Submittals

- A. Product Data: For each type of product.
- B. Product Schedule: For site furnishings use same designations indicated on Drawings.
- C. Shop Drawings: For each of the furnishings listed

PART 2 - PRODUCTS

2.1 Furnishings

- A. Site Bench-Add Alt
 - 1. Material: Steel
 - 2. Manufacturer:
 - a. Victor Stanley Site Furnishings, Dunkirk, MD Phone: 1-800-368-2573
web: victorstanley.com Or Approved Equal.
 - 3. Model: Steel Sites RB Collection
 - 4. Length: 4 foot
 - 5. Mount: Surface Mount with Stainless Steel Anchors
 - 6. Finish/Color: Power Coated Black

- B. Curvilinear Playground Bench
 - 1. Material: Red Cedar with Powder Coated Black Posts
 - 2. Manufacturer:
 - a. SITECRAFT Astoria, NY 11105 PH: 1-800-937-0203 www.site-craft.com
 - 3. Model: Standard Circular-YF
 - 4. Dimensions: Refer to specified length, radius and height on detail sheet.
 - 5. Mount: Embedded post per manufacturers detail
 - 6. Finish/Color: Power Coated Black with Red Cedar wood slat seat top.

- C. Café Table with Seats
 - 1. Material: Steel
 - 2. Manufacturer:
 - a. Dumor Site Furnishings, Mifflintown, PA Phone: 1-800-598-4018 web: www.dumor.com
 - 3. Model: Bike Rack 290
 - 4. Mount: Surface Mount
 - 5. Finish/Color: Power Coated. Color to be selected by Owner/Architect

PART 3 - EXECUTION

3.1 Examination

- A. Examine areas and conditions for compliance with requirements for correct and level finished grade, mounting surfaces, installation tolerances, and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 Installation

- A. Comply with manufacturer's written installation instructions unless more stringent requirements are indicated. Complete field assembly of site furnishings where required.
- B. Unless otherwise indicated, install site furnishings after landscaping and paving have been completed.
- C. Install site furnishings level, plumb, true, and securely anchored at locations indicated on Drawings.

END OF SECTION

SECTION 32 92 00 – LOAM AND SEEDING

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.

1.2 Summary

- A. Section includes, but is not limited to, the following:
 - 1. Seeding
 - 2. Hydroseeding
 - 3. Turf renovation
 - 4. Topsoil
- B. Related Sections include the following:
 - 1. Section 31 11 00 – Site Clearing
 - 2. Section 31 00 00 – Earthmoving

1.3 Definitions

- A. Duff Layer: The surface layer of native topsoil that is composed of mostly decayed leaves, twigs, and detritus.
- B. Finish Grade: Elevation of finished surface of planting soil.
- C. Pesticide: A substance or mixture intended for preventing, destroying, repelling, or mitigating a pest. Pesticides include insecticides, miticides, herbicides, fungicides, rodenticides, and molluscicides. They also includes substances or mixtures intended for use as a plant regulator, defoliant, or desiccant.
- D. Pests: Living organisms that occur where they are not desired or that cause damage to plants, animals, or people. Pests include insects, mites, grubs, mollusks (snails and slugs), rodents (gophers, moles, and mice), unwanted plants (weeds), fungi, bacteria, and viruses.
- E. Planting Soil: Existing, on-site topsoil; imported topsoil; or manufactured topsoil that has been modified with soil amendments and perhaps fertilizers to produce a soil mixture best for plant growth.
- F. Subgrade: The surface or elevation of subsoil remaining after excavation is complete, or the top surface of a fill or backfill before planting soil is placed.
- G. Subsoil: All soil beneath the topsoil layer of the soil profile, and typified by the lack of organic matter and soil organisms.

- H. Surface Soil: Soil that is present at the top layer of the existing soil profile at the Project site. In undisturbed areas, the surface soil is typically topsoil, but in disturbed areas such as urban environments, the surface soil can be subsoil.

1.4 Submittals

- A. Qualification Data: For landscape Installer.
- B. Certification of Grass Seed: From seed vendor for each grass-seed monostand or mixture, stating the botanical and common name, percentage by weight of each species and variety, and percentage of purity, germination, and weed seed. Include the year of production and date of packaging.
 - 1. Certification of each seed mixture for turfgrass sod. Include identification of source and name and telephone number of supplier.
 - 2. Manufacturer's recommendation of seed application rate for each seed mixture.
- C. Product Certificates: For fertilizers, from manufacturer.
- D. Pesticides and Herbicides: Product label and manufacturer's application instructions specific to Project.
- E. Maintenance Instructions: Recommended procedures to be established by Owner for maintenance of turf during a calendar year. Submit before expiration of required maintenance periods.
- F. Material Test Reports: For existing native surface topsoil, and imported or manufactured topsoil including the following:
 - 1. Sieve analysis
 - 2. Organic constituent analysis
 - 3. Acidity-alkalinity test (pH)
 - 4. Soluble salts
 - 5. Percentage tests for the following:
 - a. Nitrogen (N)
 - b. Phosphoric Acid (P₂O₅)
 - c. Potash (K₂O)
 - 6. Percentages by volume for sand, silt, and clay.
- G. Material Test Reports - Chemical Analysis: As specified in Section 31 23 00 - Earthwork.
- H. Soil/Material Origin: As specified in Section 31 23 00 - Earthwork.

1.5 Quality Assurance

- A. Installer Qualifications: A qualified landscape installer whose work has resulted in successful turf establishment.
 - 1. Pesticide Applicator: State licensed, commercial.

- B. Topsoil analysis shall provide gradation of sand, silt, and clay content; cation exchange capacity, deleterious material; pH; and mineral and plant-nutrient content of topsoil.
- C. Report suitability of topsoil for lawn growth. State recommended quantities of nitrogen, phosphorus and potash nutrients and soil amendments to be added to produce a satisfactory topsoil.

1.6 Delivery, Storage, and Handling

- A. Seed and Other Packaged Materials: Deliver packaged materials in original, unopened containers showing weight, certified analysis, name and address of manufacturer, and indication of compliance with state and Federal laws, as applicable.
- B. Bulk Materials:
 - 1. Do not dump or store bulk materials near structures, utilities, walkways and pavements, or on existing turf areas or plants.
 - 2. Provide erosion-control measures to prevent erosion or displacement of bulk discharge of soil-bearing water runoff; and airborne dust reaching adjacent water conveyance systems, or walkways.
 - 3. Accompany each delivery of bulk materials with appropriate certificates.

1.7 Schedule

- A. Planting Restrictions: Plant during one of the following periods. Coordinate planting periods with initial maintenance periods to provide required maintenance from date of Substantial Completion
 - 1. Spring Planting: April 1 to June 1.
 - 2. Fall Planting: August 15 to October 15.
- B. Weather Limitations: Proceed with planting only when existing and forecasted weather conditions permit planting to be performed when beneficial and optimum results may be obtained. Apply products during favorable weather conditions according to manufacturer's written instructions.

1.8 Lawn Maintenance

- A. Turf Maintenance Service: Provide full maintenance by skilled employees of landscape Installer. Maintain as required in "Turf Maintenance" Article. Begin maintenance immediately after each area is planted and continue until acceptable turf is established, but for not less than the following periods:
 - 1. Seeded Turf: 60 days from date of Substantial Completion.
 - a. When initial maintenance period has not elapsed before end of planting season, or if turf is not fully established, continue maintenance during next planting season.
- B. Maintain and establish lawn by watering, fertilizing, weeding, mowing, trimming, replanting, and other operations. Roll, re-grade, and replant bare or eroded areas and re-mulch to produce a uniformly smooth lawn.
- C. Watering: Provide and maintain temporary piping, hoses, and lawn-watering equipment to convey water from sources and to keep lawn uniformly moist to a depth of 4 inches.

1. Schedule watering to prevent wilting, puddling, erosion, and displacement of seed or mulch. Lay out temporary watering system to avoid walking over muddy or newly planted areas.
2. Water lawn at a minimum rate of 1 inch per week.

PART 2 - PRODUCTS

2.1 Topsoil

- A. Topsoil: ASTM D5268, pH range of 5.5 to 7, a minimum of 6 percent organic material content; free of stones 1 inch or larger in any dimension and other extraneous materials harmful to plant growth.
 1. Topsoil Source: Reuse surface soil stockpiled on-site. Verify suitability of stockpiled surface soil to produce topsoil. Clean surface soil of roots, plants, sod, stones, clay lumps, and other extraneous materials harmful to plant growth.
 - a. Supplement with imported or manufactured topsoil from off-site sources when quantities are insufficient. Obtain topsoil displaced from naturally well-drained construction or mining sites where topsoil occurs at least 4 inches deep; do not obtain from agricultural land, bogs or marshes.
 2. Topsoil Source: Import topsoil or manufactured topsoil from off-site sources. Obtain topsoil displaced from naturally well-drained construction or mining sites where topsoil occurs at least 4 inches deep; do not obtain from agricultural land, bogs or marshes.
 3. Comply with chemical analysis and soil/material origin requirements specified in Section 31 23 00.

2.2 Lawn Seed Mix

- A. Grass Seed: Fresh, clean, dry, new-crop seed complying with AOSA's "Journal of Seed Technology; Rules for Testing Seeds" for purity and germination tolerances. Seed shall not contain in excess of 2.5% weed seed. Seed containing prohibited or restricted noxious weeds will not be accepted, and shall comply with state laws governing noxious weeds. The following noxious weeds are prohibited from any mix: Bindweed, Canada Thistle, Quackgrass, Hedge Kind Weed, Horse Nettle, Wild Garlic, Bermuda Grass, cheat, Wild Onion, Johnsongrass, Perennial Sweet Sudan Grass, Sorghum hybrids.
- B. Seed Mixture for Finished Lawn Areas:
 - C. 50% Creeping Red Fescue
 - D. 30% Transist 2600 Intermediate Ryegrass
 - E. 10% Kentucky Bluegrass
 - F. 10% Chewings Fescue
- G. Seed may be mixed by an approved method on the site. If the seed is mixed on the site, each variety shall be delivered in the original containers, which shall bear the dealer's guaranteed analysis.

2.3 Soil Amendments

- A. Compost: Well-composted, stable, and weed-free organic matter, pH range of 5.5 to 8; moisture content 35 to 55 percent by weight; 100 percent passing through **3/4-inch** sieve; soluble salt content of 5 to 10 decisiemens/m; not exceeding 0.5 percent inert contaminants and free of substances toxic to plantings.
- B. Organic Matter Content: 50 to 60 percent of dry weight.
- C. Lime: ASTM C 602, agricultural limestone containing a minimum 80 percent calcium carbonate equivalent and as follows:
 - 1. Provide lime in form of dolomitic limestone, Class S, with a minimum of 95 percent passing a **No. 100** sieve.
- D. Perlite: Horticultural perlite, soil amendment grade.
- E. Sand: Clean, washed, natural or manufactured, free of toxic materials.

2.4 Fertilizer

- A. Commercial Fertilizer: Commercial-grade complete fertilizer of neutral character, consisting of fast- and slow-release nitrogen, 50 percent derived from natural organic sources of urea formaldehyde, phosphorous, and potassium in the following composition:
 - 1. Composition: Nitrogen, phosphorous, and potassium in amounts recommended in soil reports from a qualified soil-testing laboratory.
- B. Slow-Release Fertilizer: Granular or pelleted fertilizer consisting of 50 percent water-insoluble nitrogen, phosphorus, and potassium in the following composition:
 - 1. Composition: Nitrogen, phosphorous, and potassium in amounts recommended in soil reports from a qualified soil-testing laboratory.

2.5 Mulches

- A. Straw Mulch: Provide air-dry, clean, mildew- and seed-free, salt hay or threshed straw of wheat, rye, oats, or barley.
- B. Fiber Mulch: Biodegradable, dyed-wood, cellulose-fiber mulch; nontoxic; free of plant-growth or germination inhibitors; with maximum moisture content of 15 percent and a pH range of 4.5 to 6.5.
- C. Nonasphaltic Tackifier: Colloidal tackifier recommended by fiber-mulch manufacturer for slurry application; nontoxic and free of plant-growth or germination inhibitors.

PART 3 - EXECUTION

3.1 Examinations

- A. Examine areas to be planted for compliance with requirements and other conditions affecting installation and performance of the Work.
 - 1. Verify that no foreign or deleterious material or liquid such as paint, paint washout, concrete slurry, concrete layers or chunks, cement, plaster, oils, gasoline, diesel fuel, paint thinner, turpentine, tar, roofing compound, or acid has been deposited in soil within a planting area.
 - 2. Suspend planting operations during periods of excessive soil moisture until the moisture content reaches acceptable levels to attain the required results.
 - 3. Uniformly moisten excessively dry soil that is not workable or which is dusty.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.
- C. If contamination by foreign or deleterious material or liquid is present in soil within a planting area, remove the soil and contamination as directed by Engineer and replace with new planting soil.

3.2 Preparation

- A. Protect structures; utilities; sidewalks; pavements; and other facilities, trees, shrubs, and plantings from damage caused by planting operations.
 - 1. Protect adjacent and adjoining areas from hydroseeding and hydromulching overspray.
 - 2. Protect grade stakes set by others until directed to remove them.
- B. Install erosion-control measures to prevent erosion or displacement of soils and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways.

3.3 Turf Area Preparation

- A. Limit turf subgrade preparation to areas to be planted.
- B. Newly Graded Subgrades: Loosen subgrade to a minimum depth of 6 inches. Remove stones larger than 1 inch in any dimension and sticks, roots, rubbish, and other extraneous matter and legally dispose of them off Owner's property.
 - 1. Spread planting soil to a depth of 6 inches but not less than required to meet finish grades after light rolling and natural settlement. Do not spread if planting soil or subgrade is frozen, muddy, or excessively wet.
 - a. Spread approximately 1/2 the thickness of planting soil over loosened subgrade. Mix thoroughly into top 2 inches of subgrade. Spread remainder of planting soil.
- C. Unchanged Subgrades: If turf is to be planted in areas unaltered or undisturbed by excavating, grading, or surface-soil stripping operations, prepare surface soil as follows:
 - 1. Remove existing grass, vegetation, and turf. Do not mix into surface soil.
 - 2. Loosen surface soil to a depth of at least 6 inches. Apply soil amendments and fertilizers according to planting soil mix proportions and mix thoroughly into top 4 inches of soil. Till soil to a homogeneous mixture of fine texture.

3. Remove stones larger than 1 inch in any dimension and sticks, roots, trash, and other extraneous matter.
 4. Legally dispose of waste material, including grass, vegetation, and turf, off Owner's property.
- D. Finish Grading: Grade planting areas to a smooth, uniform surface plane with loose, uniformly fine texture. Grade to within plus or minus 1/2 inch of finish elevation. Roll and rake, remove ridges, and fill depressions to meet finish grades. Limit finish grading to areas that can be planted in the immediate future.
- E. Moisten prepared area before planting if soil is dry. Water thoroughly and allow surface to dry before planting. Do not create muddy soil.
- F. Before planting, obtain Engineer's acceptance of finish grading; restore planting areas if eroded or otherwise disturbed after finish grading.

3.4 Seeding

- A. Sow seed with spreader or seeding machine. Do not broadcast or drop seed when wind velocity exceeds 5 MPH.
1. Evenly distribute seed by sowing equal quantities in two directions at right angle to each other.
 2. Do not use wet seed or seed that is moldy or otherwise damaged.
 3. Do not seed against existing trees. Limit extent of seed to outside edge of planting saucer.
- B. Sow seed at a rate per manufacturer's specifications.
- C. Rake seed lightly into top 1/8 inch (3 mm) of soil, roll lightly, and water with fine spray.
- D. Protect seeded areas with slopes exceeding 1:6 and where indicated on Drawings with erosion-control blankets installed and stapled according to manufacturer's written instructions.
- E. Protect seeded areas with slopes not exceeding 1:6 by spreading straw mulch. Spread uniformly at a minimum rate of 2 tons/acre (42 kg/92.9 sq. m) to form a continuous blanket 1-1/2 inches (38 mm) in loose thickness over seeded areas. Spread by hand, blower, or other suitable equipment.
1. Anchor straw mulch by crimping into soil with suitable mechanical equipment.

3.5 Hydroseeding

- A. Hydroseeding: Mix specified seed, fertilizer, and fiber mulch in water, using equipment specifically designed for hydroseed application. Continue mixing until uniformly blended into homogeneous slurry suitable for hydraulic application.
1. Mix slurry with nonasphaltic tackifier.
 2. Spray-apply slurry uniformly to all areas to be seeded in a one-step process. Apply slurry at a rate so that mulch component is deposited at not less than 1500-lb/acre (15.6-kg/92.9 sq. m) dry weight, and seed component is deposited at not less than the specified seed-sowing rate.

3.6 Turf Renovation

- A. Renovate existing turf where indicated.
- B. Renovate turf damaged by Contractor's operations, such as storage of materials or equipment and movement of vehicles.
 - 1. Reestablish turf where settlement or washouts occur or where minor regrading is required.
 - 2. Install new planting soil as required.
- C. Remove sod and vegetation from diseased or unsatisfactory turf areas; do not bury in soil.
- D. Remove topsoil containing foreign materials, such as oil drippings, fuel spills, stones, gravel, and other construction materials resulting from Contractor's operations, and replace with new planting soil.
- E. Mow, dethatch, core aerate, and rake existing turf.
- F. Remove weeds before seeding. Where weeds are extensive, apply selective herbicides as required. Do not use pre-emergence herbicides.
- G. Remove waste and foreign materials, including weeds, soil cores, grass, vegetation, and turf, and legally dispose of them off Owner's property.
- H. Till stripped, bare, and compacted areas thoroughly to a soil depth of 6 inches (150 mm).
- I. Apply soil amendments and initial fertilizer required for establishing new turf and mix thoroughly into top 4 inches (100 mm) of existing soil. Install new planting soil to fill low spots and meet finish grades.
- J. Apply seed and protect with straw mulch as required for new turf.
- K. Water newly planted areas and keep moist until new turf is established.

3.7 SATISFACTORY LAWNS

- A. Satisfactory Seeded Lawn: At end of maintenance period, a healthy, uniform, close stand of grass has been established, free of weeds and surface irregularities, with coverage exceeding 90 percent over any 10 sq. ft. and bare spots not exceeding 3 by 3 inches.
- B. Reestablish lawns that do not comply with requirements and continue maintenance until lawns are satisfactory.

3.8 Clean-up and Protection

- A. Promptly remove soil and debris created by turf work from paved areas. Clean wheels of vehicles before leaving site to avoid tracking soil onto roads, walk, or other paved areas.

- B. Remove surplus soil and waste material, including excess subsoil, unsuitable soil, trash, and debris, and legally dispose of them off Owner's property.
- C. Erect temporary fencing or barricades and warning signs as required to protect newly planted areas from traffic. Maintain fencing and barricades throughout initial maintenance period and remove after plantings are established.
- D. Remove non-degradable erosion-control measures after grass establishment period.

END OF SECTION

SECTION 32 93 00 - PLANTS

PART 1 - GENERAL

1.1 Summary

- A. This Section includes the following:
 - 1. Trees
 - 2. Shrubs
 - 3. Perennials / Ornamental Grasses / Groundcovers

- B. Related Sections include the following:
 - 1. Section 01 57 13 "Temporary Erosion and Sedimentation Control"
 - 2. Section 31 00 00 "Earth Moving"
 - 3. Section 31 10 00 "Site Clearing"
 - 4. Section 32 92 00 "Loam and Seeding"

1.2 Definitions

- A. Balled and Burlapped Stock: Exterior plants dug with firm, natural balls of earth in which they are grown, with ball size not less than diameter and depth recommended by ANSI Z60.1 for type and size of tree or shrub required; wrapped, tied, rigidly supported, and drum-laced as recommended by ANSI Z60.1.

- B. Container-Grown Stock: Healthy, vigorous, well-rooted plants grown in a container, with a well-established root system reaching sides of container and maintaining a firm ball when removed from container. Container shall be rigid enough to hold ball shape and protect root mass during shipping and be sized according to ANSI Z60.1 for type and size of plant required.

- C. Finish Grade: Elevation of finished surface of planting topsoil.

- D. Planting Area: Areas to be planted.

- E. Planting Soil: Standardized topsoil; existing, native surface topsoil; existing, in-place surface soil; imported topsoil; or manufactured topsoil that is modified with soil amendments and perhaps fertilizers to produce a soil mixture best for plant growth.

- F. Subgrade: The surface or elevation of subsoil remaining after excavation is complete, or the top surface of a fill or backfill before planting soil is placed.

1.3 Coordination

- A. Coordination with Turf Areas (Lawns): Plant trees, shrubs, and other plants after finish grades are established and before planting turf areas unless otherwise indicated.
 - 1. When planting trees, shrubs, and other plants after planting turf areas, protect turf areas, and promptly repair damage caused by planting operations.

1.4 Submittals

- A. Product Data: For each type of product indicated.
 - 1. Plant Materials: Include quantities, sizes, quality, and sources for plant materials.
 - 2. Plant Photographs: Include color photographs in digital format of each required species and size of plant material as it will be furnished to Project. Take photographs from an angle depicting true size and condition of the typical plant to be furnished. Include a scale rod or other measuring device in each photograph. For species where more than 20 plants are required, include a minimum of three photographs showing the average plant, the best quality plant, and the worst quality plant to be furnished. Identify each photograph with the full scientific name of the plant, plant size, and name of the growing nursery.
- B. Product Certificates: For each type of manufactured product, signed by product manufacturer, and complying with the following:
 - 1. Manufacturer's certified analysis for standard products.
 - 2. Analysis of other materials by a recognized laboratory made according to methods established by the Association of Official Analytical Chemists, where applicable.
- C. Qualification Data: For landscape Installer. Include list of similar projects completed by Installer demonstrating Installer's capabilities and experience. Include project names, addresses, and year completed, and include names and addresses of owners' contact persons.
- D. Material Test Reports:
 - 1. For existing surface topsoil. Refer to specification 32 92 00 "Loam and Seeding".
 - 2. For imported planting soil.
 - a. Sieve analysis
 - b. Organic constituent analysis
 - c. Microorganism content
 - d. Acidity-alkalinity test (pH)
 - e. Soluble salts
 - f. Percentage tests for the following:
 - 1) Nitrogen (N)
 - 2) Phosphoric Acid (P₂O₅)
 - 3) Potash (K₂O)
 - g. Percentages by volume for sand, silt, and clay.

- E. Planting Schedule: Indicating anticipated planting dates for exterior plants.
- F. Maintenance Instructions: Recommended procedures to be established by Owner for maintenance of plants during a calendar year. Submit before expiration of required maintenance periods.

1.5 Quality Assurance

- A. Installer Qualifications: A qualified landscape installer whose work has resulted in successful establishment of exterior plants.
 - 1. Installer's Field Supervision: Require Installer to maintain an experienced full-time supervisor on Project site when planting is in progress.
- B. Soil-Testing Laboratory Qualifications: An independent laboratory, recognized by the State Department of Agriculture, with the experience and capability to conduct the testing indicated and that specializes in types of tests to be performed.
- C. Provide quality, size, genus, species, and variety of exterior plants indicated, complying with applicable requirements in ANSI Z60.1, "American Standard for Nursery Stock."
- D. Tree and Shrub Measurements: Measure according to ANSI Z60.1 with branches and trunks or canes in their normal position. Do not prune to obtain required sizes. Take caliper measurements 6 inches above ground for trees up to 4-inch caliper size, and 12 inches above ground for larger sizes. Measure main body of tree or shrub for height and spread; do not measure branches or roots tip-to-tip.
- E. Observation: Landscape Architect may observe trees and shrubs either at place of growth or at site before planting for compliance with requirements for genus, species, variety, size, and quality. Landscape Architect retains right to observe trees and shrubs further for size and condition of balls and root systems, insects, injuries, and latent defects and to reject unsatisfactory or defective material at any time during progress of work. Remove rejected trees or shrubs immediately from Project site.
 - 1. Notify Landscape Architect of sources of planting materials seven days in advance of delivery to site.
 - 2. Notify Landscape Architect three days in advance of proposed delivery to site.

1.6 Delivery, Storage, and Handling

- A. Packaged Materials: Deliver packaged materials in original, unopened containers showing weight, certified analysis, name and address of manufacturer, and indication of compliance with state and Federal laws if applicable.
- B. Bulk Materials:
 - 1. Do not dump or store bulk materials near structures, utilities, walkways and pavements, or on existing turf areas or plants.

2. Provide erosion-control measures to prevent erosion or displacement of bulk materials; discharge of soil-bearing water runoff; and airborne dust reaching adjacent properties, water conveyance systems, or walkways.
 3. Accompany each delivery of bulk materials with appropriate certificates.
- C. Do not prune trees and shrubs before delivery, except as approved by Landscape Architect. Protect bark, branches, and root systems from sun scald, drying, sweating, whipping, and other handling and tying damage. Do not bend or bind-tie trees or shrubs in such a manner as to destroy their natural shape. Provide protective covering of plants during delivery. Do not drop plants during delivery.
- D. Handle planting stock by root ball.
- E. Apply antidesiccant to trees and shrubs using power spray to provide an adequate film over trunks (before wrapping), branches, stems, twigs, and foliage to protect during digging, handling, and transportation.
1. If deciduous trees or shrubs are moved in full leaf, spray with antidesiccant at nursery before moving and again two weeks after planting.
- F. Wrap trees and shrubs with burlap fabric over trunks, branches, stems, twigs, and foliage to protect from wind and other damage during digging, handling, and transportation.
- G. Deliver plants after preparations for planting have been completed and install immediately. If planting is delayed more than six hours after delivery, set plants trees in shade, protect from weather and mechanical damage, and keep roots moist.
1. Set balled stock on ground and cover ball with soil, peat moss, sawdust, or other acceptable material.
 2. Do not remove container-grown stock from containers before time of planting.
 3. Water root systems of plants stored on-site with a fine-mist spray. Water as often as necessary to maintain root systems in a moist condition.

1.7 Coordination

- A. Planting Restrictions: Plant during one of the following periods. Coordinate planting periods with maintenance periods to provide required maintenance from date of Substantial Completion.
1. Deciduous Plants:
 - a. Spring Planting: March 15 to May 15.
 - b. Fall Planting: September 15 to November 15.
 2. Evergreen Plants:
 - a. Spring Planting: March 15 to June 15.
 - b. Fall Planting: August 15 to November 15.

- B. Weather Limitations: Proceed with planting only when existing and forecasted weather conditions permit.
- C. Coordination with Turfs: Plant trees and shrubs after finish grades are established and before planting turfs, unless otherwise acceptable to Landscape Architect.
 - 1. When planting trees and shrubs after turfs, protect turf areas and promptly repair damage caused by planting operations.

1.8 Warranty

- A. Special Warranty: Warrant the following exterior plants, for the warranty period indicated, against defects including death and unsatisfactory growth, except for defects resulting from lack of adequate maintenance, neglect, or abuse by Owner, or incidents that are beyond Contractor's control.
 - 1. Warranty Period for Trees and Shrubs: One year from date of Substantial Completion.
 - 2. Remove dead exterior plants immediately. Replace immediately unless required to plant in the succeeding planting season.
 - 3. Replace exterior plants that are more than 25 percent dead or in an unhealthy condition at end of warranty period.
 - 4. A limit of one replacement of each exterior plant will be required, except for losses or replacements due to failure to comply with requirements.

1.9 Maintenance

- A. Trees and Shrubs: Maintain for the following maintenance period by pruning, cultivating, watering, weeding, fertilizing, mulching, restoring planting saucers, tightening and repairing stakes and guy supports, and resetting to proper grades or vertical position, as required to establish healthy, viable plantings. Spray as required to keep trees and shrubs free of insects and disease. Restore or replace damaged tree wrappings.
 - 1. Maintenance Period: One year from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 Tree and Shrub Material

- A. General: Furnish nursery-grown trees and shrubs complying with ANSI Z60.1, with healthy root systems developed by transplanting or root pruning. Provide well-shaped, fully branched, healthy, vigorous stock free of disease, insects, eggs, larvae, and defects such as knots, sun scald, injuries, abrasions, and disfigurement.
 - 1. Trees with damaged, crooked, or multiple leaders; tight vertical branches where bark is squeezed between two branches or between branch and trunk ("included bark"); crossing trunks; cut-off limbs more than 3/4 inch in diameter; or with stem girdling roots are

unacceptable.

2. Collected Stock: Do not use plants harvested from the wild, from native stands, from an established landscape planting, or not grown in a nursery unless otherwise indicated.
- B. Grade: Provide trees and shrubs of sizes and grades complying with ANSI Z60.1 for type of trees and shrubs required. Trees and shrubs of a larger size may be used if acceptable to Landscape Architect, with a proportionate increase in size of roots or balls.
- C. Label at least one tree and one shrub of each variety and caliper with a securely attached, waterproof tag bearing legible designation of botanical and common name.
- D. If formal arrangements or consecutive order of trees or shrubs is shown, select stock for uniform height and spread to assure symmetry in planting.
- E. Shade And Flowering Trees
1. Shade Trees: Single-stem trees with straight trunk, well-balanced crown, and intact leader, of height and caliper indicated, complying with ANSI Z60.1 for type of trees required.
 - a. Provide balled and burlapped or container-grown trees.
 2. Small Flowering Trees: Branched or pruned naturally according to species and type, with relationship of caliper, height, and branching according to ANSI Z60.1; stem form as indicated.
 - a. Provide balled and burlapped or container-grown trees.
- F. Evergreens
1. Form and Size: Normal-quality, well-balanced, evergreens, of type, height, spread, and shape required, complying with ANSI Z60.1.
 - a. Provide balled and burlapped or container-grown trees.
- G. Annuals and Biennials: Provide healthy, disease-free plants of species and variety shown or listed, with well-established root systems reaching to sides of the container to maintain a firm ball, but not with excessive root growth encircling the container. Provide only plants that are acclimated to outdoor conditions before delivery and that are in bud but not yet in bloom.

2.2 Planting Soil

- A. Planting Soil Mix: Mix topsoil with the following soil amendments and fertilizers in the following quantities:
1. Ratio of Loose Compost to Topsoil by Volume: 1:4.
 2. Ratio of Loose Peat or manure to Topsoil by Volume: 1:4.
 3. Weight of Lime, Bonemeal, Superphosphate, and Commercial Fertilizer per 1000 Sq. Ft. as determined by Soil Test Report.

2.3 Topsoil

- A. Topsoil: Requirements for soil material are specified in Section 32 92 00 "Loam and Seeding."

2.4 Inorganic Soil Amendments

- A. Lime: ASTM C 602, agricultural limestone containing a minimum 80 percent calcium carbonate equivalent and as follows:
 - 1. Provide lime in form of dolomitic limestone, with a minimum of 95 percent passing a No.100 sieve.

2.5 Organic Soil Amendments

- A. Compost: Well-composted, stable, and weed-free organic matter, pH range of 5.5 to 8; moisture content 35 to 55 percent by weight; 100 percent passing through 1-inch sieve; soluble salt content of 5 to 10 decisiemens/m; not exceeding 0.5 percent inert contaminants and free of substances toxic to plantings; and as follows:
 - 1. Organic Matter Content: 50 to 60 percent of dry weight.
- B. Peat: Finely divided or granular texture, with a pH range of 6 to 7.5, containing partially decomposed moss peat, native peat, or reed-sedge peat and having a water-absorbing capacity of 1100 to 2000 percent.
- C. Manure: Well-rotted, unleached, stable or cattle manure containing not more than 25 percent by volume of straw, sawdust, or other bedding materials; free of toxic substances, stones, sticks, soil, weed seed, and material harmful to plant growth.
 - 1. Product: "Bovung" or equal.

2.6 Organic Fertilizer

- A. General: Controlled-release fertilizer composed of organic products and minerals, free of chemicals and manmade additives
 - 1. Synthetic chemical fertilizers are not permitted.
 - 2. Fertilizers containing petrochemical additives or that have been treated with pesticides or herbicides are not permitted.
- B. Composition: Nitrogen, phosphorous, and potassium in amounts recommended in soil reports from a qualified soil-testing agency.
- C. Products Include:
 - 1. Bonemeal: Finely ground raw bonemeal having a minimum analysis of one percent nitrogen and 11 percent phosphoric acid.
 - 2. Plantone: Organic plant nutrient with potential acidity (CACO₂) at 80 pounds per 2,000

pounds as manufactured by Espoma, Millville, New Jersey, or approved equal.

3. Fluid Fertilizer: "Algro" 14-7-4 low chlorine 40 percent organic root food as manufactured and supplied by Plant Food Chemical Company, Cranberry, New Jersey, or approved equal.

2.7 Water

- A. Water: Potable. Coordinate with City if off site water source is required.

2.8 Mulches

- A. General: Free from noxious weeds, mold, pesticides, or other deleterious materials, and suitable as a top dressing of trees and shrubs.
- B. Compost Mulch: Well-composted, stable, and weed-free organic matter, pH of 5.5 to 8; moisture content 35 to 55 percent by weight; 100 percent passing through a 1-inch sieve; soluble-salt content of 2 to 5 dS/m; not exceeding 0.5 percent inert contaminants and free of substances toxic to plantings; and as follows:
 1. Organic Matter Content: 50 to 60 percent of dry weight.
 2. Feedstock: Agricultural, food, or industrial residuals; biosolids; yard trimmings; or source-separated or compostable mixed solid waste.

2.9 Weed-Control Barriers

- A. Nonwoven Fabric: Polypropylene or polyester fabric, 3 oz./sq. yd. minimum.

2.10 Stakes and Guys

- A. Upright and Guy Stakes: Rough-sawn, sound, new hardwood, redwood, or pressure-preservative-treated softwood, free of knots, holes, cross grain, and other defects, 2 by 2 inches by length indicated, pointed at one end.
- B. Guy and Tie Wire: ASTM A 641/A 641M, Class 1, galvanized-steel wire, 2-strand, twisted, 0.106 inch in diameter.
- C. Guy Cable: 5-strand, 3/16-inch- diameter, galvanized-steel cable, with zinc-coated turnbuckles, a minimum of 3 inches long, with two 3/8-inch galvanized eyebolts.
- D. Hose Chafing Guard: Reinforced, 2-ply, rubber or plastic hose at least 1/2 inch in diameter, black, cut to lengths required to protect tree trunks from damage.
- E. Flags: Standard surveyor's plastic flagging tape, white, 6 inches long.

2.11 Miscellaneous Products

- A. Antidesiccant: Water-insoluble emulsion, permeable moisture retarder, film forming, for trees and

shrubs. Deliver in original, sealed, and fully labeled containers and mix according to manufacturer's written instructions.

1. Product: "Wilt-Pruf" or equal.
- B. Trunk-Wrap Tape: Two layers of crinkled paper cemented together with bituminous material, 4-inch-wide minimum, with stretch factor of 33 percent.

PART 3 - EXECUTION

3.1 Examination

- A. Examine areas to receive plantings for compliance with requirements and conditions affecting installation and performance. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 Preparation

- A. Protect structures, utilities, sidewalks, pavements, and other facilities, and lawns and existing plants from damage caused by planting operations.
- B. Provide erosion-control measures to prevent erosion or displacement of soils and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways.
- C. Lay out individual tree and shrub locations and areas for multiple plantings. Stake locations, outline areas, adjust locations when requested, and obtain Landscape Architect's acceptance of layout before excavating or planting. Make minor adjustments as required.
- D. Apply antidesiccant to trees and shrubs using power spray to provide an adequate film over trunks, branches, stems, twigs, and foliage to protect during digging, handling, and transportation.
1. If deciduous trees or shrubs are moved in full leaf, spray with antidesiccant at nursery before moving and again two weeks after planting.

3.3 Tree and Shrub Excavation

- A. Pits and Trenches: Excavate circular pits with sides sloped inward. Trim base leaving center area raised slightly to support root ball and assist in drainage. Do not further disturb base. Scarify sides of plant pit smeared or smoothed during excavation.
1. Excavate approximately three times as wide as ball diameter.
 2. Excavate pit to a depth to allow a 6-inch layer of topsoil beneath ball.
- B. Subsoil removed from excavations may not be used as backfill.

- C. Obstructions: Notify Landscape Architect if unexpected rock or obstructions detrimental to trees or shrubs are encountered in excavations.
- D. Drainage: Notify Landscape Architect if subsoil conditions evidence unexpected water seepage or retention in tree or shrub pits.

3.4 Tree and Shrub Planting

- A. Set planting stock plumb and in center of pit or trench with top of root ball 1 inch above adjacent finish grades.
 - 1. Remove burlap and wire baskets from tops of root balls and partially from sides, but do not remove from under root balls. Remove pallets, if any, before setting. Do not use planting stock if root ball is cracked or broken before or during planting operation.
 - 2. Place planting soil mix around root ball in layers, tamping to settle mix and eliminate voids and air pockets. When pit is approximately one-half backfilled, water thoroughly before placing remainder of backfill. Repeat watering until no more water is absorbed. Water again after placing and tamping final layer of planting soil mix.
 - 3. Carefully remove root ball from container without damaging root ball or plant.
- B. Organic Mulching: Apply 4-inch average thickness of organic mulch extending beyond edge of planting pit or trench. Do not place mulch within 3 inches of trunks or stems.
- C. Wrap trees of 2-inch caliper and larger with trunk-wrap tape. Start at base of trunk and spiral cover trunk to height of first branches. Overlap wrap, exposing half the width, and securely attach with a coarse sisal twine without causing girdling. Do not nail or staple to tree. Inspect tree trunks for injury, improper pruning, and insect infestation; take corrective measures required before wrapping.

3.5 Tree and Shrub Planting

- A. Prune, thin, and shape trees and shrubs according to standard horticultural practice. Prune trees to retain required height and spread. Unless otherwise indicated by Landscape Architect, do not cut tree leaders; remove only injured or dead branches from flowering trees. Prune shrubs to retain natural character. Tree and shrub sizes indicated are sizes after pruning.

3.6 Guying and Staking

- A. Guying and Staking: When noted on Drawings, guy and stake trees.
 - 1. For trees more than 3 inches in caliper, securely attach no fewer than 3 guys to stakes 30 inches long, driven to grade.
 - 2. For trees more than 6 inches in caliper, anchor guys to pressure-preservative-treated deadmen 8 inches in diameter and 48 inches long buried at least 36 inches below grade. Provide turnbuckles for each guy wire and tighten securely.

3. Attach flags to each guy wire, 30 inches above finish grade.

3.7 Ground Cover and Plant Planting

- A. Set out and space ground cover and plants as indicated.
- B. Use planting soil for backfill.
- C. Dig holes large enough to allow spreading of roots.
- D. For rooted cutting plants supplied in flats, plant each in a manner that minimally disturbs the root system but to a depth not less than two nodes.
- E. Work soil around roots to eliminate air pockets and leave a slight saucer indentation around plants to hold water.
- F. Water thoroughly after planting, taking care not to cover plant crowns with wet soil.
- G. Protect plants from hot sun and wind; remove protection if plants show evidence of recovery from transplanting shock.

3.8 Planting Area Mulching

- A. Install weed-control barriers before mulching according to manufacturer's written instructions. Completely cover area to be mulched, overlapping edges a minimum of 6 inches and secure seams with galvanized pins.
- B. Mulch backfilled surfaces of planting areas and other areas indicated.
 1. Trees and Treelike Shrubs in Turf Areas: Apply organic mulch ring of 2-inch average thickness, with indicated radius around trunks or stems. Do not place mulch within 3 inches of trunks or stems.
 2. Organic Mulch in Planting Areas: Apply 2-inch average thickness of organic mulch over whole surface of planting area, and finish level with adjacent finish grades. Do not place mulch within 3 inches of trunks or stems.

3.9 Plant Maintenance

- A. Maintain plantings by pruning, cultivating, watering, weeding, fertilizing, mulching, restoring planting saucers, adjusting and repairing tree-stabilization devices, resetting to proper grades or vertical position, and performing other operations as required to establish healthy, viable plantings.
- B. Fill in, as necessary, soil subsidence that may occur because of settling or other processes. Replace mulch materials damaged or lost in areas of subsidence.
- C. Apply treatments as required to keep plant materials, planted areas, and soils free of pests and

pathogens or disease. Use integrated pest management practices when possible to minimize use of pesticides and reduce hazards. Treatments include physical controls such as hosing off foliage, mechanical controls such as traps, and biological control agents.

3.10 Repair and Replacement

- A. General: Repair or replace existing or new trees and other plants that are damaged by construction operations, in a manner approved by Landscape Architect.
 - 1. Submit details of proposed pruning and repairs.
 - 2. Perform repairs of damaged trunks, branches, and roots within 24 hours, if approved.
 - 3. Replace trees and other plants that cannot be repaired and restored to full-growth status, as determined by Landscape Architect.

- B. Remove and replace trees that are more than 25 percent dead or in an unhealthy condition before the end of the corrections period or are damaged during construction operations that Landscape Architect determines are incapable of restoring to normal growth pattern.
 - 1. Provide new trees of same size as those being replaced for each tree of 6 inches or smaller in caliper size.
 - 2. Provide one new tree(s) of 6-inch caliper size for each tree being replaced that measures more than 6 inches in caliper size.
 - 3. Species of Replacement Trees: Same species being replaced.

3.11 Cleanup and Protection

- A. During exterior planting, keep adjacent pavings and construction clean and work area in an orderly condition. Clean wheels of vehicles before leaving site to avoid tracking soil onto roads, walks, or other paved areas.

- B. Protect plants from damage due to landscape operations, operations by other contractors and trades, and others. Maintain protection during installation and maintenance periods. Treat, repair, or replace damaged exterior planting.

3.12 Disposal

- A. Disposal: Remove surplus soil and waste material, including excess subsoil, unsuitable soil, trash, and debris, and legally dispose of them off Owner's property.

END OF SECTION

SECTION 33 41 00 – STORM UTILITY DRAINAGE

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.

1.2 Summary

- A. Section Includes:
 - 1. HDPE pipe and fittings.
 - 2. Drain basins.
- B. Related sections include the following:
 - 1. Section 01 57 13 “Temporary Erosion and Sediment Control”.
 - 2. Section 31 20 00 “Earth Moving”.

1.3 Definitions

- A. AASHTO: American Association of State Highway and Transportation Officials
- B. ASTM: American Society for Testing and Materials
- C. Drainage Structures: Including but not limited to Catch Basins, Drain Manholes, and Drain Basins.
- D. HDPE: High-density, polyethylene
- E. NPS: Nominal Pipe Size

1.4 Quality Assurance

- A. Where “Standard Specifications” is used, it shall mean “Rhode Island Department of Transportation Standard Specifications for Road and Bridge Construction, Amended March 2018” and issued supplements.

1.5 Submittals

- A. Product Data: For each type of product indicated.
- B. Shop Drawings:
 - 1. Drain basins, catch basins, manholes, and diversion structure. Include plans, elevations, sections, details, frames, covers, and grates.

- C. Product Certificates: For each type of pipe and fitting, from manufacturer.
- D. Field quality-control reports.

1.6 Delivery, Storage, and Handling

- A. Do not store plastic pipe, fittings, and structures in direct sunlight.
- B. Protect pipe, pipe fittings, and seals from dirt and damage.
- C. Handle drainage structures according to manufacturer's written rigging instructions.

1.7 Project Conditions

- A. Where "Standard Specifications" is used, it shall mean "State of Rhode Island Department of Transportation Standard Specifications for Roads and Bridge Construction, Revision of 2018" and issued supplements.
- B. Site Information: Perform site survey, research public utility records, and verify existing utility locations.

PART 2 - PRODUCTS

2.1 HDPE Pipe and Fittings

- A. Corrugated HDPE Drainage Pipe and Fittings NPS 3 to NPS 10: AASHTO M 252M, Type S, with smooth waterway for coupling joints.
 - 1. Soil tight Couplings: AASHTO M 294, corrugated, matching pipe and fittings to form soil tight joints.
- B. Corrugated HDPE Drainage Pipe and Fittings NPS 12 to NPS 60: AASHTO M 294M, Type S, with smooth waterway for coupling joints.
 - 1. Silt tight Couplings: HDPE sleeve with ASTM D 1056, Type 2, Class A, Grade 2 gasket material that mates with pipe and fittings.
- C. Perforated Wall Corrugated HDPE Drainage Pipe and Fittings: Plastic Pipe: ASTM D3350, High Density Polyethylene (HDPE) corrugated and perforated wall pipe with integrally formed smooth liner, meeting the requirements of AASHTO M 252, Type CP, for diameters between 3 inches and 10 inches and AASHTO M 294, Type SP, for diameters between 12 inches and 60 inches, soil-tight, bell and spigot joints with rubber gaskets, with pipe and fittings manufactured from virgin PE compounds with cell classification 3254420C.
 - 1. Joints and Fittings: Same material as pipe molded or formed to suit pipe size and end design, in required tee, bends, elbows, cleanouts, reducers, traps and other configurations required.

2.2 Drain Basins

- A. Manufacturers subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - 1. Nyloplast Drain Basin manufactured by ADS Inc.
 - 2. Approved equal.
- B. Frame, Grate, and Covers
 - 1. Integrated ductile iron per ASTM A536 Grade 70-50-05
- C. Nyloplast Inserta Tee may be utilized for field adjustment of lateral pipe connections.
- D. Drainage connection stub joint tightness shall conform to ASTM D3212 for corrugated HDPE and PCV pipes.
- E. Drain inlets shall include minimum 24-inch sump.

PART 3 - EXECUTION

3.1 Earthwork

- A. Excavation, trenching, and backfilling are specified Section 31 20 00 "Earth Moving."

3.2 Piping Installation

- A. General Locations and Arrangements: Drawing plans and details indicate general location and arrangement of underground storm drainage piping. Location and arrangement of piping layout take into account design considerations. Install piping as indicated, to extent practical. Where specific installation is not indicated, follow piping manufacturer's written instructions.
- B. Install piping beginning at low point, true to grades and alignment indicated with unbroken continuity of invert. Place bell ends of piping facing upstream. Install gaskets, seals, sleeves, and couplings according to manufacturer's written instructions for use of lubricants, cements, and other installation requirements.
- C. Install manholes for changes in direction unless fittings are indicated. Use fittings for branch connections unless direct tap into existing sewer is indicated.
- D. Install proper size increasers, reducers, and couplings where different sizes or materials of pipes and fittings are connected. Reducing size of piping in direction of flow is prohibited.
- E. Install gravity-flow, non-pressure drainage piping according to the following:
 - 1. Install piping pitched down in direction of flow.
 - 2. Install piping with 24 inches minimum cover unless otherwise indicated on the Drawings.

- F. Install corrugated piping according to the Corrugated Polyethylene Pipe Association's "Recommended Installation Practices for Corrugated Polyethylene Pipe and Fittings."

3.3 Pipe Joint Construction

- A. Join gravity-flow, non-pressure drainage piping according to the following:
 - 1. Join PVC sewer piping according to ASTM D 2321 and ASTM D 3034 for elastomeric-seal joints or ASTM D 3034 for elastomeric-gasketed joints.
 - 2. Join dissimilar pipe materials with non-pressure-type flexible couplings.

3.4 Drain Basin Installation

- A. Install drain basins in locations indicated.
 - 1. Set drain frames and grates to grades indicated on the Drawings.

3.5 Concrete Placement

- A. Place cast-in-place concrete according to ACI 318.

3.6 Identification

- A. Materials and their installation are specified in Section 31 20 00 "Earth Moving." Arrange for installation of warning tape directly over piping and at outside edge of underground structures.
- B. Use detectable warning tape over nonferrous piping and over edges of underground structures.

3.7 Field Quality Control

- A. Inspect interior of piping to determine whether line displacement or other damage has occurred. Inspect after approximately 24 inches of backfill is in place, and again at completion of Project.
 - 1. Submit separate reports for each system inspection.
 - 2. Defects requiring correction include the following:
 - a. Alignment: Less than full diameter of inside of pipe is visible between structures.
 - b. Deflection: Flexible piping with deflection that prevents passage of ball or cylinder of size not less than 92.5 percent of piping diameter.
 - c. Damage: Crushed, broken, cracked, or otherwise damaged piping.
 - d. Infiltration: Water leakage into piping.
 - e. Exfiltration: Water leakage from or around piping.
 - 3. Replace defective piping using new materials and repeat inspections until defects are within allowances specified.
 - 4. Reinspect and repeat procedure until results are satisfactory.

3.8 Cleaning

- A. Clean interior of piping of dirt and superfluous materials.

END OF SECTION

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Soil Erosion and Sediment Control Plan Jenks Park Redevelopment: Phase 1

Plat 5, Lot 90
Washington Street
Central Falls, Rhode Island

**City of Central Falls
Rhode Island**

September 2022



317 Iron Horse Way
Suite 204
Providence, RI 02908

Project No. 20170811.A51

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C	SESC Plan Corrective Actions Log
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G	RIPDES Construction General Permit



1 Project Narrative

1.1 Introduction

Fuss & O'Neill has prepared this Soil Erosion and Sediment Control (SESC) Plan for construction activities associated with the construction of Phase 1 of the Jenks Park Redevelopment, located in Central Falls, Rhode Island. Phase 1 of the project includes construction of a new entrance to Washington Street and installation of a new playground. Phase 1 also includes repairing and restoring the historic Cogswell Tower roof and stone masonry. The purpose of this SESC Plan is to describe the erosion and sedimentation controls that shall be employed during and after construction of the project, and to provide appropriate maintenance measures for the controls.

The contractor shall be responsible for implementing all elements of the erosion and sedimentation control measures defined within this SESC Plan during construction and comply with the terms and conditions of the *General Permit for the Rhode Island Discharge Elimination System (RIPDES)* (General Permit). The property owner shall be responsible thereafter. The project will not be considered complete until all disturbed areas have been satisfactorily stabilized, any on-site erosion has been repaired, and all temporary erosion and sedimentation controls have been removed.

The SESC Plan shall be stored and maintained on-site at all times during the extent of coverage under the General Permit. A copy of the General Permit is provided in *Appendix G*.

1.2 Project Description

The City of Central Falls, Rhode Island proposes the construction of Phase 1 of the schematic Master Plan for the restoration and renovation of Jenks Park. Phase 1 of the Master Plan includes removal of the existing Washington Street entrance and construction of a new entrance comprised of streetscape elements and gateway signage as well as installation of a new playground.

1.3 Site Conditions

The Site is located between Washington Street, Summit Street, and Broad Street in Pawtucket, RI. (See *Appendix A* for Site Location Map). Topography of the site generally slopes down in elevation towards the streets on each side of the park. Stormwater runoff from the Phase 1 area flows west across the site and is either infiltrated or flows onto Washington Street and enters the storm drain.

The majority of the site is classified as Canton-Urban land complex (HSG B) by the NRCS Web Soil Survey. Based on the RIDEM Environmental Resource Map, the site is located in the Blackstone River Subwatershed, and no portion of the site lies in a Natural Heritage Area. Based on the Federal Emergency Management Agency (FEMA) Flood Maps Number 44007C0194J, the Site is within Zone X and is an area of minimal flood hazard.



1.4 Construction Sequence

Refer to the General Notes & Legend (Sheet CN-001) drawing.

2 Erosion and Sedimentation Control

Temporary and permanent structural and nonstructural practices shall be implemented throughout the project to minimize erosion of soils from the disturbed site. These measures provide protection against erosion and sedimentation both during and after construction. Erosion and sedimentation controls shall be continually monitored to ensure proper function and prevent wind and water erosion of soils from the site. Additional structural and non-structural controls shall be implemented if conditions warrant and when directed by the property owner, representative of the property owner, or RIDEM. Plans identifying the location and installation details for soil erosion and sediment controls used on site are located in *Appendix E*.

Erosion and sediment control measures shall be constructed in accordance with the *Rhode Island Soil Erosion and Sediment Control Handbook* (2016) with latest addenda and revisions. Refer to Section 4.0 of this report for maintenance notes regarding the erosion controls.

2.1 Vegetative Practices

- **Temporary Vegetative Cover:** Temporary vegetative cover shall be applied to exposed soils and stockpiles that have not yet reached finished grade as soon as possible, but not more than 14 days after the construction activity in that area has temporarily ceased, unless the activity is to resume within 21 days.

Temporary vegetative cover shall be installed as outlined in the *Rhode Island Soil Erosion and Sediment Control Handbook* between the following recommended seeding dates: April 1 to June 15 and August 15 to September 30. Temporary vegetative cover shall consist of 60% of Annual or Perennial Ryegrass and 40% of Millet or Sudangrass or 100% of Winter Rye. Optimum seeding dates for Millet and Sudangrass are between May 15 and July 15. Annual or Perennial Ryegrass shall be planted at a rate of 1.5 pounds per 1,000 square feet, Winter Rye shall be planted at a rate of 2.5 pounds per 1,000 square feet, and Millet or Sudangrass shall be planted at a rate of 1.0 pound per 1,000 square feet.

- **Permanent Vegetative Cover:** Permanent vegetative cover shall be applied within fourteen (14) days after the construction activity in a disturbed area has permanently ceased or when grading work within the limit of disturbance is to be suspended for a period of more than one year. Permanent vegetative cover shall be installed as outlined in the *Rhode Island Soil Erosion and Sediment Control Handbook* between the following recommended seeding dates: April 1 to June 15 and August 15 to September 30.





Upland areas will be restored with a no mow, low maintenance lawn seed mixture by Prairie Nursery in Westfield, WI or approved equal. Seed mix shall conform to section L.02 of the Rhode Island Department of Transportation Standard Specifications.

- **Mulching:** If seeding cannot be completed immediately or within the recommended seeding dates, temporary mulching will be used to protect the site and delay seeding until the next recommended seeding period. Straw mulch, wood fiber mulch, and hydromulch are recommended. Wood fiber mulch should not be used alone in the winter or during hot, dry weather. Straw mulch shall be anchored immediately after spreading to prevent wind-blowing. Mulch anchoring should also be used on slopes greater than 3H:1V and concentrated flow areas such as diversion and waterway channels.

All mulches shall be inspected periodically, in particular after rainstorms, to check for rill erosion. Where erosion is observed, additional mulch shall be applied. If netting is used, the net should be inspected after rainstorms for dislocation or failure. If washouts or breakage occur, the net shall be reinstalled as necessary after repairing damage to slope. Inspections should take place until grasses are firmly established. Grass is considered to be firmly established at a minimum height of three (3) inches.

2.2 Structural Practices

- **Inlet Protection:** Silt sacks and/or wattle barriers shall be installed in on-site and off-site catch basins and curb inlets that may be subject to sedimentation in order to prevent sediment from entering storm drainage system prior to permanent stabilization of the disturbed site.
- **Perimeter Sediment Barriers:** Staked straw wattles, straw bales, or other approved sediment barriers shall be installed downgradient of the site as shown on the plans. Additional straw wattles may be used within the limit of disturbance to minimize the areas of exposed soils contributing runoff to the perimeter barrier. Inspection shall be made after each storm event and repair or replacement shall be made promptly when the wattles are damaged or deteriorated and no longer effective. Accumulated sediment shall be removed when sediment behind the wattles reaches one-half of the original height of the barrier. Barriers that are deteriorated or otherwise ineffective shall be replaced.
- **Construction Entrance:** Construction entrances shall be installed at all locations where construction vehicles will exit the site. All vehicle traffic entering or exiting the project site shall pass over the construction entrances to reduce the tracking or flowing of sediment onto the surrounding roadways.



2.3 Other Controls

- **Dust Control:** Dust control is proposed to prevent blowing and movement of dust from exposed soil surfaces and to reduce the presence of dust which may cause off-site damage or pose a hazard to the health of humans, wildlife, and plants. Dust control may include, but is not limited to, application of water, mulch, and/or crushed stone or coarse gravel to exposed topsoil. Water should be applied at an average application rate of one gallon of water per square yard of exposed area. The exact number of applications and amount of water used shall be based upon field and weather conditions water should not be used if it results in hazardous or objectionable conditions such as, but not limited to, ice, flooding, or pollution.
- **Waste Containment and Disposal:** All waste shall be properly stored in containers shall be covered to avoid contact with wind and precipitation. Materials that could be a potential source of stormwater pollution such as gasoline, diesel fuel, hydraulic oil, etc., shall be stored at the end of each day in a storage trailer or covered location and taken off-site and properly disposed of. All types of waste generated at this site shall be disposed of in a manner consistent with State Law and/or regulations.
- **Street Sweeping:** The contractor is responsible for sweeping adjacent walks and roadway(s) during and at the completion of construction. Paved areas should be inspected and swept prior to rain events. Trash, sediment, and construction debris within the street shall be removed and disposed of in accordance with applicable local, state, and federal guidelines and regulations.
- **Staging and Stockpiling:** Stockpiles of any construction material shall not be located outside the designated staging area. Stockpiles shall not have side slopes greater than 3H:1V, and stockpiles of erodible material shall be seeded and ringed with perimeter controls specified in the *Rhode Island Soil Erosion and Sediment Control Handbook*. If soil stockpiles are not stabilized with vegetation, then they must be securely covered at the end of each workday to avoid contact with precipitation and wind. Migrated stockpiled materials shall not be swept or washed onto impervious surfaces or into any drainage inlet.

All chemicals and/or hazardous waste material must be stored properly and legally in covered areas, with containment systems constructed in or around the storage areas. Areas must be designated for materials delivery and storage.

- **Good Housekeeping:** The project site shall provide for the minimization of exposure of construction debris (including, but not limited to, insulation, wiring, paints and paint cans, solvents, wall board, etc.) to precipitation by means of disposal and/or proper shelter or cover. In addition, construction waste shall be properly disposed of in order to avoid exposure to precipitation at the end of each working day.

3 Inspection

All stormwater control measures, disturbed areas, areas used for the storage of materials that are exposed to precipitation (including soil stockpiles), discharge locations, and locations where vehicles enter and exit the site, shall be inspected by or under the supervision of the permittee at least once every seven (7) calendar days and within 24 hours after any storm event that generates at least 0.25 inches of rainfall per 24 hour period and/or after a significant amount of runoff. The site shall be inspected for evidence of, or the potential for, pollutants entering the waters of the State or a separate storm sewer system. The SESC Inspection Report and Instructions are located in *Appendix B*.

If an inspection reveals a discharge of sediments to the waters of the State or a separate storm sewer system, the permittee shall notify the RIDEM of the nature of the discharge, the measures taken to clean up the discharge, and the measures taken to prevent future releases. Based on the results of the inspections, the *Soil Erosion and Sediment Control Plan (SESC Plan)* shall be revised as appropriate, but in no case later than seven calendar days following the inspection. Such modifications shall provide for implementation of any changes to the SESC Plan within seven calendar days following the inspection.

A report summarizing the scope of the inspection, name(s), and titles of personnel making the inspection, the date(s) of the inspection, major observations relating to the implementation of the SESC Plan, and actions shall be made and retained as part of the SESC Plan for at least five years from the date that the site has undergone final stabilization. Reports shall identify any incidents of noncompliance. Where a report does not identify any incidents of noncompliance, the report shall contain a certification that the site is in compliance with the SESC Plan and this permit. The report shall be signed prior to the start of construction in accordance with Part V. G. of the General Permit.

3.1 Corrective Actions

If, in the opinion of the designated site inspector, corrective action is required, the inspector shall inform the site operator that corrective action is necessary. The site operator must make all necessary repairs whenever maintenance of the erosion and pollution controls is required. Non-compliance issues shall be addressed no later than seven (7) calendar days from the date of inspection.

In accordance with the SESC Plan, the site operator shall commence with the requisite cleaning and maintenance measures no later than the next consecutive calendar day after receiving notification from the designated site inspector, and shall aggressively and expeditiously perform such cleaning and maintenance work until the original problem is remedied.

The corrective action log contained in each inspection report must be completed, signed, and dated by the site operator once all necessary repairs have been completed. A copy of the Corrective Action Log is located in *Appendix C*.

4 Maintenance

The Contractor is responsible for the maintenance and/or replacement of all temporary and permanent erosion and sedimentation control devices and Best Management Practices (BMPs) to ensure proper operation throughout the life of the project. The Contractor is responsible for the maintenance of permanent measures until construction of the project is completed. The Owner is responsible thereafter. If any amendments must be made the SESC plan by the Owner or Contractor, the responsible party shall complete the amendment log located in *Appendix D*.

4.1 Inlet Protection

Silt sacks and straw bales installed in and around drain inlets shall be inspected at least once every seven (7) calendar days and within 24 hours after any storm event which generates at least 0.25 inches of rainfall per 24-hour period and/or after a significant amount of runoff. Silt sacks should be inspected for tears in the fabric barrier and replaced immediately upon discovery of failure. Sediment removal shall be performed in accordance with the manufacturer's instructions. Straw bale inlet protection should be replaced once every month until the area is stabilized.

4.2 Perimeter Sediment Barriers

Perimeter sediment barriers shall be repair or replaced promptly as needed. Accumulated sediment shall be removed when sediment behind the barriers reaches one-half of the original height of the barrier. Barriers that are deteriorated or otherwise ineffective shall be replaced.

4.3 Construction Entrances

All proposed construction entrances shall be maintained in a condition that will prevent tracking or flowing of sediment onto the surrounding roadways. This will require periodic top dressing with additional stone or additional length as conditions demand and repair or replacement of any measures used to trap sediment. All sediment spilled, dropped, washed, or tracked onto the surrounding roadways shall be removed immediately.

4.4 Dust Control

It shall be the Contractor's responsibility to control dust and take all necessary measures to ensure all roads are maintained in a dust free condition at all times throughout the life of the contract. The contractor shall provide a water truck on the site for the duration of the site construction, or until exposed soils are protected from wind or water erosion. Repetitive treatments shall be applied as necessary.

5 Spill Prevention and Control

5.1 Prohibited Discharges

In accordance with Part III.J.2.a of the *RIPDES Construction General Permit*, the following discharges are prohibited at the construction site:

- Contaminated groundwater, unless authorized by DEM.
- Wastewater from washout of concrete, unless the discharge is contained and managed appropriately.
- Wastewater from washout of stucco, paint, form release oils, curing compounds, and other construction materials.
- Fuels, oils, or other pollutants used in vehicle and equipment operation and maintenance.
- Soaps or solvents used in vehicle and equipment washing.
- Toxic or hazardous substances from a spill or other release.

5.2 Spill Prevention and Response Procedure

Any inadvertent or deliberate discharge of waste oil or any other pollutant to the stormwater disposal system requires immediate notification to the RIDEM Oil Pollution Control Program as per the Oil Pollution Control Regulations at (401) 222-1360. During non-working hours, notification of spills can be made to the RIDEM Division of Enforcement at (401) 277-3070 (the 24-hour emergency response phone number).

Any incident of groundwater contamination resulting from the improper discharge of pollutants to the stormwater disposal system shall be the responsibility of the property owner as well as any other parties that the RIDEM determines to be responsible for the contamination. Pursuant to State Laws and Regulations, the RIDEM may require the property owner and other responsible parties to remediate releases of pollutants to the environment. The Owner shall create a maintenance log, showing the date, time, name of inspector, inspection comments, and any actions taken. The Owner shall be responsible for remediating incidents that adversely impact groundwater quality.

5.3 Control of Allowable Non-Stormwater Discharges

If allowable non-storm water discharges occur at the site, such discharges shall be visually observed and recorded as outlined in accordance with Part II of the General Permit in *Appendix G*. The list of potential sources of allowable non-stormwater discharges for this project is as follows:

- Discharge from vehicle wash-down where no detergents are used
- The use of water to control dust
- Watering of temporary or permanent vegetative cover
- Pumping of uncontaminated groundwater to a temporary dewatering basin
- Pavement wash waters where spills or leaks of toxic or hazardous materials have not occurred (unless all spilled materials have been removed) and where detergents are not used

6 Party Certifications

All parties working at the project site are required to comply with the Soil Erosion and Sedimentation Control (SESC) Plan for any work that is performed on-site. The site owner, site operator, contractors and sub-contractors are encouraged to advise all employees working on this project of the requirements of the SESC Plan. A copy of the SESC Plan may be obtained by contacting the site owner or site operator.

The site owner and site operator and each subcontractor engaged in activities at the construction site that could impact stormwater must be identified and sign the following certification statement.

I acknowledge that I have read and understand the terms and conditions of the SESC Plan for the above designated project and agree to follow the practices described herein.

Applicant/Owner SESC Contact

Company:

Name and Title:

Address:

City, State, Zip Code:

Telephone:

E-mail:

Signature/Date

Contractor (Site Operator)

Company:

Name and Title:

Address:

City, State, Zip Code:

Telephone:

E-mail:

Signature/Date

Designated Site Inspector

Company:

Name and Title:

Address:

City, State, Zip Code:

Telephone:

E-mail:

Signature/Date

SESC Plan Contact

Fuss & O'Neill, Inc.

Andy Glines, PE

317 Iron Horse Way, Suite 204

Providence RI 02908

401-861-3070 Ext. 4540

aglines@fando.com

Signature/Date

7 Operator Certification

(Upon Contract award, the Operator must sign this certification statement before construction may begin.)

I certify under penalty of law that this document and all attachments were prepared under the direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete.

I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations. I am aware that it is the responsibility of the owner/operator to implement and amend the SESC Plan as appropriate in accordance with the requirements of the RIPDES Construction General Permit.

Operator Signature:

Date

Contractor Representative:

Contractor Title:

Contractor Company Name:

Appendix A

Site Location Map

File: J:\DWG\20170811\A51\Civil\Figures\20170811\A51_LOC01_AERIAL.dwg Layout: FIGURE 1 Plotted: 2022-09-08 1:19 PM Saved: 2022-09-08 1:19 PM User: sironis
 PC3: AUTOCAD PDF (GENERAL DOCUMENTATION).PC3 STB/CTB: FOSTB
 LAYER STATE:



REFERENCE:
 AERIAL IMAGE WAS TAKEN FROM THE WEBSITE
[HTTP://MAPS.EDC.URI/RIGIS](http://maps.edc.uri/rigis), DATED 2020.

SCALE:
HORZ.: 1"= 800'
VERT.:
DATUM:
HORZ.:
VERT.:
0 400 800
GRAPHIC SCALE



FUSS & O'NEILL
 317 IRON HORSE WAY, SUITE 204
 PROVIDENCE, RI 02908
 401.861.3070
www.fando.com

CITY OF CENTRAL FALLS
 SITE LOCATION MAP
 JENKS PARK REDEVELOPMENT
 CENTRAL FALLS RHODE ISLAND

PROJ. No.: 20170811.A51
 DATE: SEPTEMBER 2022
FIGURE 1

Appendix B

SESC Plan Inspection Report and Instructions



SESC Plan Inspection Report Instructions

For all projects with at least one (1) acre of soil disturbance, the site owner and operator are required to develop and comply with a site specific Soil Erosion and Sediment Control Plan (SESC Plan) in order to remain in compliance with the Rhode Island Pollutant Discharge Elimination System (RIPDES) General Permit for Stormwater Discharges Associated with Construction Activity (RIPDES Construction General Permit).

This inspection report template has been provided by RIDEM for use by the site operator and designated inspector to document the erosion, runoff, and sediment control conditions at the construction site. It should be customized to meet the requirements in the RIPDES Construction General Permit and the site specific SESC Plan.

Using the Inspection Report

This inspection report is designed to be customized according to the control measures and conditions at the site. On a copy of the site plan, number all stormwater control measures and areas of the site that will be inspected. Include both structural (basins, outlet protection, swales, etc.) and non-structural (construction entrances, perimeter barriers, trash areas, etc.) control measures and areas that will be inspected. Also, identify all point source discharges/outfalls, areas of highly erosive soils, and the priority natural resource areas (i.e. streams, wetlands, mature trees, etc). List each control measure or area to be inspected separately in the site-specific control measure section of the inspection report.

Complete any items that will remain constant, such as the project information and control measure locations and descriptions. Then, print out multiple copies of this customized inspection report to use during the inspections.

When conducting the inspection, walk the site by following the site map and numbered control measure locations for inspection. Also note whether the overall site issues have been addressed. Customize this list according to the conditions at the site.

Minimum Monitoring and Reporting Requirements

All stormwater control measures, disturbed areas, areas used for the storage of materials that are exposed to precipitation (including unstabilized soil stockpiles), discharge locations, and locations where vehicles enter or exit the site must be inspected at least once every seven (7) calendar days and within twenty-four (24) hours after any storm event, which generates at least 0.25-inches of precipitation per twenty four (24) hour period and/or after a significant amount of runoff or snowmelt. An appropriate rain gauge (as may be found on www.wunderground.com or www.nws.noaa.gov (or similar sites)) must be identified and utilized for the determination of the storm events.

General Notes

- A separate inspection report will be prepared for each inspection.
- The Inspection Reference Number shall be a combination of the RIPDES Permit Authorization Number - consecutively numbered inspections.
ex/ Inspection reference number for the 4th inspection of a project would be:
RIR10####-4
- Each report will be signed and dated by the inspector and forwarded to the site operator within 24 hours of the inspection.
- Each report will be signed and dated by the site operator and returned to the inspector within 24 hours of receipt.
- It is the responsibility of the site operator to maintain a copy of the SESC Plan, copies of all completed inspection reports, and amendments as part of the SESC Plan documentation at the site during construction.

Corrective Actions

If the SESC Plan Inspection determines that corrective actions are necessary to install or repair control measures, the resultant actions taken must be documented by the site operator. The actions must be recorded in the Corrective Action Log attached to each SESC Plan inspection form. If the site operator disagrees with the corrective action recommendations, it must be documented, with justifiable reasons, in the Corrective Action Log, as well.

Amendments

All SESC Plan Amendments, except minor non-technical revisions, must be approved by the site owner and site operator. The revision must be recorded in the Record of Amendments Log Sheet within the SESC Plan, and dated red-line drawings and/or a detailed written description of the revision must be appended to the SESC Plan. Inspection forms must be revised to reflect all amendments. Update the *Revision Date* and the *Version #* in the footer of the report to reflect amendments made.

The SESC Plan shall be amended whenever there is a change in design, construction, operation, maintenance or other procedure, which has a significant effect on the potential for the discharge of pollutants, or if the SESC Plan proves to be ineffective in achieving its objectives.

*****Remember that the regulations are performance-oriented.
Even if best management practices are installed on a site according
to the approved plan, the site is only in compliance when
erosion, runoff, sedimentation, and pollution
are effectively controlled.*****

SESC Plan Inspection Report

Project Information			
Name			
Location			
DEM Permit No.			
Site Owner	Name	Phone	Email
Site Operator	Name	Phone	Email
Inspection Information			
Inspector Name	Name	Phone	Email
Inspection Date		Start/End Time	
Inspection Type <input type="checkbox"/> Weekly <input type="checkbox"/> Pre-storm event <input type="checkbox"/> During storm event <input type="checkbox"/> Post-storm event <input type="checkbox"/> Other			
Weather Information			
Last Rain Event Date: Duration (hrs): Approximate Rainfall (in):			
Rain Gauge Location & Source:			
Weather at time of this inspection:			

Check statement that applies then sign and date below:

I, as the designated Inspector, certify that this site has been inspected and is in compliance with the site SESC Plan and the RIPDES Construction General Permit.

I, as the designated Inspector, certify that this site has been inspected and I have made the determination that the site requires corrective actions before it will be compliant with the site SESC Plan and the RIPDES Construction General Permit. The required corrective actions are noted within this inspection report.

Inspector:	Print Name	Signature	Date
<p>The Site Operator (identified in the permit application) acknowledges the receipt of this SESC Plan inspection report, and understands the requirements set forth in the RIPDES Construction General Permit regarding the implementation and maintenance of erosion, runoff, and sedimentation controls and pollution prevention measures.</p>			
Operator:	Print Name	Signature	Date

PROJECT:

INSPECTION DATE:

Site-specific Control Measures

Number the structural and non-structural stormwater control measures identified in the SESC Plan on the site map and list them below (add as necessary). Bring a copy of this inspection form and numbered site map with you during your inspections. This list will help ensure that you are inspecting all required control measures at your site.

FILL THIS TABLE USING THE SESC PLAN TABLES 2.13 & 3.14.

	Location/Station	Control Measure Description	Installed & Operating Properly?	Assoc. Photo/ Figure #	Corrective Action Needed (Yes or No; if 'Yes', please detail action required)
1			<input type="checkbox"/> Yes <input type="checkbox"/> No		
2			<input type="checkbox"/> Yes <input type="checkbox"/> No		
3			<input type="checkbox"/> Yes <input type="checkbox"/> No		
4			<input type="checkbox"/> Yes <input type="checkbox"/> No		
5			<input type="checkbox"/> Yes <input type="checkbox"/> No		
6			<input type="checkbox"/> Yes <input type="checkbox"/> No		
7			<input type="checkbox"/> Yes <input type="checkbox"/> No		
8			<input type="checkbox"/> Yes <input type="checkbox"/> No		
9			<input type="checkbox"/> Yes <input type="checkbox"/> No		
10			<input type="checkbox"/> Yes <input type="checkbox"/> No		
11			<input type="checkbox"/> Yes <input type="checkbox"/> No		
12			<input type="checkbox"/> Yes <input type="checkbox"/> No		
13			<input type="checkbox"/> Yes <input type="checkbox"/> No		
14			<input type="checkbox"/> Yes <input type="checkbox"/> No		
15			<input type="checkbox"/> Yes <input type="checkbox"/> No		

PROJECT:

INSPECTION DATE:

	Location/Station	Control Measure Description	Installed & Operating Properly?	Assoc. Photo/ Figure #	Corrective Action Needed (Yes or No; if 'Yes', please detail action required)
16			<input type="checkbox"/> Yes <input type="checkbox"/> No		
17			<input type="checkbox"/> Yes <input type="checkbox"/> No		
18			<input type="checkbox"/> Yes <input type="checkbox"/> No		
19			<input type="checkbox"/> Yes <input type="checkbox"/> No		
20			<input type="checkbox"/> Yes <input type="checkbox"/> No		
21			<input type="checkbox"/> Yes <input type="checkbox"/> No		
22			<input type="checkbox"/> Yes <input type="checkbox"/> No		
23			<input type="checkbox"/> Yes <input type="checkbox"/> No		
24			<input type="checkbox"/> Yes <input type="checkbox"/> No		
25			<input type="checkbox"/> Yes <input type="checkbox"/> No		
26			<input type="checkbox"/> Yes <input type="checkbox"/> No		
27			<input type="checkbox"/> Yes <input type="checkbox"/> No		
28			<input type="checkbox"/> Yes <input type="checkbox"/> No		
29			<input type="checkbox"/> Yes <input type="checkbox"/> No		
30			<input type="checkbox"/> Yes <input type="checkbox"/> No		

(add more as necessary)

Overall Site Issues

Below are some general site issues that should be assessed during inspections. Please customize this list as needed for conditions at the site. If item is not applicable, please note why.

	Location/Station		Assoc. Photo/ Figure #	Corrective Action Needed (If 'Yes', please detail action required and include location/station)
1	Have Limits of Disturbance been properly marked and maintained?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A		
2	Have perimeter controls and sediment barriers been adequately installed and maintained?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A		
3	Are storm drain inlets properly protected?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A		
4	Are natural resource areas (e.g., streams, wetlands, trees, etc.) protected with barriers or similar best management practices (BMPs)?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A		
5	Have graveled access entrance and exit drives and parking areas been installed and maintained?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A		
6	Have sediment controls been installed on all steep side slopes and down slopes that are disturbed, especially those adjacent to property lines, drainage conveyances/inlets or water bodies?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A		
7	Are all steep slopes and disturbed areas not actively being worked properly stabilized?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A		
8	Have soils been stabilized where final grading is complete and land disturbance activities have permanently ceased?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A		
9	Have soils been stabilized where land disturbance activities have been halted temporarily and are not planned to resume within the next fourteen (14) days?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A		
10	Have soil/gravel stockpiles been stabilized or isolated?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A		
11	Are building materials which possess an elevated pollution potential stored inside or under cover?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A		
12	Are stockpiles of construction wastes properly covered or disposed of to reduce exposure?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A		
13	Are washout facilities (e.g. paint, concrete) available, clearly marked, and maintained?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A		

	Location/Station		Assoc. Photo/ Figure #	Corrective Action Needed (If 'Yes', please detail action required and include location/station)
14	Are vehicle and equipment fueling, cleaning, and maintenance areas free of spills, leaks, or any other deleterious material?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A		
15	Are hazardous materials spill kits in place and are there enough materials as prescribed in the SESC Plan to adequately prevent spills from entering any stormwater drainage systems?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A		
16	Have provisions been made for wind erosion and dust control?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A		
17	Have areas of obvious erosion/channelization been repaired?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A		
18	Are receiving conveyance systems and receiving waters at discharge points free of sediment deposition?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A		
19	Is there evidence of sediment being tracked into the street or off-site?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A		
20	Are non-stormwater discharges (e.g., wash water, dewatering) properly controlled?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A		
21	Are post-construction stormwater practices protected from sedimentation prior to final stabilization and bringing them online?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A		
22	Are infiltrating stormwater practices and qualifying pervious areas protected during construction activities to avoid compacting soil?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A		
23	(Other)	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A		

(add more as necessary)

PROJECT:

INSPECTION DATE:

General Field Comments:

PROJECT:

INSPECTION DATE:

Photos:

(Associated photos – each photo should be dated and have a unique identification # and written description indicating where it is located within the project area. If a close up photo is required, it should be preceded with a photo including both the detail area and some type of visible fixed reference point. Photos should be annotated with Station numbers and other identifying information where needed.)

Photo #: (insert Photo here)	Station:
	Description:

Photo #: (insert Photo here)	Station:
	Description:

Photo #: (insert Photo here)	Station:
	Description:

Photo #: (insert Photo here)	Station:
	Description:

Photo #: (insert Photo here)	Station:
	Description:

Photo #: (insert Photo here)	Station:
	Description:

(add more as necessary)

PROJECT: _____

INSPECTION DATE: _____

Corrective Action Log

TO BE FILLED OUT BY SITE OPERATOR

Describe repair, replacement, and maintenance of control measures, actions taken, date completed, and note the person that completed the work.

	Location/Station	Corrective Action	Date Completed	Person Responsible
Operator Signature:		Date:		

Appendix C

SESC Plan Corrective Actions Log

Corrective Actions Log

Identify soil erosion and sedimentation control repairs, replacements, and/or maintenance measures performed.

#	Location of Corrective Action	Description of Corrective Action	Person Responsible for Corrective Action	Date Completed
1				
2				
3				
4				
5				
6				
7				
8				

Appendix D

SESC Plan Amendments Log

SESC Plan Amendment Log

Describe amendment(s) to be made to the SESC Plan, the date, and the person/title making the amendment. ALL amendments must be made by Site Operator and approved by the Site Owner.

#	Amendment Date	Description of Amendment	Amended by: Person/Title	Site Owner Must Initial
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				

Appendix E

Soil Erosion and Sediment Control Plans and Details
(Included in Field Copy of SESC Plan)

Appendix F

Rhode Island Soil Erosion and Sediment Control Handbook Excerpts

Diversions



(Photo Credit: NRCS)

Definition

- A drainage way of parabolic or trapezoidal cross-section with a supporting ridge on the lower side that is constructed across a slope.

Purpose

- To intercept and convey runoff to stable outlets at non-erosive velocities.

Applicability

- For drainage areas 2-acres or larger. See **Perimeter Dikes** for drainage areas less than 2 acres.
- Where runoff from higher areas has potential for damaging properties, causing erosion, or interfering with, or preventing the establishment of, vegetation on lower areas.
- Where surface and/or shallow subsurface flow is damaging sloping upland.
- Where the length of slopes needs to be reduced so that soil loss will be kept to a minimum.
- Not for slopes greater than 15%.
- Not applicable below high sediment producing areas unless land treatment measures or structural measures, designed to prevent damaging accumulations of sediment in the channels, are installed with, or before, the diversions.

Note: Diversions are only applicable below stabilized or protected areas.

Note: Diversions should be used with caution on soils subject to slippage.

Planning and Design Requirements

Location

Diversion location shall be determined by considering outlet conditions, topography, land use, soil type, length of slope, seep planes (when seepage is a problem), and the development layout.

Capacity

- TR-55, Urban Hydrology for Small Watersheds, or other appropriate methods shall compute peak rates of runoff values used in determining the capacity requirements.
- The constructed diversion shall have the capacity to carry, as a minimum, the peak discharge from a ten year, 24 hour frequency rainfall event with freeboard of not less than 0.3 feet.
- Diversions designed to protect homes, schools, industrial buildings, roads, parking lots, and comparable high-risk areas, and those designed to function in connection with other structures, shall have sufficient capacity to carry peak runoff expected from a storm frequency consistent with the hazard involved.

Cross Section

- The diversion channel shall be parabolic or trapezoidal in shape and shall be designed in accordance with **Lined Waterways** and **Vegetated Waterways**.
- The diversion shall be designed to have stable side slopes not steeper than 2:1.
- The diversion shall be flat enough to ensure ease of maintenance of the diversion and its protective cover.
- The ridge shall have a minimum width of four feet at the design water elevation; a minimum of 0.3 feet freeboard and a reasonable settlement factor shall be provided.

Velocity and Grade

- The permissible velocity for the specified method of stabilization will determine the maximum grade.
- Maximum permissible velocities of flow for the stated conditions of stabilization shall be as determined in **Lined Waterways** and **Vegetated Waterways**.

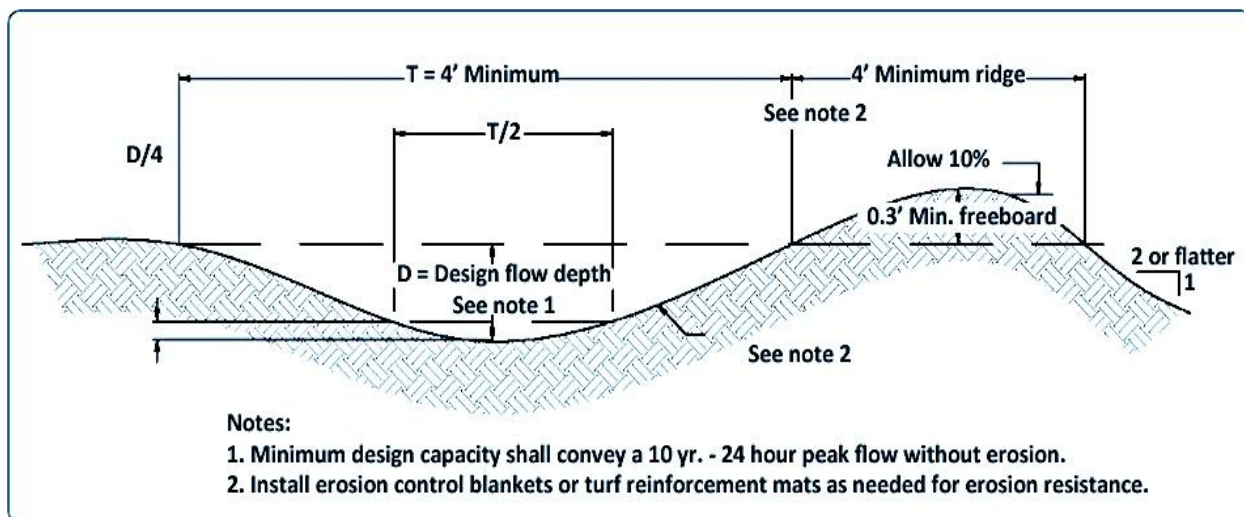
Outlets

- Each diversion must have an adequate outlet.
- The outlet may be a grassed waterway, vegetated or paved area, grade stabilization structure, stable watercourse, or subsurface drain outlet.
- In all cases, the outlet must convey runoff to a point where outflow will not cause damage.
- Vegetated outlets, if needed, shall be installed before diversion construction to ensure establishment of vegetative cover in the outlet channel.
- The design elevation of the water surface in the diversion shall not be lower than the design elevation of the water surface in the outlet at their junction when both are operating at design flow.

Installation Requirements

- Diversions shall be installed and stabilized as follows (See also **Figure 1**).
- All trees, brush, stumps, obstructions, and other objectionable material shall be removed and disposed of so as not to interfere with the proper functioning of the diversion.
- The diversion shall be excavated or shaped to line, grade, and cross-section as required to meet the criteria specified herein and be free of bank projections or other irregularities with will impede normal flow.
- Fills shall be compacted as needed to prevent unequal settlement that would cause damage in the complete diversion.
- All earth removed and not needed in construction shall be spread or disposed of so that it will not interfere with the functioning of the diversion.
- Stabilization shall be done according to the appropriate standard and specifications for vegetative measures.
 - For design velocities of less than 3.5 ft/sec., seeding and mulching may be used for the establishment of the vegetation. It is recommended that when conditions permit, temporary diversions or other means be used to prevent water from entering the diversion during the establishment of vegetation.
 - For design velocities of more than 3.5 ft/sec., the diversion shall be stabilized with sod, with seeding protected by jute or excelsior matting, or with seeding and mulching including temporary diversion of the water until the vegetation is established.
 - For design velocities of more than 3.5 ft/sec., a permanent stone lined waterway is also acceptable. Design pursuant to **Lined Waterways** and **Vegetated Waterways**.

Figure 1. Diversion



(Credit: 2002 Connecticut Guidelines for Soil Erosion and Sediment Control)

Inspection, Maintenance, and Removal Requirements

- Inspect the diversion at least once a week and within 24 hours of the end of a storm with a rainfall amount of 0.25-inches or greater during construction or until the diversion is completely stabilized. Check for seed and/or mulch movement and/or rill erosion. Mow as required for vegetated diversions. Remove sediment and repair damage to diversions immediately.
- After construction is complete and the diversion is completely stabilized, inspect the diversion annually and after each major rainfall for damage and deterioration. Repair damages immediately. Ongoing maintenance shall include the removal of accumulated sediment and debris from the channel and mowing as required.

Temporary Sediment Traps



(Photo Credit: US EPA)

Definition

- A temporary ponding area with a stone outlet formed by excavation and/or constructing an earthen embankment.
- Note: Avoid placing temporary sediment traps directly in the line of flow. If placed in the line of flow, peak flows must be addressed.

Purpose

- To detain sediment-laden runoff from small disturbed areas long enough to allow a majority of the sediment to settle out.

Applicability

- Below disturbed areas where the contributing drainage area is 5 acres or less -- for drainage areas greater than 5 acres use a **Temporary Sediment Basin**.
- Where the intended use is 6 months or less. For uses extending beyond 6 months use a **Temporary Sediment Basin**.
- When diverting sediment-laden water with temporary diversions that meet the above limitations for use.

Planning and Design Requirements

Note: This measure is intended to be used for a period of 6 months or less. For uses greater than 6 months use a **Temporary Sediment Basin**.

Preliminary Considerations

Sequence the construction of temporary sediment traps, along with other perimeter erosion and sediment controls so that traps are constructed and functional before land disturbance in the contributing drainage area occurs.

The temporary sediment trap has two storage requirements: one for wet storage and one for dry storage. Commonly, the wet storage is created by excavation within a drainage way and the dry storage created by the construction of a pervious stone dike across the drainage way. Sometimes the trap is formed, at least in part, by the construction of an embankment. Such an embankment constitutes a dam and is therefore limited to a height of no greater than 6 feet and requires care in its construction. (Please note: A proposal to construct an impoundment having a dam six (6) feet in height or more, or a capacity of fifteen (15) acre-feet or more, or that is a significant or high hazard dam may subject the owner to additional requirements in accordance with the RIDEM Dam Safety Program and the State of Rhode Island Department of Environmental Management Office of Compliance and Inspection – Rules and Regulation for Dam Safety.)

ESC plans should identify the size of the contributing drainage area, wet and dry storage requirements as well as the volume of sediment accumulation that will trigger trap cleaning. Sediment is required to be removed from the trap when the sediment accumulation exceeds half of the wet storage volume of the trap. The plans should also guarantee that access is provided for sediment removal and detail how excavated sediment will be disposed (such as by use in fill areas on-site or removal to an approved off-site location).

Variations in temporary sediment trap design may be considered, but plan reviewers should ensure the minimum storage requirements and structural requirements noted below are maintained.

Location

Locate temporary sediment traps so that they can be installed prior to conducting any grading activities in the contributing watershed. Do not locate traps in close proximity to existing or proposed building foundations if there is any concern regarding seepage of water from the temporary sediment trap into the foundations or foundation excavation area. Locate traps to obtain maximum storage benefit from the terrain, for ease of clean out and disposal of the trapped sediment.

It is not recommended to locate a sediment basin within an extended detention basin or a stormwater treatment basin. Fine soil particles found in the sediments removed by the sediment basin will seal the underlying soils of the sediment basin and the future infiltration capacity of the soils may be significantly reduced.

Trap Capacity

The temporary sediment trap shall have an initial storage volume of 134 cubic yards per acre of drainage area, half of which shall be in the form of wet storage to provide a stable settling medium. The remaining storage volume shall be in the form of a drawdown (dry storage) which will provide extended settling time during less frequent, larger storm events. **Figure 1** contains the formulas for calculating the wet storage volume and the dry storage volume. The volume of wet storage shall be measured from the low point of the excavated area to the base of the stone outlet

structure (see **Figure 2**). The volume of the dry storage shall be measured from the base of the stone outlet to the top of the stone outlet (overflow mechanism). Note: In accordance with Standard 10 of the 2010 Rhode Island Stormwater Design and Installation Standards Manual temporary sediment trapping measures must be sized to store 1 inch of runoff from the contributing area or per the sediment volume method (equation provided in **Temporary Sediment Basins**) whichever is greater.

Try to provide a storage area which has a minimum 2:1 length to width ratio (measured from point of maximum runoff introduction to outlet).

Figure 1. Wet and Dry Temporary Sediment Trap Storage Volume Formulas

Wet storage volume may be approximated as follows:

$$V_w = 0.85 \times A_w \times D_w$$

where,

- V_w = the wet storage volume in cubic feet
- A_w = the surface area of the flooded area at the base of the stone outlet in square feet
- D_w = the maximum depth in feet, measured from the low point in the trap to the base of the stone outlet.

Dry storage volume may be approximated as follows:

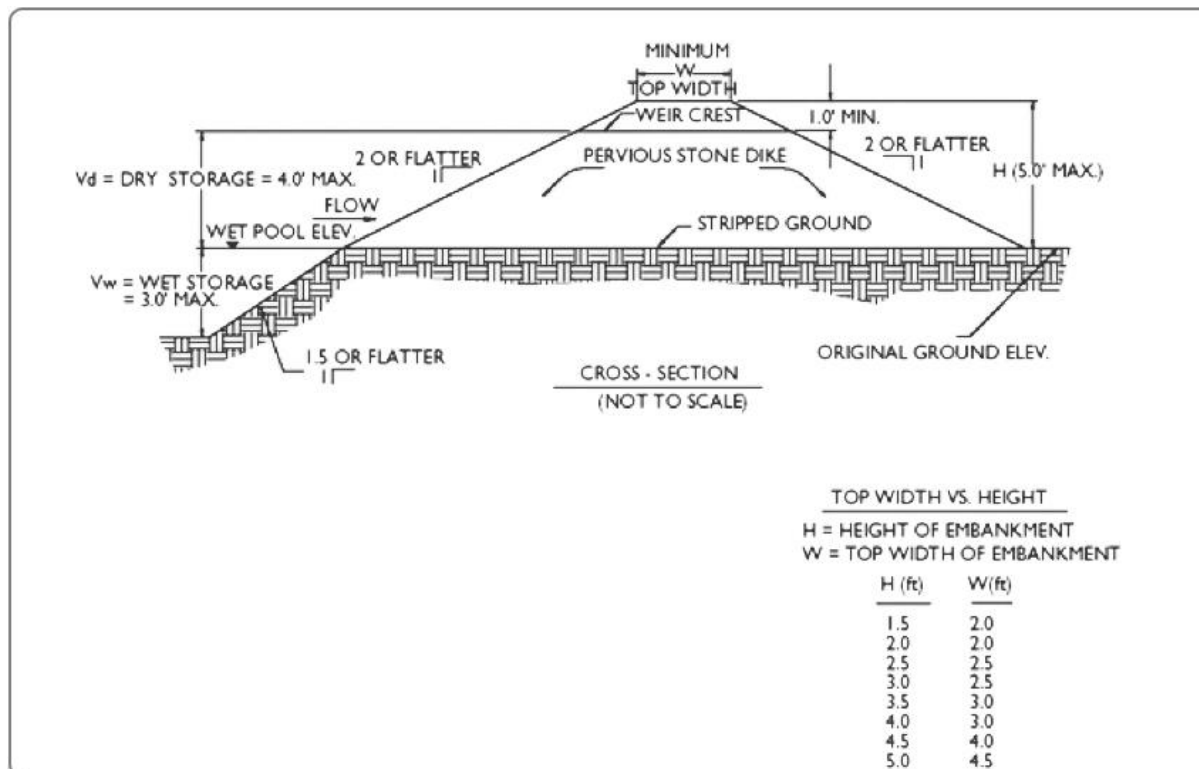
$$V_d = \frac{(A_w + A_d)}{2} \times D_d$$

where,

- V_d = the dry storage volume
- A_w = the surface area of the flooded area at the base of the stone outlet in square feet.
- A_d = the surface area of the flooded area at the top of the stone outlet (over flow mechanism), in square feet
- D_d = the depth in feet, measured from the base of the stone outlet to the top of the stone outlet

Note: Conversion between cubic feet and cubic yards is: cubic feet x 0.037 = cubic yards.

Figure 2. Minimum Top Width for Temporary Sediment Trap Embankments Based on Height of Embankment



(Credit: 2002 Connecticut Guidelines for Soil Erosion and Sediment Control)

Slope Limitations

All cut and fill slopes shall be 2:1 or flatter except for the excavated wet storage area where slopes shall not exceed 1.5:1. The maximum depth of excavation within the wet storage area should not exceed three (3) feet to facilitate clean-out and for site safety considerations.

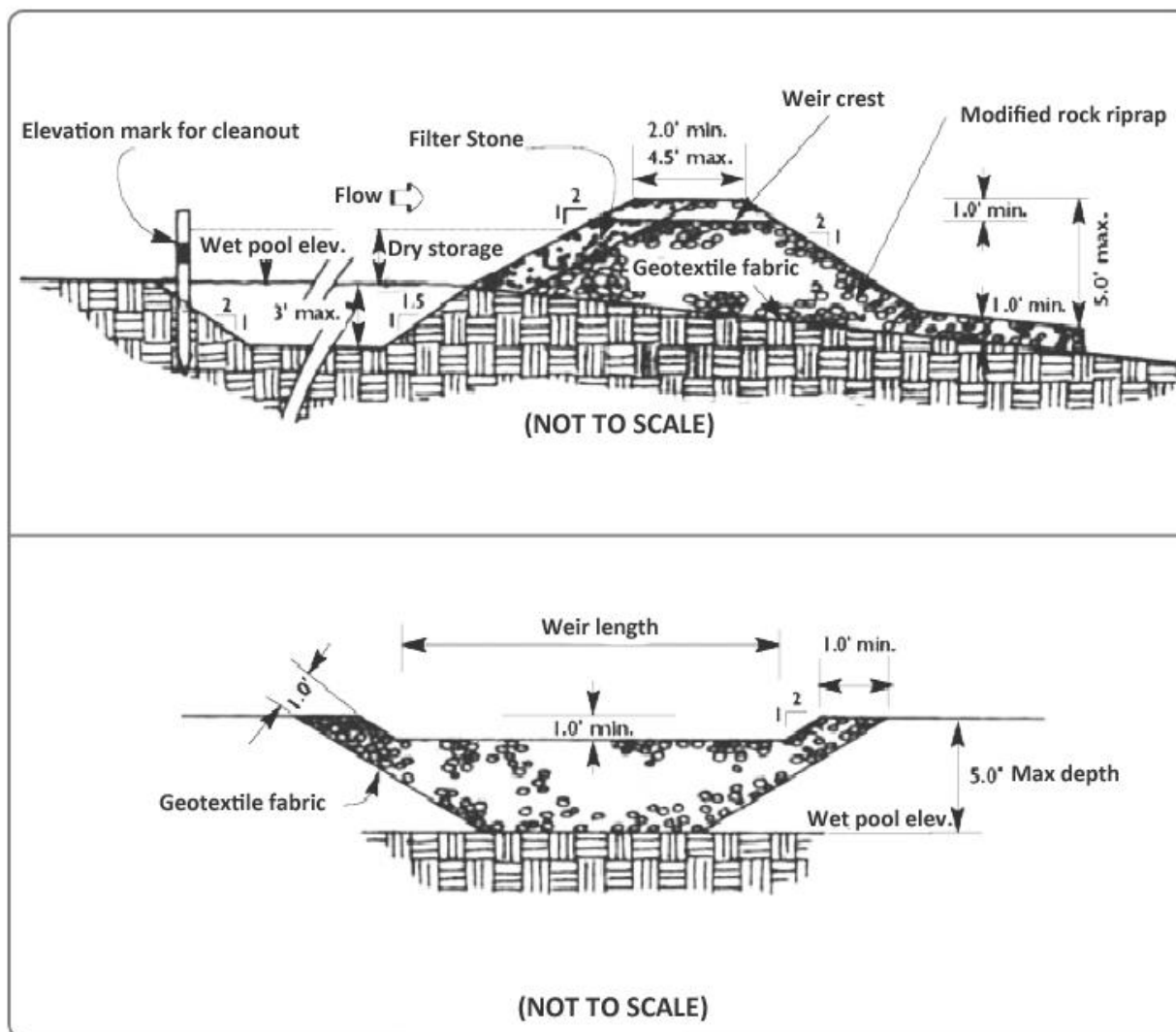
Inlet/Outlet Configuration

The outlet shall be located at the most distant hydraulic point from the inlet. In cases where a long narrow site runs perpendicular to the direction of flow, baffles consisting of stone dikes or other structurally sufficient barriers should be added along the long axis of the trap to increase travel distance through the trap.

Outlet

Plan the outlet in such a manner that the minimum required wet storage and dry storage volumes are created (see Trap Capacity section above) and one (1) foot of free board between the top of the outlet or weir crest and the crest of the embankment is established. The outlet consists of a pervious stone dike with a core of modified riprap and faced on the upstream side with stone which meets the requirements of RIDOT Standard Specifications for Road and Bridge Construction Subsection M.01.09 Table I, Column V for Filter Stone. Temporary sediment traps must outlet onto stabilized (preferably undisturbed) ground, into a watercourse, stabilized channel, or into a storm drain system. **Figure 3** shows an example of an outlet for a temporary sediment trap.

Figure 3. Views of a Temporary Sediment Trap Outlet



(Credit: 2002 Connecticut Guidelines for Soil Erosion and Sediment Control)

Embankment

The maximum height of a temporary sediment trap embankment is limited to 5 feet as measured vertically from the crest of the embankment to the down slope base of the embankment or toe of the stone dike, whichever is lower. Minimum top widths (W) and outlet heights (H_o) for various embankment heights (H) are shown in **Figure 2**. Side slopes of the embankment shall be 2:1 or flatter.

Materials

Modified Riprap: shall meet the requirements of RIDOT Standard Specifications for Road and Bridge Construction Subsection M.10.03.2.

Filter Stone: shall meet the requirements of RIDOT Standard Specifications for Road and Bridge Construction Subsection M.01.09 Table I, Column V Filter Stone.

Sediment Storage Markers

Detail the location and installation requirements for sediment storage stakes or other means of showing the threshold elevation for sediment cleanout.

Installation Requirements

Clear, grub and strip any vegetation and root mat from any proposed embankment and outlet area. Remove stones and rocks whose diameter is greater than three (3) inches and other debris.

Excavate wet storage and construct the embankment and/or outlet as needed to attain the necessary storage requirements. Use only fill material for the embankment that is free from excessive organics, debris, large rocks (over six (6) inches) or other unsuitable materials. Compact the embankment in 9-inch layers by traversing with equipment while it is being constructed.

Stabilize the earthen embankment using any of the following measures, Seeding for Temporary Vegetative Cover; Seeding for Permanent Vegetative Cover; or Slope Protection, immediately after installation.

Carry out construction operations in such a manner that erosion and water pollution are minimized.

Inspection, Maintenance, and Removal Requirements

Inspect the temporary sediment trap at least once a week and within 24 hours of the end of a storm with a rainfall amount of 0.25 inch or greater. Check the outlet to ensure that it is structurally sound and has not been damaged by erosion or construction equipment. The height of the stone outlet or weir crest should be maintained at least 1 foot below the crest of the embankment. Also check for sediment accumulation and filtration performance.

When sediments have accumulated to one half the minimum required volume of the wet storage, dewater the trap as needed, remove sediments and restore the trap to its original dimensions. Dispose of the sediment removed from the basin in a suitable area and in such a manner that it will not erode and cause sedimentation problems.

The temporary sediment trap may be removed after the contributing drainage area is stabilized. If it is to be removed, then the plans should show how the site of the temporary sediment trap is to be graded and stabilized after removal.

Appendix G

RIPDES Construction General Permit
(Included in Field Copy of SESC Plan)