

Town of Medley Public Services Facility

Project Specifications



Town of Medley

Office of Capital
Projects &
Development Services
777 NW & 72 Avenue
Medley, Florida 33166

ATKINS

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PUBLIC SERVICES FACILITY
Town of Medley, Florida

SECTION 01 0000 - GENERAL REQUIREMENTS

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SECTION 01 0000 - GENERAL REQUIREMENTS

1.1 GENERAL INTENTION

- A. Contractor shall furnish all labor, materials, LEED documentation and perform work as necessary to construct buildings, site elements, utilities, and temporary environmental controls as required by drawings and specifications. Contractor shall cooperate with Owner for other projects on the subject property.
- B. Visits to the site by Bidders may be made only by appointment with the Owner's Representative.
- C. Before placement and installation of work subject to tests by testing laboratory retained by the Town of Medley, the Contractor shall notify the Owner's Representative in sufficient time to enable testing laboratory personnel to be present at the site in time for proper taking and testing of specimens and field inspection. Such prior notice shall be not less than three work days unless otherwise designated by the Owner's Representative.
- D. Prior to commencing work, contractor shall provide proof that an OSHA certified "competent person" (CP) (29 CFR 1926.20(b)(2)) will maintain a presence at the work site whenever the general or subcontractors are present.
- E. Training:
 - 1. All employees of contractor or subcontractors shall have the 10-hour OSHA certified Construction Safety course and /or other relevant competency training, as determined by Owner's Representative.
 - 2. Submit training records of all such employees for approval before the start of work.

1.2 STATEMENT OF BID ITEM(S)

- A. ITEM I, GENERAL CONSTRUCTION: Work includes general building construction, site construction, grading, temporary environmental controls, and the construction of utility systems and the construction and certain other items. Construction is phased.

1.3 SPECIFICATIONS AND DRAWINGS FOR CONTRACTOR

- A. After NOTICE TO PROCEED, __2__ set of specifications and drawings will be furnished.
- B. Additional sets of drawings may be made by the Contractor, at Contractor's expense

1.4 CONSTRUCTION SECURITY REQUIREMENTS

- A. General:
 - 1. The contractor is responsible for the security of the work site until final acceptance by the Town of Medley.

2. Contractor shall carefully protect and minimize damage to any existing Work that is to be retained.
3. Personnel working on this project shall not bring or consume alcoholic beverages or controlled substances to the site.
4. Any personnel working in secure areas of the project shall wear a worker I.D. badge at all times. The Owner's Representative shall define the secure areas of the project and the timeframe during construction when the areas are deemed secure.
5. Contractor shall provide a written (hardcopy and electronic format) security plan.
6. The Contractor is responsible for the control of secure project documents such as project plans and project specifications.
7. A pre-construction meeting will be required with the Owner's Representative to review the project security plan and document control.

B. Security Plan:

1. The Contractor shall prepare a security plan. The security plan shall define both physical and administrative security procedures that will remain effective for the entire duration of the project. The security plan shall designate a person from the Contractor's firm who will be on-site to be the Site Security Officer.
2. The Contractor is responsible for assuring that all sub-contractors working on the project and their employees also comply with these regulations.

C. Document Control:

1. Before starting any work, the Contractor/Sub Contractors shall submit an electronic security memorandum describing the approach to following goals and maintaining confidentiality of "sensitive information" for review and approval of Owner's Representative.
2. The Contractor is responsible for safekeeping of all drawings, project manuals and other project information. This information shall be shared only with those with a specific need to accomplish the project. All sets of drawings and specifications shall be labeled and numbered.
3. A log shall be maintained of all drawings and specifications that are used by the Contractor and sub-contractors. The log shall contain at a minimum the date the document was created, distributed to sub-contractor, returned by sub-contractor and destroyed by the Contractor.
4. Certain documents, sketches, videos or photographs and drawings may be marked "Law Enforcement Sensitive" or "Sensitive Unclassified". Secure such information in separate containers and limit the access to only those who will need it for the project. Return the information to the Owner's Representative upon request.
5. These security documents shall not be removed or transmitted from the project site without the written approval of Owner's Representative.
6. All "sensitive information" paper waste or electronic media such as CD's shall be shredded

and destroyed in a manner acceptable to the Owner's Representative.

7. Notify Owner's Representative and Site Security Officer immediately when there is a loss or compromise of "sensitive information".
8. The contractor shall provide a means to adequately destroy all drawings and specifications upon project close-out (with exception of required close-out documents, as-builts and other documents required by the Owner's Representative).

D. Site Security Personnel

1. The Contractor shall provide on-site security personnel, 24 hours a day, 7 days a week for the duration of the construction project.
2. The Contractor shall provide and/or maintain a facility for the security personnel.
3. The Contractor shall pay for all costs associated with site security and the associated utilities.

1.5 FIRE SAFETY

A. Applicable Publications: Publications listed below form part of this Article to extent referenced.

Publications are referenced in text by basic designations only.

1. American Society for Testing and Materials (ASTM):
E84-2009Surface Burning Characteristics of Building Materials
2. National Fire Protection Association (NFPA):
10-2010.....Standard for Portable Fire Extinguishers
30-2008.....Flammable and Combustible Liquids Code
51B-2009Standard for Fire Prevention During Welding, Cutting and Other Hot Work
70-2011.....National Electrical Code
241-2009.....Standard for Safeguarding Construction, Alteration, and Demolition Operations
3. Occupational Safety and Health Administration (OSHA):
29 CFR 1926Safety and Health Regulations for Construction

B. Fire Safety Plan: Establish and maintain a fire protection program in accordance with 29 CFR 1926. Prior to start of work, prepare a plan detailing project-specific fire safety measures, including periodic status reports, and submit to Architect and Owner's Representative for review for compliance with contract requirements in accordance with Section 01 3000, ADMINISTRATIVE REQUIREMENTS. Prior to any worker for the contractor or subcontractors beginning work, they

shall undergo a safety briefing provided by the general contractor's competent person per OSHA requirements. This briefing shall include information on the construction limits, means of egress, break areas, work hours, locations of restrooms, etc. Documentation shall be provided to the Architect of Record that individuals have undergone contractor's safety briefing, examples of documentation are meeting minutes and sign-in sheets. Safety Briefings shall be provided periodically (minimum bi-weekly) for the entire duration of the work.

- C. Site Access: Maintain free and unobstructed access to facility emergency services and for fire, police and other emergency response forces in accordance with NFPA 241.
- D. Fire Extinguishers: Provide and maintain extinguishers in construction areas and temporary storage areas in accordance with 29 CFR 1926, NFPA 241 and NFPA 10.
- E. Flammable and Combustible Liquids: Store, dispense and use liquids in accordance with 29 CFR 1926, NFPA 241 and NFPA 30.
- F. Fire Hazard Prevention and Safety Inspections: Inspect entire construction areas weekly. Coordinate with, and report findings and corrective actions weekly to Architect of Record and Owner's Representative.
- G. Smoking: Smoking is prohibited except in designated smoking rest areas.
- H. Dispose of waste and debris in accordance with NFPA 241 and LEED requirements – See Construction Waste Management (Section 01 7419) and Sustainable Design Requirements (Section 01 8111).
- I. Perform other construction and demolition operations in accordance with 29 CFR 1926.

1.6 OPERATIONS AND STORAGE AREAS

- A. The Contractor shall confine all operations (including storage of materials) on Town of Medley premises to areas authorized or approved by the Owner's Representative. Contractor shall hold and save the Town of Medley, its officers and agents, free and harmless from liability of any nature occasioned by the Contractor's performance or lack of performance.
- B. Temporary buildings (e.g., storage sheds, shops, offices) and utilities may be erected by the Contractor only with the approval of the Owner's Representative and shall be built with labor and materials furnished by the Contractor without expense to the Town of Medley. The temporary buildings and utilities shall become the property of the Contractor at the completion of the project.
- C. The Contractor shall, under regulations prescribed by the Owner's Representative, use only established roadways, or use temporary roadways constructed by the Contractor when and as authorized by Owner's Representative. When materials are transported in prosecuting the work, vehicles shall not be loaded beyond the loading capacity recommended by the manufacturer of the vehicle or prescribed by any Federal, State, or local law or regulation. When it is necessary to cross curbs or sidewalks, the Contractor shall protect them from damage. The Contractor shall repair or pay for the repair of any damaged curbs, sidewalks, or roads and any other existing

elements including utilities.

- D. Working space and space available for storing materials shall be as shown on the drawings or as determined by the Owner's Representative.
- E. Execute work in such a manner as to interfere as little as possible with work being done by others.
Keep roads clear of construction materials, debris, standing construction equipment and vehicles at all times.
- F. Utilities Services: Where necessary to cut existing pipes, electrical wires, conduits, cables, etc., of utility services, or of fire protection systems or communications systems (except telephone), they shall be cut and capped at suitable places where shown; or, in absence of such indication, where directed by Architect of Record. All such actions shall be coordinated with the Utility Company involved:
 - 1. Whenever it is required that a connection fee be paid to a public utility provider for new permanent service to the construction project, for such items as water, sewer, electric, gas or steam, payment of such fee shall be the responsibility of the Town of Medley and not the Contractor.
- G. Phasing: To insure such executions, Contractor shall furnish the Architect of Record with a schedule of approximate phasing, dates on which the Contractor intends to accomplish work in each specific area of site or portion thereof. In addition, Contractor shall notify the Architect of Record two weeks in advance of the proposed date of starting work in each specific area of site, or portion thereof. Arrange such phasing dates to insure accomplishment of this work in successive phases mutually agreeable to Owner's Representative, Architect of Record and Contractor.
- H. Construction Fence: Shall be removed after project is complete. Contractor shall repair and modify fence as necessary to complete the work, including relocation to secure Police Department construction area as necessary. Contractor shall submit a report illustrating existing condition of fence and gates (annotated plans and photos) to Owner's Representative prior to the start of work.
- I. Coordinate the work for this contract with other construction operations as directed by Architect of Record and Owner's Representative. This includes the scheduling of traffic and the use of roadways, as specified in Article, USE OF ROADWAYS. Contractor shall provide Maintenance of Traffic and associated permits for this project.

1.7 ALTERATIONS

- A. Survey: Before any work is started, the Contractor shall make a thorough survey with the Architect of Record and the Owner's Representative of the site anticipated routes of access, and furnish a report, signed by all three, to the Owner's Representative. This report shall list area via an as-built site plan:
 - 1. Tree Protection and their condition
 - 2. Condition of existing trees

3. Condition of roadways/access easements
 4. Condition of utilities to remain (Contractor to verify that all utilities to remain are functioning before the start of the work)
 5. Sidewalk, drives, curbs, inlets and catch basins to remain
 6. Bus stops, signs and light poles.
 7. Construction fence
 8. Construction Sign(s) and their condition
 9. Erosion and control devices and their condition
 10. Soil Tracking Prevention Devices and their condition
 11. Stabilized construction entries and their condition
- B. Any items required by drawings to be either reused or relocated or both, found during this survey to be nonexistent, or in opinion of Architect of Record or the Town of Owner's Representative to be in such condition that their use is impossible or impractical, shall be furnished and/or replaced by Contractor with new items in accordance with specifications which will be furnished by Contractor. Provided the contract work is changed by reason of this subparagraph B, the contract will be modified accordingly.
- C. Re-Survey: Thirty days before expected partial or final inspection date, the Contractor and Architect of Record together shall make a thorough re-survey of the areas involved. They shall furnish a report on conditions then existing, as compared with conditions of same as noted in first condition survey report:
1. Re-survey report shall also list any damage caused by Contractor to such items, despite protection measures; and, will form basis for determining extent of repair work required of Contractor to restore damage caused by Contractor's workmen in executing work of this contract.

1.8 RESERVED

1.9 DISPOSAL AND RETENTION

- A. Materials and equipment accruing from work removed and from demolition of structures, or parts thereof, shall be disposed of as follows:
1. Reserved items which are to remain property of the Town of Medley are identified by attached tags or noted on drawings or in specifications as items to be stored. Items that remain property of the Town of Medley shall be removed or dislodged from present locations in such a manner as to prevent damage which would be detrimental to re-installation and reuse. Store such items where directed by Architect of Record.
 2. Items not reserved shall become property of the Contractor and be removed by Contractor from site.

1.10 PROTECTION OF EXISTING VEGETATION, STRUCTURES, EQUIPMENT, UTILITIES, AND IMPROVEMENTS

- A. The Contractor shall preserve and protect all structures, equipment, and vegetation (such as trees) on or adjacent to the work site, which are not to be removed. The Contractor shall only remove trees when specifically authorized to do so. If any limbs or branches of trees are broken during contract performance, or by the careless operation of equipment, or by workmen, the Contractor shall trim those limbs or branches with a clean cut and paint the cut with a tree-pruning compound as directed by the Owner's Representative. Any item that dies as a result of the contractor's actions shall be replaced according to the Miami Dade County Department of Environmental Resource Management requirements and as agreed to by the Owner's Representative. All fees and fines associated with this work will be paid by the Contractor.
- B. The Contractor shall protect from damage all existing improvements and utilities at or near the work site and on adjacent property of a third party, the locations of which are made known to or should be known by the Contractor. The Contractor shall repair any damage to those facilities, including those that are the property of a third party, resulting from failure to comply with the requirements of this contract or failure to exercise reasonable care in performing the work. If the Contractor fails or refuses to repair the damage promptly, the Owner's Representative may have the necessary work performed and charge the cost to the Contractor. Contractor shall call for utility locate prior to starting any underground work. Utility locates shall remain current for the entire duration of the work.
- C. Refer to Section 01 5719, TEMPORARY ENVIRONMENTAL CONTROLS, for additional requirements on protecting vegetation, soils and the environment. Refer to Articles, "Alterations", "Restoration", and "Operations and Storage Areas" for additional instructions concerning repair of damage to structures and site improvements.
- D. The Contractor is responsible for employing best management practices in the execution of the work. The affected activities often include, but are not limited to the following:
 - Designating areas for equipment maintenance and repair;
 - Providing waste receptacles at convenient locations and provide regular collection of wastes;
 - Locating equipment wash down areas on site, and provide appropriate control and collection of wash-waters;
 - Protection of soil
 - Providing protected storage areas for chemicals, paints, solvents, fertilizers, and other potentially toxic materials; and
 - Providing adequately maintained sanitary facilities.

1.11 RESTORATION

- A. Remove, cut, alter, replace, patch and repair existing work as necessary to install new work.

Existing work to be altered or extended and that is found to be defective in any way, shall be reported to the Architect of Record before it is disturbed. Materials and workmanship used in restoring work, shall conform in type and quality to that of original existing construction, except if the existing construction is substandard or as otherwise shown or specified.

- B. Upon completion of contract, deliver work complete and undamaged. Existing work disturbed or removed as a result of performing required new work, shall be patched, repaired, reinstalled, or replaced with new work, and refinished and left in good condition.
- C. At Contractor's own expense, Contractor shall immediately restore to service and repair any damage caused by Contractor's workmen to existing piping and conduits, wires, cables, etc., of utility services or of fire protection systems and communications systems (including telephone) which are indicated on drawings and which are not scheduled for discontinuance or abandonment.
- D. Expense of repairs to such utilities and systems not shown on drawings or locations of which are unknown will be covered by adjustment to contract time and price.

1.12 PHYSICAL DATA

- A. Data and information furnished or referred to below is for the Contractor's information. The Town of Medley shall not be responsible for any interpretation of or conclusion drawn from the data or information from other Contractors.
 - 1. The indications of physical conditions on the drawings and in the specifications are the result of site investigations by surveyor.
- B. Subsurface conditions have been developed by core borings and test pits. Logs of subsurface exploration are shown diagrammatically on drawings.
- C. A copy of the soil report is attached and shall be considered part of the contract documents.
- D. Town of Medley does not guarantee that other materials will not be encountered nor that proportions, conditions or character of several materials will not vary from those indicated by explorations. Bidders are expected to examine site of work and logs of borings; and, after investigation, decide for themselves character of materials and make their bids accordingly. Upon proper application to Owner's Representative, bidders will be permitted to make subsurface explorations of their own at site.

1.13 PROFESSIONAL SURVEYING SERVICES

A registered professional land surveyor or registered civil engineer whose services are retained and paid for by the Contractor shall perform services specified herein and in other specification sections. The Contractor shall certify that the land surveyor or civil engineer is not one who is a regular employee of the Contractor, and that the land surveyor or civil engineer has no financial interest in this contract.

1.14 LAYOUT OF WORK

- A. The Contractor shall lay out the work from Town of Medley established base lines and bench marks, indicated on the drawings, and shall be responsible for all measurements in connection with the layout. The Contractor shall furnish, at Contractor's own expense, all stakes, templates, platforms, equipment, tools, materials, and labor required to lay out all parts of the work. The Contractor shall be responsible for executing the work to the lines and grades defined in the contract documents, and those that may be established or indicated by the Owner's Representative. The Contractor shall also be responsible for maintaining and preserving all stakes and other marks established by the Owner's Representative until authorized to remove them. If such marks are destroyed by the Contractor or through Contractor's negligence before their removal is authorized, the Owner's Representative may replace them and deduct the expense of the replacement from any amounts due or to become due to the Contractor.
- B. Contractor shall furnish to the Architect of Record certificates from a registered land surveyor or registered civil engineer that the following work is complete in every respect as required by contract drawings.
 - 1. Grading
 - 2. Elevations of and locations of catch basins and other storm water management devices (inlets and inverts).
 - 3. Labeled lines and elevations of all utilities.
 - 4. Finish floor elevations (including top and bottom of ramps in garage) and lowest floor Elevation.
 - 5. Bottom of beam/finish for all bridges, parking garage entrance/exit beams and signage.
 - 6. Elevations at top and bottom of ADA compliant ramps, inclined planes, etc.
 - 7. Curbs, drives and ADA complaint parking spaces
 - 8. Elevations of all equipment affected by flood plain requirements.
- C. Following completion of general mass excavation and before any other permanent work is performed, establish and plainly mark (through use of appropriate batter boards or other means) sufficient additional survey control points or system of points as may be necessary to assure proper alignment, orientation, and grade of all major features of work. Survey shall include, but not be limited to, location of lines and grades of footings, corners of building, major utilities and elevations of floor slabs:
 - 1. Such additional survey control points or system of points thus established shall be checked and certified by a registered land surveyor or registered civil engineer. Furnish such certification to the Architect of Record before any work (such as utilities and other major controlling features) is placed.
- D. During progress of work, Contractor shall have line grades and plumbness of all major form work checked and certified by a registered land surveyor or registered civil engineer as meeting

requirements of contract drawings. Furnish such certification to the Architect of Record.

- E. Whenever changes from contract drawings are made in line or grading requiring certificates, record such changes on a reproducible drawing bearing the registered land surveyor or registered civil engineer seal, and forward these drawings upon completion of work to Architect of Record.
- F. The Contractor shall perform the surveying and layout work of this and other articles and specifications in accordance with the provisions of Article "Professional Surveying Services".

1.15 AS-BUILT DRAWINGS

- A. The contractor shall maintain one full size set of as-built drawings which will be kept current during construction of the project, to include all contract changes, modifications and clarifications.
- B. All variations shall be shown in the same general detail as used in the contract drawings. To insure compliance, as-built drawings shall be made available for the Architect of Record's review, as often as requested.
- C. Contractor shall deliver two approved completed sets of as-built drawings to the Architect of Record within 15 calendar days after each completed phase and after the acceptance (Substantial Completion) of the project by the Architect of Record.
- D. Paragraphs A, B, & C shall also apply to all shop drawings.

1.16 USE OF ROADWAYS

- A. For hauling, use only established public roads or temporary roads which are necessary in the performance of contract work when authorized by the Architect of Record or Owner's Representative. Temporary roads shall be constructed by the Contractor at Contractor's expense. When necessary to cross curbing, sidewalks, or similar construction, they must be protected by well-constructed bridges.

1.17 RESERVED

1.18 RESERVED

1.19 RESERVED

1.20 RESERVED

1.21 TEMPORARY TOILETS

- A. Provide as required, (for use of all Contractor's workmen) ample temporary sanitary toilet accommodations with suitable sewer and water connections; or, when approved by Architect of Record, provide suitable dry closets where directed. Keep such places clean and free from vermin, including flies and mosquitos, and all connections and appliances connected therewith are to be removed prior to completion of contract, and premises left perfectly clean.

1.22 AVAILABILITY AND USE OF UTILITY SERVICES

- A. Furnish all temporary electric services.
 - 1. The Contractor shall meter and pay for any electrical required for Construction and Testing.
- B. Water (for Construction and Testing): Furnish temporary water service.
 - 1. Obtain water by providing temporary connection to Town water distribution system. Provide reduced pressure backflow preventer at each connection. The Contractor shall meter and pay for water required for construction activities.
 - 2. Maintain connections, pipe, fittings and fixtures and conserve water-use so none is wasted.

1.23 RESERVED

1.24 TESTS

- A. Pre-test equipment and systems and make corrections required for proper operation of such systems before requesting final tests. Provide a pre-test report indicating pass/fail status. Final test will not be conducted unless pre-tested.
- B. Conduct final tests required in various sections of specifications in presence of an authorized representative of the Owner's Representative. Contractor shall furnish all labor, materials, equipment, instruments, and forms, to conduct and record such tests.
- C. Mechanical and electrical systems shall be balanced, controlled and coordinated. A system is defined as the entire complex which must be coordinated to work together during normal operation to produce results for which the system is designed. For example, air conditioning supply air is only one part of entire system which provides comfort conditions for a building. Other related components are return air, exhaust air, steam, chilled water, refrigerant, hot water, controls and electric Town, etc
- D. All related components as defined above shall be functioning when any system component is tested. Tests shall be completed within a reasonably short period of time during which operating and environmental conditions remain reasonably constant.
- E. Individual test result of any component, where required, will only be accepted when submitted with the test results of related components and of the entire system.
- F. Coordinate with project commissioning requirements.
- G. Coordinate with LEED documentation requirements.

1.25 INSTRUCTIONS

- A. Contractor shall furnish Maintenance and Operating manuals and verbal instructions when required by the various sections of the specifications and as hereinafter specified.

- B. Manuals: Maintenance and operating manuals (four copies each) for each separate piece of equipment shall be delivered to the Architect of Record coincidental with the delivery of the equipment to the job site. Manuals shall be complete, detailed guides for the maintenance and operation of equipment. They shall include complete information necessary for starting, adjusting, maintaining in continuous operation for long periods of time and dismantling and reassembling of the complete units and sub-assembly components. Manuals shall include an index covering all component parts clearly cross-referenced to diagrams and illustrations. Illustrations shall include "exploded" views showing and identifying each separate item. Emphasis shall be placed on the use of special tools and instruments. The function of each piece of equipment, component, accessory and control shall be clearly and thoroughly explained. All necessary precautions for the operation of the equipment and the reason for each precaution shall be clearly set forth. Manuals must reference the exact model, style and size of the piece of equipment and system being furnished. Manuals referencing equipment similar to but of a different model, style, and size than that furnished will not be accepted.
- C. Instructions: Contractor shall provide qualified, factory-trained manufacturers' representatives to give detailed instructions to assigned Town of Medley' personnel in the operation and complete maintenance for each piece of equipment. All such training will be at the job site. These requirements are more specifically detailed in the various technical sections. Instructions for different items of equipment that are component parts of a complete system, shall be given in an integrated, progressive manner. All instructors for every piece of component equipment in a system shall be available until instructions for all items included in the system have been completed. This is to assure proper instruction in the operation of inter-related systems. All instruction periods shall be at such times as scheduled by the Architect of Record and shall be considered concluded only when the Architect of Record is satisfied in regard to complete and thorough coverage. The Town of Medley reserves the right to request the removal of, and substitution for, any instructor who, in the opinion of the Architect of Record, does not demonstrate sufficient qualifications in accordance with requirements for instructors above.

1.26 RESERVED

1.27 RESERVED

1.28 RESERVED

1.29 CONSTRUCTION SIGN

- A. Maintain sign and remove it when directed by the Town of Medley Project Manager.

1.30 RESERVED

1.31 RESERVED

E N D OF SECTION

SECTION 01 0015 - LIST OF DRAWING SHEETS

The drawings listed below accompanying this specification form a part of the contract.

GENERAL

CIVIL

LANDSCAPE

ARCHITECTURAL

A-100	COVER SHEET
G-001	NOTES AND SYMBOLS
G-002	STRUCTURAL NOTES
G-003	SITE SURVEY
A-101	DEMOLITION PLANS
A-102	PROPOSED SITE PLAN
A-103	PROPOSED VEHICLE WASH AND VEND PLANS
A-104	PROPOSED CLEANOUT DRY BEDS PEMB PLANS

STRUCTURAL

PLUMBING

FIRE PROTECTION

FIRE ALARM

ELECTRICAL

TELECOM

SECTION 01 1000 – SUMMARY

PART 1 - GENERAL

1.1 LOCATION OF WORK

Work is located in the Town of Medley, FL. Exact location is shown on the Drawings.

1.2 WORK TO BE PERFORMED

The Work to be performed under this Contract shall consist of providing equipment, materials, supplies, and manufactured articles; and for furnishing transportation and services, including fuel, power, water, and essential communications; and for the performance of labor, work, or other operations in strict accordance with this Project Manual.

Wherever the Project Manual address a third party, i.e., subcontractor, manufacturer, vendor, etc., it is to be considered as the Contractor through the third party. Wherever a reference to number of days is noted, it shall mean calendar days.

1.3 SUMMARY

A. Section includes:

1. Summary of scope of work
2. Work sequence
3. Contractor use of site
4. Contractor personnel jobsite restrictions

B. Related documents and sections:

1. General Conditions of the Contract
2. General Requirements

1.4 SUMMARY OF SCOPE OF WORK

The Town is completing the design of XX

1.5 SEQUENCE OF CONSTRUCTION

- A. Following receipt of Notice to Proceed with the Work, the Contractor shall notify the Town at least 5-days before he is ready to start actual construction to allow the Town time to make arrangements for inspection of the Work.
- B. Work under the Contract shall be scheduled and performed in such a manner as to result in the least possible disruption to residents.
- C. Submit a sequence of construction schedule for the entire project.

- D. The Contractor shall note that some areas of the Work may require deep excavation and dewatering, which may require sheeting and by-pass pumping. The Contractor shall be responsible for adhering to all permit requirements.
- E. Cancellation of Planned Shutdown: A planned shutdown may be cancelled by the Town upon 24-hour notification by the Town/CEI to the Contractor. Such cancellation shall be expected due to wet weather conditions or other conditions beyond the control of the Town, CEI, or Contractor. All efforts shall be taken to check weather forecasts and the like prior to scheduling shutdowns. However, if a cancellation must occur, the Town shall not be responsible for any additional costs associated with mobilization and demobilization.
- F. Coordinate construction schedule and operations with Owner.

1.6 DEMOLITION AND SALVAGE OF EXISTING FACILITIES

Coordinate any demolition activities with CEI.

1.7 REHABILITATION

The Contractor shall be responsible for the restoration of driveway approaches, and others areas affected by the work necessary to complete this Work.

1.8 DISPOSAL OF DEBRIS

All debris, materials, piping, and miscellaneous waste products from the Work described in the section shall be removed from the project as soon as possible. They shall be disposed of in accordance with applicable federal, state, and local regulations. The Contractor is responsible for determining these regulations and shall bear all costs or retain any profit associated with disposal of these items.

1.9 CONTRACTOR USE OF SITE

- A. Contractor will have unrestricted use of site.
 - 2. Contractor has use of the area to
 - 3. Parking: Contractor and work force may use designated portions of site to XX parking lot. Do not interfere with adjacent Owner's parking requirements.

1.10 CONTRACTOR'S PERSONNEL JOBSITE RESTRICTIONS

- A. Contractor shall enforce the following requirements on his entire workforce throughout the progress of the Work:
 - 3. All personnel on site, directly or indirectly in the employ of Contractor, are restricted from any interaction with any Owner, Owner's staff, or other members of the public while on, or adjacent to Owner's property except through jobsite meetings conducted by the Design Professional and the Owner or as otherwise determined by the Owner.

2. Contractor's personnel shall remain in their designated work areas. Communications with any non-project related persons on or near the site shall be through Project Superintendent.
3. No firearms or other types of weapons, of any sort are allowed on site. If member of the Contractor's workforce is found to be in possession of a firearm, of any kind, they will be directed to leave immediately and will not be allowed to return. This includes firearms found in company or private vehicles, tool boxes, or brought on site in any other manner;
4. Smoking is prohibited in any building and enclosed spaces. Smoking shall be limited to designated areas of the site, as determined by Owner.
5. There shall be no use, possession, sale, and distribution of alcohol, drugs, or other controlled substances on its premises. The Contractor shall also prohibit the presence of an individual with such substances in their body from the workplace.
6. Any employee who is found in violation of requirements of these restrictions, or of any others within the Contract Documents, or who refuses to permit inspection shall be barred from the Project site at the discretion of the Owner.
7. Comply with Owner's procedures for individual visual identification of Contractor's workforce on site and in secure areas. If identification badges are required make sure that they are worn at all times on site during the work.

PART 2 - PRODUCTS

Not used.

PART 3 - EXECUTION

Not used.

END OF SECTION

SECTION 01 1060 - SAFETY REQUIREMENTS AND PROTECTION OF PROPERTY

SUMMARY
01 1000

PUBLIC SERVICES FACILITY
Town of Medley, Florida

PART 1 - GENERAL

1.01 CONTRACTOR'S RESPONSIBILITY FOR SAFETY

Conduct whatever work is necessary for safety and be solely and completely responsible for conditions of the job site, including safety of all persons (including employees) and property during the construction of the project. This requirement shall apply continuously and not be limited to normal working hours.

1.02 FEDERAL, STATE, AND LOCAL SAFETY REQUIREMENTS

- A. Safety provisions shall conform to the Federal and State Departments of Labor Occupational Safety and Health Act (OSHA), and all other applicable Federal, State, County, and local laws, ordinances, codes, the requirements set forth herein, and any regulations that may be specified in other parts of these specifications. Where any of these are in conflict, the more stringent requirements shall prevail. Contractor's failure to thoroughly familiarize himself with the aforementioned safety provisions shall not relieve him from compliance with the obligations and penalties set forth therein.
- B. All open excavations made in the earth shall be performed in compliance with the State of Florida Trench Safety Act, OSHA 29 CFR 1926.650, Subpart P (Chapter 90-96, Laws of Florida). The Contractor shall appoint a "competent person", in accordance with Subpart P, who shall be present at the jobsite. A "competent person" shall mean one who is capable of identifying existing and predictable hazards in the surroundings, or working conditions which are unsanitary, hazardous, or dangerous to employees, and who has authorization to take prompt corrective measures to eliminate them.
- C. The Contractor shall familiarize himself with the "Underground Facility Damage Prevention and Safety Act", Florida Statute 556. The Contractor shall contact the Sunshine State One-Call Center, at 1-800-432-4770, forty-eight hours prior to any excavation. Failure to familiarize himself with the aforementioned safety provisions shall not relieve him from compliance with the obligations and penalties set forth therein.
- D. Conduct operations in such a manner utilizing warning devices, such as traffic cones, barricades and warning lights that traffic, pedestrian and Town personnel are given adequate warning of hazards of the worksite as may be deemed necessary by the Town, Engineer of Record, and governing agency having jurisdiction over the work or political subdivision.

1.03 SAFE ACCESS BY FEDERAL, STATE, AND LOCAL GOVERNMENT OFFICIALS

The Contractor shall at all times provide proper facilities for safe access to the work by authorized government officials.

1.04 CONSTRUCTION SAFETY PROGRAM

- A. Develop and maintain for the duration of this project, a safety program that will effectively incorporate and implement all required safety provisions. The Contractor shall appoint an

employee who is qualified and authorized to supervise and enforce compliance with the safety program.

- B. Certain products specified in these specifications contain warnings by the manufacturers that under certain conditions, if instructions for use are not followed, a hazardous condition may exist. It is the Contractor's responsibility to instruct his workmen in the safe use of the product, or any product substitution.
- C. The duty of the Engineer of Record to conduct construction review of the Contractor's performance is not intended to include a review or approval of the adequacy of the Contractor's safety supervisor, the safety program, or any safety measures taken in, on, or near the construction site.

1.05 SAFETY EQUIPMENT

- A. As part of the safety program, maintain at office or other well-known place at the jobsite, safety equipment applicable to the work as prescribed by the governing safety authorities, all articles necessary for giving first-aid to the injured, and establish the procedure for the immediate relocation to a hospital or a doctor's care of any person who may be injured on the jobsite.
- B. Perform all necessary work to protect the general public from hazards, including, but not limited to, surface irregularities or unramped grade changes in pedestrian walkway or sidewalk, and trenches or excavations in roadway. Furnish barricades, lanterns, and proper signs to safeguard the public and work.
- C. The performance of all work and all completed construction, particularly with respect to ladders, platforms, structure openings, scaffolding, fall protection devices, shoring, logging, machinery guards and the like, shall be in accordance with the applicable governing safety authorities.
- D. During construction, construct and at all times maintain satisfactory and substantial temporary chain link fencing, solid fencing, railings, barricades or steel plates, as applicable, at all openings, obstructions, or other hazards in streets and walkways. All such barriers shall have adequate warning lights as necessary, or required, for safety.

1.06 STORAGE OF HAZARDOUS MATERIALS

- A. The Contractor is hereby cautioned that he cannot store any environmentally hazardous materials such as solvents, greases, lubricants or any other type of chemical substances at the project site. The Contractor shall be allowed to keep such materials at the site which is to be used for immediate use only.
- B. The materials shall be stored and handled in a proper and safe manner and upon its use immediately dispose of the containers, cans, rags and remnants of the materials in a manner approved by PERA at the Contractor's own cost. The Contractor cannot store empty containers at the site. In case of any violation, the Town will report such violation to PERA and the Contractor shall be subject to all the penalties and fines as required by State and County regulations.

1.07 TRAFFIC SAFETY AND ACCESS TO PROPERTY

- A. Comply with all rules and regulations of the city, state, and county authorities regarding closing or restricting the use of public streets or highways. No public or private road shall be closed, except by express permission of the Town. Conduct the work so as to assure the least possible obstruction to traffic and normal commercial pursuits. Protect all obstructions within traveled roadways by installing approved barricades, signs, and lights where necessary for the safety of the public. The convenience of the general public and residents and the protection of persons and property are of prime importance and shall be provided for in an adequate and satisfactory manner.
- B. Where traffic will pass over backfilled trenches before they are paved, the top of the trench shall be maintained in a condition that will allow normal vehicular traffic to pass over. Temporary access driveways must be provided where required. Cleanup operations shall follow immediately behind backfilling and the worksite shall be kept in an orderly condition at all times.
- C. When flagmen and guards are required by regulation or when deemed necessary for safety, they shall be furnished with approved orange wearing apparel and other regulation traffic control devices.

1.08 FIRE PREVENTION AND PROTECTION

- A. Perform all work in fire-safe manner. Furnish and maintain on the site adequate fire-fighting equipment capable of extinguishing incipient fires. Comply with applicable federal, local, and state fire-prevention regulations. Where these regulations do not apply, applicable parts of the National Fire Prevention Standard for Safeguarding Building Construction Operations (NFPA No. 241) shall be followed.
- B. The Contractor shall have a Hot Work Permit Program and shall complete a permit prior to cutting or welding. A Fire Watch shall be designated to help monitor the hot work operation.

1.09 TRAFFIC CONTROL AND USE OF PUBLIC STREETS

- A. The Contractor shall be responsible for traffic control as specified hereinafter. Any reference to Miami-Dade County, its departments, or its published regulations, permits and data, shall be synonymous and interchangeable with other recognized governing bodies over particular areas of streets or their departments, published regulations, permits, or data. Abide by all applicable laws, regulations and codes thereof, pertaining to maintenance of public streets, detour of traffic, traffic control and other provisions as may be required for this project.
- B. The Contractor shall be fully responsible for the maintenance of public streets, detour of traffic (including furnishing and maintaining regulatory and informative signs along the detour route), traffic control and other provisions, throughout the project as required by the Town and the Miami-Dade County Department of Public Works, Traffic Engineering Division (Traffic Division). Traffic shall be maintained according to corresponding typical traffic control details as outlined in the Dade County Public Works Manual. No street shall be completely blocked nor

blocked more than one-half at any time, keeping the other half open for traffic without specific approval.

- C. If required by the Town, employ the required number of uniformed off-duty policemen to maintain and regulate the flow of traffic through the construction area. The number of men required and the number of hours on duty necessary for the maintenance and regulation of the traffic flow shall be subject to their approval. If required for traffic control permits or agencies, the Contractor shall work odd or night hours, as required for traffic control reasons, and the cost of such work shall be considered as incidental to construction.
- D. The Contractor shall provide all barricades and/or flashing warning lights necessary to warn motorists of the construction throughout the project.
- E. Excavated or other material stored adjacent to or partially upon a roadway pavement shall be adequately marked for traffic safety at all times. Provide necessary access to all adjacent property during construction.
- F. The contractor shall be responsible for the provision, installation and maintenance of all traffic control and safety devices, in accordance with specifications outlined in the Dade County Public Works Manual. In addition, provide for the resetting of all traffic control and information signing removed during the construction period.
- G. Where excavations are to be made in the vicinity of signalized intersections, attention is directed to the fact that vehicle loop detectors may have been embedded in the pavement. Verify these locations by inspecting the site of the work and by contacting the Sunshine State One-Call Center at 1-800-432-4770. Any loop detector which is damaged, whether shown on the Drawings or not, shall be repaired or replaced to the satisfaction of the Town.
- H. Notify the Town 24 hours in advance of the construction date, and 48 hours in advance of construction within any signalized intersection.
- I. Temporary pavement will be required over all cuts in pavement areas, and also where traffic is to be routed over swale or median areas. When the temporary pavement for routing traffic is no longer necessary, it shall be removed and the swale or median area restored to their previous condition.

1.10 CONTRACTOR'S RESPONSIBILITY FOR UTILITY PROPERTIES AND SERVICE

- A. Where the Contractor's operation could cause damage or inconvenience to railway, telephone, fiber optic, television, electrical power, oil, gas, water, sewer, or irrigation systems, the Contractor shall make all arrangements necessary for the protection of these utilities and services or any other known utilities.
- B. Notify all utility companies that are affected by the construction operation at least 48 hours in advance. Under no circumstance expose any utility without first obtaining permission from the

appropriate agency. Once permission has been granted, locate, expose, and provide temporary support for all existing underground utilities and utility poles where necessary.

- C. The Contractor and his subcontractors shall be solely and directly responsible to the owner and operators of such properties for any damage, injury, expense, loss, inconvenience, delay, suits, actions, or claims of any character brought because of any injuries or damage which may result from the construction operations under this project.
- D. Neither the Town nor its officers or agents shall be responsible to the Contractor for damages as a result of the Contractor's failure to protect utilities encountered in the work.
- E. In the event of interruption to domestic water, sewer, storm drain, or other utility services as a result of accidental breakage due to construction operations, promptly notify the proper authority. Cooperate with said authority in restoration of service as promptly as possible and bear all costs of repair. In no event shall interruption of any utility service be allowed outside working hours unless granted by the owner of the utility.
- F. In the event water service lines that interfere with trenching are encountered, the Contractor may, by obtaining prior approval of the water utility, cut the service, dig through, and restore the service with similar and equal materials at the Contractor's expense and as approved by the Town.
- G. Drainage culverts that are at or near right angles to a pipeline and are removed by the Contractor shall be replaced in kind at the expense of the Contractor unless otherwise noted.
- H. Replace, with material approved by the Town, at Contractor's expense, any and all other laterals, existing utilities or structures removed or damaged during construction, unless otherwise provided for in these specifications and as approved by the Town.

1.11 HURRICANE PREPAREDNESS

A. General

During such periods of time as are designated by the United States Weather Bureau as being a hurricane alert, the Contractor shall perform all precautions as necessary to safeguard the work and property, including the removal of all small equipment and materials from the site, lashing all other equipment and materials to each other and to rigid construction, and any other safety measures as may be directed by the Engineer.

B. Upon Notification of a Hurricane Watch

The Contractor should prepare or have in place a Plan of Action for the specific actions to be taken on their particular projects.

C. Upon Notification of a Hurricane Warning

1. The Contractor shall implement their Plan of Action to protect the project and the public.
2. For construction projects within the public right-of-ways, the Contractor shall suspend his construction operations, backfill all open trenches, remove all construction equipment and

materials from the right-of-way, remove unnecessary traffic barricades and signs and secure remaining barricades by "half burial" or "double sand bags".

1.12 WORKING IN CONFINED SPACES

Where a Contractor needs to work in a confined space, the Contractor must comply with the General Industry, OSHA Confined Space Standard, CFR 1910.146 or the equivalent Confined Space Standard in DFR 1926, Construction Standards.

PART 2 - PRODUCTS

(Not Used)

PART 3 - EXECUTION

(Not Used)

END OF SECTION 01 1060

SECTION 01 2000 - PRICE AND PAYMENT

PROCEDURES PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Procedures for preparation and submittal of applications for progress payments.

1.2 SCHEDULE OF VALUES

- A. Provide schedule of values based on specification sections in AIA Document G703. Form should be of sufficient detail to adequately represent the work to be installed.
- B. Electronic media printout including equivalent information will be considered in lieu of standard form specified; submit sample to Architect for approval.
- C. Forms filled out by hand will not be accepted.
- D. Payment Applications will not be accepted prior to acceptance by Architect and Owner's Representative.

1.3 APPLICATIONS FOR PROGRESS PAYMENTS

- A. Payment Period: Submit at intervals stipulated in the Agreement.
- B. Electronic media printout including equivalent information will be considered in lieu of standard form specified; submit sample to Architect for approval.
- C. Forms filled out by hand will not be accepted.
- D. Execute certification by signature of authorized officer.
- E. Submit three copies of each Application for Payment with updated AIA Document G703 form.
- G. An updated schedule shall be provided with each Application for Payment.

END OF SECTION

SECTION 01 2100 - ALLOWANCES

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Cash allowances.
- B. Contingency allowance.
- C. Inspecting and testing allowances.
- D. Payment and modification procedures relating to allowances.

1.2 RELATED REQUIREMENTS

- A. Section 01 2000 - Price and Payment Procedures: Additional payment and modification procedures.

1.3 CASH ALLOWANCES

- A. Costs Included in Cash Allowances: Cost of product to Contractor or subcontractor, less applicable trade discounts, less cost of delivery to site, less applicable taxes.
- B. Costs Not Included in Cash Allowances: Product delivery to site and handling at the site, including unloading, uncrating, and storage; protection of products from elements and from damage; and labor for installation and finishing. _____.
- C. Architect Responsibilities:
 - 1. Consult with Contractor for consideration and selection of products, suppliers, and installers.
 - 2. Select products in consultation with Owner and transmit decision to Contractor.
 - 3. Prepare Change Order.
- D. Contractor Responsibilities:
 - 1. Assist Architect in selection of products, suppliers, and installers.
 - 2. Obtain proposals from suppliers and installers and offer recommendations.
 - 3. On notification of which products have been selected, execute purchase agreement with designated supplier and installer.
 - 4. Arrange for and process shop drawings, product data, and samples. Arrange for delivery.
 - 5. Promptly inspect products upon delivery for completeness, damage, and defects. Submit claims for transportation damage.
- E. Differences in costs will be adjusted by Change Order.

1.4 CONTINGENCY ALLOWANCE

- A. Contractor's costs for products, delivery, installation, labor, insurance, payroll, taxes, bonding, equipment rental, overhead and profit will be included in Change Orders authorizing expenditure of funds from this Contingency Allowance.
- B. Funds will be drawn from the Contingency Allowance only by Change Order.

- C. At closeout of Contract, funds remaining in Contingency Allowance will be credited to Owner by Change Order.

1.5 INSPECTING AND TESTING ALLOWANCES

- A. Costs Included in Inspecting and Testing Allowances: Cost of engaging an inspecting or testing agency; execution of inspecting and tests; and reporting results.
- B. Costs Not Included in the Inspecting and Testing Allowances:
 - 1. Costs of incidental labor and facilities required to assist inspecting or testing agency.
 - 2. Costs of testing services used by Contractor separate from Contract Document requirements.
 - 3. Costs of retesting upon failure of previous tests as determined by Architect.
- C. Payment Procedures:
 - 1. Submit one copy of the inspecting or testing firm's invoice with next application for payment.
 - 2. Pay invoice on approval by Architect.
- D. Differences in cost will be adjusted by Change Order.

1.6 ALLOWANCES SCHEDULE

- A. Section _____ - _____ : Include the stipulated sum of \$ _____ for purchase and delivery of _____.
- _____ : Include the stipulated sum of \$ _____ for purchase and

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

SECTION 01 2200 - UNIT PRICES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes administrative and procedural requirements for unit prices.
- B. Related Requirements:
 - 1. Section 01 0000 General Requirements.
 - 2. Section 01 4000 Quality Requirements
 - 3. Section 01 4529 Testing Laboratory Services

1.3 DEFINITIONS

- A. Unit price is an amount incorporated in the Agreement, applicable during the duration of the Work as a price per unit of measurement for materials, equipment, or services, or a portion of the Work, added to or deducted from the Contract Sum by appropriate modification, if the scope of Work or estimated quantities of Work required by the Contract Documents are increased or decreased.

1.4 PROCEDURES

- A. Unit prices include all necessary material, plus cost for delivery, installation, insurance, overhead, and profit.
- B. Measurement and Payment: See individual Specification Sections for work that requires establishment of unit prices. Methods of measurement and payment for unit prices are specified in those Sections.
- C. Owner reserves the right to reject Contractor's measurement of work-in-place that involves use of established unit prices and to have this work measured, at Owner's expense, by an independent surveyor acceptable to Contractor.
- D. List of Unit Prices: A schedule of unit prices is included in Part 3. Specification Sections referenced in the schedule contain requirements for materials described under each unit price.

PART 2 PRODUCTS - NOT USED

PART 3 SCHEDULE OF UNIT PRICES

1. Unit Price No. 4 Lighting Fixtures \$ each installed
2. Concrete Sidewalks \$per SF
3. Milling of Asphalt pavement \$ per SF
4. Solid Sod \$ per SF
5. New Asphalt Pavement \$ per S Y
6. Traffic Stripping \$ per LF

END OF SECTION

SECTION 01 2300 - ALTERNATES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes: Procedures and descriptions for alternates which decrease or increase scope of project.
- B. Related documents and sections:
 - 1. Instructions to Bidders:
 - 2. Agreement Between Owner and Contractor

1.2 CONDITIONS

- A. All requirements of General and Supplementary Conditions, applicable sections of Specifications, and applicable portions of Drawings shall govern scope, quality, and execution of alternates.
- B. Alternates will be selected in order listed on Bid Form and as allowed by available funding.
- C. Contractor may submit alternates (additive or deductive) to reduce project construction time or to reduce project cost to Owner. Architect/Engineer and Owner will review alternates for compliance with the Basis of Design, the Owner's Project Requirements and the intent of the contract documents. The Architect/Engineer will render an opinion of the alternate's compliance with the previously mentioned project documents. The Owner will approve or reject the inclusion of the alternate in the scope of the work.
- D. Provide additive and deductive alternates in the following format:
 - 1. ADDITIVE ALTERNATE NO. 1 - [_____]

Alternate requires [construction] [provision] [installation] of
[_____].

Include as part of alternate [_____].

If alternate is accepted, delete [_____]
as part of Base Bid.
 - 2. DEDUCTIVE ALTERNATE NO. 1 - [_____]

Alternate requires [construction] [provision] [installation] of [_____].

Include as part of alternate [_____].

If alternate is accepted, delete [_____] as part of Base Bid.

1.3 PROCEDURES

- A. Consider all work that must be accomplished for complete incorporation of alternates including modifications to Base Bid items.
- B. Include in lump sum prices for alternates all costs of labor, materials, equipment, permits, fees, insurance, bonds, overhead, and profit.
- C. Immediately after award of Contract, advise all necessary personnel and suppliers as to which alternates have been selected by Owner. Use all means necessary to alert those personnel and suppliers involved as to all changes in the work caused by Owner's selection or rejection of alternates.
- D. Coordinate related work and modify surrounding work to integrate work of each alternate.

PART 2 - PRODUCTS

Not used.

PART 3 - EXECUTION

Not used.

END OF SECTION

SECTION 01 2977 - MEASUREMENT AND PAYMENT

PART 1 GENERAL

1.01 UNIT PRICE WORK

- A. Payment for Work listed in the Unit Price Schedule will be made at the contract unit price indicated multiplied by the units of completed Work.
- B. The Unit Price of an item of Unit Price Work may be subject to re-evaluation, negotiation and possible adjustment under the following conditions:
 - 1. If the total cost of a particular item of Unit Price Work differs by more than the percentage stipulated in the Contract from the estimated quantity of such item indicated in the Contract Documents and if the Contractor justifies and adequately documents to the Owner's Representative's satisfaction, additional expenses have been incurred as a result thereof.

1.02 NON UNIT PRICE WORK - NEGOTIATED BASIS

- A. If the Work includes Work which is not covered by the Unit Price Schedule, payment for such work may be based on a negotiated dollar amount agreed upon by the Contractor, and the Owner's Representative. The negotiated dollar amount shall be calculated in a manner similar to that provided below:
 - 1. By estimating the fair and reasonable cost of: (i) labor, including all wages, required wage supplements and insurance required by law (worker's compensation, social security, disability, unemployment, etc.) paid to or on behalf of foreman, workers and other employees below the rank of the Contractor's designated representative directly employed at the Work site; (ii) materials; (iii) equipment, excluding hand tools (which are defined as equipment having a purchase price of less than five hundred dollars), which, in the judgment of the Town of Medley, would have been or will be employed exclusively and directly on the Work, as the case may be; and, where the same is performed directly by the Contractor.
 - 2. All profit, overhead and expense of whatsoever kind and nature, other than those set forth above in items (i) through (iii), are covered by the aforesaid percentage overrides and no additional payment therefore will be made by the Town of Medley.
- B. The Contractor shall, after being requested, promptly submit to the Owner's Representative a detailed breakdown of the Contractor's proposal. The Owner's Representative shall promptly review and respond to the submitted proposal.
- C. Upon reaching agreement on a negotiated dollar amount for the non-unit price Work, the Town of Medley shall confirm the agreement in writing, and the Contractor shall proceed with the Work.

1.03 NON UNIT PRICE WORK - LABOR AND MATERIAL BASIS

- A. If the Work includes Work which is not covered by this Unit Price Schedule, payment for such Work may be based on the actual cost of labor and materials; cost to be determined as the Work progresses. The labor and material (L&M) dollar amount shall be calculated in a manner similar to that provided below:
1. By determining the actual cost of the Work in the same manner as in the above Subparagraph 1.02. A. 1., except that actual costs of the Contractor be utilized in lieu of estimated costs. The Town of Medley shall have the option to utilize this method provided it notifies the Contractor of its intent to do so prior to the time the Contractor is properly authorized to commence performance of such non-unit price Work.
 2. Whenever this Contract requires the determination of the actual cost of equipment, it shall be determined as follows:
 - a. Equipment used or to be used in the performance of Work shall be specifically described by the manufacturer, model number and date of manufacture and be of suitable size and capacity required for the work to be performed.
 - b. For the purposes of computing the Contractor's cost for self-owned equipment, the rate used for periods of under five days shall be the monthly rate set forth for the item of equipment in the "Rental Rate Blue Book" published by K-III Directory Corporation (800) 669-3282 divided by 22 days to establish a daily rate and divided again by eight hours to establish an hourly rate. The rate used for periods of 5 days or more shall be 45 percent of the published monthly rate. In the event the "Rental Rate Blue Book" does not list the item of equipment used, the applicable rate shall be determined in the same manner as set forth above except that the monthly rate used shall be that set forth in "The AED Green Book" published by K-III Directory Corporation (800) 669-3282. In the event that a rate is not established in the "Rental Rate Blue Book" or "The AED Green Book" for a particular piece of equipment, the Owner's Representative shall establish a rate for ownership costs and operating costs for that piece of equipment, that is consistent with its cost and expected life. Self-owned equipment is defined to include equipment rented from controlled or affiliated companies.
 - c. Rented equipment will be paid for at the actual rental cost.
 - d. For the purposes of the performance of work, when, in the opinion of the Contractor, and as approved in writing by the Owner's Representative, suitable equipment is not available on the Site, the moving of said equipment to and from the Site will be paid for at actual cost.
 - e. Notwithstanding any other provision, if the Town of Medley should determine that the nature or size of the equipment used by the Contractor in connection with the

performance of Work is larger or more elaborate, as the case may be, than the size or nature of the minimum equipment determined by the Owner's Representative to be suitable for the performance of Work, the cost of equipment used in calculating the costs of Work will not be based upon the equipment used by the Contractor but instead will be based on the smallest or least elaborate equipment determined by the Owner's Representative to have been suitable for the performance of the Work. In no event shall the amount paid to the Contractor for the use of self-owned construction equipment exceed the lower of the actual cost of such equipment or the depreciated value of such equipment as carried on the Contractor or subcontractors books.

- f. The Contractor shall be reimbursed for its operating costs for self-owned equipment based on actual cost data. Operating costs shall include fuel, lubricants, other operating expendables and preventive and field maintenance. Operating costs do not include the operator's wages. In the event, after documented and demonstrated due diligence, actual operating costs are not ascertainable, then the Contractor will be compensated utilizing not more than 50 percent of the operating costs set forth in the "Rental Rate Blue Book" and the Contractor shall be reimbursed the product of the number of hours of actual use multiplied by the operating cost per hour.
- g. The rate for idle equipment and stand-by equipment, shall be based upon the rate of depreciation specified in the Contractor's books and records, or 50 percent of the rate set forth in the "Rental Rate Blue Book," with the appropriate adjustments noted in Subparagraph 1.03 A. 2 (b), above, whichever is less. In the event the equipment is fully depreciated, the rate shall be the actual ownership costs based upon audit of the Contractor's books and records.
- h. The maximum amount of reimbursement for the ownership costs of self-owned equipment is limited to the original purchase price of the equipment as listed in the "Green Guide for Construction Equipment" published by K-III Directory Corporation (800) 669-3282. In the specific event when the ownership reimbursement is limited by the original purchase price, the Contractor shall, nevertheless, be reimbursed for the operating cost per hour for each hour of actual use.

- B. If the Contractor employs subcontractors in the performance of the Work, the actual cost to the subcontractor of labor and materials as defined in Subparagraph 1.03 A. 2 (b) above.

C. Overhead and Profit:

- 1. If the Work is performed by the Contractor, an amount, as stated in the contract, may be added to the cost of labor and materials for overhead and profit.

2. If the Work is performed by a subcontractor, an amount, as stated in the contract, may be added for the benefit of such subcontractor, and for the benefit of the Contractor an additional sum, if stated in the contract.
3. If any Work is performed by a sub-subcontractor, no further allowance will be made.

1.04 PAYMENT METHOD

- A. It is the intent of the Town of Medley to compensate the contractor in accordance with Article 1.01 above.
- B. There may be occasions when NON-UNIT PRICE WORK is necessary. For those occasions, the first choice will be to compensate the contractor in accordance with Article 1.02 above.
- C. If all reasonable attempts to comply with Paragraph 1.04 B. above have failed to result in a negotiated dollar amount for the non-unit price Work, the Contractor shall be directed to proceed with the Work, and will be compensated in accordance with Article 1.03 above.

PART 2 PRODUCTS (Not Used)

PART 3 EXECUTION (Not Used)

END OF SECTION 01 2977

SECTION 01 3000 - ADMINISTRATIVE REQUIREMENTS

PART 1 GENERAL

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.1 SUBMITTALS FOR REVIEW

- A. When the following are specified in individual sections, submit them for review:
 - 1. Product data.
 - 2. Shop drawings.
 - 3. Samples for selection.
 - 4. Samples for verification.
- B. Submit to Architect for review for the limited purpose of checking for conformance with information given and the design concept expressed in the contract documents.
- C. Samples will be reviewed only for aesthetic, color, or finish selection.
- D. After review, provide copies and distribute in accordance with the GENERAL CONDITIONS, Section 01 3323 SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES and for record documents purposes described in Section 01 7800 - CLOSEOUT SUBMITTALS.

3.2 SUBMITTALS FOR INFORMATION

- A. When the following are specified in individual sections, submit them for information:
 - 1. Design data.
 - 2. Certificates.
 - 3. Test reports.
 - 4. Inspection reports.
 - 5. Manufacturer's instructions.
 - 6. Manufacturer's field reports.
 - 7. Other types indicated.
- B. Submit for Architect's and Owner's Representative's knowledge. No action will be taken.
- C. Submit the following information not later than 15 days after approval of the Contract unless the Contractor or the Director determines an earlier submission is required to properly schedule or progress the Work.
 - 1. Contractor list of Sub-contractors and Suppliers: An affirmative review of the subcontractor's responsibility will be conducted.
 - 2. Indicate the items of Work proposed to be accomplished by subcontractors, the name and address of each proposed subcontractor.
 - 3. Indicate the names and addresses of proposed suppliers, the dollar value of the supplies.
 - 4. Failure in providing this information may result in payments being withheld.
 - 5. If after initial approval, circumstances require a change in a subcontractor or supplier or require additional subcontractors or suppliers to be used, submit a revised list to

reflect the changes or additions.

3.3 SUBMITTALS FOR PROJECT CLOSEOUT

- A. When the following are specified in individual sections, submit them at project closeout:
 - 1. Project record documents.
 - 2. Operation and maintenance data.
 - 3. Warranties.
 - 4. Bonds.
 - 5. Other types as indicated.
- B. Submit for Owner's benefit during and after project completion.

3.4 NUMBER OF COPIES OF SUBMITTALS

- A. Documents for Review:
 - 1. Submit the number of copies as per the GENERAL CONDITIONS.
- B. Documents for Information: Submit two copies.
- C. Samples: Submit the number specified in individual specification sections; one of which will be retained by Architect.
 - 1. After review, produce duplicates.
 - 2. Retained samples will not be returned to Contractor unless specifically so stated.
 - 3. Contractor to maintain samples at the project site for review by Architect and/or Owner's Representative.

3.5 SUBMITTAL PROCEDURES

- A. Identify variations from Contract Documents and Product or system limitations that may be detrimental to successful performance of the completed Work.
- B. Submittals not requested will not be recognized or processed.
- C. When revised for resubmission, identify all changes made since previous submission.
- D. Refer to Section 01 3323 SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES

END OF SECTION 01 3000

SECTION 01 3100 - PROJECT MANAGEMENT AND COORDINATION

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes:

1. General requirements for coordination of Work.
2. Field engineering.
3. Requirements for participation in and administration of:
 - a. Pre-construction conference.
 - b. Progress meetings.
 - c. Pre-installation conferences.
4. Progress schedule.

B. Related documents and sections:

1. General Conditions
2. Section 01 4000 – Quality Requirements:

1.2 SUBMITTALS

A. Provide in accordance with Section 01 3000 - Administrative Requirements:

1. Site mobilization plan
 - a. Submit for Owner's approval prior to start of Work.
 - b. Update as necessary during progress of Work to adjust for changed conditions and as approved by Owner.
2. Coordination drawings:
 - a. Provide where coordination is critical for installation of components fabricated off site and where space is limited and maximum utilization of

space is required.

- b. Show relationship and integration of components and construction entities, required installation sequence, dimensions, and tolerances.

B. Staff assignment list and emergency contact information:

1. Prior to Pre-Construction Conference, provide to Design Professional a list of Contractor's principal staff assignments for Project. Indicate names, duties and responsibilities, addresses, emergency contact information and telephone numbers. Include resume of proposed Project Superintendent showing prior experience as superintendent on projects of similar size and scope. Naming more than one Project Superintendent to be in charge depending which is present at the site will not be acceptable. Design Professional shall be informed in writing prior to any proposed change in Project Superintendent during the progress of the Work. See also Paragraph 3.9 of the General Conditions.
2. Distribute contact information and post in field office coordination.

1.3 GENERAL COORDINATION REQUIREMENTS

- A. Scheduling: Coordinate scheduling, submittals and work of various specification sections to ensure efficient and orderly sequence of installation of interdependent construction elements. Ensure that work of one specification section is not installed in such a manner as to limit, preclude, or restrict work of another section.
- B. Coordinate completion and clean-up of work of separate specification sections in preparation for final inspection specified in Section 01 7716 - Contract Closeout.
- C. After acceptance of Work, coordinate access to facility for required maintenance, monitoring, adjusting, and correcting deficiencies to manner to minimize disruption of Owner's activities.
- D. Coordinate with Owner regarding work of Owner's forces and separate contractors. Ensure coordination of such work with Project Schedule.
- E. Coordinate with Commissioning Agent for inspections and submittals

1.4 FIELD ENGINEERING

- A. Existing control datum for field engineering is indicated on Drawings.
- B. Locate or establish survey control and reference points prior to starting site

construction. Protect points during construction and record locations with horizontal and vertical data on Project Record Documents in accordance with Section 01 7800 - Closeout Submittals.

- C. Prior to start of construction, verify location of control points and layout information on Drawings relative to property, setback, and easement lines.
- D. Provide competent field engineering services. Establish elevations, lines, and levels utilizing recognized engineering survey practices. Periodically verify layouts.
- E. Promptly replace dislocated control and reference points based on original survey control.

1.5 PRE-CONSTRUCTION CONFERENCE

- A. Conference will be held after execution of the Agreement and prior to issuance of Notice to Proceed. Time and location will be coordinated with Owner and Design Professional. Meet at the site or other location convenient to all parties.
- B. Attendance: Owner, Design Professional, consultants, Contractor, and major subcontractors and suppliers.
- C. Agenda:
 - 1. Distribution of Contract Documents.
 - 2. Designation and description of roles of responsible personnel representing Owner, Contractor, and Design Professional.
 - 3. Status of permits and Notice to Proceed.
 - 4. Site mobilization plan, use of premises by Contractor and Owner, Owner's occupancy requirements, work hours, regular school schedule and special school schedule considerations.
 - 5. Construction schedule, work sequence, and delivery priorities.
 - 6. Weekly job meeting schedule.
 - 7. Owner's right to salvage.
 - 8. Presentation and discussion of site mobilization plan
 - 9. Construction facilities, controls, and temporary utilities.

10. Procedures for processing submittals, applications for payment, substitution requests, field decisions and communications, and contract modifications.
11. Emergency contact information.
12. Wage rates.
13. Security, Contractor's use of keys, safety, first aid, and housekeeping.
14. Behavior of work force on site.
15. Procedures for spotting of utility lines.
16. Procedures for maintaining project record documents.
17. Requirements for startup of equipment.
18. Testing and inspection procedures.
19. Introduce Owner's separate contractors and consultants
20. Inspection and acceptance of equipment put into service during construction.
21. Contract closeout procedures.
22. Other pertinent items.

1.7 PROGRESS MEETINGS

- A. Refer to General Conditions.

1.8 PRE-INSTALLATION CONFERENCES

- A. When required by an individual specification section, convene a pre-installation conference at site.
- B. Require attendance of entities directly concerned with item of work.
- C. Notify Design Professional 4 days in advance of meeting.
- D. Prepare agenda and preside at conference. Record minutes, and distribute copies within 3 days to participants and Design Professional.

- E. At meeting, review conditions of installation, preparation and installation procedures, and coordination with related work.

1.9 PROGRESS SCHEDULE

- A. See General Conditions for requirements.

PART 2 - PRODUCTS

2.1 EQUIPMENT

- A. Verify utility requirements and characteristics of equipment are compatible with facility utilities. Coordinate work of various specification sections having interdependent requirements for installing, connecting to, and placing in service such equipment.

PART 3 - EXECUTION

3.1 COORDINATION WITH INSTALLED CONSTRUCTION

- A. Cutting and patching of installed construction shall be accomplished in accordance with Section 01 7300 - Execution Requirements.

END OF SECTION

SECTION 01 3114 - FACILITY SERVICES COORDINATION

PART 1 GENERAL

1.1 MECHANICAL AND ELECTRICAL COORDINATOR

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.1 COORDINATION REQUIRED

- A. Coordinate the work listed below:
 - 1. Fire Suppression: Division 21.
 - 2. Plumbing: Division 22.
 - 3. Heating, Ventilating, and Air Conditioning: Division 23.
 - 4. Integrated Automation: Division 25.
 - 5. Electrical: Division 26.
 - 6. Communications: Division 27.
 - 7. Electronic Safety and Security: Division 28.
 - 8. Site Utilities: Division 33.
- B. Coordinate progress schedules, including dates for submittals and for delivery of products.
- C. Conduct meetings among subcontractors and others concerned, to establish and maintain coordination and schedules, and to resolve coordination matters in dispute.
- D. Participate in progress meetings. Report on progress of work to be adjusted under coordination requirements, and any required changes in schedules. Transmit minutes of meetings and reports to concerned parties.

3.2 COORDINATION OF SUBMITTALS

- A. Review shop drawings, product data, and samples for compliance with Contract Documents and for coordination with related work. Transmit copies of reviewed documents to Architect.

3.3 COORDINATION OF SUBSTITUTIONS AND MODIFICATIONS

- A. Review proposals and requests for substitution prior to submission to Architect.

3.4 OBSERVATION OF WORK

3.5 EQUIPMENT START-UP

END OF SECTION

SECTION 01 32 16 - CONSTRUCTION SCHEDULE

PART 1 - GENERAL

1.1 PROJECT SCHEDULE

- A. The schedule provisions are designed to provide the Contractor and the Town with a tool for planning and controlling the work. The contractor is responsible for creating a Baseline Schedule and monthly Schedule Updates as specified herein. The schedule shall be created or produced on Primavera Project Manager P6 v2 or its latest software version, capable of meeting the criteria as specified in this section. The Contractor shall provide a backup copy CD of the schedule, which may also be concurrently sent via electronic mail for the Town's use and review. A fully readable XER primavera file shall accompany all the required reports.

1.2 SCHEDULES REVIEWS, REVISIONS, ACCEPTANCE

- A. The Town or its Consultants will review the initial submissions of the Baseline Schedule or Update Schedules and will respond with comments within fifteen (15) calendar days of submission. Any areas that, in the opinion of the Town or its Consultants, conflict with timely completion of the Contract or does not comply with the contract documents shall be subject to revision by the Contractor.
- B. The Contractor shall revise the Schedules to reflect the Town's or its Consultants comments within ten (10) calendar days of receipt.
- C. Contractor's invoices shall not be processed until the Baseline Schedule and the monthly schedule updates have been approved as set forth in Article 10.6 of the General Conditions.
- D. The Town or its Consultants will issue a recommendation letter or report upon determining that the Contractor's schedules reflect a reasonable representation of expected and required project performance. The accepted Schedule shall serve as the Project Baseline Schedule or latest Update Schedule. Acceptance by the Town or its Consultants of the Contractor's Project Schedule does not relieve the Contractor of any responsibility whatsoever for the accuracy or feasibility of the Project Schedule, or of the Contractor's ability to meet the Contract Completion Date. Nor does such acceptance create a warranty by the Town or its Consultants expressed or implied of the activities, logic, durations or manpower and equipment loading of the Contractor's Project Schedule.

- E. Approval of the schedule extends only to the Contractor's compliance with the CPM construction schedule's form and content and not to the Contractor's construction means and methods.

1.3 The Project Schedule shall employ CPM using retained logic for the planning, scheduling and reporting of the work to be performed under the Contract. Schedule descriptive terms used shall be compatible with the terminology used by Primavera in its current software manuals.

1.4 The Contractor shall issue separate project schedules for the different GMP contracts including but not limited to preliminary, baselines, updates and final completion schedules. All phasing requirements shall be reflected in the Baseline Schedule without any reservations whatsoever.

1.5 CONTRACTOR'S SCHEDULING CONSULTANTS

- A. The Contractor shall designate in writing, and submit qualifications of its Scheduling Consultant, who shall be responsible for the preparation and maintenance of the Project Schedule. Such qualifications shall include not less than two (2) previous projects of similar type, complexity and value utilizing Critical Path Method (CPM) scheduling. The Scheduling Consultant shall be available on an as-needed basis. The Scheduling Consultant may be from within the Contractor's organization or an outside Consultant.

- 1. The Scheduling Consultant shall have complete authority to act on behalf of the Contractor in fulfilling the Project Schedule requirements of the Contract and such authority shall not be interrupted throughout the duration of the Contract unless approved in writing by the Town.

- 2. The Scheduling Consultant shall attend schedule-related meetings and monthly update meetings throughout the duration of the Contract as requested by the Town.

1.6 COMPUTER-PRODUCED REPORTS

- A. Print reports, four (4) hardcopies on 8 ½" x 11" or 11" x 17" paper, one-sided, for each Requisition for Payment, bound in the following sequence:

1. Cover page (on cover stock) and identical title page with project name, number and location, Contractor, requisition number, date, Owner's name & address, A/E's name and address.
2. Narrative Report (see Exhibit 1).
3. Complete Bar Chart Schedule Sorted by Early Start (see Exhibit 2).
4. Critical Path Report (see Exhibit 3).
5. Report filtered by Owner & A/E Responsibility and sorted by Early Start (see Exhibit 4).
6. Report Sorted by CSI Master Format Division (see Exhibit 5).
7. Cost Profile and S-Curve (see Exhibit 6).
8. Resource Profile and S-Curve (see Exhibit 7).
9. Milestone Schedule (see Exhibit 8).

PART 2 - PRELIMINARY SCHEDULE

- 2.1 Within fifteen (15) calendar days after Notice to Proceed, the Contractor shall prepare and submit for review by the Town and its Consultants a preliminary construction schedule representing the construction of Phase II; the Town Hall, Mechanical Building, Parking Garage, and Off-Site work, and Phase III; the Police Department Building as indicated in the contract documents.
 - A. The preliminary schedule should display the first 90 days of work and shall include the Contractor's general approach to executing the rest of the Work.
 - B. The preliminary schedule shall include no more than 300 activities.

PART 3 - BASELINE SCHEDULE (PHASE II/III GMP PACKAGE)

- 3.1 Within thirty (30) calendar days after Notice to Proceed, the Contractor shall prepare and submit, for review and approval by the Town and/or its Consultants, a detailed Baseline Schedule complying fully with the contract time, documents, and requirements of the Phase II/III GMP Package.
 - A. The Baseline Schedule shall contain no Contract changes or delays that may have occurred before its submittal. These shall appear in the appropriate schedule update. Negative Float will not be permitted in the Baseline Schedule and will render the Baseline Schedule as non-compliant.

- B. No payments shall be made to the Contractor until the Baseline Construction Schedule has been submitted as specified herein and approved by the Town.
- C. The Baseline Schedule shall contain between 1500 and 3500 detail task activities applicable to the GMP Packages, including submittal / approval / fabrication tasks and shall account for the entire duration of the Contract Time.
1. The Town may require the addition of up to 300 task activities into the network diagram and reports in addition to the tasks that are the responsibility of the Contractor.
 2. Construction Activities (excluding “Level of Effort”) shall be not less than one (1) day or more than twenty (20) days in duration unless otherwise approved by the Town or its Consultants. Procurement, reviews, closings, and third party (excluding subcontractors) activities are examples of activities that may be exempted from this requirement at the Town’s discretion.
 3. The work related to each activity shall be limited to one work trade and one area. Activity descriptions shall include verbs and shall quantify the where possible.
 4. The Contractor shall submit a detailed Schedule showing all work to be accomplished on the project. The schedule shall clearly indicate the sequence and interdependency of work activities. The Detailed Baseline Schedule shall include, but not be limited to, the following:
 - a. Submittal Activities
 - 1) Submittal activities shall include all required Contract submittals and reviews and respective durations in accordance with the terms and conditions of the Contract.
 - 2) Include Vendor design activities, vendor supplied information, shop drawings, engineering, etc.
 - 3) LEED reporting requirements shall be included in the Baseline Schedule.
 - b. Review & Approve Submittal Activities

- 1) The Town's review of shop drawings, product data, samples and requested substitutions shall be identified as schedule activities. The minimum duration for these activities shall be set forth as per Article 3.15 of the General Conditions and section 01 33 23 of the technical specifications.

c. Procurement Activities

- 1) The proposed procurement activities shall include fabrication and delivery of key and long-lead procurement elements (ex. Fabricate/Deliver Elevator). The schedule shall indicate intended fabrication dates and realistic delivery dates for all procurement activities. The Contractor should be mindful of the Town's Direct Purchase program and should apply responsibility codes accordingly (refer to section 013216.2.1.5 of the technical specifications).

d. Construction Activities

- 1) The construction activities shall cover all physical work activities performed by the Contractor and subcontractors. Any shut-down periods shall be clearly indicated.
- 2) The construction activities shall also cover all work to be performed by the Town, its contractors or private utility contractors related to the Contract to get all of the inter-project dependencies identified explicitly and in detail.
- 3) The time duration to each activity shall be the Contractor's best estimate of working hours required to complete the activity considering the scope and resources planned for the activity and shall be limited to the maximum allotted work period during weekend shutdown.
- 4) Construction activities shall be properly broken down into sufficient detail or as otherwise required by the Town. Combination of multiple tasks into one activity will not be accepted.

e. Commissioning Activities

- 1) The commissioning activities shall cover all training or testing activities required by the Contract prior to Substantial Completion of a portion of or all the work.

- f. Inspection Activities
 - 1) All required inspection activities shall be illustrated in the project schedule (ex. Building Code Inspections, Threshold Inspection, Final Inspections, etc.).
- g. Punchlist, Demobilization and As-Built Activities
 - 1) The punchlist activities shall include without limitation all activities and durations required in this Contract with respect to punchlist walkthrough, development and issuance of punchlist, and correction of punchlist items. Upon issuance of formal Punchlist, the Contractor shall develop or expand its punchlist activities to include sufficient activity detail illustrating the resolution of punchlist comments.
 - 2) Demobilization activities shall include all scope required to demobilize and return the worksite to an acceptable condition.
 - 3) Activities representing the process for all As-Built and Closeout documents shall be included in the Baseline Schedule.
 - 4) FFE/Town Occupancy activities shall be incorporated in the Baseline Schedule as required by the Town.
- h. Milestones
 - 1) The Baseline shall include all Milestone events required by the Contract Documents or requested by the Town. The following is a list of milestone activities that should be included into the Baseline Schedule. The Town reserves its right to add additional milestones at its discretion (see Exhibit 9).
- i. Third Party Activities
 - 1) All third party activities that have an effect on the progress of the project should also be incorporated in to the Baseline Schedule (ex. LEED inspections, certifications, Utility installations/inspections, etc.).

Note: All activities related to meeting the LEED Platinum Goal requirements should be included in the Contractors Baseline Schedule.

- j. Activities relating to the Work's total duration, such as general requirements or supervision, shall be established as a "Level of Effort" type so that earned value will always be in proportion to the percentage complete of the entire Work.
5. All activities shall be assigned activity codes to represent the proper Phasing, Area, Responsibility, CSI/Master Format Divisions, etc in the Baseline Schedule. The Contractor shall code each task to allow selection for preparation of or exclusion from any given set of reports.
 - a. Activity Codes:
 - 1) The Contractor shall create unique Activity Codes at the "Project" level in Primavera Project Manager P6 v2 or its latest software version.
 - 2) The following table identifies the Town's required activity codes. The Contractor may use additional codes for its own requirements.

Code Value	"Sample Description"
PHASE	1. Phase 1 - Phase Description 2. Phase 2 - Phase Description 3. Phase 3 - Phase Description
TASK TYPE	1. General 2. Submittals 3. Construction 4. Milestones, etc
BUILDING/AREA	1. Building 1 2. Building 2 3. Site, etc.
FLOOR	4. Ground, 5. 2nd Floor 6. 3rd Floor, etc
RESPONSIBILITY	1. Contractor 2. Subcontractor 3. Architect 4. Owner, etc
CSI/MF DIVISION	1. Division 1 General Conditions 2. Division 3 Concrete 3. Division 4 Masonry, etc.

- D. Each activity in the schedule shall have at least one predecessor and one successor unless otherwise approved by the Town or its Consultants. All activities except “Notice to Proceed” will be required to have at least one predecessor tied to “start” of the subject activity, and all activities except “Project Final Completion” will be required to have at least one successor tied to the “finish” of the subject activity.
- E. The logic relationships between activities (other than “level of effort”) will generally be finish-to-start. Start-to Finish relationships will only be permitted by prior agreement with the Town or its Consultants.
- F. The use of Lags and their values should be carefully reviewed so to not exceed five (5) work days or the duration of the activities in the relationship in question. Long Lag Values and Negative Lags will not be permitted unless agreed upon by the Town or its Consultants.
- G. The Contractor shall not use constraints of any type without the prior approval of the Town or its Consultants for each instance. A constraint shall be used for project completion indicating the requisite Contract completion dates in the different stages or phases of the project in an effort to properly indicate float. The use of “Free Float Constraints” is not permitted unless approved by the Town and its Consultants. Schedule activities as early as possible unless specific tasks must be logically scheduled otherwise.
- H. The float in the project schedule is not for the exclusive use of either the Town or the Contractor, but is jointly owned by both and is a resource available to and shared by both parties as needed to meet the Contract completion dates. Accordingly, the Contractor shall not use float suppression techniques or sequester shared float through such strategies as extending activity duration estimates to consume available float, application of constraints, using preferential logic, the progress override option, etc.
- I. Unless otherwise directed by the Town, the schedule shall be Cost Loaded. Upon acceptance of the Schedule of Values as provided in the Contract Documents, cost loading shall be implemented on each activity with a one-to-one relationship with the Schedule of Values, or in the event the Contractor and Town determine a one-to-one relationship is not practical, a cross-reference shall be provided. Values shall be assigned that accurately reflect the total cost of the

work described, including labor, materials, equipment, subcontractors, etc. These values must be maintained accurately with actual expenditure data to be based on invoicing in monthly updates. The sum of the values assigned to the activities in the Contractor's schedule shall be equal to the Contract budget, expended to date and remaining to spend values for each individual activity and the total Contract. Cost loading resources shall be named and coded to correlate directly the Contractor's invoicing. These values are to be utilized to assist the Town in cash flow predictions and as an additional measure of project progress.

1. Load the cost of each activity on the network diagram to include:

Cost of equipment: RESOURCE code = xxxEQU,

Cost of materials installed: RESOURCE code = xxxMAT, and

Cost of labor: RESOURCE code = xxxLAB.

2. Cost Accounts:

Cost Account Numbers may be established using the appropriate 5 digit CSI-Master Format number and a cost category code (L=Labor, M=Material, E=Equipment, O=Other).

- J. The Contractor shall Resource Load the Baseline Schedule using man hours of effort and units. Each activity shall be assigned values, which reflect total man hours of effort and units to accomplish the work described.

1. Load resource crew information into the resource dictionary for the network diagram using CSI MasterFormat 2004 (CSI-MF) section designations.

2. Identify the type of resource as follows,

LAB = Labor

MAT = Material

EQU = Equipment

Thus, 010LAB for General Reqmts, 022LAB for Earthwork, 033LAB for Concrete

3. The Contractor shall use resource loading reports to ensure that appropriate numbers of Contractor and subcontractor personnel are available during all phases of the Work. The

Town may require, when it deems it necessary an up to date manpower report from the Contractor.

K. Create Unique “Project” Calendars for use in the planning and update of the project schedule. Schedule tasks in working days (5 working days per week, including holidays) and in precedence format. The use of alternative calendars could be considered with prior approval by the Town.

1. Consider the Town’s and the Federal Standard Holiday Calendar to be implemented in the project schedule.

L. Anticipated lost time due to weather shall be included in the project Schedule to ensure completion of all work within the Contract time. The number of anticipated weather days incorporated in the project schedule shall be based on the provisions noted in Article 3.20 of the General Conditions.

M. The Baseline Schedule shall be signed by each critical Subcontractor, indicating agreement with scheduled durations.

1. Obtain the agreement of critical Subcontractors (as applicable to the GMP package)– in areas critical to timely performance of the Work Schedules and durations of any tasks and labor efforts required to complete them. Obtain agreement in areas such as but not limited to:

Concrete	Windows	Fire suppression	Controls / EMS	
Steel	Gypsum board	Plumbing	Communications	
HVAC	Roof assembly	Special Equip.	Electrical	Electronic safety/security
Sitework				

Note: Name, title, and signature of company official is required for meeting this requirement.

2. Failure of a Subcontractor to agree with this schedule shall serve as notice to the Contractor of potential schedule difficulties.

3. Contractor shall work with disagreeing Subcontractor and report when agreement is reached.
4. Under no circumstances shall the disagreement by a Subcontractor be cause for excusable or compensable delay for the Contractor. The full responsibility for completing the Work on time remains with the Contractor.

N. Along with the Baseline Schedule, the Contractor shall issue a written Narrative to explain its construction approach and the schedule logic. The Narrative shall discuss the project's critical path, state how the Contractor plans to work the project (days/shifts/hours), and present any weather and temperature restrictions included in the schedule. Where applicable the narrative shall thoroughly discuss the interface between the Contractor's work and the other Contractor's or third parties at the level of detail sufficient to manage the various contractors, and to the satisfaction of the Town. The narrative shall include a list of project specific assumptions made which if untrue are likely to adversely affect the Contractor's ability to maintain its schedule.

- 3.2 In addition to the Baseline Schedule, the Contractor shall submit the graphical and tabular reports specified in section 013216.1.6 COMPUTER-PRODUCED REPORTS.

PART 4 - SCHEDULE UPDATE

- 4.1 The Contractor shall submit a Schedule Update on a monthly basis for review and approval by the Town and the A/E along with the monthly Requisition of Payment. No payments shall be made to Contractor until the current Schedule Update has been submitted as specified and approved by the Town. A monthly schedule should be issued even if a pay requisition has not been submitted by the Contractor.

A. The effective date of each Schedule Update shall be the cut-off-date of the work to be included in the Monthly Progress Payment Request.

1. The Contractor shall update the schedule using physically derived (as compared to duration based) percents complete and adjustments to remaining durations. Revisions to the Network logic to more accurately reflect the anticipated workflow can be discussed and mutually agreed-to, as well as changes to activity durations, man-power, and equipment.

2. The Contractor shall make any logic modifications needed to reflect the actual progress of the project at the time of the reporting period. All out-of-sequence issues should be corrected and addressed by the Contractor prior to submitting the schedule update for review. Such modifications and corrections should be explained via the Contractor's Narrative Report (see Exhibit 1).
 3. In the event a submittal or shop drawing is rejected or returned for correction, a new activity will be inserted into the schedule for Resubmission and another for Review of the Resubmission.
- B. The Project Schedule shall be updated on a weekly basis throughout the entire Contract time and until the Contract's Completion of all Work. Schedule updates shall be used in progress meetings (TBD), with understanding that such updates shall be the Contractor's best estimate of progress to date. The Contractor shall provide a three week schedule view at the progress meetings of the Schedule, which shall include the previous week's progress and the upcoming activities for the next two weeks look ahead.
- 4.2 In addition to the schedule update, the Contractor shall submit the graphical and tabular reports specified in section 013216.1.6 COMPUTER-PRODUCED REPORTS.
- 4.3 Each Project Schedule Update, based upon the Contractor's input as stated above, will be forwarded to the Town and will include the following information:
- A. A written Narrative Report that compares the current project completion date to the contract completion date and presents the current critical path. The Narrative should also discuss current and expected progress and current and expected man-power compared to the requirements of the schedule. It should describe current and expected problems and present possible resolutions. It should identify any decisions or actions needed from Town, A/E, or others. The Narrative should also include but is not limited to the following detailed information (see Exhibit 1 for more details):
1. A listing of activities added and deleted and clarifications for such.
 2. A listing of logic changes and clarifications for such (ex. constraints, relationships, etc.).
 3. Specific future actions that will recover any existing project slippage.

4.4 RECOVERY SCHEDULES

- A. Whenever it becomes apparent from the updated monthly status review or the monthly computer-produced calendar-dated schedule that phasing, Substantial Completion or Final Completion dates will not be met due to the Contractor's or its Subcontractors own actions, the Contractor shall take corrective measures necessary to expedite the progress of construction at no additional cost to the Town as set forth in Article 3.19.3 of the General Conditions.
 - 1. The Town will request, and the Contractor shall submit, a revised Project Schedule that has been revised to recover the current slippage. Such recovery schedule shall meet the requirements of the Detailed Schedule as delineated herein and shall be maintained alongside the Project Schedule until such time as recovery is accomplished.
 - a. The Contractor shall attach a written narrative to the recovery schedule that will describe each of the revisions to the schedule logic, durations and manpower. The Contractor shall issue a revised Network (Bar Chart), appropriate computer reports and a computer diskette or CD-R of the electronic data.

PART 5 - FINAL COMPLETION SCHEDULE

- 5.1 At the completion of the project and after attaining Final Completion, the Contractor shall issue a Final Completion Schedule for the Town's review. The final schedule update shall be an "As Built" schedule indicating that all activities have been completed.

PART 6 - TIME EXTENSION & ACCELERATION

6.1 ACCELERATION

- A. The Contractor can only proceed with an acceleration if and when directed in writing by the Town.
- B. Early completion forecast in the project schedule shall not entitle Contractor to compensation for acceleration unless agreed upon in writing between the Town and Contractor.

6.2 DELAY NOTIFICATIONS & TIME EXTENSION REQUIREMENTS

A. Notifications

1. Delay notifications shall be made as set forth in Article 9.1 of the General Conditions.

B. Time Extensions Required Documentation (TIA)

1. When the Contractor desires to obtain an extension of the project duration because of a change notice or other occurrence on the project, the Contractor shall submit to the Town a written Time Impact Analysis (TIA) illustrating the influence of the change notice or occurrence on the Contract Schedule. Each Time Impact Analysis shall include a Fragmentary Network (FragNet) incorporated into a copy of the then-current Project Schedule demonstrating how the Contractor proposes to incorporate the change notice or occurrence into the Project Schedule. The Time Impact Analysis shall demonstrate the time impact based on the date the change notice was given to the Contractor or the date of the occurrence; the status of construction at that point in time; and the event time computation of all affected activities. Upon acceptance of a change order, the Contractor shall update the Project Schedule with such change order FragNet to produce the Current Schedule. Time extensions will not be granted in the event and for the duration the Contractor was otherwise concurrently delayed. Upon approval by the Town, the change order or occurrence shall be included in the next Project Schedule update.
2. The Contractor shall demonstrate using a FragNet how such occurrence may affect the schedule, then track such affects noting any changes in sequencing and/or mitigation efforts. The status of work prior to, the predicted effect, and the effects during and after the occurrence shall be compared to determine any Contract time extension or milestone adjustments.
3. An extension in the scheduled date of Contract intermediate milestones, Substantial Completion of a portion of or of all the Work or Final Completion will only be granted in the event of Excusable Delays affecting Work activities on the critical path or on activities which due to the delay become critical as set forth in Article 9.3 of the General Conditions.

--- E N D ---

Contractor Name
Contractor Address Contractor
Town, State, Zip Code Contractor
Phone

EXHIBIT "1"

Date: _____
To: Town of Medley
Department of Capital Improvement Projects
PM Name
Ref: CONTRACTOR'S NARRATIVE REPORT

Project #: _____ Project Name: _____ Requisition No _____
Project Address _____

Section I – Project Schedule

PG File Name: _____ Data Date: _____
Contract Completion Date: _____ Current Forecast Completion : _____
(per Phase if applicable)

- ☐ The project is on schedule
- ☐ The project is ahead/behind schedule by _____ calendar days.
- ☐ The Critical Path is going through) _____.

Section II – Description of current and anticipated problem areas, delaying factors and their impact.

Comment: _____

Section III – Explanation of corrective action taken or proposed

Comment : _____

Section IV – Clarification of logic changes made to the project schedule

List all logic modifications made to the schedule, for example (separate attachments can be used to clarify all logic changes):

Added/Delete Activities _____	Reasons why _____
Added/Delete Relationships _____	Reasons why _____
Added/Delete Lags _____	Reasons why _____

Contractor's Signature: _____ Title: _____

File Name: SampProj				Project Name								DATA DATE: 14-Oct-09																																			
Activity ID	Activity Name	OD	RD	Duration % Complete	Start	Finish	Late Start	Late Finish	Total Float	Budgeted Total Cost	Earned Value Cost	2009												2010												2011											
												M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J									
Project Name																																															
Phase 1																																															
Bldg 3																																															
All Floors																																															
B31170	Bldg. 3: Set Cooling Tower, Chillers & Pumps	10	10	0%	06-Apr-10	19-Apr-10	23-Apr-10	06-May-10	13	\$1,327,560.03	\$0.00	■ Bldg. 3: Set Cooling Tower, Chillers & Pumps																																			
B31270	Bldg. 3 Form & reinforce Stair 11	8	8	0%	16-Apr-10	27-Apr-10	11-May-10	20-May-10	17	\$17,563.12	\$0.00	■ Bldg. 3 Form & reinforce Stair 11																																			
B31200	Bldg. 3: Shell Complete	0	0	0%		21-Apr-10		06-May-10	11	\$0.00	\$0.00	◆ Bldg. 3: Shell Complete																																			
B31280	Bldg. 3 Install Louvers	5	5	0%	22-Apr-10	28-Apr-10	07-May-10	13-May-10	11	\$13,405.03	\$0.00	■ Bldg. 3 Install Louvers																																			
B31290	Bldg. 3: Install Windows	5	5	0%	22-Apr-10	28-Apr-10	07-May-10	13-May-10	11	\$37,587.04	\$0.00	■ Bldg. 3: Install Windows																																			
B31340	Bldg. 3 Install Doors	5	5	0%	28-Apr-10	04-May-10	11-Jun-10	17-Jun-10	31	\$13,316.03	\$0.00	■ Bldg. 3 Install Doors																																			
B31310	Bldg. 3 Inspect Stair 11	1	1	0%	28-Apr-10	28-Apr-10	21-May-10	21-May-10	17	\$0.00	\$0.00	■ Bldg. 3 Inspect Stair 11																																			
B31330	Bldg. 3 Pour Stair 11	2	2	0%	29-Apr-10	30-Apr-10	24-May-10	25-May-10	17	\$5,400.03	\$0.00	■ Bldg. 3 Pour Stair 11																																			
B31380	Bldg. 3 Install Stair 11 railings	5	5	0%	03-May-10	07-May-10	26-May-10	02-Jun-10	17	\$22,664.63	\$0.00	■ Bldg. 3 Install Stair 11 railings																																			
B31440	Bldg. 3: FDCC Elec. Inspection & FPL Authorization to Energ	5	5	0%	05-May-10	11-May-10	22-Jun-10	28-Jun-10	33	\$0.00	\$0.00	■ Bldg. 3: FDCC Elec. Inspection & FPL Authorization																																			
B31450	Bldg. 3 Install Hardware	5	5	0%	05-May-10	11-May-10	01-Jul-10	08-Jul-10	40	\$10,161.03	\$0.00	■ Bldg. 3 Install Hardware																																			
B31360	Bldg. 3 Install Int Glazing	2	2	0%	05-May-10	06-May-10	18-Jun-10	21-Jun-10	31	\$9,355.67	\$0.00	■ Bldg. 3 Install Int Glazing																																			
B31580	Bldg. 3 Install Chilled Water Piping	15	15	0%	06-May-10	26-May-10	01-Jun-10		17	\$48,620.00	\$0.00	■ Bldg. 3 Install Chilled Water Piping																																			
B31530	Bldg. 3 Install Plumbing Fixtures & Eye Wash units	2	2	0%	18-May-10	19-May-10	05-Jul-10	06-Jul-10	32	\$9,660.00	\$0.00	■ Bldg. 3 Install Plumbing Fixtures & Eye Wash units																																			
B31730	Bldg. 3 Install Chilled Water Piping Insulation	10	10	0%	29-May-10	10-Jun-10	02-Jun-10	06-Jul-10	17	\$0.00	\$0.00	■ Bldg. 3 Install Chilled Water Piping Insulation																																			
B31670	Bldg. 3 Start up HVAC	0	0	0%	05-Jun-10		05-Jun-10			\$0.00	\$0.00	◆ Bldg. 3 Start up HVAC																																			
B31710	Bldg. 3 Install Marker and Tackboards	3	3	0%	09-Jun-10	11-Jun-10	21-Jun-10		8	\$5,000.00	\$0.00	■ Bldg. 3 Install Marker and Tackboards																																			
B31700	Bldg. 3 Install Fire Extinguisher & Cabinet	2	2	0%	07-Jun-10	11-Jun-10	18-Jun-10	21-Jun-10	9	\$1,900.00	\$0.00	■ Bldg. 3 Install Fire Extinguisher & Cabinet																																			
B31780	Bldg. 3 P/A Test & Certify			0%	10-Jun-10		01-Jul-10	06-Jul-10	15	\$0.00	\$0.00	■ Bldg. 3 P/A Test & Certify																																			
B31800	Bldg. 3 Energization Milestone	0	0	0%	16-Jun-10		09-Jul-10		16	\$0.00	\$0.00	◆ Bldg. 3 Energization Milestone																																			
B31830	Bldg. 3 F/A Test & Certify	5	5	0%	18-Jun-10	24-Jun-10	01-Jul-10	08-Jul-10	9	\$0.00	\$0.00	■ Bldg. 3 F/A Test & Certify																																			
B31840	Bldg. 3 Identifying Devices Installations	2	2	0%	24-Jun-10	25-Jun-10	07-Jul-10	08-Jul-10	8	\$4,572.03	\$0.00	■ Bldg. 3 Identifying Devices Installations																																			
B31850	Bldg. 3: Substantial Completion Inspection	2	2	0%	24-Jun-10	25-Jun-10	07-Jul-10	08-Jul-10	8	\$0.00	\$0.00	■ Bldg. 3: Substantial Completion Inspection																																			
B31870	Bldg. 3: Punch List Generation by A/E	7	7	0%	25-Jun-10	02-Jul-10	08-Jul-10	15-Jul-10	12	\$0.00	\$0.00	■ Bldg. 3: Punch List Generation by A/E																																			
B31880	Bldg. 3: T&B Performed by MDCPS Contractor	14	14	0%	25-Jun-10	10-Jul-10	22-Jul-10	05-Aug-10	26	\$0.00	\$0.00	■ Bldg. 3: T&B Performed by MDCPS Contractor																																			
B31860	Bldg. 3: Substantial Completion	0	0	0%		25-Jun-10		08-Jul-10	8	\$0.00	\$0.00	◆ Bldg. 3: Substantial Completion																																			
B31890	Bldg. 3 BCC Inspection	10	10	0%	28-Jun-10	12-Jul-10	30-Jul-10	12-Aug-10	23	\$0.00	\$0.00	■ Bldg. 3 BCC Inspection																																			
B31920	Bldg. 3: Punch List Performance	21	21	0%	02-Jul-10	24-Jul-10	15-Jul-10	05-Aug-10	12	\$0.00	\$0.00	■ Bldg. 3: Punch List Performance																																			
B31910	Bldg. 3 HVAC Start up Prep (flushing, rotations, etc...)	10	10	0%	09-Jul-10	22-Jul-10	09-Jul-10	22-Jul-10	0	\$0.00	\$0.00	■ Bldg. 3 HVAC Start up Prep (flushing, rotations, etc...)																																			
B31900	Bldg. 3: Address T&B Comments	7	7	0%	10-Jul-10	17-Jul-10	05-Aug-10	12-Aug-10	26	\$0.00	\$0.00	■ Bldg. 3: Address T&B Comments																																			
B31950	Bldg. 3: Utility Switchover	14	14	0%	22-Jul-10	05-Aug-10	23-Jul-10	05-Aug-10	0	\$0.00	\$0.00	■ Bldg. 3: Utility Switchover																																			
B31940	Bldg. 3: FF&E by Owner	7	7	0%	24-Jul-10	31-Jul-10	05-Aug-10	12-Aug-10	12	\$0.00	\$0.00	■ Bldg. 3: FF&E by Owner																																			
B31930	Bldg. 3: Occupancy	0	0	0%		31-Jul-10		12-Aug-10	12	\$0.00	\$0.00	◆ Bldg. 3: Occupancy																																			
1st Floor																																															
B312000	Bldg. 3 Install Electrical Rough U/G	10	10	0%	03-Dec-09	16-Dec-09	15-Dec-09	29-Dec-09	8	\$100,000.03	\$0.00	■ Bldg. 3 Install Electrical Rough U/G																																			
B312003	Bldg. 3: Install Mech & Plumb Rough U/G	10	10	0%	10-Dec-09	23-Dec-09	22-Dec-09	06-Jan-10	8	\$20,278.03	\$0.00	■ Bldg. 3: Install Mech & Plumb Rough U/G																																			
B312001	Bldg. 3: Excavate Foundations	3	3	0%	17-Dec-09	21-Dec-09	30-Dec-09	04-Jan-10	8	\$12,960.03	\$0.00	■ Bldg. 3: Excavate Foundations																																			
B31030	Bldg. 3 Place Rebar Foundations	4	4	0%	21-Dec-09	24-Dec-09	04-Jan-10	07-Jan-10	8	\$10,923.12	\$0.00	■ Bldg. 3 Place Rebar Foundations																																			
B312004	Bldg. 3 Inspect Rebar Foundations	1	1	0%	28-Dec-09	28-Dec-09	08-Jan-10	08-Jan-10	8	\$0.00	\$0.00	■ Bldg. 3 Inspect Rebar Foundations																																			
B31050	Bldg. 3 Cast Foundations	2	2	0%	29-Dec-09	30-Dec-09	11-Jan-10	12-Jan-10	8	\$27,000.03	\$0.00	■ Bldg. 3 Cast Foundations																																			
Actual Work																																															
Remaining Work																																															
Critical Remaining Work																																															
◆ Milestone																																															
Contractor Name																																															
Baseline Schedule / June 2010 Schedule Update																																															
Page 1 of 4												EXHIBIT "2"																																			

Actual Work

Remaining Work

Critical Remaining Work

◆ ◆ Milestone

Contractor Name

Critical Path

Page 1 of 4

EXHIBIT "3"

File Name: SampProj				Project Name						DATA DATE: 14-Oct-09																																			
Activity ID	Activity Name	OD	RD	Duration % Complete	Start	Finish	Late Start	Late Finish	Total Float	2009												2010												2011											
										Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Project Name																																													
Phase 1																																													
Site Civil Activities																																													
Owner																																													
TF-1220	Occupy Temp Portables at Athletic Field	1	1	0%	16-Feb-10	16-Feb-10	09-Mar-10	09-Mar-10	15																																				
EDO-01310	Bus Drop Off, Occupancy	0	0	0%		03-May-10		04-May-10	1																																				
TF-1230	1st street - Traffic relocated	0	0	0%	05-May-10			05-May-10	0																																				
Bldg 2																																													
Owner																																													
E2-13740	Bldg. 2: Voice & Data Wiring & Trim 1st Floor	0	0	0%	03-Nov-10		26-May-11		144																																				
E2-13750	Bldg. 2: Voice & Data Wiring & Trim 2nd Floor	0	0	0%	24-Nov-10		26-May-11		129																																				
E2-01250	Bldg. 2: Perform T&B by Owner	14	14	0%	04-May-11	18-May-11	19-Jul-11	02-Aug-11	74																																				
E2-01300	Bldg. 2: FF&E by	7	7	0%	11-Jun-11	18-Jun-11	02-Aug-11	09-Aug-11	51																																				
E2-01310	Bldg. 2: Occupancy	0	0	0%		18-Jun-11		09-Aug-11	51																																				
Architect																																													
E2-01260	Bldg. 2: Punch List Generation by A/E	7	7	0%	04-May-11	11-May-11	25-Jun-11	02-Jul-11	51																																				
Bldg 3																																													
Owner																																													
E31-430	Bldg. 3: Voice & Data Wiring & Trim 1st Floor	0	0	0%	04-May-11		27-Jul-10		39																																				
E31-010	Bldg. 3: Voice & Data Wiring & Trim 2nd Floor	0	0	0%	04-May-10		27-Jul-10																																						
E31-220	Bldg. 3: T&B Performed by Contractor	14	14	0%	04-May-11	10-Jul-11	27-Jul-11	02-Aug-11	26																																				
E31-2250	Bldg. 3: FF&E by Owner	7	7	0%	24-Jul-10	Jul-10	05-Aug-10	12-Aug-10	12																																				
E31-2270	Bldg. 3: Occupancy			0%		11-Aug-10		12-Aug-10	12																																				
Architect																																													
E31-2100	Bldg. 3: Punch List Generation by A/E	7	7	0%	25-Jun-10	02-Jul-10	08-Jul-10	15-Jul-10	12																																				
Bldg 31																																													
Owner																																													
E31-000	Bldg. 31: Voice & Data Wiring & Trim 1st Floor	0	0	0%	29-Sep-10		21-Jun-11		186																																				
E31-010	Bldg. 31: Voice & Data Wiring & Trim 2nd Floor	0	0	0%	23-Dec-10		21-Jun-11		126																																				
E31-020	Bldg. 31: Voice & Data Wiring & Trim 3rd Floor	0	0	0%	24-Feb-11		21-Jun-11		82																																				
E31-040	Bldg. 31: Perform T&B by Owner Contractor	14	14	0%	27-Jun-11	12-Jul-11	19-Jul-11	02-Aug-11	21																																				
E31-1270	Bldg. 31: FF&E by Owner	7	7	0%	02-Aug-11	06-Aug-11	02-Aug-11	09-Aug-11	0																																				
E31-1250	Bldg. 31: Occupancy	0	0	0%		06-Aug-11		09-Aug-11	0																																				
Architect																																													
E31-1240	Bldg. 31: Punch List Generation by A/E	7	7	0%	27-Jun-11	05-Jul-11	27-Jun-11	05-Jul-11	0																																				
Bldg 32																																													
Owner																																													
E32-1030	Bldg. 32 Partial Asbestos Abatement of Bldg 7 - NIC	10	10	0%	17-Feb-10	02-Mar-10	19-Mar-10	23-Mar-10	15																																				
E32-1010	Bldg. 32 Voice & Data Wiring & Trim 1st Floor	0	0	0%	23-Aug-10		23-Jun-11		214																																				
E32-1020	Bldg. 32 Voice & Data Wiring & Trim 2nd Floor	0	0	0%	08-Nov-10		23-Jun-11		163																																				
E32-1030	Bldg. 32 Voice & Data Wiring & Trim 3rd Floor	0	0	0%	12-Jan-11		23-Jun-11		115																																				
E32-1050	Bldg. 32 Perform T&B by Contractor	14	14	0%	06-Jun-11	20-Jun-11	19-Jul-11	02-Aug-11	42																																				
E32-1070	Bldg. 32 FF&E by Owner	7	7	0%	14-Jul-11	21-Jul-11	02-Aug-11	09-Aug-11	19																																				
E32-1050	Bldg. 32 Occupancy	0	0	0%		21-Jul-11		09-Aug-11	19																																				

Actual Work

Remaining Work

Critical Remaining Work





◆ Milestone

Contractor Name

Responsibility by Owner and A/E

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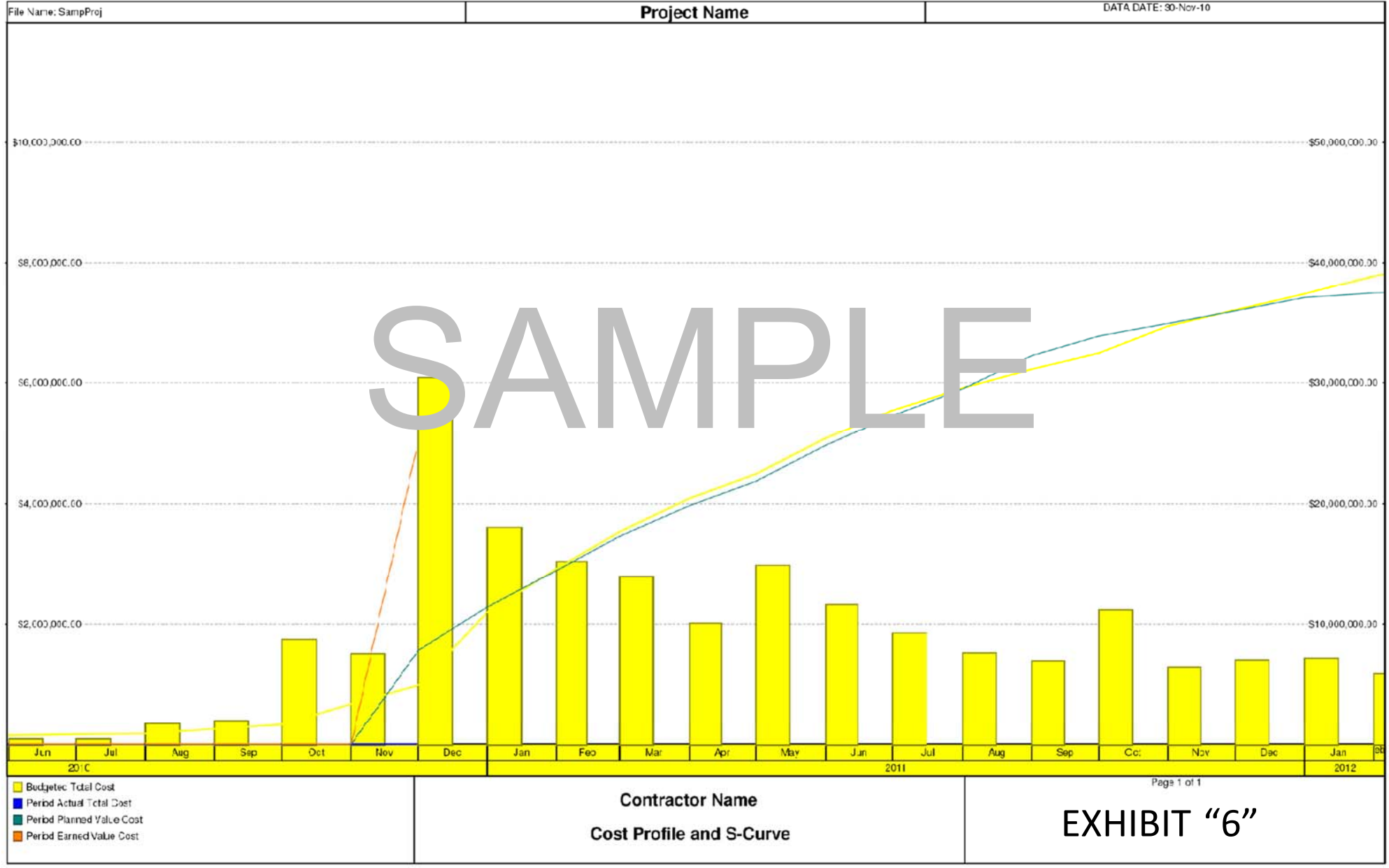
EXHIBIT "4"

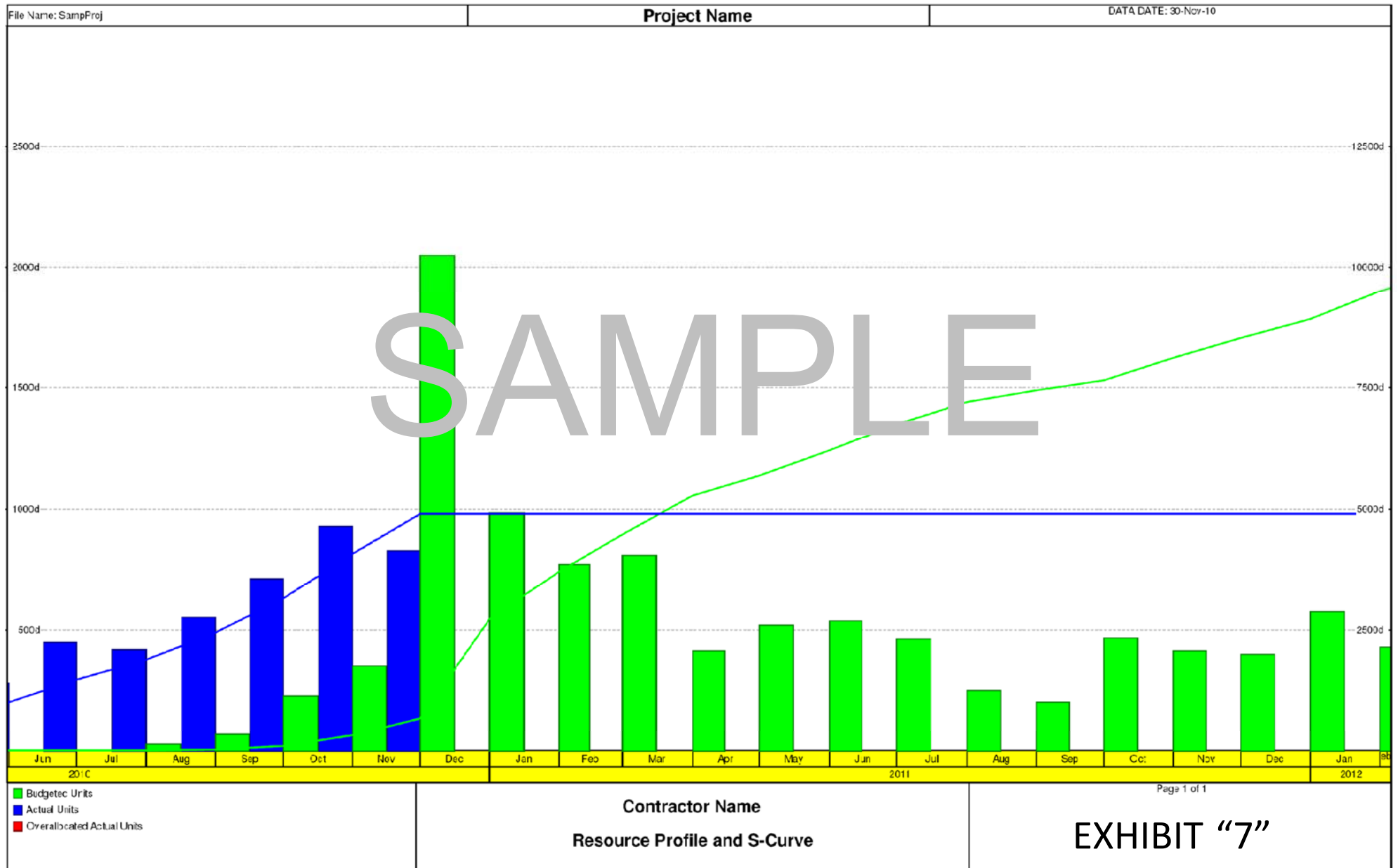
 Actual Work
 Remaining Work
 Critical Remaining Work
 Milestone

Contractor Name
 Responsibility by Owner and A/E

EXHIBIT "4"

File Name: SampProj										Project Name										DATA DATE: 14-Oct-09																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																				
Activity ID	Activity Name	CD	RD	Duration % Complete	Start	Finish	Total Float	Budgeted Total Cost	Earned Value Cost	2009												2010												2011												2012																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
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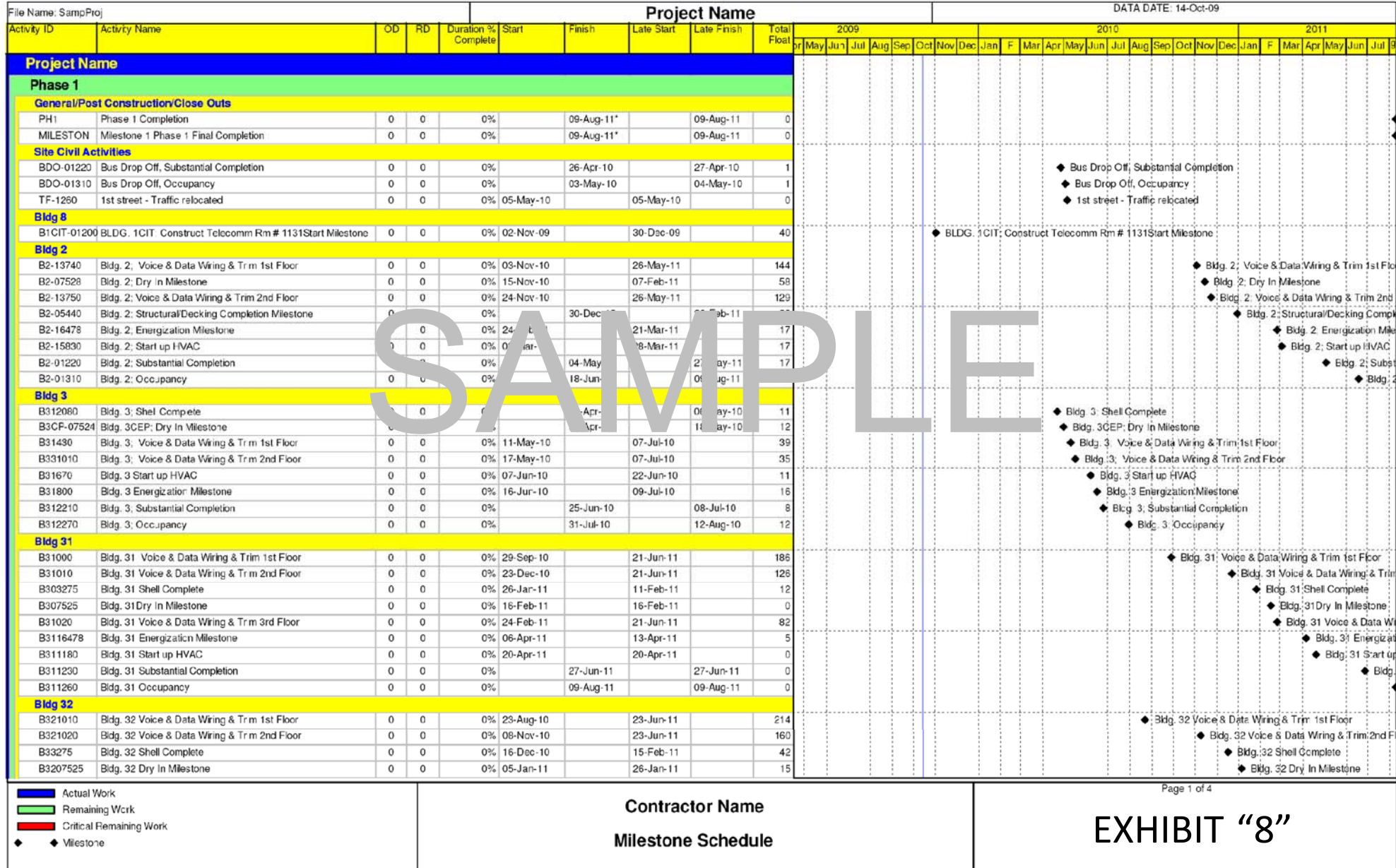


EXHIBIT “9”

MilestoneScheduleFilterCriteria

These milestones should be incorporated into the schedule as applicable to each GMPPackage. If the project is phased or has multiple building or areas, then this criteria will be applied to each building and/or phase of construction.

1. Date of Award
2. Notice to Proceed (NTP)
3. Easement Dedication
4. Commissioning of UST
5. Installation of Chambers
6. Utility Stub-outs
7. Vibro Compaction (Start & Completion)
8. Rough Grading
9. LEED Submittals
10. Patching of Asphalt in Roadway
11. Permanent Power
12. Completion of Concrete Slab
13. Completion of Concrete Columns Erection
14. Completion of Concrete Beams Erection
15. Completion of Bar joists or Structural Member Installation
16. Completion of Roof Metal Decking
17. Completion of Window Installation
18. Dry-in Milestone
19. Completion of Metal Framing
20. Completion of Drywall Installation
21. Completion of above Ceiling Inspections.
22. Completion of Interior Painting
23. Completion of Interior Floor Finishes
24. Completion of Landscaping
25. Off-site Roadway Completion
26. HVAC Start-up
27. Elevator Certification
28. Fire Alarm Certification
29. Substantial Completion
30. Punchlist Completion
31. Final Completion

SECTION 01 3323 - SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES

PART 1 GENERAL

- 1.01 Refer to Articles in the GENERAL CONDITIONS.
- 1.02 For the purposes of this contract, samples, test reports, certificates, and manufacturers' literature and data shall also be subject to the previously referenced requirements. The following text refers to all items collectively as SUBMITTALS.
- 1.03 Submit for approval, all of the items specifically mentioned under the separate sections of the specification, with information sufficient to evidence full compliance with contract requirements (including LEED requirements). Materials, fabricated articles and the like to be installed in permanent work shall equal those of approved submittals. After an item has been approved, no change in brand or make will be permitted unless:
 - A. Satisfactory written evidence is presented to, and approved by the Owner's Representative, that manufacturer cannot make scheduled delivery of approved item or;
 - B. Item delivered has been rejected and substitution of a suitable item is an urgent necessity or;
 - C. Other conditions become apparent which indicates approval of such substitute item to be in best interest of the Town of Medley.
- 1.04 Forward submittals in sufficient time to permit proper consideration by all parties (A/E and Commissioning Agent), submittal to Green Building Certification Institute (GBCI) and approval action by A/E. Time submission to assure adequate lead time for procurement of contract - required items. Delays attributable to untimely and rejected submittals will not serve as a basis for extending contract time for completion.
- 1.05 Submittals will be reviewed for compliance with contract requirements by Architect-Engineer, and action thereon will be taken by A/E on behalf of the Town of Medley.
- 1.06 Contractor will assign a file number thereto. Contractor, in any subsequent correspondence, shall refer to this file and identification number to expedite replies relative to previously approved or disapproved submittals.
- 1.07 The Town of Medley reserves the right to require additional submittals, whether or not particularly mentioned in this contract. If additional submittals beyond those required by the contract are furnished pursuant to request thereof by the Owner's Representative, adjustment in contract price and time will be made in accordance with Articles of the GENERAL CONDITIONS.

- 1.08 The Owner's Representative and Architect-Engineer assumes no responsibility for checking layout drawings for exact sizes, exact numbers and detailed positioning of items.
- 1.09 Submittals must be submitted by Contractor only and shipped prepaid. The Architect of Record and the Owner's Representative assume no responsibility for checking quantities or exact numbers included in such submittals.
- A. Submittals will receive consideration only when covered by a transmittal letter signed by Contractor. Letter shall be sent via first class mail and shall contain the list of items, name of the project, name of Contractor, contract number, applicable specification paragraph numbers, applicable drawing numbers (and other information required for exact identification of location for each item), manufacturer and brand, and such additional information as may be required by specifications for particular item being furnished. In addition, catalogs shall be marked to indicate specific items submitted for approval.
1. A copy of letter must be enclosed with items, and any items received without identification letter will be considered "unclaimed goods" and held for a limited time only.
 2. Each sample, certificate, manufacturers' literature and data shall be labeled to indicate the name and location of the project, name of Contractor, manufacturer, brand, and contract number and location(s) on project.
 3. Required certificates shall be signed by an authorized representative of manufacturer or supplier of material, and by Contractor.
- B. If submittal samples have been disapproved, resubmit new samples as soon as possible after notification of disapproval. Such new samples shall be marked "Resubmitted Sample" in addition to containing other previously specified information required on label and in transmittal letter.
- C. Approved samples will be kept on file by the Contractor at the site. Where noted in technical sections of specifications, approved samples in good condition may be used in their proper locations in contract work.
- D. All submittal documents shall be reviewed for compliance prior to submission to A/E. Contractor shall affix a stamp indicating their review and conformance of the elements in the submittal to the contract documents. Submittal documents, drawings (shop, erection or setting drawings) and schedules, required for work of various trades, shall be checked before submission by technically qualified employees of Contractor for accuracy, completeness and compliance with contract requirements. These drawings and schedules shall be stamped and signed by Contractor certifying to such check.

1. For each drawing required, submit one legible photographic paper or vellum reproducible.
 2. Reproducible shall be full size.
 3. Each drawing shall have marked thereon, proper descriptive title, including Project, location, project number, manufacturer's number, reference to contract drawing number, detail Section Number, and Specification Section Number.
 4. A space 4-3/4 by 5 inches shall be reserved on each drawing to accommodate approval or disapproval stamp.
 5. Submit drawings, ROLLED WITHIN A MAILING TUBE, fully protected for shipment.
 6. One reproducible print of approved or disapproved shop drawings will be forwarded to Contractor.
 7. When work is directly related and involves more than one trade, shop drawings shall be submitted to Architect-Engineer under one cover.
 8. Transmit submittals to commissioning agent shall be in pdf format.
- 1.10 Samples, shop drawings, test reports, certificates and manufacturers' literature and data, shall be submitted for approval to the Architect-Engineer:

URS

7650 Corporate Center Drive #400

Miami, FL, 33126

and for review to the Commissioning Agent:

The Spinnaker Group, Inc

501 Spinnaker

Weston, FL, 33326

- 1.11 Mock-ups shall be reviewed and approved by the Architect-Engineer and the Owner's Representative prior to the installation of the related work. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
- 1.12 Mock-ups shall comply with the requirements of the associated specification section.
- 1.13 Mock-ups shall be reviewed at the project site or laydown area.

- 1.14 The cost of mock-ups and their surroundings shall be included in the Contractor's fee and shall be included in the project schedule of values.
- 1.15 The components of the mock-up can become a part of the final work were stated in the related specification section or if agreed to by the Owner's Representative.
- 1.16 The mock-ups shall be presented in the same orientation as the final installed application with similar lighting and thermal conditions (temperature and humidity). Mock-ups shall contain representative samples of corners (inside, outside, mitered, etc), joints (vertical and horizontal) and finishes.
- 1.17 Mock-ups shall be a minimum of 48"x48" unless noted otherwise.

E N D OF SECTION 01 3323

SECTION 01 4000 - QUALITY REQUIREMENTS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.02 SUMMARY

- A. Section includes administrative and procedural requirements for quality assurance and quality control.
- B. Testing and inspecting services are required to verify compliance with requirements specified or indicated. These services do not relieve Contractor of responsibility for compliance with the Contract Document requirements.
 - 1. Specific quality-assurance and -control requirements for individual construction activities are specified in the Sections that specify those activities. Requirements in those Sections may also cover production of standard products.
 - 2. Specified tests, inspections, and related actions do not limit Contractor's other quality-assurance and -control procedures that facilitate compliance with the Contract Document requirements.
 - 3. Requirements for Contractor to provide quality-assurance and -control services required by Architect, Owner's Representative, or authorities having jurisdiction are not limited by provisions of this Section.
- C. Related Sections:
 - 1. Specification section 01 3100 Project Management and Coordination
 - 2. Divisions 02 through 49 Sections for specific test and inspection requirements.

1.03 DEFINITIONS

- A. Quality-Assurance Services: Activities, actions, and procedures performed before and during execution of the Work to guard against defects and deficiencies and substantiate that proposed construction will comply with requirements.
- B. Quality-Control Services: Tests, inspections, procedures, and related actions during and after execution of the Work to evaluate that actual products incorporated into the Work and completed construction comply with requirements. Services do not include contract enforcement activities performed by Owner's Representative.
- C. Product Testing: Tests and inspections that are performed by an NRTL, an NVLAP, or a testing agency qualified to conduct product testing and acceptable to authorities having jurisdiction, to establish product performance and compliance with specified requirements.
- D. Source Quality-Control Testing: Tests and inspections that are performed at the source, i.e., plant, mill, factory, or shop.

- E. Field Quality-Control Testing: Tests and inspections that are performed on-site for installation of the Work and for completed Work.
- F. Testing Agency: An entity engaged to perform specific tests, inspections, or both. Testing laboratory shall mean the same as testing agency.
- G. Installer/Applicator/Erector: Contractor or another entity engaged by Contractor as an employee, Subcontractor, or Sub-subcontractor, to perform a particular construction operation, including installation, erection, application, and similar operations.
 - 1. Use of trade-specific terminology in referring to a trade or entity does not require that certain construction activities be performed by accredited or unionized individuals, or that requirements specified apply exclusively to specific trade or trades.
- H. Experienced: When used with an entity or individual, "experienced" means having successfully completed a minimum of five previous projects similar in nature, size, and extent to this Project; being familiar with special requirements indicated; and having complied with requirements of authorities having jurisdiction.

1.04 CONFLICTING REQUIREMENTS

- A. Referenced Standards: If compliance with two or more standards is specified and the standards establish different or conflicting requirements for minimum quantities or quality levels, comply with the most stringent requirement. Refer conflicting requirements that are different, but apparently equal, to Owner's Representative for a decision before proceeding.
- B. Minimum Quantity or Quality Levels: The quantity or quality level shown or specified shall be the minimum provided or performed. The actual installation may comply exactly with the minimum quantity or quality specified, or it may exceed the minimum within reasonable limits. To comply with these requirements, indicated numeric values are minimum or maximum, as appropriate, for the context of requirements. Refer uncertainties to Owner's Representative for a decision before proceeding.

1.05 INFORMATIONAL SUBMITTALS

- A. Contractor's Quality-Control Plan: For quality-assurance and quality-control activities and responsibilities.
- B. Contractor's Quality-Control Manager Qualifications: For supervisory personnel.
- C. Testing Agency Qualifications: For testing agencies specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include proof of qualifications in the form of a recent report on the inspection of the testing agency by a recognized authority.
- D. Schedule of Tests and Inspections: Prepare in tabular form and include the following:
 - 1. Specification Section number and title.
 - 2. Entity responsible for performing tests and inspections.
 - 3. Description of test and inspection.
 - 4. Identification of applicable standards.

5. Identification of test and inspection methods.
6. Number of tests and inspections required.
7. Time schedule or time span for tests and inspections.
8. Requirements for obtaining samples.
9. Unique characteristics of each quality-control service.

1.06 CONTRACTOR'S QUALITY-CONTROL PLAN

- A. Quality-Control Plan, General: Submit quality-control plan within 10 days of Notice to Proceed, and not less than five days prior to preconstruction conference. Submit in format acceptable to Owner's Representative and Architect of Record. Identify personnel, procedures, controls, instructions, tests, records, and forms to be used to carry out Contractor's quality- assurance and quality-control responsibilities. Coordinate with Contractor's construction schedule.
- B. Quality-Control Personnel Qualifications: Engage qualified full-time personnel trained and experienced in managing and executing quality-assurance and quality-control procedures similar in nature and extent to those required for Project.
 1. Project quality-control manager may also serve as Project superintendent.
- C. Submittal Procedure: Describe procedures for ensuring compliance with requirements through review and management of submittal process. Indicate qualifications of personnel responsible for submittal review.
- D. Testing and Inspection: Include in quality-control plan a comprehensive schedule of Work requiring testing or inspection, including the following:
 1. Contractor-performed tests and inspections including subcontractor-performed tests and inspections. Include required tests and inspections and Contractor-elected tests and inspections.
 2. Special inspections required by authorities having jurisdiction and indicated on the "Statement of Special Inspections."
 3. Owner-performed tests and inspections indicated in the Contract Documents.
- E. Continuous Inspection of Workmanship: Describe process for continuous inspection during construction to identify and correct deficiencies in workmanship in addition to testing and inspection specified. Indicate types of corrective actions to be required to bring work into compliance with standards of workmanship established by Contract requirements and approved mockups.
- F. Monitoring and Documentation: Maintain testing and inspection reports including log of approved and rejected results. Include work Contracting Officer has indicated as nonconforming or defective. Indicate corrective actions taken to bring nonconforming work into compliance with requirements. Comply with requirements of authorities having jurisdiction.

1.07 REPORTS AND DOCUMENTS

- A. Test and Inspection Reports: Prepare and submit certified written reports specified in other Sections. Include the following:

1. Date of issue.
2. Project title and number.
3. Name, address, and telephone number of testing agency.
4. Dates and locations of samples and tests or inspections.
5. Names of individuals making tests and inspections.
6. Description of the Work and test and inspection method.
7. Identification of product and Specification Section.
8. Complete test or inspection data.
9. Test and inspection results and an interpretation of test results.
10. Record of temperature and weather conditions at time of sample taking and testing and inspecting.
11. Comments or professional opinion on whether tested or inspected Work complies with the Contract Document requirements.
12. Name and signature of laboratory inspector.
13. Recommendations on retesting and re-inspecting.

B. **Manufacturer's Technical Representative's Field Reports:** Prepare written information documenting manufacturer's technical representative's tests and inspections specified in other Sections. Include the following:

1. Name, address, and telephone number of technical representative making report.
2. Statement on condition of substrates and their acceptability for installation of product.
3. Statement that products at Project site comply with requirements.
4. Summary of installation procedures being followed, whether they comply with requirements and, if not, what corrective action was taken.
5. Results of operational and other tests and a statement of whether observed performance complies with requirements.
6. Statement whether conditions, products, and installation will affect warranty.
7. Other required items indicated in individual Specification Sections.

C. **Factory-Authorized Service Representative's Reports:** Prepare written information documenting manufacturer's factory-authorized service representative's tests and inspections specified in other Sections. Include the following:

1. Name, address, and telephone number of factory-authorized service representative making report.
2. Statement that equipment complies with requirements.
3. Results of operational and other tests and a statement of whether observed performance complies with requirements.
4. Statement whether conditions, products, and installation will affect warranty.
5. Other required items indicated in individual Specification Sections.

D. **Permits, Licenses, and Certificates:** For Town of Medley' records, submit copies of permits, licenses, certifications, inspection reports, releases, jurisdictional settlements, notices, receipts for fee payments, judgments, correspondence, records, and similar documents, established for compliance with standards and regulations bearing on performance of the Work.

1.08 QUALITY ASSURANCE

A. **General:** Qualifications paragraphs in this article establish the minimum qualification

levels required; individual Specification Sections specify additional requirements.

- B. **Manufacturer Qualifications:** A firm experienced in manufacturing products or systems similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.
- C. **Fabricator Qualifications:** A firm experienced in producing products similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.
- D. **Installer Qualifications:** A firm or individual experienced in installing, erecting, or assembling work similar in material, design, and extent to that indicated for this Project, whose work has resulted in construction with a record of successful in-service performance.
- E. **Professional Engineer Qualifications:** A professional engineer who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for installations of the system, assembly, or product that are similar to those indicated for this Project in material, design, and extent.
- F. **Testing Agency Qualifications:** An NRTL, an NVLAP, or an independent agency with the experience and capability to conduct testing and inspecting indicated, as documented according to ASTM E 329; and with additional qualifications specified in individual Sections; and where required by authorities having jurisdiction, that is acceptable to authorities.
 - 1. **NRTL:** A nationally recognized testing laboratory according to 29 CFR 1910.7.
 - 2. **NVLAP:** A testing agency accredited according to NIST's National Voluntary Laboratory Accreditation Program.
- G. **Manufacturer's Technical Representative Qualifications:** An authorized representative of manufacturer who is trained and approved by manufacturer to observe and inspect installation of manufacturer's products that are similar in material, design, and extent to those indicated for this Project.
- H. **Factory-Authorized Service Representative Qualifications:** An authorized representative of manufacturer who is trained and approved by manufacturer to inspect installation of manufacturer's products that are similar in material, design, and extent to those indicated for this Project.

1.09 QUALITY CONTROL

- A. **Town of Medley' Responsibilities:** Where quality-control services are indicated as Town's responsibility, Town will engage a qualified testing agency to perform these services.
 - 1. Town will furnish Contractor with names, addresses, and telephone numbers of testing agencies engaged and a description of types of testing and inspecting they are engaged to perform.
 - 2. Payment for these services will be made from testing and inspecting allowances, as authorized by Change Orders.
 - 3. Costs for retesting and re-inspecting construction that replaces or is necessitated by work that failed to comply with the Contract Documents will be charged to Contractor, and the Contract Sum will be adjusted by Change Order.

- B. Contractor Responsibilities: Tests and inspections not explicitly assigned to Town of Medley are Contractor's responsibility. Perform additional quality-control activities required to verify that the Work complies with requirements, whether specified or not.
1. Unless otherwise indicated, provide quality-control services specified and those required by authorities having jurisdiction. Perform quality-control services required of Contractor by authorities having jurisdiction, whether specified or not.
 2. Where services are indicated as Contractor's responsibility, engage a qualified testing agency to perform these quality-control services.
 - a. Contractor shall not employ same entity engaged by Owner, unless agreed to in writing by Owner.
 3. Notify testing agencies at least 72 hours in advance of time when Work that requires testing or inspecting will be performed.
 4. Where quality-control services are indicated as Contractor's responsibility, submit a certified written report, in duplicate, of each quality-control service.
 5. Testing and inspecting requested by Contractor and not required by the Contract Documents are Contractor's responsibility.
 6. Submit additional copies of each written report directly to authorities having jurisdiction, when they so direct.
- C. Manufacturer's Field Services: Where indicated, engage a factory-authorized service representative to inspect field-assembled components and equipment installation, including service connections. Report results in writing as specified in Division 01 Section "Submittal Procedures."
- D. Manufacturer's Technical Services: Where indicated, engage a manufacturer's technical representative to observe and inspect the Work. Manufacturer's technical representative's services include participation in pre-installation conferences, examination of substrates and conditions, verification of materials, observation of Installer activities, inspection of completed portions of the Work, and submittal of written reports.
- E. Retesting/Re-inspecting: Regardless of whether original tests or inspections were Contractor's responsibility, provide quality-control services, including retesting and re-inspecting, for construction that replaced Work that failed to comply with the Contract Documents.
- F. Testing Agency Responsibilities: Cooperate with Owner's Representative and Contractor in performance of duties. Provide qualified personnel to perform required tests and inspections.
1. Notify Owner's Representative, Architect of Record and Contractor promptly of irregularities or deficiencies observed in the Work during performance of its services.
 2. Determine the location from which test samples will be taken and in which in-situ tests are conducted.
 3. Conduct and interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from requirements.
 4. Submit a certified written report, in duplicate, of each test, inspection, and similar quality-control service through Contractor.
 5. Do not release, revoke, alter, or increase the Contract Document requirements or approve or accept any portion of the Work.
 6. Do not perform any duties of Contractor.

- G. Associated Services: Cooperate with agencies performing required tests, inspections, and similar quality-control services, and provide reasonable auxiliary services as requested. Notify agency sufficiently in advance of operations to permit assignment of personnel. Provide the following:
1. Access to the Work.
 2. Incidental labor and facilities necessary to facilitate tests and inspections.
 3. Adequate quantities of representative samples of materials that require testing and inspecting. Assist agency in obtaining samples.
 4. Facilities for storage and field curing of test samples.
 5. Delivery of samples to testing agencies.
 6. Preliminary design mix proposed for use for material mixes that require control by testing agency.
 7. Security and protection for samples and for testing and inspecting equipment at Project site.
- H. Coordination: Coordinate sequence of activities to accommodate required quality-assurance and -control services with a minimum of delay and to avoid necessity of removing and replacing construction to accommodate testing and inspecting.
1. Schedule times for tests, inspections, obtaining samples, and similar activities.
- I. Schedule of Tests and Inspections: Prepare a schedule of tests, inspections, and similar quality-control services required by the Contract Documents as a component of the Contractor's quality-control plan. Coordinate and submit concurrently with Contractor's construction schedule. Update as the Work progresses. .
1. Distribution: Distribute schedule to Architect, Owner's Representative, testing agencies, and each party involved in performance of portions of the Work where tests and inspections are required.

1.10 SPECIAL TESTS AND INSPECTIONS

- A. Special Tests and Inspections: Conducted by a qualified special inspector as required by authorities having jurisdiction, as indicated in individual Specification Sections, and as follows:
1. Verifying that manufacturer maintains detailed fabrication and quality-control procedures and reviewing the completeness and adequacy of those procedures to perform the Work.
 2. Notifying Owner's Representative, Architect, and Contractor promptly of irregularities and deficiencies observed in the Work during performance of its services.
 3. Submitting a certified written report of each test, inspection, and similar quality-control service to Architect and Owner's Representative with copy to Contractor and to authorities having jurisdiction.
 4. Submitting a final report of special tests and inspections at Substantial Completion, which includes a list of unresolved deficiencies.
 5. Interpreting tests and inspections and stating in each report whether tested and inspected work complies with or deviates from the Contract Documents.
 6. Retesting and re-inspecting corrected work.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.01 TEST AND INSPECTION LOG

- A. Prepare a record of tests and inspections. Include the following:
 - 1. Date test or inspection was conducted.
 - 2. Description of the Work tested or inspected.
 - 3. Date test or inspection results were transmitted to Owner's Representative.
 - 4. Identification of testing agency or special inspector conducting test or inspection.
- B. Maintain log at Project site. Post changes and modifications as they occur. Provide access to test and inspection log for Owner's Representative's reference during normal working hours.

3.02 REPAIR AND PROTECTION

- A. General: On completion of testing, inspecting, sample taking, and similar services, repair damaged construction and restore substrates and finishes.
 - 1. Provide materials and comply with installation requirements specified in other Specification Sections or matching existing substrates and finishes. Restore patched areas and extend restoration into adjoining areas with durable seams that are as invisible as possible. Comply with the Contract Document requirements for cutting and patching in Division 01 Section "Execution."
- B. Protect construction exposed by or for quality-control service activities.
- C. Repair and protection are Contractor's responsibility, regardless of the assignment of responsibility for quality-control services.

END OF SECTION 01 4000

SECTION 01 4100 - POLLUTION CONTROL

PART 1 - GENERAL

1.01 EROSION CONTROL AND SEDIMENTATION

The work consists of installing measures or performing work to control erosion and minimize the production of sediment and other pollutants to water and air from construction activities. A Generic Permit for Stormwater Discharge from Large and Small Construction Activities (CGP) from the Florida Department of Environmental Protection (FDEP) may be required. FDEP Document 62-621.300(4)(a). The measures and works shall include, but are not limited to, the following:

- A. **Staging of earthwork activities** — the excavation and moving of soil materials shall be scheduled to minimize the size of areas disturbed and unprotected from erosion for the shortest reasonable time.
- B. **Seeding** — seeding to protect disturbed areas shall occur as soon as reasonably possible following completion of that earthwork activity.
- C. **Mulching** — mulching to provide temporary protection of the soil surface from erosion.
- D. **Diversions** — temporary diversions to divert water from work areas and to collect water from work areas for treatment and safe disposition. When the diversions are no longer required or when permanent measures are installed the area shall be restored to its near original condition.
- E. **Stream crossings** — culverts or bridges where equipment must cross streams. They are temporary and shall be removed and the area restored to its original condition when the crossings are no longer required or when permanent measures are installed.
- F. **Sediment basins** — sediment basins collect, settle, and eliminate sediment from eroding areas from impacting properties and streams below the construction site(s). These basins are temporary and shall be removed and the area restored to its original condition when they are no longer required or when permanent measures are installed.
- G. **Sediment filters** — straw bale filters or geotextile sediment fences trap sediment from areas of limited runoff. Sediment filters shall be properly anchored to prevent erosion under or around them. These filters are temporary and shall be removed and the area restored to its original condition when they are no longer required or when permanent measures are installed.
- H. **Waterways** — waterways for the safe disposal of runoff from fields, diversions, and other structures or measures. These works are temporary and shall be removed and the area restored to its original condition when they are no longer required or when permanent measures are installed.

1.02 CHEMICAL POLLUTION

- A. The contractor shall provide watertight tanks or barrels or construct a sump sealed with plastic sheets to dispose of chemical pollutants, such as drained lubricating or transmission fluids, grease, soaps, concrete mixer wash water, or asphalt, produced as a by-product of the construction activities. At the completion of the construction work, sumps shall be removed and the area restored to its original condition. Sump removal shall be conducted without causing pollution. Sanitary facilities, such as chemical toilets or septic tanks shall not be located next to live streams, wells, or springs. They shall be located at a distance sufficient to prevent contamination of any water source. At the completion of construction activities, facilities shall be disposed of without causing pollution.

1.03 AIR POLLUTION

- A. The burning of brush or slash and the disposal of other materials shall adhere to state and local regulations. Fire prevention measures shall be taken to prevent the start or spreading of wildfires that may result from project activities. Firebreaks or guards shall be constructed and maintained at locations shown on the drawings. All public access or haul roads used by the contractor during construction of the project shall be sprinkled or otherwise treated to fully suppress dust. All dust control methods shall ensure safe construction operations at all times. If chemical dust suppressants are applied, the material shall be a commercially available product specifically designed for dust suppression and the application shall follow manufacturer's requirements and recommendations. A copy of the product data sheet and manufacturer's recommended application procedures shall be provided to the engineer 5 working days before the first application. All pollution control measures and temporary works shall be adequately maintained in a functional condition for the duration of the construction period. All temporary measures shall be removed and the site restored to near original condition.

1.04 NOISE POLLUTION

- A. Provide methods, means and facilities to minimize noise produced by construction operations.

PART 2 - PRODUCTS

(Not Used)

PART 3 - EXECUTION

(Not Used)

END OF SECTION 01 4100

SECTION 01 4170 - CLEANING

PART 1 - GENERAL

1.01 SCOPE OF WORK

This Section specifies the maintenance of the work site in a clean, orderly, hazard-free condition.

1.02 QUALITY ASSURANCE

- A. Conduct cleaning and disposal operations in accordance with local ordinances and anti-pollution laws. Rubbish, volatile wastes, and other construction wastes shall be neither burned nor buried on the work site, and shall not be disposed of into storm drains, sanitary drains, streams or other waterways.
- B. Final cleaning shall be accomplished either by workmen experienced in cleaning operations or by professional cleaners.

PART 2 - PRODUCTS

2.01 ON-SITE WASTE CONTAINERS

Provide on-site waste containers for collection of waste materials, debris and rubbish. See Section 01016 regarding storage requirements for environmentally hazardous materials.

2.02 CLEANING MATERIALS

Cleaning materials shall be as recommended by the manufacturer of the surface to be cleaned.

PART 3 - EXECUTION

3.01 SAFETY REQUIREMENTS

- A. Maintain work site in accordance with local ordinances and anti-pollution laws applicable to work site cleanliness, and in a neat, orderly and hazard-free condition until final acceptance of the work. Catwalks, accessible underground structures, work site sidewalks and walkways adjacent to the work site shall be kept free from hazards caused by construction activities.
- B. Store volatile wastes including rags in covered metal containers, and remove from work site daily.
- C. Prevent accumulations of wastes which create hazardous conditions.
- D. Artificially ventilate spaces which are not naturally ventilated when volatile and noxious substances are being used in those spaces.

3.02 INTERIM CLEANING

- A. Perform cleaning every workday for duration of the Work. Structures, grounds, and areas of the work site and public and private properties shall be maintained free from accumulations of waste materials

- and rubbish caused by construction operations on the work site. Place waste materials and rubbish in on-site containers.
- B. Remove or secure loose material on open decks and on other exposed surfaces at end of each day's work or more often to maintain work site in hazard-free condition. Prevent dislodgement of materials due to wind and other forces.
 - C. Wet down dry materials and rubbish to lay dust and prevent blowing dust.
 - D. Empty on-site waste containers whenever necessary, so that trash overflow does not occur. Legally dispose of contents at either public or private dumping areas.
 - E. Control the handling of materials, debris and rubbish; do not drop or throw from heights.
 - F. Immediately remove spillage of on-site fuels, oil or construction-related material from hauling routes.
 - G. Perform cleaning operations so dust and other contaminants resulting from cleaning processes will not fall on wet, newly painted surfaces.

3.03 FINAL CLEANING

- A. In preparation for final acceptance or occupancy, conduct final inspection of exposed interior and exterior surfaces, and of concealed spaces.
- B. Remove grease, dust, dirt, rust stain on concrete floors, labels, fingerprints and other foreign materials from exposed interior and exterior finished surfaces. Flush down all parking level areas and stairs leaving such surfaces clean of all sand, laitances, etc.
- C. Maintain cleaning operations until project has been finally accepted.

END OF SECTION 01 4170

SECTION 01 4175 - MAINTENANCE OF TRAFFIC AND PUBLIC STREETS

PART 1 - GENERAL

1.01 SCOPE OF WORK

The Contractor shall furnish all equipment, supplies, personnel, labor and services to accomplish maintenance of traffic at all locations required to complete this project and as authorized by the Engineer.

The intent is to maintain safe and expeditious movement of traffic around every work area where the public may be exposed to the potential hazards of the contract operations.

1.02 REGULATIONS

As used herein, any reference to Miami-Dade County, its departments, or its published regulations, permits and data, shall be synonymous and interchangeable with other recognized governing bodies over particular areas or streets, or their departments, published regulations (i.e., Manual of Uniform Traffic Control Devices (MUTCD), Florida Department of Transportation (FDOT) Roadway and Bridge Standard Index Drawing Book), permits or data. The Contractor shall abide by all applicable laws, regulations, and codes thereof pertaining to Maintenance of Traffic on public streets, detour of traffic, traffic control and other provisions as may be required for this Project.

1.03 MAINTENANCE OF TRAFFIC (M.O.T.)

- A. The Contractor shall be fully responsible for the M.O.T. on public streets, detour of traffic (including furnishing and maintaining regulatory and informative signs along the detour route), traffic control, and other provisions, throughout the Project, as required by the Miami-Dade County Department of Public Works, Traffic Engineering Division (Traffic Division) or FDOT and the above noted standards. Traffic shall be maintained according to corresponding typical traffic control details as outlined in the Miami-Dade County Public Works Manual and the above noted standards. No street shall be completely blocked, nor blocked more than one-half at any time, keeping the other one-half open for traffic, without specific approval.
- B. Supervision of traffic control and safety by a Uniformed Police Officer from the Town of Medley Police Department, if required, shall be furnished by the Contractor without cost to the Town. The Contractor is required to retain the services of the Town of Medley Police Officers for the Supervision. Further, any and all additional traffic measures deemed necessary by such offices shall be carried out by the Contractor without cost to the Town.
- C. The Contractor shall provide all barricades with warning lights, necessary arrow boards and signs, to warn motorists of the work throughout the Project. Adequate approved devices shall be erected and maintained by the Contractor to detour traffic.
- D. Excavated or other material stored adjacent to or partially upon a roadway pavement shall be adequately marked for traffic safety at all times. The Contractor shall provide necessary access to all adjacent property during construction.

- E. The Contractor shall be responsible for the provision, installation and maintenance of all M.O.T. and safety devices, in accordance with specifications outlined in the Miami-County Public Works Manual and the above noted standards. In addition, the Contractor shall be responsible for providing the Town, the Town of Medley Police Department and the CEI with M.O.T. plans for lane closures and/or detours for approval. These plans (sketches) shall be produced by an individual employed by the Contractor and certified as "Work Zone Traffic Safety Supervisor" by the International Municipal Signal Association.
- F. Where excavations are to be made in the vicinity of signalized intersections, attention is directed to the fact that vehicle loop detectors may have been embedded in the pavement.
- G. The Contractor shall notify the Town and the Town of Medley Police Department 24 hours in advance of the construction date or 48 hours in advance of construction within any signalized intersection.
- H. Temporary pavement or steel plates will be required over all cuts in pavement areas, and also where traffic is to be routed over swale or median areas. When the temporary pavement and/or steel plates for routing traffic is no longer necessary, it shall be removed and the swale or median areas restored to their previous condition.
- I. Pavement markings damaged during construction shall be remarked, as required by the Town.

PART 2 - PRODUCTS

(Not Used)

PART 3 - EXECUTION

(Not Used)

END OF SECTION 01 4175

SECTION 01 4529 - TESTING LABORATORY SERVICES

PART 1 - GENERAL

1.1 DESCRIPTION:

This section specifies materials testing activities and inspection services required during project construction to be provided by a Testing Laboratory retained by the Town of Medley. The Contractor shall provide access as required to job site and all items, equipment and personnel required to perform the tests.

1.2 APPLICABLE PUBLICATIONS:

- A. The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by the basic designation only.
- B. American Association of State Highway and Transportation Officials (AASHTO):
 - T27-06.....Sieve Analysis of Fine and Coarse Aggregates
 - T96-02 (R2006)Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine
 - T99-01 (R2004)The Moisture-Density Relations of Soils Using a 2.5 Kg (5.5 lb.) Rammer and a 305 mm (12 in.) Drop
 - T104-99 (R2003)Soundness of Aggregate by Use of Sodium Sulfate or Magnesium Sulfate
 - T180-01 (R2004)Moisture-Density Relations of Soils using a 4.54 kg (10 lb.) Rammer and a 457 mm (18 in.) Drop
 - T191-02(R2006)Density of Soil In-Place by the Sand-Cone Method
- C. American Concrete Institute (ACI):
 - 506.4R-94 (R2004)Guide for the Evaluation of Shotcrete
- D. American Society for Testing and Materials (ASTM):
 - A325-06Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength
 - A370-07Definitions for Mechanical Testing of Steel Products
 - A416/A416M-06.....Steel Strand, Uncoated Seven-Wire for Prestressed Concrete
 - A490-06Heat Treated Steel Structural Bolts, 150 ksi Minimum Tensile Strength
 - C31/C31M-06Making and Curing Concrete Test Specimens in the Field
 - C33-03Concrete Aggregates
 - C39/C39M-05Compressive Strength of Cylindrical Concrete Specimens

C109/C109M-05	Compressive Strength of Hydraulic Cement Mortars
C138-07	Unit Weight, Yield, and Air Content (Gravimetric) of Concrete
C140-07	Sampling and Testing Concrete Masonry Units and Related Units
C143/C143M-05	Slump of Hydraulic Cement Concrete
C172-07	Sampling Freshly Mixed Concrete
C173-07	Air Content of freshly Mixed Concrete by the Volumetric Method
C330-05	Lightweight Aggregates for Structural Concrete
C567-05	Density Structural Lightweight Concrete
C780-07	Pre-construction and Construction Evaluation of Mortars for Plain and Reinforced Unit Masonry
C1019-08	Sampling and Testing Grout
C1064/C1064M-05	Freshly Mixed Portland Cement Concrete
C1077-06	Laboratories Testing Concrete and Concrete Aggregates for Use in Construction and Criteria for Laboratory Evaluation
C1314-07	Compressive Strength of Masonry Prisms
D698-07	Laboratory Compaction Characteristics of Soil Using Standard Effort
D1143-07	Piles Under Static Axial Compressive Load
D1188-07	Bulk Specific Gravity and Density of Compacted Bituminous Mixtures Using Paraffin-Coated Specimens
D1556-07	Density and Unit Weight of Soil in Place by the Sand-Cone Method
D1557-07	Laboratory Compaction Characteristics of Soil Using Modified Effort
D2166-06	Unconfined Compressive Strength of Cohesive Soil
D2167-94(R2001)	Density and Unit Weight of Soil in Place by the Rubber Balloon Method
D2216-05	Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass
D2922-05	Density of soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth)
D2974-07	Moisture, Ash, and Organic Matter of Peat and Other Organic Soils

- D3666-(2002).....Minimum Requirements for Agencies Testing and Inspection
Bituminous Paving Materials
- D3740-07Minimum Requirements for Agencies Engaged in the Testing
and Inspecting Road and Paving Material
- E94-04.....Radiographic Testing
- E164-03.....Ultrasonic Contact Examination of Weldments
- E329-07.....Agencies Engaged in Construction Inspection and/or Testing
- E543-06.....Agencies Performing Non-Destructive Testing
- E605-93(R2006)Thickness and Density of Sprayed Fire-Resistive Material
(SFRM) Applied to Structural Members
- E709-(2001)Guide for Magnetic Particle Examination
- E1155-96(R2008)Determining FF Floor Flatness and FL Floor Levelness Numbers
- E. American Welding Society (AWS):
 - D1.1-07Structural Welding Code-Steel

1.3 REQUIREMENTS:

- A. Accreditation Requirements: Construction materials testing laboratories must be accredited by a laboratory accreditation authority and will be required to submit a copy of the Certificate of Accreditation and Scope of Accreditation. The laboratory's scope of accreditation must include the appropriate ASTM standards (i.e.; E 329, C 1077, D 3666, D3740, A 880, E 543) listed in the technical sections of the specifications. Laboratories engaged in Hazardous Materials Testing shall meet the requirements of OSHA and EPA. The policy applies to the specific laboratory performing the actual testing, not just the "Corporate Office."
- B. Inspection and Testing: Testing laboratory shall inspect materials and workmanship and perform tests described herein and additional tests requested by Owner's Representative. When it appears materials furnished, or work performed by Contractor fail to meet construction contract requirements, Testing Laboratory shall direct attention of Architect and Owner's Representative to such failure.
- C. Written Reports: Testing laboratory shall submit test reports to Owner's Representative, Architect of Record, and Contractor, unless other arrangements are agreed to in writing by the Owner. Submit reports of tests that fail to meet construction contract requirements on colored paper.
- D. Verbal Reports: Give verbal notification to Architect of Record immediately of any irregularity.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.1 EARTHWORK:

- A. General: The Testing Laboratory shall provide qualified personnel, materials, equipment, and transportation as required to perform the services identified/required herein, within the agreed to schedule and/or time frame. The work to be performed shall be as identified herein and shall include but not be limited to the following:
1. Observe fill and subgrades during proof-rolling to evaluate suitability of surface material to receive fill or base course. Provide recommendations to the Architect of Record regarding suitability or unsuitability of areas where proof-rolling was observed. Where unsuitable results are observed, witness excavation of unsuitable material and recommend to Architect of Record extent of removal and replacement of unsuitable materials and observe proof-rolling of replaced areas until satisfactory results are obtained.
 2. Provide full time observation of fill placement and compaction and field density testing in building areas and provide full time observation of fill placement and compaction and field density testing in pavement areas to verify that earthwork compaction obtained is in accordance with contract documents.
 3. Provide supervised geotechnical technician to inspect excavation, subsurface preparation, and backfill for structural fill.
- B. Testing Compaction:
1. Determine maximum density and optimum moisture content for each type of fill, backfill and subgrade material used, in compliance with AASHTO T99T180 ASTM D698 and/or ASTM D1557.
 2. Make field density tests in accordance with the primary testing method following ASTM D2922 wherever possible. Field density tests utilizing ASTM D1556 shall be utilized on a case by case basis only if there are problems with the validity of the results from the primary method due to specific site field conditions. Should the testing laboratory propose these alternative methods, they should provide satisfactory explanation to the Architect of Record before the tests are conducted.
 - a. Building Slab Subgrade: At least one test of subgrade for every 185 m² (2000 square feet) of building slab, but in no case fewer than three tests. In each compacted fill layer, perform one test for every 185 m² (2000 square feet) of overlaying building slab, but in no case fewer than three tests.

- b. Foundation Wall Backfill: One test per 30 m (100 feet) of each layer of compacted fill but in no case fewer than two tests.
 - c. Pavement Subgrade: One test for each 335 m² (400 square yards), but in no case fewer than two tests.
 - d. Curb, Gutter, and Sidewalk: One test for each 90 m (300 feet), but in no case fewer than two tests.
 - e. Trenches: One test at maximum 30 m (100 foot) intervals per 1200 mm (4 foot) of vertical lift and at changes in required density, but in no case fewer than two tests.
 - f. Footing Subgrade: At least one test for each layer of soil on which footings will be placed. Subsequent verification and approval of each footing subgrade may be based on a visual comparison of each subgrade with related tested subgrade when acceptable to Resident Engineer. In each compacted fill layer below wall footings, perform one field density test for every 30 m (100 feet) of wall. Verify subgrade is level, all loose or disturbed soils have been removed, and correlate actual soil conditions observed with those indicated by test borings.
- C. Testing for Footing Bearing CapaTown: Evaluate if suitable bearing capatown material is encountered in footing subgrade.
- D. Testing Materials: Test suitability of on-site and off-site borrow as directed by Architect of Record.

3.2 LANDSCAPING:

- A. Test topsoil for organic materials, pH, phosphate, potash content, and gradation of particles.
 - 1. Test for organic material by using ASTM D2974.
 - 2. Determine percent of silt, sand, clay, and foreign materials such as rock, roots, and vegetation.
- B. Submit laboratory test report of topsoil to Architect of Record.

3.3 ASPHALT CONCRETE PAVING:

- A. Aggregate Base Course:
 - 1. Determine maximum density and optimum moisture content for aggregate base material in accordance with AASHTO T180, Method D.
 - 2. Make a minimum of three field density tests on each day's final compaction on each aggregate course in accordance with AASHTO T191.
 - 3. Sample and test aggregate as necessary to insure compliance with specification requirements for gradation, wear, and soundness as specified in the applicable state highway standards and specifications.
- B. Asphalt Concrete:

1. Aggregate: Sample and test aggregates in stock pile and hot-bins as necessary to insure compliance with specification requirements for gradation (AASHTO T27), wear (AASHTO T96), and soundness (AASHTO T104).
2. Temperature: Check temperature of each load of asphalt concrete at mixing plant and at site of paving operation.
3. Density: Make a minimum of two field density tests in accordance with ASTM D1188 of asphalt base and surface course for each day's paving operation.

3.4 SITE WORK CONCRETE:

Test site work concrete including materials for concrete as required in Article CONCRETE of this section.

3.5 CONCRETE:

A. Batch Plant Inspection and Materials Testing:

1. Perform continuous batch plant inspection until concrete quality is established to satisfaction of Architect of Record with concurrence of Owner's Representative and perform periodic inspections thereafter as determined by Architect of Record.
2. Periodically inspect and test batch proportioning equipment for accuracy and report deficiencies to Architect of Record.
3. Sample and test mix ingredients as necessary to insure compliance with specifications.
4. Sample and test aggregates daily and as necessary for moisture content. Test the dry rodded weight of the coarse aggregate whenever a sieve analysis is made, and when it appears there has been a change in the aggregate.
5. Certify, in duplicate, ingredients and proportions and amounts of ingredients in concrete conform to approved trial mixes. When concrete is batched or mixed off immediate building site, certify (by signing, initialing or stamping thereon) on delivery slips (duplicate) that ingredients in truck-load mixes conform to proportions of aggregate weight, cement factor, and water-cement ratio of approved trial mixes.

B. Field Inspection and Materials Testing:

1. Provide a technician at site of placement at all times to perform concrete sampling and testing.
2. Review the delivery tickets of the ready-mix concrete trucks arriving on-site. Notify the Contractor if the concrete cannot be placed within the specified time limits or if the type of concrete delivered is incorrect. Reject any loads that do not comply with the Specification requirements. Rejected loads are to be removed from the site at the Contractor's expense. Any rejected concrete that is placed will be subject to removal.

3. Take concrete samples at point of placement in accordance with ASTM C172. Mold and cure compression test cylinders in accordance with ASTM C31. Make at least three cylinders for each 40 m³ (50 cubic yards) or less of each concrete type, and at least three cylinders for any one day's pour for each concrete type. Label each cylinder with an identification number. Resident Engineer may require additional cylinders to be molded and cured under job conditions.
4. Perform slump tests in accordance with ASTM C143. Test the first truck each day, and every time test cylinders are made. Test pumped concrete at the hopper and at the discharge end of the hose at the beginning of each day's pumping operations to determine change in slump.
5. Determine the air content of concrete per ASTM C173. For concrete required to be air-entrained, test the first truck and every 20 m³ (25 cubic yards) thereafter each day. For concrete not required to be air-entrained, test every 80 m³ (100 cubic yards) at random. For pumped concrete, initially test concrete at both the hopper and the discharge end of the hose to determine change in air content.
6. If slump or air content fall outside specified limits, make another test immediately from another portion of same batch.
7. Perform unit weight tests in compliance with ASTM C138 for normal weight concrete and ASTM C567 for lightweight concrete. Test the first truck and each time cylinders are made.
8. Notify laboratory technician at batch plant of mix irregularities and request materials and proportioning check.
9. Verify that specified mixing has been accomplished.
10. Environmental Conditions: Determine the temperature per ASTM C1064 for each truckload of concrete during hot weather and cold weather concreting operations:
 - a. When ambient air temperature falls below 4.4 degrees C (40 degrees F), record maximum and minimum air temperatures in each 24 hour period; record air temperature inside protective enclosure; record minimum temperature of surface of hardened concrete.
 - b. When ambient air temperature rises above 29.4 degrees C (85 degrees F), record maximum and minimum air temperature in each 24 hour period; record minimum relative humidity; record maximum wind velocity; record maximum temperature of surface of hardened concrete.
11. Inspect the reinforcing steel placement, including bar size, bar spacing, top and bottom concrete cover, proper tie into the chairs, and grade of steel prior to concrete placement. Submit detailed report of observations.

12. Observe conveying, placement, and consolidation of concrete for conformance to specifications.
 13. Observe condition of formed surfaces upon removal of formwork prior to repair of surface defects and observe repair of surface defects.
 14. Observe curing procedures for conformance with specifications, record dates of concrete placement, start of preliminary curing, start of final curing, end of curing period.
 15. Observe preparations for placement of concrete:
 - a. Inspect handling, conveying, and placing equipment, inspect vibrating and compaction equipment.
 - b. Inspect preparation of construction, expansion, and isolation joints.
 16. Observe preparations for protection from hot weather, cold weather, sun, and rain, and preparations for curing.
 17. Observe concrete mixing:
 - a. Monitor and record amount of water added at project site.
 - b. Observe minimum and maximum mixing times.
 18. Measure concrete flatwork for levelness and flatness as follows:
 - a. Perform Floor Tolerance Measurements F_F and F_L in accordance with ASTM E1155.
Calculate the actual overall F- numbers using the inferior/superior area method.
 - b. Perform all floor tolerance measurements within 48 hours after slab installation and prior to removal of shoring and formwork.
 - c. Provide the Contractor and the Architect of Record with the results of all profile tests, including a running tabulation of the overall F_F and F_L values for all slabs installed to date, within 72 hours after each slab installation.
 19. Other inspections:
 - a. Grouting under base plates.
 - b. Grouting anchor bolts and reinforcing steel in hardened concrete.
- C. Laboratory Tests of Field Samples:
1. Test compression test cylinders for strength in accordance with ASTM C39. For each test series, test one cylinder at 7 days and one cylinder at 28 days. Use remaining cylinder as a spare tested as directed by Architect of Record or Owner's Representative. Compile laboratory test reports as follows: Compressive strength test shall be result of one cylinder, except when one cylinder shows evidence of improper sampling, molding or testing, in which case it shall be discarded and strength of spare cylinder shall be used.

2. Make weight tests of hardened lightweight structural concrete in accordance with ASTM C567.
3. Furnish certified compression test reports (duplicate) to Owner's Representative. In test report, indicate the following information:
 - a. Cylinder identification number and date cast.
 - b. Specific location at which test samples were taken.
 - c. Type of concrete, slump, and percent air.
 - d. Compressive strength of concrete in MPa (psi).
 - e. Weight of lightweight structural concrete in kg/m^3 (pounds per cubic feet).
 - f. Weather conditions during placing.
 - g. Temperature of concrete in each test cylinder when test cylinder was molded.
 - h. Maximum and minimum ambient temperature during placing.
 - i. Ambient temperature when concrete sample in test cylinder was taken.
 - j. Date delivered to laboratory and date tested.

3.6 REINFORCEMENT:

- A. Review mill test reports furnished by Contractor.
- B. Make one tensile and one bend test in accordance with ASTM A370 from each pair of samples obtained.
- C. Written report shall include, in addition to test results, heat number, manufacturer, type and grade of steel, and bar size.
- D. Perform tension tests of mechanical and welded splices in accordance with ASTM A370.

END OF SECTION 01 4529

SECTION 01 5213 - FIELD OFFICE AND SHEDS

PART 1 - GENERAL

1.1 DESCRIPTION:

Section Includes: Temporary field office (including parking area), storage sheds, work sheds, and security personnel.

- A. Contractor shall assume responsibility for all improvements and structures in the construction staging area installed as part of the scope of the prior phase. Maintenance, security, and utilities shall be the responsibility of the contractor as described herein.
- B. Contractor shall be responsible for further development of the construction staging area with all additional temporary facilities required by Trade Contractors and Sub-Contractors.

1.2 SUBMITTALS

- A. Submit in accordance with Section 01 3000, ADMINISTRATIVE REQUIREMENTS.
- B. Contractor shall provide calculations and connection details signed by a Florida registered professional engineer.

1.3 APPLICABLE PUBLICATIONS

- A. The publications listed below form a part of this specification to the extent referenced.
- B. American Society of Civil Engineers (ASCE) 7 (latest edition)

PART 2 – FIELD OFFICE AND SHEDS

2.1 OWNER & ARCHITECT/ENGINEER FIELD OFFICE

- A. The Contractor shall provide the following:
 - 1. ElectriTown, high speed internet access, hot and cold water, and other necessary utility services (including telephone) for all equipment required per this specification. All utilities will be paid by Contractor.
 - 2. The contractor to maintain a suitable alarm system for the field office (service to be paid for by Contractor).
 - 3. Maintain exterior lighting at entrance doors.
 - 4. Provide functioning telephones: minimum three (3) with all cabling and accessories.
 - 5. Maintain photocopier for use by the Owner and/or the A/E. Photocopier to be maintained throughout duration of project.

6. Provide maintenance as required for the facsimile machine that is available for use by the Owner and/or the A/E.

7. Provide two wireless 2-way communication devices for use by the Owner and the A/E.

B. Contractor shall, for the duration of the Owner's occupancy, provide the following:

1. Satisfactory conditions in and around the field office and parking area.
2. Maintenance of gravel surfaced area, including the area for parking, in an acceptable condition for vehicle and foot traffic at all times.
3. Maintenance of all utility services.
4. Weekly janitorial services and supplies (toilet paper, soap, etc.).
5. Potable water, fuel and electric power for normal office uses, including lights, heating and air conditioning.

2.2 STORAGE SHEDS / WORK SHEDS

A. As required of various trades.

B. Dimensions: Adequate for storage and handling of products.

C. Ventilation: Comply with specified and code requirements for products stored.

2.3 SECURITY PERSONNEL FACILITY

A. Contractor to maintain existing portable facility for the use of the security personnel. Relocate as necessary for the duration of the project.

B. Provide all functioning utilities required for the shed, including local telephone service. All utilities for the security personnel shed shall be paid for by the contractor.

C. Maintain signage indicating that the shed is the security shed for the duration of the project.

PART 3 – EXECUTION

3.1 INSTALLATION

A. Fill and grade sites for temporary structures to provide surface drainage.

B. Construct temporary field offices and storage sheds and/or facilities on proper foundations. Provide connections for utility services.

C. Secure portable or mobile buildings/sheds, when used, against break-ins and hurricane requirements per code.

3.2 REMOVAL

A. At the completion of all work, including the punch list, the field office, equipment, furnishing and facilities shall become the property of the Contractor and shall be removed from the site.

END OF SECTION

FIELD OFFICE AND SHEDS
01 5213

PUBLIC SERVICES FACILITY
Town of Medley, Florida

SECTION 01 5713 - TEMPORARY EROSION AND SEDIMENT CONTROL

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Prevention of erosion due to construction activities.
- B. Prevention of sedimentation of waterways, open drainage ways, and storm and sanitary sewers due to construction activities.
- C. Restoration of areas eroded due to insufficient preventive measures.
- D. Compensation of Owner for fines levied by authorities having jurisdiction due to non-compliance by Contractor.

1.2 RELATED REQUIREMENTS

- A. Section 01 3515 - LEED Certification Procedures: LEED credits relating to erosion and sedimentation control.

1.3 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. LEED Submittals: Submit all submittals required in this section in accordance with procedures specified in Section 01 3515.
- C. Erosion and Sedimentation Control Plan:
 - 1. Include:
 - a. Site plan identifying soils and vegetation, existing erosion problems, and areas vulnerable to erosion due to topography, soils, vegetation, or drainage.
 - b. Site plan showing grading; new improvements; temporary roads, traffic accesses, and other temporary construction; and proposed preventive measures.
 - c. Where extensive areas of soil will be disturbed, include storm water flow and volume calculations, soil loss predictions, and proposed preventive measures.
 - d. Schedule of temporary preventive measures, in relation to ground disturbing activities.
 - e. Other information required by law.
 - f. Format required by law is acceptable, provided any additional information specified is also included.
 - 2. Obtain the approval of the Plan by authorities having jurisdiction.
 - 3. Obtain the approval of the Plan by Owner.
- D. Inspection Reports: Submit report of each inspection; identify each preventive measure, indicate condition, and specify maintenance or repair required and accomplished.

END OF SECTION

TEMPORARY EROSION AND SEDIMENT CONTROL NEW
MUNICIPAL COMPLEX

01
5713

PUBLIC SERVICES FACILITY
Town of Medley, Florida
Town of Medley, Florida

SECTION 01 5719 - TEMPORARY ENVIRONMENTAL CONTROLS PART 1 - GENERAL

1.1 DESCRIPTION

- A. This section specifies the control of environmental pollution and damage that the Contractor must consider for air, water, and land resources. It includes management of visual aesthetics, noise, solid waste, radiant energy, and radioactive materials, as well as other pollutants and resources encountered or generated by the Contractor. The Contractor is obligated to consider specified control measures with the costs included within the various contract items of work.
- B. Environmental pollution and damage is defined as the presence of chemical, physical, or biological elements or agents which:
 - 1. Adversely effect human health or welfare,
 - 2. Unfavorably alter ecological balances of importance to human life,
 - 3. Effect other species of importance to humankind, or;
 - 4. Degrade the utility of the environment for aesthetic, cultural, and historical purposes.
- C. Definitions of Pollutants:
 - 1. Chemical Waste: Petroleum products, bituminous materials, salts, acids, alkalis, herbicides, pesticides, organic chemicals, and inorganic wastes.
 - 2. Debris: Combustible and noncombustible wastes, such as leaves, tree trimmings, ashes, and waste materials resulting from construction or maintenance and repair work.
 - 3. Sediment: Soil and other debris that has been eroded and transported by runoff water.
 - 4. Solid Waste: Rubbish, debris, garbage, and other discarded solid materials resulting from industrial, commercial, and agricultural operations and from community activities.
 - 5. Surface Discharge: The term "Surface Discharge" implies that the water is discharged with possible sheeting action and subsequent soil erosion may occur. Waters that are surface discharged may terminate in drainage ditches, storm sewers, creeks, and/or "water of the United States" and would require a permit to discharge water from the governing agency.
 - 6. Rubbish: Combustible and noncombustible wastes such as paper, boxes, glass and crockery, metal and lumber scrap, tin cans, and bones.
 - 7. Sanitary Wastes:
 - a. Sewage: Domestic sanitary sewage and human and animal waste.
 - b. Garbage: Refuse and scraps resulting from preparation, cooking, dispensing, and consumption of food.

1.2 QUALITY CONTROL

- A. Establish and maintain quality control for the environmental protection of all items set forth herein.

- B. Record on daily reports any problems in complying with laws, regulations, and ordinances. Note any corrective action taken.

1.3 REFERENCES

- A. The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.
- B. U.S. National Archives and Records Administration (NARA):

33 CFR 328Definitions

1.4 SUBMITTALS

- A. In accordance with Section, 01 30 00, ADMINISTRATIVE REQUIREMENTS, furnish the following:

1. Environmental Protection Plan: After the contract is awarded and prior to the commencement of the work, the Contractor shall meet with the A/E to discuss the proposed Environmental Protection Plan and to develop mutual understanding relative to details of environmental protection. Not more than 20 days after the meeting, the Contractor shall prepare and submit to the A/E and the Town of Medley Project Manager for approval, a written and/or graphic Environmental Protection Plan including, but not limited to, the following:
 - a. Name(s) of person(s) within the Contractor's organization who is (are) responsible for ensuring adherence to the Environmental Protection Plan.
 - b. Name(s) and qualifications of person(s) responsible for manifesting hazardous waste to be removed from the site.
 - c. Name(s) and qualifications of person(s) responsible for training the Contractor's environmental protection personnel.
 - d. Description of the Contractor's environmental protection personnel training program.
 - e. A list of Federal, State, and local laws, regulations, and permits concerning environmental protection, pollution control, noise control and abatement that are applicable to the Contractor's proposed operations and the requirements imposed by those laws, regulations, and permits.
 - f. Methods for protection of features to be preserved within authorized work areas including trees, shrubs, vines, grasses, ground cover, landscape features, air and water quality, fish and wildlife, soil, historical, and archeological and cultural resources.
 - g. Procedures to provide the environmental protection that comply with the applicable laws and regulations. Describe the procedures to correct pollution of the environment due to accident, natural causes, or failure to follow the procedures as described in the Environmental Protection Plan.
 - h. Permits, licenses, and the location of the solid waste disposal area.
 - i. Drawings showing locations of any proposed temporary excavations or embankments for haul roads, material storage areas, structures, sanitary facilities, and stockpiles of excess or spoil materials. Include as part of an Erosion Control Plan approved by the AHJ.
 - j. Environmental Monitoring Plans for the job site including land, water, air, and noise.

- k. Work Area Plan showing the proposed activity in each portion of the area and identifying the areas of limited use or nonuse. Plan should include measures for marking the limits of use areas. This plan may be incorporated within the Erosion Control Plan.
- B. Approval of the Contractor's Environmental Protection Plan will not relieve the Contractor of responsibility for adequate and continued control of pollutants and other environmental protection measures.

1.5 PROTECTION OF ENVIRONMENTAL RESOURCES

- A. Protect environmental resources within the project boundaries and those affected outside the limits of permanent work during the entire period of this contract. Confine activities to areas defined by the specifications and drawings.
- B. Protection of Land Resources: Prior to construction, identify all land resources to be preserved within the work area. Do not remove, cut, deface, injure, or destroy land resources including trees, shrubs, vines, grasses, top soil, and land forms without permission from the Architect of Record. Do not fasten or attach ropes, cables, or guys to trees for anchorage unless specifically authorized, or where special emergency use is permitted.
 - 1. Work Area Limits: Prior to any construction, mark the areas that require work to be performed under this contract. Mark or fence isolated areas within the general work area that are to be saved and protected. Protect monuments, works of art, and markers before construction operations begin. Convey to all personnel the purpose of marking and protecting all necessary objects.
 - 2. Protection of Landscape: Protect trees, shrubs, vines, grasses, land forms, and other landscape features shown on the drawings to be preserved by marking, fencing, or using any other approved techniques.
 - a. Box and protect from damage existing trees and shrubs to remain on the construction site.
 - b. Immediately repair all damage to existing trees and shrubs by trimming, cleaning, and painting with antiseptic tree paint.
 - c. Do not store building materials or perform construction activities closer to existing trees or shrubs than the farthest extension of their limbs.
 - 3. Reduction of Exposure of Unprotected Erodible Soils: Plan and conduct earthwork to minimize the duration of exposure of unprotected soils. Clear areas in reasonably sized increments only as needed to use. Form earthwork to final grade as shown. Immediately protect side slopes and back slopes upon completion of rough grading.
 - 4. Temporary Protection of Disturbed Areas: Construct diversion ditches, benches, and berms to retard and divert runoff.
 - a. Sediment Basins: Trap sediment from construction areas in temporary or permanent sediment basins that accommodate the runoff of a local 25 year (design year) storm. After each storm, pump the basins dry and remove the accumulated sediment. Control overflow/drainage with paved weirs or by vertical overflow pipes, draining from the surface.
 - b. Reuse or conserve the collected topsoil sediment as directed by the A/E. Topsoil use and requirements are specified in Section 31 20 00, EARTH MOVING.
 - c. Institute effluent quality monitoring programs as required by Federal, State, and local environmental agencies.
 - 5. Erosion and Sedimentation Control Devices: The erosion and sediment controls selected and

- maintained by the Contractor shall be such that water quality standards are not violated as a result of the Contractor's activities. Construct or install all temporary and permanent erosion and sedimentation control features shown. Maintain temporary erosion and sediment control measures such as berms, dikes, drains, sedimentation basins, grassing, and mulching, until permanent drainage and erosion control facilities are completed and operative.
6. Manage borrow areas on site to minimize erosion and to prevent sediment from entering nearby water courses or lakes.
 7. Manage and control spoil areas site to limit spoil to areas shown and prevent erosion of soil or sediment from leaving the site.
 8. Protect adjacent areas from despoilment by temporary excavations and embankments.
 9. Handle and dispose of solid wastes in such a manner that will prevent contamination of the environment. Place solid wastes (excluding clearing debris) in containers that are emptied on a regular schedule. Transport all solid waste off site and dispose of waste in compliance with Federal, State, and local requirements.
 10. Store chemical waste away from the work areas in corrosion resistant containers and dispose of waste in accordance with Federal, State, and local regulations.
 11. Handle discarded materials other than those included in the solid waste category as directed by the Architect of Record.
- C. Protection of Water Resources: Keep construction activities under surveillance, management, and control to avoid pollution of surface and ground waters and sewer systems. Implement management techniques to control water pollution by the listed construction activities that are included in this contract.
1. Washing and Curing Water: Do not allow wastewater directly derived from construction activities to enter water areas. Collect and place wastewater in retention ponds allowing the suspended material to settle, the pollutants to separate, or the water to evaporate.
 2. Monitor water areas affected by construction.
- D. Protection of Air Resources: Keep construction activities under surveillance, management, and control to minimize pollution of air resources. Burning is not permitted on the job site. Keep activities, equipment, processes, and work operated or performed, in strict accordance with the State of Florida and Federal

emission and performance laws and standards. Maintain ambient air quality standards set by the Environmental Protection Agency, for those construction operations and activities specified.

1. Particulates: Control dust particles, aerosols, and gaseous by-products from all construction activities, processing, and preparation of materials at all times, including weekends, holidays, and hours when work is not in progress.
 2. Particulates Control: Maintain all excavations, stockpiles, haul roads, permanent and temporary access roads, plant sites, spoil areas, borrow areas, and all other work areas within or outside the project boundaries free from particulates which would cause a hazard or a nuisance. Sprinklering, chemical treatment of an approved type, light bituminous treatment, baghouse, scrubbers, electrostatic precipitators, or other methods are permitted to control particulates in the work area.
 3. Hydrocarbons and Carbon Monoxide: Control monoxide emissions from equipment to Federal and State allowable limits.
 4. Odors: Control odors of construction activities and prevent obnoxious odors from occurring.
- E. Reduction of Noise: Minimize noise using every action possible. Perform noise-producing work in less sensitive hours of the day or week as directed by the Town of Medley Project Manager. Maintain noise-produced work at or below the decibel levels and within the time periods specified.
1. Perform construction activities involving repetitive, high-level impact noise only between 7:00 a.m. and 6:00 p.m unless otherwise permitted by local ordinance or the Town of Medley Project Manager. Repetitive impact noise on the property shall not exceed the following dB limitations:

Time Duration of Impact Noise	Sound Level in
dB More than 12 minutes in any hour	70
Less than 30 seconds of any hour	85
Less than three minutes of any hour	80
Less than 12 minutes of any hour	75

2. Provide sound-deadening devices on equipment and take noise abatement measures that are necessary to comply with the requirements of this contract, consisting of, but not limited to, the following:
 - a. Maintain maximum permissible construction equipment noise levels at 50 feet

(dBA): EARTHMOVING		MATERIALS	
HANDLING			
FRONT LOADERS	75	CONCRETE MIXERS	75
BACKHOES	75	CONCRETE PUMPS	75
DOZERS	75	CRANES	75
TRACTORS	75	DERRICKS IMPACT	75
SCAPERS	80	PILE DRIVERS	95
GRADERS	75	JACK HAMMERS	75

TRUCKS	75	ROCK DRILLS	80
PAVERS, STATIONARY	80	PNEUMATIC TOOLS	80
PUMPS	75		
GENERATORS	75	SAWS	75
COMPRESSORS	75	VIBRATORS	75

- b. Use shields or other physical barriers to restrict noise transmission.
 - c. Provide soundproof housings or enclosures for noise-producing machinery.
 - d. Use efficient silencers on equipment air intakes.
 - e. Use efficient intake and exhaust mufflers on internal combustion engines that are maintained so equipment performs below noise levels specified.
 - f. Line hoppers and storage bins with sound deadening material.
 - g. Conduct truck loading, unloading, and hauling operations so that noise is kept to a minimum.
3. Measure sound level for noise exposure due to the construction at least once every five successive working days while work is being performed above 55 dB(A) noise level. Measure noise exposure at the property line or 50 feet from the noise source, whichever is greater. Measure the sound levels on the A weighing network of a General Purpose sound level meter at slow response. Submit the recorded information to the A/E noting any problems and the alternatives for mitigating actions.
- F. Restoration of Damaged Property: If any direct or indirect damage is done to public or private property resulting from any act, omission, neglect, or misconduct, the Contractor shall restore the damaged property to a condition equal to that existing before the damage at no additional cost to the Government. Repair, rebuild, or restore property as directed or make good such damage in an acceptable manner.
- G. Final Clean-up: On completion of project and after removal of all debris, rubbish, and temporary construction, Contractor shall leave the construction area in a clean condition satisfactory to the Architect of Record /Town of Medley Project Manager. Cleaning shall include off the site disposal of all items and materials not required to be salvaged, as well as all debris and rubbish resulting from demolition and new work operations.

E N D O F SECTION

SECTION 01 5721 - INDOOR AIR QUALITY CONTROLS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Construction procedures to promote adequate indoor air quality after construction.
- B. Building flush-out after construction and before occupancy.
- C. Testing indoor air quality after completion of construction.

1.2 PROJECT GOALS

- A. See Section 01 3515 - LEED Certification Procedures, for overall project goals relating to environment and energy.
- B. Dust and Airborne Particulates: Prevent deposition of dust and other particulates in HVAC ducts and equipment.
 - 1. Cleaning of ductwork is not contemplated under this Contract.
 - 2. Contractor shall bear the cost of cleaning required due to failure to protect ducts and equipment from construction dust.
- C. Airborne Contaminants: Procedures and products have been specified to minimize indoor air pollutants.
 - 1. Furnish products meeting the specifications.
 - 2. Avoid construction practices that could result in contamination of installed products leading to indoor air pollution.
- D. Ventilation: HVAC system has been designed to achieve the minimum requirements for ventilation specified in ASHRAE 62.1.

1.3 RELATED REQUIREMENTS

- A. Section 01 3515 - LEED Certification Procedures: LEED credits relating to indoor air quality.
- B. Section 01 4000 - Quality Requirements: Testing and inspection services.
- C. Section 01 6116 - Volatile Organic Compound (VOC) Content Restrictions.

1.4 REFERENCE STANDARDS

- A. ASHRAE Std 52.2 - Method of Testing General Ventilation Air-Cleaning Devices for Removal Efficiency by Particle Size; 2007.
- B. ASHRAE Std 62.1 - Ventilation For Acceptable Indoor Air Quality; 2010.

1.5 DEFINITIONS

- A. Adsorptive Materials: Gypsum board, acoustical ceiling tile and panels, carpet and carpet tile, fabrics, fibrous insulation, and other similar products.

- B. Contaminants: Gases, vapors, regulated pollutants, airborne mold and mildew, and the like, as specified.
- C. Particulates: Dust, dirt, and other airborne solid matter.
- D. Wet Work: Concrete, plaster, coatings, and other products that emit water vapor or volatile organic compounds during installation, drying, or curing.

1.6 QUALITY ASSURANCE

- A. Testing and Inspection Agency Qualifications: Independent testing agency having minimum of 5 years experience in performing the types of testing specified.
- B. This Section includes requirements for the development of a Construction Indoor Air Quality Management Plan (IAQ Plan). Develop the IAQ Plan for approval by the Architect of Record. The IAQ Plan shall be implemented throughout the duration of the project construction, and shall be documented as outlined in the Administrative Requirements.
 - 1. The IAQ Plan is part of the LEED BUILDING requirements for the project.
 - 2. The IAQ plan must be approved prior to start of work within the building envelope.
- C. The Construction IAQ Management Plan shall meet the following criteria:
 - 1. Construction activities shall be planned to meet or exceed the minimum requirements of the Sheet Metal and Air Conditioning National Contractors' Association (SMACNA) "IAQ Guidelines for Occupied Buildings under Construction", First Edition, 1995.
 - 2. Absorptive materials shall be protected from moisture damage when stored on-site and after installation.
 - 3. If air handlers are to be used during construction, filtration with a Minimum Efficiency Reporting Value (MERV) of 8 must be at each return air grill, as determined by ASHRAE 52.2-1999.
 - 4. Filtration media shall be replaced immediately prior to occupancy. Filtration media shall have a Minimum Efficiency Reporting Value (MERV) of 13 as determined by ASHRAE 52.2-1999.
 - 5. A "Sequence of Finish Installation Plan" shall be developed, highlighting measures to reduce the absorption of VOCs by materials that act as "sinks".
- D. Further description of the Construction IAQ Management Plan requirements is as follows:
 - 1. SMACNA Guidelines: Chapter 3 of the referenced "IAQ Guidelines for Occupied Buildings Under Construction", outline IAQ measures in five categories as listed below. The Construction IAQ Management Plan shall be organized in accordance with the SMACNA format, and shall address measures to be implemented in each of the five categories (including subsections). All subsections shall be listed in the Plan; items that are not applicable for this project should be listed as such.
 - a. HVAC Protection:
 - 1) Return Side.
 - 2) Central Filtration.
 - 3) Supply Side.
 - 4) Duct Cleaning.
 - b. Source Control:
 - 1) Product Substitution.
 - 2) Modifying Equipment Operation.

- 3) Changing Work Practices.
- 4) Local Exhaust.
- 5) Air Cleaning.
- 6) Cover or Seal.
- c. Pathway Interruption:
 - 1) Depressurize Work Area.
 - 2) Pressurize Occupied Space.
 - 3) Erect Barriers to Contain Construction Areas.
 - 4) Relocate Pollutant Sources.
 - 5) Temporarily Seal the Building.
- d. Housekeeping.
- e. Scheduling:
 - 1) Protect of Materials from Moisture Damage: As part of the “Housekeeping” section of the Construction IAQ Management Plan, measures to prevent installed materials or material stored on-site from moisture damage shall be described. This section should also describe measures to be taken if moisture damage does occur to absorptive materials during the course of construction.
 - 2) Replacement of Filtration Media: Under the “HVAC Protection” section of the Construction IAQ Management Plan, a description of the filtration media in all ventilation equipment shall be provided. The description shall include replacement criteria for filtration media during construction, and confirmation of filtration media replacement for all equipment immediately prior to occupancy.
 - 3) Sequence of Finish Installation for Materials: Where feasible, absorptive materials shall be installed after the installation of materials or finishes which have high short-term emissions of VOC’s, formaldehyde, particulates, or other air-borne compounds. Absorptive materials include, but are not limited to: carpets; acoustical ceiling panels; fabric wall coverings; insulations (exposed to the airstream); upholstered furnishings; and other woven, fibrous or porous materials. Materials with high short-term emissions include, but are not limited to: adhesives, sealants and glazing compounds (specifically those with petrochemical vehicles or carriers); paints, wood preservatives and finishes; control and/or expansion joint fillers; hard finishes requiring adhesive installation; gypsum board (with associated finish processes and products); and composite or engineered wood products with formaldehyde binders.
 - 4) Develop a separate sequencing plan that identifies feasible opportunities to meet the above-stated goals for the project. The plan shall be submitted to the Director’s Representative in accordance with the SUBMITTALS specification section.

- 5) Implementation and Coordination: Implement the Construction IAQ Management Plan, and coordinate the Plan with all affected trades. Include provisions in the Construction IAQ Management Plan for addressing conditions in the field that do not adhere to the Plan, including provisions to implement a stop work order, or to rectify non-compliant conditions.
- 6) Designate one individual as the Construction IAQ Representative, who will be responsible for communicating the progress of the Plan with the A/E on a regular basis, and for assembling the required LEED documentation.

1.07 SUBMITTALS

A. Submit the following records and documents:

1. A copy of the Construction IAQ Management Plan and the Sequence Installation Plan, as defined above.
2. Product cut-sheets for all filtration media used during construction immediately prior to occupancy, with MERV values highlighted. Cut sheets shall be submitted with the Contactor's or Subcontractor's 'approved' stamp as confirmation that the products are the products installed on the project.
3. Provide the A/E with a minimum of 18 photographs comprising of at least six photographs taken on three different occasions during construction. The photographs shall document the implementation of the Construction IAQ Management Plan throughout the course of the project construction. Examples include photographs of ductwork sealing and protection, temporary ventilation measures, and conditions of on-site materials storage (to prevent moisture damage). Photographs shall include integral date stamping, and shall be submitted with brief descriptions of the Construction IAQ Management Plan measure documented, or be referenced to project meeting minutes or similar project documents which reference to the Construction IAQ Management Plan measure documented.

PART 2 PRODUCTS

2.1 MATERIALS

- A. Low VOC Materials: See other sections for specific requirements for materials with low VOC content.
- B. Auxiliary Air Filters: MERV of 8, minimum, when tested in accordance with ASHRAE 52.2.

PART 3 EXECUTION

3.1 CONSTRUCTION PROCEDURES

- A. Prevent the absorption of moisture and humidity by adsorptive materials by:
 1. Sequencing the delivery of such materials so that they are not present in the building until wet work is completed and dry.
 2. Delivery and storage of such materials in fully sealed moisture-impermeable packaging.

3. Provide sufficient ventilation for drying within reasonable time frame.

- B. Begin construction ventilation when building is substantially enclosed.
- C. If extremely dusty or dirty work must be conducted inside the building, shut down HVAC systems for the duration; remove dust and dirt completely before restarting systems.
- D. HVAC equipment and ductwork may NOT be used for ventilation during construction:
 - 1. Provide temporary ventilation equivalent to 1.5 air changes per hour, minimum.
 - 2. Exhaust directly to outside.
 - 3. Seal HVAC air inlets and outlets immediately after duct installation.
- E. Do not store construction materials or waste in mechanical or electrical rooms.
- F. Prior to use of return air ductwork without intake filters clean up and remove dust and debris generated by construction activities.
 - 1. Inspect duct intakes, return air grilles, and terminal units for dust.
 - 2. Clean plenum spaces, including top sides of lay-in ceilings, outsides of ducts, tops of pipes and conduit.
 - 3. Clean tops of doors and frames.
 - 4. Clean mechanical and electrical rooms, including tops of pipes, ducts, and conduit, equipment, and supports.
 - 5. Clean return plenums of air handling units.
 - 6. Remove intake filters last, after cleaning is complete.
- G. Do not perform dusty or dirty work after starting use of return air ducts without intake filters.
- H. Use other relevant recommendations of SMACNA IAQ Guideline for Occupied Buildings Under Construction for avoiding unnecessary contamination due to construction procedures.

3.2 BUILDING FLUSH-OUT

- A. Contractor to perform a full continuous flush-out.
- B. Perform building flush-out before occupancy.
- C. Do not start flush-out until:
 - 1. All construction is complete.
 - 2. HVAC systems have been tested, adjusted, and balanced for proper operation.
 - 3. Inspection of inside of return air ducts and terminal units confirms that cleaning is not necessary.
 - 4. New HVAC filtration media have been installed.
- D. Building Flush-Out: Operate all ventilation systems at normal flow rates with 100 percent outside air until a total air volume of 14,000 cubic feet per square foot of floor area has been supplied.
 - 1. Obtain Owner's concurrence that construction is complete enough before beginning flush-out.
 - 2. Maintain interior temperature of at least 60 degrees F and interior relative humidity no higher than 60 percent.
 - 3. If additional construction involving materials that produce particulates or any of the specified contaminants is conducted during flush-out, start flush-out over.
 - 4. If interior spaces must be occupied prior to completion of the flush-out, supply a minimum

of 25 percent of the total air volume prior to occupancy, and:

- a. Begin ventilation at least three hours prior to daily occupancy.
- b. Continue ventilation during all occupied periods.
- c. Provide minimum outside air volume of 0.30 cfm per square foot or design minimum outside air rate, whichever is greater.

- E. Install new HVAC filtration media after completion of flush-out and before occupancy or further testing.

END OF SECTION

SECTION 01 6000 - PRODUCT REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes administrative and procedural requirements for selection of products for use in Project; product delivery, storage, and handling; manufacturers' standard warranties on products; special warranties; and comparable products.
- B. Related Requirements:
 - 1. Section 01 3000 for Administrative Requirements.
 - 2. Section 01 3323 for Shop Drawing Requirements

1.3 DEFINITIONS

- A. Products: Items obtained for incorporating into the Work, whether purchased for Project or taken from previously purchased stock. The term "product" includes the terms "material," "equipment," "system," and terms of similar intent.
 - 1. Named Products: Items identified by manufacturer's product name, including make or model number or other designation shown or listed in manufacturer's published product literature, that is current as of date of the Contract Documents.
 - 2. New Products: Items that have not previously been incorporated into another project or facility. Products salvaged or recycled from other projects are not considered new products.
 - 3. Comparable Product: Product that is demonstrated and approved through submittal process to have the indicated qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics that equal or exceed those of specified product.
- B. Basis-of-Design Product Specification: A specification in which a specific manufacturer's product is named and accompanied by the words "basis-of-design product," including make or model number or other designation, to establish the significant qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics for purposes of evaluating comparable products of additional manufacturers named in the specification.

1.4 ACTION SUBMITTALS

- A. Comparable Product Requests: Submit request for consideration of each comparable product. Identify product or fabrication or installation method to be replaced. Include Specification Section number and title and Drawing numbers and titles.
 - 1. Include data to indicate compliance with the requirements specified in "Comparable Products" Article.
 - 2. Architect's Action: If necessary, Architect will request additional information or documentation for evaluation within one week of receipt of a comparable product request. Architect will notify Contractor of approval or rejection of proposed comparable product request within **15** days of receipt of request, or **7** days of receipt of additional information or documentation, whichever is later.
 - a. Form of Approval: As specified in Sections 01 3000.
 - b. Use product specified if Architect does not issue a decision on use of a comparable product request within time allocated.
- B. Basis-of-Design Product Specification Submittal: Comply with requirements in Sections 01 3000. Show compliance with requirements.

1.5 QUALITY ASSURANCE

- A. Compatibility of Options: If Contractor is given option of selecting between two or more products for use on Project, select product compatible with products previously selected, even if previously selected products were also options.
 - 1. Each contractor is responsible for providing products and construction methods compatible with products and construction methods of other contractors.
 - 2. If a dispute arises between contractors over concurrently selectable but incompatible products, Architect will determine which products shall be used.

1.6 PRODUCT DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, and handle products using means and methods that will prevent damage, deterioration, and loss, including theft and vandalism. Comply with manufacturer's written instructions.
- B. Delivery and Handling:
 - 1. Schedule delivery to minimize long-term storage at Project site and to prevent overcrowding of construction spaces.
 - 2. Coordinate delivery with installation time to ensure minimum holding time for items that are flammable, hazardous, easily damaged, or sensitive to deterioration, theft, and other losses.

3. Deliver products to Project site in an undamaged condition in manufacturer's original sealed container or other packaging system, complete with labels and instructions for handling, storing, unpacking, protecting, and installing.
4. Inspect products on delivery to determine compliance with the Contract Documents and to determine that products are undamaged and properly protected.

C. Storage:

1. Store products to allow for inspection and measurement of quantity or counting of units.
2. Store materials in a manner that will not endanger Project structure.
3. Store products that are subject to damage by the elements, under cover in a weathertight enclosure above ground, with ventilation adequate to prevent condensation.
4. Protect foam plastic from exposure to sunlight, except to extent necessary for period of installation and concealment.
5. Comply with product manufacturer's written instructions for temperature, humidity, ventilation, and weather-protection requirements for storage.
6. Protect stored products from damage and liquids from freezing.
7. Provide a secure location and enclosure at Project site for storage of materials and equipment by Owner's construction forces. Coordinate location with Owner.

1.7 PRODUCT WARRANTIES

- A. Warranties specified in other Sections shall be in addition to, and run concurrent with, other warranties required by the Contract Documents. Manufacturer's disclaimers and limitations on product warranties do not relieve Contractor of obligations under requirements of the Contract Documents.
1. Manufacturer's Warranty: Written warranty furnished by individual manufacturer for a particular product and specifically endorsed by manufacturer to Owner.
 2. Special Warranty: Written warranty required by the Contract Documents to provide specific rights for Owner.
- B. Special Warranties: Prepare a written document that contains appropriate terms and identification, ready for execution.
1. Manufacturer's Standard Form: Modified to include Project-specific information and properly executed.
 2. Specified Form: When specified forms are included with the Specifications, prepare a written document using indicated form properly executed.
 3. See other Sections for specific content requirements and particular requirements for submitting special warranties.
- C. Submittal Time: Provide within 30 days of Substantial Completion.

PART 2 - PRODUCTS

2.1 PRODUCT SELECTION PROCEDURES

- A. General Product Requirements: Provide products that comply with the Contract Documents, are undamaged and, unless otherwise indicated, are new at time of installation.
1. Provide products complete with accessories, trim, finish, fasteners, and other items needed for a complete installation and indicated use and effect.
 2. Standard Products: If available, and unless custom products or nonstandard options are specified, provide standard products of types that have been produced and used successfully in similar situations on other projects.
 3. Owner reserves the right to limit selection to products with warranties not in conflict with requirements of the Contract Documents.
 4. Where products are accompanied by the term "as selected," Architect will make selection.
 5. Descriptive, performance, and reference standard requirements in the Specifications establish salient characteristics of products.
 6. Or Equal: For products specified by name and accompanied by the term "or equal," or "or approved equal," or "or approved," comply with requirements in "Comparable Products" Article to obtain approval for use of an unnamed product.
- B. Product Selection Procedures:
1. Product: Where Specifications name a single manufacturer and product, provide the named product that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered.
 2. Manufacturer/Source: Where Specifications name a single manufacturer or source, provide a product by the named manufacturer or source that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered.
 3. Products:
 - a. Restricted List: Where Specifications include a list of names of both manufacturers and products, provide one of the products listed that complies with requirements. Comparable products or substitutions for Contractor's convenience will be considered if agreed to by Town of Medley Project Manager.
 - b. Nonrestricted List: Where Specifications include a list of names of both available manufacturers and products, provide one of the products listed, or an unnamed product, that complies with requirements. Comply with requirements in "Comparable Products" Article for consideration of an unnamed product.
 4. Manufacturers:
 - a. Restricted List: Where Specifications include a list of manufacturers' names, provide a product by one of the manufacturers listed that complies with requirements. Comparable products or substitutions for Contractor's convenience will be considered if agreed to by Town of Medley Project Manager.

- b. Nonrestricted List: Where Specifications include a list of available manufacturers, provide a product by one of the manufacturers listed, or a product by an unnamed manufacturer, that complies with requirements. Comply with requirements in "Comparable Products" Article for consideration of an unnamed manufacturer's product.
- 5. Basis-of-Design Product: Where Specifications name a product, or refer to a product indicated on Drawings, and include a list of manufacturers, provide the specified or indicated product or a comparable product by one of the other named manufacturers. Drawings and Specifications indicate sizes, profiles, dimensions, and other characteristics that are based on the product named. Comply with requirements in "Comparable Products" Article for consideration of an unnamed product by one of the other named manufacturers.
- C. Visual Matching Specification: Where Specifications require "match Architect's sample", provide a product that complies with requirements and matches Architect's sample. Architect's decision will be final on whether a proposed product matches.
 - 1. If no product available within specified category matches and complies with other specified requirements, comply with requirements in General Conditions regarding substitutions for proposal of product.
- D. Visual Selection Specification: Where Specifications include the phrase "as selected by Architect from manufacturer's full range" or similar phrase, select a product that complies with requirements. Architect will select color, gloss, pattern, density, or texture from manufacturer's product line that includes both standard and premium items.

2.2 COMPARABLE PRODUCTS

- A. Conditions for Consideration: Architect will consider Contractor's request for comparable product when the following conditions are satisfied. If the following conditions are not satisfied, Architect may return requests without action, except to record noncompliance with these requirements:
 - 1. Evidence that the proposed product does not require revisions to the Contract Documents, that it is consistent with the Contract Documents and will produce the indicated results, and that it is compatible with other portions of the Work.
 - 2. Detailed comparison of significant qualities of proposed product with those named in the Specifications. Significant qualities include attributes such as performance, weight, size, durability, visual effect, and specific features and requirements indicated.
 - 3. Evidence that proposed product provides specified warranty.
 - 4. List of similar installations for completed projects with project names and addresses and names and addresses of architects and owners, if requested.
 - 5. Samples, if requested.

PART 3- EXECUTION (Not Used)

END OF SECTION 016000

PRODUCT REQUIREMENTS
01 6000

PUBLIC SERVICES FACILITY
Town of Medley, Florida

SECTION 01 6116 - VOLATILE ORGANIC COMPOUND (VOC) CONTENT RESTRICTIONS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. VOC restrictions for product categories listed below under "DEFINITIONS."
- B. All products of each category that are installed in the project must comply; Owner's project goals do not allow for partial compliance.

1.2 RELATED REQUIREMENTS

- A. Section 01 3000 - Administrative Requirements: Submittal procedures.
- B. Section 01 3515 - LEED Certification Procedures.
- C. Section 01 4000 - Quality Requirements: Procedures for testing and certifications.
- D. Section 01 5721 - Indoor Air Quality Controls: Procedures and testing; LEED requirements.
- E. Section 01 6000 - Product Requirements: Fundamental product requirements, substitutions and product options, delivery, storage, and handling.

1.3 DEFINITIONS

- A. VOC-Restricted Products: All products of each of the following categories when installed or applied on-site in the building interior:
 - 1. Adhesives, sealants, and sealer coatings.
 - 2. Carpet.
 - 3. Carpet cushion.
 - 4. Carpet tile.
 - 5. Resilient floor coverings.
 - 6. Paints and coatings.
 - 7. Insulation.
 - 8. Gypsum board.
 - 9. Acoustical ceilings and panels.
 - 10. Cabinet work.
 - 11. Wall coverings.
 - 12. Composite wood and agrifiber products used either alone or as part of another product.
 - 13. Other products when specifically stated in the specifications.
- B. Interior of Building: Anywhere inside the exterior weather barrier.
- C. Adhesives: All gunnable, trowelable, liquid-applied, and aerosol adhesives, whether specified or not; including flooring adhesives, resilient base adhesives, and pipe jointing adhesives.
- D. Sealants: All gunnable, trowelable, and liquid-applied joint sealants and sealant primers, whether specified or not; including firestopping sealants and duct joint sealers.

1.4 REFERENCE STANDARDS

- A. CAL (CHPS LEM) - Low-Emitting Materials Product List; California Collaborative for High Performance Schools (CHPS); current edition at www.chps.net/.
- B. CAL (VOC) - Standard Practice for the Testing of Volatile Organic Emissions From Various Sources Using Small-Scale Environmental Chambers (including Addendum 2004-01); State of California Department of Health Services; 2004
- C. CRI (GLCC) - Green Label Testing Program - Approved Product Categories for Carpet Cushion; Carpet and Rug Institute; Current Edition.
- D. CRI (GLP) - Green Label Plus Carpet Testing Program - Approved Products; Carpet and Rug Institute; Current Edition.
- E. GEI (SCH) - GREENGUARD "Children and Schools" Certified Products; GREENGUARD Environmental Institute; current listings at www.greenguard.org.
- F. GreenSeal GS-36 - Commercial Adhesives; Green Seal, Inc.; 2000.
- G. SCAQMD 1168 - South Coast Air Quality Management District Rule No.1168; current edition; www.aqmd.gov.
- H. SCS (CPD) - SCS Certified Products; Scientific Certification Systems; current listings at www.scs-certified.com.

1.5 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Evidence of Compliance: Submit for each different product in each applicable category.
 - 1. Identify evidence submittals with the words "LEED Report".
- C. Product Data: For each VOC-restricted product used in the project, submit product data showing compliance, except when another type of evidence of compliance is required.
- D. Installer Certifications for Accessory Materials: Require each installer of any type of product (not just the products for which VOC restrictions are specified) to certify that either 1) no adhesives, joint sealants, paints, coatings, or composite wood or agrifiber products have been used in the installation of his products, or 2) that such products used comply with these requirements.

1.6 QUALITY ASSURANCE

- A. Testing Agency Qualifications: Independent firm specializing in performing testing and inspections of the type specified in this section.

PART 2 PRODUCTS

2.1 MATERIALS

- A. All VOC-Restricted Products: Provide products having VOC content of types and volume not greater than those specified in State of California Department of Health Services Standard Practice for the Testing of Volatile Organic Emissions From Various Sources Using Small-Scale Environmental Chambers.
 - 1. Evidence of Compliance: Acceptable types of evidence are:
 - a. Current GREENGUARD Children & Schools certification; www.greenguard.org.
 - b. Current Carpet and Rug Institute Green Label Plus certification; www.carpet-rug.org.
 - c. Current SCS Floorscore certification; www.scs-certified.com.
 - d. Current SCS Indoor Advantage Gold certification; www.scs-certified.com.
 - e. Product listing in the CHPS Low-Emitting Materials Product List at www.chps.net/manual/lem_table.htm.
 - f. Current certification by any other agencies acceptable to CHPS.
 - g. Report of laboratory testing performed in accordance with CHPS requirements for getting a product listed in the Low-Emitting Materials Product List; report must include laboratory's statement that the product meets the specified criteria.
 - 2. Product data submittals showing VOC content are NOT acceptable forms of evidence.
- B. Adhesives and Joint Sealants: Provide only products having volatile organic compound (VOC) content not greater than required by South Coast Air Quality Management District Rule No.1168.
 - 1. Evidence of Compliance: Acceptable types of evidence are:
 - a. Report of laboratory testing performed in accordance with requirements.
- C. Aerosol Adhesives: Provide only products having volatile organic compound (VOC) content not greater than required by GreenSeal GS-36.
 - 1. Evidence of Compliance: Acceptable types of evidence are:
 - a. Current GreenSeal Certification.
- D. Paints and Coatings:
 - 1. Provide coatings that comply with the most stringent requirements specified in the following:
 - a. 40 CFR 59, Subpart D--National Volatile Organic Compound Emission Standards for Architectural Coatings.
 - b. USGBC LEED Rating System, edition as stated in Section 01 3515; for interior wall and ceiling finish (all coats), anti-corrosive paints on interior ferrous metal, clear wood stains and finishes, sanding sealers, other sealers, shellac, and floor coatings.
 - 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.
 - 3. Evidence of Compliance: Acceptable types of evidence are:
 - a. Report of laboratory testing performed in accordance with requirements.
 - b. Published product data showing compliance with requirements.
 - c. Certification by manufacturer that product complies with requirements.

- E. Carpet Tile and Adhesive: Provide products having VOC content not greater than that required for CRI Green Label Plus certification.
 - 1. Evidence of Compliance: Acceptable types of evidence are:
 - a. Current Green Label Plus Certification.
 - b. Report of laboratory testing performed in accordance with requirements.
- F. Carpet Tile and Adhesive: Provide products having VOC content as specified in Section 09 6813.
- G. Composite Wood and Agrifiber Products and Adhesives Used for Laminating Them: Provide products having no added urea-formaldehyde resins.
 - 1. Evidence of Compliance: Acceptable types of evidence are:
 - a. Current SCS "No Added Urea Formaldehyde" certification; www.scscertified.com.
 - b. Published product data showing compliance with requirements.
 - c. Certification by manufacturer that product complies with requirements.
- H. Other Product Categories: Comply with limitations specified elsewhere.

PART 3 EXECUTION

3.1 FIELD QUALITY CONTROL

- A. Owner reserves the right to reject non-compliant products, whether installed or not, and require their removal and replacement with compliant products at no extra cost to Owner.
- B. All additional costs to restore indoor air quality due to installation of non-compliant products will be borne by Contractor.

END OF SECTION

SECTION 01 7123 - FIELD ENGINEERING

PART 1 GENERAL

1.01 RELATED WORK SPECIFIED ELSEWHERE

- A. Project Record Drawings: Section 01 7716.

1.02 QUALITY ASSURANCE

- A. Employ an independent Land Surveyor, licensed to practice in the State of Florida, for the duration of the Work, to certify the accuracy of the survey work.
 - 1. The word "independent" as used above means a person not in the regular employment of the Contractor or having any vested interest in the Contractor's business.

1.03 SUBMITTALS

- A. Submit the name, address, telephone number, and registration number of the Land Surveyor before starting the survey work.
- B. On request, submit documentation verifying accuracy of survey work.
- C. Upon completion of the Work, submit a certificate signed and sealed by the Land Surveyor, stating that the elevations and locations of the Work are in conformance with the Contract Documents.

1.04 PROJECT RECORD DOCUMENTS

- A. Maintain a complete and accurate log of control and survey work as it progresses.
- B. Record location data for control points in sketch form and turn over 6 copies of sketches and computations to the A/E.
- C. Submit Record Documents under provisions of Section 01 7716.

1.05 TOOLS, EQUIPMENT, AND MATERIALS

- A. Furnish all tools, equipment, and materials required to perform the work of this Section.
- B. Permanent Survey Markers: Conform to Federal Highway Administration Project Development and Design Manual Section 5A.3.1 specifications for control surveys.

1.06 EXAMINATION

- A. Verify locations of control points prior to starting work.

- B. Promptly notify A/E of any discrepancies discovered.

1.07 CONTROL POINTS

- A. Control datum for survey is indicated on the Drawings.
- B. Protect control points prior to starting site work; preserve control points during construction.
- C. Promptly report to A/E and Town of Miami Garden's Project Manager the loss or destruction of any control point or relocation required because of changes in grades or other reasons.
- D. Replace dislocated control points based on original survey control. Make no changes without prior written notice to the Town of Miami Garden's Project Manager.

1.08 ESTABLISHING CONTROL POINTS

- A. Prior to clearing or earthwork operations, install permanent survey markers at the coordinate locations shown on the drawings. Establish and record the exact coordinates of these markers to within one one-hundredth of a foot horizontally.
- B. Reference coordinates and elevations to the horizontal and vertical datum provided for this contract.
- C. Locate each permanent survey marker from at least 3 points of permanent reference.

1.09 SURVEY REQUIREMENTS

- A. Utilize recognized engineering survey practices.
- B. Establish a minimum of two permanent survey markers to be used as bench marks for vertical control on the Site where indicated on the Drawings and referenced to established control points. Record locations, with horizontal and vertical data to within one one-hundredth of a foot, on Project Record Documents.
- C. Establish elevations, lines and levels. Locate and lay out by instrumentation and similar appropriate means:
 - 1. Site improvements including pavements; stakes for grading, fill and topsoil placement; utility locations, slopes, and invert elevations.
 - 2. Grid or axis for structures.
 - 3. Building foundation, column locations, ground floor elevations.
- D. Verify disturbed layouts by same means.

1.10 FIELD ENGINEERING FOR GENERAL EARTHWORK

- A. Provide not less than one stake for each 2,500 square feet where rough and finished grades are flatter than one foot of rise per 10 feet of run.
- B. Provide not less than one stake for each 2,000 square feet where rough and finished grades are greater than one foot of rise per 10 feet of run but less than one foot of rise per 4 feet of run.
- C. Provide not less than one stake for each 1,000 square feet where rough and finished grades are greater than one foot of rise per 4 feet of run.
- D. Provide stakes spaced not more than 50 feet apart along centerline of ditches and swales. Provide additional stakes at right angles to centerline, and opposite each centerline stake, to mark bottom and top of slopes.
- E. Mark each stake with the correct finished grade elevation and the appropriate cut or fill at that stake.

1.11 FIELD ENGINEERING FOR DRAINAGE STRUCTURES, AND PIPES

- A. Drainage Structures: Provide stakes marked with inverts. Also mark structure number if indicated on Drawings.
- B. Pipes: Provide stakes at each end marked with inverts.

1.12 FIELD ENGINEERING FOR ROADWAYS AND PAVING WORK

- A. Place two offset stakes at each centerline station (50 foot intervals) and at tangent points, radius points, abrupt changes in grade, super-elevation, and other locations necessary to maintain layout and grade control.
- B. Mark each stake with the correct centerline station number, description, offset and cut or fill.
- C. Restore faded or illegible markings.
- D. Provide pins and hubs directly adjacent to the Work at a spacing of 25 feet. Mark pins and affix string lines to provide adequate horizontal and vertical control for paving work.
- E. Immediately following placement of the final paving course and prior to project closeout, re-establish and mark the location of all centerline stations with masonry nails at least 2 inches long. Drive nail heads flush with the pavement surface.
- F. For points of curve and tangent points provide identifying markings at the outside edge of each lane.

PART 2 PRODUCTS (Not Used)

PART 3 EXECUTION (Not Used)

END OF SECTION

SECTION 01 7300 - EXECUTION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes general administrative and procedural requirements governing execution of the Work including, but not limited to, the following:
 - 1. Construction layout.
 - 2. Field engineering and surveying.
 - 3. Installation of the Work.
 - 4. Cutting and patching.
 - 5. Coordination of Owner-installed products.
 - 6. Progress cleaning.
 - 7. Starting and adjusting.
 - 8. Protection of installed construction.
 - 9. Correction of the Work.
- B. Related Requirements:
 - 1. Section 01 3000 "Administrative Requirements"
 - 2. Section 01 7800 "Closeout Procedures"
 - 3. Section 07 8400 "Firestopping"

1.3 DEFINITIONS

- A. Cutting: Removal of in-place construction necessary to permit installation or performance of other work.
- B. Patching: Fitting and repair work required to restore construction to original conditions after installation of other work.

1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For land surveyor and/or professional engineer.
- B. Certificates: Submit certificate signed by land surveyor and/or professional engineer certifying that location and elevation of improvements comply with requirements.

- C. Cutting and Patching Plan: Submit plan describing procedures at least **10** days prior to the time cutting and patching will be performed. Include the following information:
1. Extent: Describe reason for and extent of each occurrence of cutting and patching.
 2. Changes to In-Place Construction: Describe anticipated results. Include changes to structural elements and operating components as well as changes in building appearance and other significant visual elements.
 3. Products: List products to be used for patching and firms or entities that will perform patching work.
 4. Dates: Indicate when cutting and patching will be performed.
 5. Utilities and Mechanical and Electrical Systems: List services and systems that cutting and patching procedures will disturb or affect. List services and systems that will be relocated and those that will be temporarily out of service. Indicate length of time permanent services and systems will be disrupted.
 - a. Include description of provisions for temporary services and systems during interruption of permanent services and systems.
- D. Landfill Receipts: Submit copy of receipts issued by a landfill facility, licensed to accept hazardous materials, for hazardous waste disposal.
- E. Certified Surveys: Submit **two** copies signed by land surveyor and/or professional engineer.
- F. Final Property Survey: Submit **10** copies showing the Work performed and record survey data.

1.5 QUALITY ASSURANCE

- A. Land Surveyor Qualifications: A professional land surveyor who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing land-surveying services of the kind indicated.
- B. Cutting and Patching: Comply with requirements for and limitations on cutting and patching of construction elements.
1. Structural Elements: When cutting and patching structural elements, notify Architect of locations and details of cutting and await directions from Architect before proceeding. Shore, brace, and support structural elements during cutting and patching. Do not cut and patch structural elements in a manner that could change their load-carrying capacity or increase deflection
 2. Operational Elements: Do not cut and patch operating elements and related components in a manner that results in reducing their capacity to perform as intended or that results in increased maintenance or decreased operational life or safety. Operational elements include the following:
 - a. Primary operational systems and equipment.
 - b. Fire separation assemblies.
 - c. Air or smoke barriers.

- d. Fire-suppression systems.
 - e. Mechanical systems piping and ducts.
 - f. Control systems.
 - g. Communication systems.
 - h. Fire-detection and -alarm systems.
 - i. Conveying systems.
 - j. Electrical wiring systems.
 - k. Operating systems of special construction.
3. Other Construction Elements: Do not cut and patch other construction elements or components in a manner that could change their load-carrying capacity, that results in reducing their capacity to perform as intended, or that results in increased maintenance or decreased operational life or safety. Other construction elements include but are not limited to the following:
- a. Water, moisture, or vapor barriers.
 - b. Membranes and flashings.
 - c. Exterior curtain-wall construction.
 - d. Sprayed fire-resistive material.
 - e. Equipment supports.
 - f. Piping, ductwork, vessels, and equipment.
 - g. Noise- and vibration-control elements and systems.
4. Visual Elements: Do not cut and patch construction in a manner that results in visual evidence of cutting and patching. Do not cut and patch exposed construction in a manner that would, in Architect's opinion, reduce the building's aesthetic qualities. Remove and replace construction that has been cut and patched in a visually unsatisfactory manner.
- C. Cutting and Patching Conference: Before proceeding, meet at Project site with parties involved in cutting and patching, including mechanical and electrical trades. Review areas of potential interference and conflict. Coordinate procedures and resolve potential conflicts before proceeding.
- D. Manufacturer's Installation Instructions: Obtain and maintain on-site manufacturer's written recommendations and instructions for installation of products and equipment.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. General: Comply with requirements specified in other Sections.
 - 1. Use products for patching that comply with requirements in Section 018113 "Sustainable Design Requirements"

- B. In-Place Materials: Use materials for patching identical to in-place materials. For exposed surfaces, use materials that visually match in-place adjacent surfaces to the fullest extent possible.
 - 1. If identical materials are unavailable or cannot be used, use materials that, when installed, will provide a match acceptable to Architect for the visual and functional performance of in-place materials.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Existing Conditions: The existence and location of underground and other utilities and construction indicated as existing are not guaranteed. Before beginning sitework, investigate and verify the existence and location of underground utilities and other construction affecting the Work.
 - 1. Before construction, verify the location and invert elevation at points of connection of sanitary sewer, storm sewer, and water-service piping; underground electrical services, and other utilities.
 - 2. Furnish location data for work related to Project that must be performed by public utilities serving Project site.
- B. Examination and Acceptance of Conditions: Before proceeding with each component of the Work, examine substrates, areas, and conditions, with Installer or Applicator present where indicated, for compliance with requirements for installation tolerances and other conditions affecting performance. Record observations.
 - 1. Examine roughing-in for mechanical and electrical systems to verify actual locations of connections before equipment and fixture installation.
 - 2. Examine walls, floors, and roofs for suitable conditions where products and systems are to be installed.
 - 3. Verify compatibility with and suitability of substrates, including compatibility with existing finishes or primers.
- C. Written Report: Where a written report listing conditions detrimental to performance of the Work is required by other Sections, include the following:
 - 1. Description of the Work.
 - 2. List of detrimental conditions, including substrates.
 - 3. List of unacceptable installation tolerances.
 - 4. Recommended corrections.
- D. Proceed with installation only after unsatisfactory conditions have been corrected. Proceeding with the Work indicates acceptance of surfaces and conditions.

3.2 PREPARATION

- A. Existing Utility Information: Furnish information to local utility and Owner that is necessary to adjust, move, or relocate existing utility structures, utility poles, lines, services, or other utility appurtenances located in or affected by construction. Coordinate with authorities having jurisdiction.
- B. Field Measurements: Take field measurements as required to fit the Work properly. Recheck measurements before installing each product. Where portions of the Work are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication. Coordinate fabrication schedule with construction progress to avoid delaying the Work.
- C. Space Requirements: Verify space requirements and dimensions of items shown diagrammatically on Drawings.
- D. Review of Contract Documents and Field Conditions: Immediately on discovery of the need for clarification of the Contract Documents caused by differing field conditions outside the control of Contractor, submit a request for information to Architect according to requirements in Section 013100 "Project Management and Coordination."

3.3 CONSTRUCTION LAYOUT

- A. Verification: Before proceeding to lay out the Work, verify layout information shown on Drawings, in relation to the property survey and existing benchmarks. If discrepancies are discovered, notify Architect/Engineer promptly.
- B. General: Engage a land surveyor and/or professional engineer to lay out the Work using accepted surveying practices.
 - 1. Establish benchmarks and control points to set lines and levels at each story of construction and elsewhere as needed to locate each element of Project.
 - 2. Establish limits on use of Project site.
 - 3. Establish dimensions within tolerances indicated. Do not scale Drawings to obtain required dimensions.
 - 4. Inform installers of lines and levels to which they must comply.
 - 5. Check the location, level and plumb, of every major element as the Work progresses.
 - 6. Notify Architect/Engineer when deviations from required lines and levels exceed allowable tolerances.
 - 7. Close site surveys with an error of closure equal to or less than the standard established by authorities having jurisdiction.
- C. Site Improvements: Locate and lay out site improvements, including pavements, grading, fill and topsoil placement, utility slopes, and rim and invert elevations.
- D. Building Lines and Levels: Locate and lay out control lines and levels for structures, building foundations, column grids, and floor levels, including those required for mechanical and

electrical work. Transfer survey markings and elevations for use with control lines and levels. Level foundations and piers from two or more locations.

- E. Record Log: Maintain a log of layout control work. Record deviations from required lines and levels. Include beginning and ending dates and times of surveys, weather conditions, name and duty of each survey party member, and types of instruments and tapes used. Make the log available for reference by Architect/Engineer.

3.4 FIELD ENGINEERING

- A. Identification: Owner will identify existing benchmarks, control points, and property corners.
- B. Reference Points: Locate existing permanent benchmarks, control points, and similar reference points before beginning the Work. Preserve and protect permanent benchmarks and control points during construction operations.
 - 1. Do not change or relocate existing benchmarks or control points without prior written approval of Architect/Engineer. Report lost or destroyed permanent benchmarks or control points promptly. Report the need to relocate permanent benchmarks or control points to Architect/Engineer before proceeding.
 - 2. Replace lost or destroyed permanent benchmarks and control points promptly. Base replacements on the original survey control points.
- C. Benchmarks: Establish and maintain a minimum of **two** permanent benchmarks on Project site, referenced to data established by survey control points (or a minimum as required elsewhere in the documents). Comply with authorities having jurisdiction for type and size of benchmark.
 - 1. Record benchmark locations, with horizontal and vertical data, on Project Record Documents.
 - 2. Where the actual location or elevation of layout points cannot be marked, provide temporary reference points sufficient to locate the Work.
 - 3. Remove temporary reference points when no longer needed. Restore marked construction to its original condition.
- D. Certified Survey: On completion of foundation walls, major site improvements, and other work requiring field-engineering services, prepare a certified survey showing dimensions, locations, angles, and elevations of construction and sitework.
- E. Final Property Survey: Engage a land surveyor and/or professional engineer to prepare a final property survey showing significant features (real property) for Project. Include on the survey a certification, signed land surveyor and/or professional engineer, that principal metes, bounds, lines, and levels of Project are accurately positioned as shown on the survey.
 - 1. Show boundary lines, monuments, streets, site improvements and utilities, existing improvements and significant vegetation, adjoining properties, acreage, grade contours, and the distance and bearing from a site corner to a legal point.
 - 2. Recording: At Substantial Completion, have the final property survey recorded by or with authorities having jurisdiction as the official "property survey."

3.5 INSTALLATION

- A. General: Locate the Work and components of the Work accurately, in correct alignment and elevation, as indicated.
 - 1. Make vertical work plumb and make horizontal work level.
 - 2. Where space is limited, install components to maximize space available for maintenance and ease of removal for replacement.
 - 3. Conceal pipes, ducts, and wiring in finished areas unless otherwise indicated.
 - 4. Maintain minimum headroom clearance of **96 inches** in occupied spaces and **90 inches** in unoccupied spaces.
- B. Comply with manufacturer's written instructions and recommendations for installing products in applications indicated.
- C. Install products at the time and under conditions that will ensure the best possible results. Maintain conditions required for product performance until Substantial Completion.
- D. Conduct construction operations so no part of the Work is subjected to damaging operations or loading in excess of that expected during normal conditions of occupancy.
- E. Sequence the Work and allow adequate clearances to accommodate movement of construction items on site and placement in permanent locations.
- F. Tools and Equipment: Do not use tools or equipment that produce harmful noise levels.
- G. Templates: Obtain and distribute to the parties involved templates for work specified to be factory prepared and field installed. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing products to comply with indicated requirements.
- H. Attachment: Provide blocking and attachment plates and anchors and fasteners of adequate size and number to securely anchor each component in place, accurately located and aligned with other portions of the Work. Where size and type of attachments are not indicated, verify size and type required for load conditions.
 - 1. Mounting Heights: Where mounting heights are not indicated, mount components at heights directed by Architect.
 - 2. Allow for building movement, including thermal expansion and contraction.
 - 3. Coordinate installation of anchorages. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.
- I. Joints: Make joints of uniform width. Where joint locations in exposed work are not indicated, arrange joints for the best visual effect. Fit exposed connections together to form hairline joints.
- J. Hazardous Materials: Use products, cleaners, and installation materials that are not considered hazardous.

3.6 CUTTING AND PATCHING

- A. Cutting and Patching, General: Employ skilled workers to perform cutting and patching. Proceed with cutting and patching at the earliest feasible time, and complete without delay.
 - 1. Cut in-place construction to provide for installation of other components or performance of other construction, and subsequently patch as required to restore surfaces to their original condition.
- B. Existing Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during installation or cutting and patching operations, by methods and with materials so as not to void existing warranties.
- C. Temporary Support: Provide temporary support of work to be cut.
- D. Protection: Protect in-place construction during cutting and patching to prevent damage. Provide protection from adverse weather conditions for portions of Project that might be exposed during cutting and patching operations.
- E. Adjacent Occupied Areas: Where interference with use of adjoining areas or interruption of free passage to adjoining areas is unavoidable, coordinate cutting and patching according to requirements in Section 011000 "Summary."
- F. Existing Utility Services and Mechanical/Electrical Systems: Where existing services/systems are required to be removed, relocated, or abandoned, bypass such services/systems before cutting to prevent interruption to occupied areas.
- G. Cutting: Cut in-place construction by sawing, drilling, breaking, chipping, grinding, and similar operations, including excavation, using methods least likely to damage elements retained or adjoining construction. If possible, review proposed procedures with original Installer; comply with original Installer's written recommendations.
 - 1. In general, use hand or small power tools designed for sawing and grinding, not hammering and chopping. Cut holes and slots neatly to minimum size required, and with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use.
 - 2. Finished Surfaces: Cut or drill from the exposed or finished side into concealed surfaces.
 - 3. Concrete and Masonry: Cut using a cutting machine, such as an abrasive saw or a diamond-core drill.
 - 4. Excavating and Backfilling: Comply with requirements in applicable Sections where required by cutting and patching operations.
 - 5. Mechanical and Electrical Services: Cut off pipe or conduit in walls or partitions to be removed. Cap, valve, or plug and seal remaining portion of pipe or conduit to prevent entrance of moisture or other foreign matter after cutting.
 - 6. Proceed with patching after construction operations requiring cutting are complete.
- H. Patching: Patch construction by filling, repairing, refinishing, closing up, and similar operations following performance of other work. Patch with durable seams that are as invisible as practicable. Provide materials and comply with installation requirements specified in other Sections, where applicable.

1. Inspection: Where feasible, test and inspect patched areas after completion to demonstrate physical integrity of installation.
 2. Exposed Finishes: Restore exposed finishes of patched areas and extend finish restoration into retained adjoining construction in a manner that will minimize evidence of patching and refinishing.
 - a. Clean piping, conduit, and similar features before applying paint or other finishing materials.
 - b. Restore damaged pipe covering to its original condition.
 3. Floors and Walls: Where walls or partitions that are removed extend one finished area into another, patch and repair floor and wall surfaces in the new space. Provide an even surface of uniform finish, color, texture, and appearance. Remove in-place floor and wall coverings and replace with new materials, if necessary, to achieve uniform color and appearance.
 - a. Where patching occurs in a painted surface, prepare substrate and apply primer and intermediate paint coats appropriate for substrate over the patch, and apply final paint coat over entire unbroken surface containing the patch. Provide additional coats until patch blends with adjacent surfaces.
 4. Ceilings: Patch, repair, or rehang in-place ceilings as necessary to provide an even-plane surface of uniform appearance.
 5. Exterior Building Enclosure: Patch components in a manner that restores enclosure to a weathertight condition and ensures thermal and moisture integrity of building enclosure.
- I. Cleaning: Clean areas and spaces where cutting and patching are performed. Remove paint, mortar, oils, putty, and similar materials from adjacent finished surfaces.

3.7 OWNER-INSTALLED PRODUCTS

- A. Site Access: Provide access to Project site for Owner's construction personnel.
- B. Coordination: Coordinate construction and operations of the Work with work performed by Owner's construction personnel.
 1. Construction Schedule: Inform Owner of Contractor's preferred construction schedule for Owner's portion of the Work. Adjust construction schedule based on a mutually agreeable timetable. Notify Owner if changes to schedule are required due to differences in actual construction progress.
 2. Preinstallation Conferences: Include Owner's construction personnel at preinstallation conferences covering portions of the Work that are to receive Owner's work. Attend preinstallation conferences conducted by Owner's construction personnel if portions of the Work depend on Owner's construction.

3.8 PROGRESS CLEANING

- A. General: Clean Project site and work areas daily, including common areas. Enforce requirements strictly. Dispose of materials lawfully.
 - 1. Comply with requirements in NFPA 241 for removal of combustible waste materials and debris.
 - 2. Do not hold waste materials more than seven days during normal weather or three days if the temperature is expected to rise above 80 deg F (27 deg C).
 - 3. Containerize hazardous and unsanitary waste materials separately from other waste. Mark containers appropriately and dispose of legally, according to regulations.
 - a. Use containers intended for holding waste materials of type to be stored.
 - 4. Coordinate progress cleaning for joint-use areas where Contractor and other contractors are working concurrently.
- B. Site: Maintain Project site free of waste materials and debris.
- C. Work Areas: Clean areas where work is in progress to the level of cleanliness necessary for proper execution of the Work.
 - 1. Remove liquid spills promptly.
 - 2. Where dust would impair proper execution of the Work, broom-clean or vacuum the entire work area, as appropriate.
- D. Installed Work: Keep installed work clean. Clean installed surfaces according to written instructions of manufacturer or fabricator of product installed, using only cleaning materials specifically recommended. If specific cleaning materials are not recommended, use cleaning materials that are not hazardous to health or property and that will not damage exposed surfaces.
- E. Concealed Spaces: Remove debris from concealed spaces before enclosing the space.
- F. Exposed Surfaces in Finished Areas: Clean exposed surfaces and protect as necessary to ensure freedom from damage and deterioration at time of Substantial Completion.
- G. Waste Disposal: Do not bury or burn waste materials on-site. Do not wash waste materials down sewers or into waterways. Comply with waste disposal requirements in **Section 01 5719 "Temporary Environmental Controls." Section 01 7419 "Construction Waste Management "**
- H. During handling and installation, clean and protect construction in progress and adjoining materials already in place. Apply protective covering where required to ensure protection from damage or deterioration at Substantial Completion.
- I. Clean and provide maintenance on completed construction as frequently as necessary through the remainder of the construction period. Adjust and lubricate operable components to ensure operability without damaging effects.

- J. Limiting Exposures: Supervise construction operations to assure that no part of the construction, completed or in progress, is subject to harmful, dangerous, damaging, or otherwise deleterious exposure during the construction period.

3.9 STARTING AND ADJUSTING

- A. Coordinate startup and adjusting of equipment and operating components with requirements in Section 019113 "General Commissioning Requirements."
- B. Start equipment and operating components to confirm proper operation. Remove malfunctioning units, replace with new units, and retest.
- C. Adjust equipment for proper operation. Adjust operating components for proper operation without binding.
- D. Test each piece of equipment to verify proper operation. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
- E. Manufacturer's Field Service: Comply with qualification requirements in Section 014000 "Quality Requirements."

3.10 PROTECTION OF INSTALLED CONSTRUCTION

- A. Provide final protection and maintain conditions that ensure installed Work is without damage or deterioration at time of Substantial Completion.
- B. Comply with manufacturer's written instructions for temperature and relative humidity.

END OF SECTION 01 7300

SECTION 01 7419 - CONSTRUCTION WASTE MANAGEMENT

PART 1 – GENERAL

1.1 DESCRIPTION

- A. This section specifies the requirements for the management of non-hazardous building construction and demolition waste.
- B. Waste disposal in landfills shall be minimized to the greatest extent possible. Of the inevitable waste that is generated, as much of the waste material as economically feasible shall be salvaged, recycled or reused. The project goal is to achieve 95% recycled or salvaged debris as per MR Credit 2 Construction Waste Management as described in the USGBC LEED Reference Guide for Green Building Design and Construction, 2009 Edition.
- C. Contractor shall use all reasonable means to divert construction waste from landfills and incinerators, and facilitate their salvage and recycle not limited to the following:
 - 1. Waste Management Plan development and implementation.
 - 2. Techniques to minimize waste generation.
 - 3. Sorting and separating of waste materials.
 - 4. Salvage of existing materials and items for reuse or resale.
 - 5. Recycling of materials that cannot be reused or sold.
- D. At a minimum the following waste categories shall be diverted from landfills:
 - 1. Soil
 - 2. Inerts (eg, concrete, masonry and asphalt)
 - 3. Clean dimensional wood and palette wood
 - 4. Green waste (biodegradable landscaping materials)
 - 5. Engineered wood products (plywood, particle board and I-joists, etc)
 - 6. Metal products (eg, steel, wire, beverage containers, copper, etc)
 - 7. Cardboard, paper and packaging
 - 8. Bitumen roofing materials
 - 9. Plastics (eg, ABS, PVC)
 - 10. Carpet and/or pad
 - 11. Gypsum board
 - 12. Insulation
 - 13. Paint
 - 14. Fluorescent lamps

1.2 RELATED WORK

- A. Section 01 00 00, GENERAL REQUIREMENTS.
- B. Section 01 81 11, SUSTAINABLE DESIGN REQUIREMENTS.
- C. Section 01 3514 LEED CREDIT SUMMARY
- D. Section 01 3514.01 LEED NC 2009 CREDIT SUMMARY
- E. Section 01 3515 LEED CERTIFICATION PROCEDURES
- F. Section 01 3516 LEED SUBMITTAL FORMS
- G. Section 01 3516.01 LEED MATERIAL COST SUMMARY FORM H.
- Section 01 3516.02 LEED WOOD-CONTAINING PRODUCT LIST I.
- Section 01 3516.03 LEED METAL-CONTAINING PRODUCT LIST
- J. Section 01 3516.04 LEED MATERIAL CONTENT FORM
- K. Section 01 3516.05 LEED NEW PRODUCT SOURCE FORM
- L. Section 01 3516.06 LEED REUSED PRODUCT FORM
- M. Section 01 3516.07 LEED PROHIBITED CONTENT INSTALLER CERTIFICATION
- N. Section 01 9113 FUNDAMENTAL AND ENHANCED COMMISSIONING
- O. Section 01 3000 ADMINISTRATIVE REQUIREMENTS

1.3 QUALITY ASSURANCE

- A. Contractor shall practice efficient waste management when sizing, cutting and installing building products. Processes shall be employed to ensure the generation of as little waste as possible.
Construction and demolition waste includes products of the following:
 - 1. Excess or unusable construction materials.
 - 2. Packaging used for construction products.
 - 3. Poor planning and/or layout.
 - 4. Construction error.
 - 5. Over ordering.
 - 6. Weather damage.
 - 7. Contamination.
 - 8. Mishandling.
 - 9. Breakage.
- B. Establish and maintain the management of non-hazardous building construction and demolition waste set forth herein. Conduct a site assessment to estimate the types of materials that will be generated by demolition and construction.

- C. Contractor shall develop and implement procedures to reuse and recycle new materials to 95 percent, but a minimum of 75 percent.
- D. Contractor shall be responsible for implementation of any special programs involving rebates or similar incentives related to recycling. Any revenues or savings obtained from salvage or recycling shall accrue to the contractor.
- E. Contractor shall provide records and documentation of all demolition, removal and legal disposal of materials. Contractor shall ensure that facilities used for recycling, reuse and disposal shall be permitted for the intended use to the extent required by local, state, federal regulations. The Whole Building Design Guide website <http://www.wbdg.org> provides a Construction Waste Management Database that contains information on companies that haul, collect, and process recyclable debris from construction projects.
- F. Contractor shall assign a specific area to facilitate separation of materials for reuse, salvage, recycling, and return. Such areas are to be kept neat and clean and clearly marked in order to avoid contamination or mixing of materials.
- G. Contractor shall provide on-site instructions and supervision of separation, handling, salvaging, recycling, reuse and return methods to be used by all parties during waste generating stages.
- H. Record on daily reports any problems in complying with laws, regulations and ordinances with corrective action taken.

1.4 TERMINOLOGY

- A. Class III Landfill: A landfill that accepts non-hazardous resources such as household, commercial and industrial waste resulting from construction, remodeling, repair and demolition operations.
- B. Clean: Untreated and unpainted; uncontaminated with adhesives, oils, solvents, mastics and like products.
- C. Construction and Demolition Waste: Includes all non-hazardous resources resulting from construction, remodeling, alterations, repair and demolition operations.
- D. Dismantle: The process of parting out a building in such a way as to preserve the usefulness of its materials and components.
- E. Disposal: Acceptance of solid wastes at a legally operating facility for the purpose of land filling (includes Class III landfills and inert fills).
- F. Inert Backfill Site: A location, other than inert fill or other disposal facility, to which inert materials are taken for the purpose of filling an excavation, shoring or other soil engineering operation.

- G. Inert Fill: A facility that can legally accept inert waste, such as asphalt and concrete exclusively for the purpose of disposal.
- H. Inert Solids/Inert Waste: Non-liquid solid resources including, but not limited to, soil and concrete that does not contain hazardous waste or soluble pollutants at concentrations in excess of water-quality objectives established by a regional water board, and does not contain significant quantities of decomposable solid resources.
- I. Mixed Debris: Loads that include commingled recyclable and non-recyclable materials generated at the construction site.
- J. Mixed Debris Recycling Facility: A solid resource processing facility that accepts loads of mixed construction and demolition debris for the purpose of recovering re-usable and recyclable materials and disposing non-recyclable materials.
- K. Permitted Waste Hauler: A company that holds a valid permit to collect and transport solid wastes from individuals or businesses for the purpose of recycling or disposal.
- L. Recycling: The process of sorting, cleansing, treating, and reconstituting materials for the purpose of using the altered form in the manufacture of a new product. Recycling does not include burning, incinerating or thermally destroying solid waste.
 - 1. On-site Recycling – Materials that are sorted and processed on site for use in an altered state in the work, i.e. concrete crushed for use as a sub-base in paving.
 - 2. Off-site Recycling – Materials hauled to a location and used in an altered form in the manufacture of new products.
- M. Recycling Facility: An operation that can legally accept materials for the purpose of processing the materials into an altered form for the manufacture of new products. Depending on the types of materials accepted and operating procedures, a recycling facility may or may not be required to have a solid waste facilities permit or be regulated by the local enforcement agency.
- N. Reuse: Materials that are recovered for use in the same form, on-site or off-site.
- O. Return: To give back reusable items or unused products to vendors for credit.
- P. Salvage: To remove waste materials from the site for resale or re-use by a third party.
- Q. Source-Separated Materials: Materials that are sorted by type at the site for the purpose of reuse and recycling.
- R. Solid Waste: Materials that have been designated as non-recyclable and are discarded for the purposes of disposal.

- S. Transfer Station: A facility that can legally accept solid waste for the purpose of temporarily storing the materials for re-loading onto other trucks and transporting them to a landfill for disposal, or recovering some materials for re-use or recycling.

1.5 SUBMITTALS

- A. In accordance with Section 01 3000, ADMINISTRATIVE REQUIREMENTS, furnish the following:
- B. Prepare and submit to the A/E a written demolition debris management plan. The plan shall include, but not be limited to, the following information:
 - 1. Procedures to be used for debris management.
 - 2. Techniques to be used to minimize waste generation.
 - 3. Analysis of the estimated job site waste to be generated:
 - a. List of each material and quantity to be salvaged, reused, recycled.
 - b. List of each material and quantity proposed to be taken to a landfill.
 - 4. Detailed description of the Means/Methods to be used for material handling.
 - a. On site: Material separation, storage, protection where applicable.
 - b. Off site: Transportation means and destination. Include list of materials.
 - 1) Description of materials to be site-separated and self-hauled to designated facilities.
 - 2) Description of mixed materials to be collected by designated waste haulers and removed from the site.
 - c. The names and locations of mixed debris reuse and recycling facilities or sites.
 - d. The names and locations of trash disposal landfill facilities or sites.
 - e. Documentation that the facilities or sites are approved to receive the materials.
- C. Designated Manager responsible for instructing personnel, supervising, documenting and administer over meetings relevant to the Waste Management Plan.
- D. Monthly summary of construction and demolition debris diversion and disposal, quantifying all materials generated at the work site and disposed of or diverted from disposal through recycling. The summary report shall conform to the requirements set forth in MR Credit 2 Construction Waste Management as described in the USGBC LEED Reference Guide for Green Building Design and Construction, 2009 Edition.

1.6 APPLICABLE PUBLICATIONS

- A. Publications listed below form a part of this specification to the extent referenced. Publications are referenced by the basic designation only. In the event that criteria requirements conflict, the most stringent requirements shall be met.

B. U.S. Green Building Council (USGBC):

LEED Green Building Rating System for New Construction

1.7 RECORDS

Maintain records to document the quantity of waste generated; the quantity of waste diverted through sale, reuse, or recycling; and the quantity of waste disposed by landfill or incineration.

Records shall be kept in accordance with MR Credit 2 Construction Waste Management as described in the USGBC LEED Reference Guide for Green Building Design and Construction, 2009 Edition.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. List of each material and quantity by weight to be salvaged, recycled, or reused.
- B. List of each material and quantity by weight taken to a landfill.
- C. Material tracking data: Receiving parties, dates removed, transportation costs, weight tickets, tipping fees, manifests, invoices, net total costs or savings.

PART 3 - EXECUTION

3.1 COLLECTION

- A. Provide all necessary containers, bins and storage areas to segregate debris and facilitate effective waste management.
- B. Clearly identify containers, bins and storage areas so that recyclable materials are separated from trash and can be transported to respective recycling facility for processing.
- C. Hazardous wastes shall be separated, stored, disposed of according to local, state, federal regulations. Hazardous waste quantities are excluded from the recycled debris calculation.

3.2 DISPOSAL

- A. Contractor shall be responsible for transporting and disposing of materials that cannot be delivered to a source-separated or mixed materials recycling facility to a transfer station or disposal facility that can accept the materials in accordance with state and federal regulations.
- B. Construction or demolition materials with no practical reuse or that cannot be salvaged or recycled shall be disposed of at a landfill or incinerator.

3.3 REPORT

- A. With each application for progress payment, submit a summary of construction and demolition debris diversion and disposal including beginning and ending dates of period covered.

- B. Quantify all materials diverted from landfill disposal through salvage or recycling during the period with the receiving parties, dates removed, transportation costs, weight tickets, manifests, invoices. Include the net total costs or savings for each salvaged or recycled material.
- C. Quantify all materials disposed of during the period with the receiving parties, dates removed, transportation costs, weight tickets, tipping fees, manifests, invoices. Include the net total costs for each disposal.

E N D OF SECTION

SECTION 01 7423 - PRE-OCCUPANCY CLEANING

PART 1 GENERAL

1.01 RELATED WORK SPECIFIED ELSEWHERE

- A. Final Cleaning: Section 01 7716.

PART 2 PRODUCTS (Not Used)

PART 3 EXECUTION

3.01 PRE-OCCUPANCY CLEANING

- A. Perform the pre-occupancy cleaning when directed by the Owner's Representative.
- B. Sequence: Begin pre-occupancy cleaning operations at the top floor and proceed down to the lowest floor. Complete the cleaning required on each floor before proceeding to the next floor.
- C. Perform the pre-occupancy cleaning within the minimum standards specified, including but not limited to the following requirements.
 - 1. Floor Maintenance:
 - a. Do not splash, disfigure, or damage baseboards, walls, stair risers, furniture or equipment during these operations.
 - b. Take proper precautions to advise building occupants/users of wet and/or slippery floor conditions during the cleaning operations.
 - c. Be responsible for the security of equipment, materials, tools, etc. The Owner's Representative (if space is available) will assign storage area(s) for the neat storage of tools and equipment.
 - d. Sweeping and Damp Mopping:
 - 1) Thoroughly sweep the floors to remove visible dirt and debris. Remove all visible paint marks, wads of gum, tar and similar substances from the floor surface.
 - 2) After sweeping and damp mopping operations, all floors shall be clean and free of dirt streaks; no dirt shall be left in corners, under furniture, behind doors, on stair landings and treads. Entrances and all similar areas shall be swept clean of all dirt and trash. No dirt shall be left where sweepings have been picked up. There shall be no dirt, trash or foreign matter under desks, tables, chairs, etc.
 - e. Wet Mopping and Scrubbing:

- 1) Properly prepare the floors, thoroughly sweep to remove all visible dirt and debris. Remove all paint spots, wads of gum, tar and similar substances from the floor surface. On completion of the mopping and scrubbing, the floors shall be clean and free of dirt, water streaks, mop marks, string, etc., properly rinsed, and dry mopped to present an overall appearance of cleanliness. All surfaces shall be dry and corners and cracks clean after the wet mopping or scrubbing. Scrubbing shall be accomplished by machine or by hand with a brush.
- f. Floor Finishing:
 - 1) Proper preparation of a floor, prior to refinishing, is considered the most important procedure in floor maintenance. Therefore, special attention must be given to the following requirements: Sweep entire floor area with treated dust cloth to control airborne dust and apply the proper stripping solution or synthetic disinfectant detergents to the floor; scrub with a floor scrubbing machine or agitate with a mop to remove old finish and/or old wax, soap film, dirt and stains; pick up dirty solution with a mop, squeegee or wet vacuum and thoroughly rinse with clean water and dry.
 - 2) Apply floor finish in even coats. The number of coats applied will depend on the type and condition of the floor, but shall not be less than 2 coats.
 - 3) Take special care when applying the floor finish, do not splash or coat the baseboard, walls, furniture or equipment.
- g. Machine scrub concrete floors and wash with a germicidal cleaner, finish with 2 coats of sealer.
- h. Machine scrub vinyl floor tile and wash and strip and refinish with 2 coats of sealer and 2 coats of finish as per EPA guidelines on asbestos hazard reduction.
- i. Machine scrub ceramic and quarry tile flooring and wash with a germicidal type cleaner, rinse with clean water and wipe with a well-wrung mop.
- j. Vacuum carpeting thoroughly.
- k. Coat vinyl floors in Geriatric program and living areas with a floor finish that is slip resistant and that results in little or no shine when dry, such as Johnson's complete or equivalent.
1. Use Hilliard 341 on non-conductive floors, or equivalents.
2. Dusting: Do not move dust from spot to spot, but remove directly from the areas in which it lies by the most effective means such as appropriately treated dusting cloths, vacuum tools, etc. When doing high cleaning, dust shall not be allowed to fall from high areas onto furniture and equipment below. The following conditions shall exist after the completion of each dusting task:
 - a. There shall be no dust streaks.
 - b. Corners, crevices, moldings, and ledges shall be free of all dust.

- c. There shall be no oils, spots or smudges on dusted surfaces caused by dusting tools.
 - d. When inspected by a flashlight, there shall be few traces of dust on any surface.
- 3. Damp Wiping: Use a clean damp cloth or sponge to remove all dirt, spots, streaks and smudges from walls, doors (both wood and metal), glass and other specified surfaces. When dry, the surfaces shall have a polished appearance. The wetting solution shall contain an appropriate cleaning agent. When damp wiping in toilet areas, a multi-purpose (disinfectant-deodorizer) cleaner shall be used.
- 4. Bright Metal Polishing: Polish bright metal by damp wiping and drying with a suitable cloth. If a polished appearance is not thereby produced, apply the appropriate metal polish.
- 5. Windows and Glass:
 - a. Wash and clean all interior and exterior glass, with the inside and outside cleaning of windows to be performed on the same day.
 - b. After each washing operation, all glass shall be clean and free of dirt, grime, streaks, excessive moisture and shall not be cloudy.
 - c. Window sills, sash and woodwork about interior glass and other such surroundings shall be thoroughly wiped free of drippings and other water marks.
 - d. Cleaners shall use pads to protect window sills when placing cleaning materials on them and all such pads and/or cloths necessary to protect the property shall be furnished by the Contractor. Window sills are not to be utilized in lieu of ladders and/or step ladders.
 - e. Extreme care shall be taken in opening any and all windows, when opening them for cleaning, assume full responsibility for damage to glass and painted surfaces.
- 6. Spot Cleaning: Following this operation, smudges, marks or spots shall have been removed from the designated areas without causing unsightly discoloration.
- 7. Trash Removal:
 - a. Collect and remove all refuse, debris, rubbish and trash throughout the entire building. Unless otherwise directed by the Director's Representative all collected matter shall be deposited in dumpsters of sanitation trucks provided by the Contractor, and removed from the site.
 - b. Collect and remove all refuse, debris, rubbish and trash from the interior of the air handling unit enclosures under each window or wherever located. Vacuum the interior of each unit. This will require the removal and replacement of cover plates. Personnel will be made available to demonstrate the proper procedure for the removal and replacement of the cover plates.
- 8. Ceilings: Vacuum acoustic ceilings, taking care not to damage them. Vacuum painted plaster ceilings and spot clean where required. Wash entire ceiling if stain results.
- 9. Fixtures and Equipment:
 - a. Thoroughly scour, wash and disinfect all equipment and fixtures, including, but not limited to toilet bowls, seats, urinals, wash

- basins, mirrors, shelving, dispensers, receptors, slop sinks, water fountains, kitchen equipment, refrigerators and booth partitions, various dispensers, walk-in refrigerators, and lockers.
 - b. Plumbing fixtures (drinking fountains, wash basins, urinals, toilets, etc.) shall be thoroughly washed, using a germicidal solution, and dried, leaving no dust, spots, streaks or stains, rust, mold, encrustation or excess moisture. The walls and floor adjacent to fixtures shall be free of spots, drippings and water marks. Drinking fountains shall be kept free of trash, ink, coffee grounds, etc., and nozzles free from encrustation.
 - c. Light fixtures, including glass and plastic lenses, ceiling and wall-mounted lights, cover panels, side panels, louvers, fixture frames and lamps, shall be vacuumed and cleaned with a damp cloth.
 - d. Supply vents, exhaust grilles and room fan coil units shall be thoroughly vacuumed and cleaned.
10. Walls:
- a. Dust and spot clean painted and vinyl-covered walls. In areas where spot cleaning will produce color differences, the entire wall shall be washed, cleaned and wiped dry.
 - b. Scrub ceramic tile walls with a germicidal cleaner, rinse and wipe dry.
 - c. Vacuum brick and concrete interior walls and all adhered debris shall be removed in accordance with guidelines established by the Structural Clay Products Institute, the National Concrete Institute and the National Concrete Masonry Association.
11. Wood and Metal Doors: Remove protective tape from doors, frames and signage and kickplates. Remove all tape and adhesive residues. Clean and polish all unpainted metal on doors, including, but not limited to, trim, hardware, kickplates, handplates and door knobs. Wood doors shall be thoroughly cleaned and oiled and wiped dry.
12. Elevators: Clean all surfaces in the interior of the car including hoistway doors and services of the corridors on the side of the elevator and all bright metal surfaces polished. All resilient tiles shall be cleaned and spray buffed. Dust and damp wipe elevator cab doors, wall and bright work. Scrub and wash elevator cab floors using germicidal detergent.
13. Stairwells: Sweep all stairs clean. Remove all paint spots, wads of gum, tar and similar substances and wash with a germicidal cleaner. Vacuum brick and/or concrete block walls, remove spots, stains, etc. and wash and dry (wipe or blow dry).
14. Porches/Entrances: Thoroughly sweep, vacuum and wash porches and entrances with a germicidal cleaner.
15. Other:
- a. Overhead items, such as louvers, grilles, pipes, molding, etc., shall be dusted, vacuumed and spot cleaned.
 - b. Metal surfaces such as hardware, frames, cover plates, stainless steel counters and sinks, corner guards, conveyors, etc., shall be cleaned with a damp cloth and polished where required.
 - c. Furniture and equipment shall be wiped clean using special care, be responsible for damage to this equipment. Where the workers

see a piece of equipment too delicate or have doubt regarding how to proceed, they will request further instructions from the Town of Medley Project Manager.

- d. For all operations where furniture or equipment is moved, no chairs, waste baskets or other similar items shall be stacked on desks, tables or window sills. Upon completion of work, all furniture and equipment must be returned to its original position.
 - e. Under no circumstances shall any product or procedure be used that may leave a non-conductive film.
16. Safety Standards: Conform to all Federal, State and Local Codes and Safety Standards and to the best practices of the trade.

END OF SECTION

SECTION 01 7716 - CONTRACT CLOSEOUT

PART 1 GENERAL

1.01 RELATED REQUIREMENTS SPECIFIED ELSEWHERE

- A. Other provisions pertaining to this Section are included in the General Conditions.

1.02 CONTRACT CLOSEOUT INSPECTIONS

- A. The following 3 inspections will be made in addition to the normal inspections to ensure that all Contract requirements are met and that the Work is complete and acceptable. The purpose of each of these inspections is to furnish the Contractor a written list of Contract exceptions, omissions, and incompletions so that the Work can be progressed to timely completion in accordance with the Contract Documents.
 - 1. Detailed Inspection: The "Detailed Inspection" will be made when the Work is substantially complete. A copy of the detailed inspection list will be furnished to the Contractor. When this inspection progresses over any length of time, copies of the list will be furnished as the inspection progresses so that the Contractor may proceed with the required Work without delay. Prior to the detailed inspection, the contractor shall inspect the work and ensure that the work is in compliance with the contract documents. The contractor shall prepare a report detailing the items found in their inspection that are to be corrected and correct them prior to the detailed inspection. The report shall be submitted to the A/E and Town of Medley Project Manager a minimum of 30 days prior to the detailed inspection. The detailed inspection will not be held prior to receipt of the report from the contractor.
 - 2. Final Inspection: The Contractor will be advised by letter of the date and time of final inspection. A copy of the final inspection list containing all incomplete or unsatisfactory items and the time allowed to complete the Work will be furnished to the Contractor.
 - 3. Joint Inspection for Physical Completion: The joint inspection for physical completion may be made to verify completion of the exception items listed on the final inspection list so that the physical completion date (defined in the General Conditions) may be established.

1.03 FINAL CLEANING

- A. Perform final cleaning prior to joint inspection for physical completion. Leave the premises in a neat, unobstructed condition, the work areas broom clean (except where more thorough cleaning is specified), and everything in perfect repair and adjustment.

- B. Clean site; sweep paved areas, rake clean landscaped surfaces.
- C. Remove tools, equipment, waste and surplus materials, rubbish, and construction facilities from the premises as soon as possible upon completion of the Work.

1.04 PROJECT RECORD DOCUMENTS

- A. Maintain on site, 2 sets of the following record documents; record actual revisions to the Work:
 - 1. Contract Drawings.
 - 2. Project Manual.
 - 3. Addenda.
 - 4. Change Orders and other modifications to the Contract.
 - 5. Reviewed shop drawings, product data, and samples.
- B. Store record documents separate from documents used for construction.
- C. Record information concurrent with construction progress.
- D. Project Manual: Legibly mark and record in Part 2 of each Section of the Specifications, a description of the actual products installed, including the following:
 - 1. Manufacturer's name and product model and number.
 - 2. Product substitutions or alternates utilized.
 - 3. Changes made by addenda and modifications.
- E. Record Documents and Shop Drawings: Legibly mark each item to record actual construction including:
 - 1. Measured depths of foundations in relation to finish (first) (main) floor datum.
 - 2. Measured horizontal and vertical locations of underground utilities and appurtenances, referenced to permanent surface improvements.
 - 3. Measured locations of internal utilities and appurtenances concealed in construction, referenced to visible and accessible features of the Work.
 - 4. Field changes of dimension and detail.
 - 5. Details not on original Contract Drawings.
- F. Construction Work Contract, Concealed Single Ply Membrane Roofing Work: Maintain, at the site, 2 sets of the membrane manufacturer's sheet layout drawings for recording joint locations. Mark up the drawings in red as follows:
 - 1. Show the actual size of membrane sheets.
 - 2. Dimension the location of end and edge joints, and factory and field fabricated patches in the membrane. Show dimensions taken from fixed locations such as parapet walls, gravel stops, etc. Dimensions shall be accurate to within one foot.
 - 3. Show the type and location of penetrations through the roof.

- G. Upon completion of the work, create electronic versions of the project record documents. Black and white documents are to be scanned into TIFF format using CCIT Group 4 compression. Documents with color, which include black line documents with color notations, are to be scanned into TIFF format using a minimum of 8 colors and “packbit” compression.
1. The scanned images are to be put on a compact disc (CD) using ISO 9660 format. Name the electronic files with the same name as the drawing. Create a folder on the CD for each trade and one for Shop Drawings.
 2. Label the CD with the project number, name, and title as it appears on the project manual cover. If there is more than one CD include notation to that effect on the label; i.e., 1 of 3, 2 of 3, 3 of 3. The project record documents and CD(s) are to be turned over to the Director’s Representative.
- H. Applications for progress payments will not be approved if the record documents are not kept current. Application for final payment will not be approved until the project record documents are delivered to the Director’s Representative.

1.05 OPERATION AND MAINTENANCE DATA

- A. Prepare 2 sets comprised of 8-1/2 x 11 inch text pages bound in capaTown expansion binders with durable plastic covers identified with printed title “OPERATION AND MAINTENANCE INSTRUCTIONS”, title of project, and subject matter of binder when multiple binders are required. Prepare a printed Table of Contents for each volume, with each product or system description identified. Internally subdivide the binder contents with permanent page dividers, logically organized as described below, with tab titles clearly printed under reinforced laminated plastic tabs:

Part 1: Directory, listing names, addresses, and telephone numbers of Architect/Engineer, Contractor, subcontractors, and major equipment suppliers.

Part 2: Operation and maintenance instructions, arranged by system and subdivided by specification section. For each category, identify names, addresses, and telephone numbers of subcontractors and suppliers.

Identify the following:

1. Significant design criteria.
2. List of equipment.
3. Parts list for each component.
4. Operating instructions.
5. Maintenance instructions for equipment and systems.
6. Maintenance instructions for finishes, including recommended cleaning methods and materials and special precautions identifying detrimental agents.

Part 3: Project documents and certificates, including the following:

1. Shop drawings and product data.
 2. Air and water balance reports.
 3. Certificates.
 4. Photocopies of warranties.
- B. Submit one copy of completed volumes in final form 15 days prior to final inspection. This copy will be returned after final inspection, with the Owner's comments. Revise content of documents as required prior to final submittal.
- C. Submit 2 volumes prior to final Application for Payment.

1.06 WARRANTIES

- A. Furnish warranty certification and copies of warranties that extend beyond the one year period required by the General Conditions. Warranties submitted without warranty certification will not be accepted.
1. Warranty Certification: Written certification from the warrantor that invoices for installation, service, supplies, and warranty fees have been paid in full to persons or firms due payment, and that the warranty is in effect and non-retractable due to any of the specified conditions.
- B. Prepare printed Table of Contents and assemble warranty certifications and warranty copies in a binder with a durable plastic cover.
- C. Deliver the binder to the Owner's Representative and Architect of Record prior to final Application for Payment.
- D. For items of Work delayed beyond date of Substantial Completion, provide updated submittal within 10 days after acceptance, indicating date of acceptance as start of warranty period.
- E. Applications for final payment will not be approved until the warranty certification and warranty documents are delivered to the Owner's Representative and Architect of Record.

1.07 SPARE PARTS AND MAINTENANCE MATERIALS

- A. Label and deliver spare parts, maintenance items, and extra materials to the Site. Place in locations as directed.
1. Include "NOT FOR WARRANTY REPAIRS" on the labels.
 2. Obtain receipt prior to final payment.
- B. Do not use the spare parts and maintenance materials required by the Contract Documents to remedy defects during the one-year period described in the General Conditions.

- C. Furnish the names, business addresses, and telephone numbers of fully equipped authorized service organizations to the Owner's Representative and Architect of Record.
- D. Applications for final payment will not be approved until these items are delivered to the Owner's Representative and Architect of Record.

PART 2 PRODUCTS (Not Used)

PART 3 EXECUTION (Not Used)

END OF SECTION

SECTION 01 7800 - CLOSEOUT SUBMITTALS

PART 1 – GENERAL

1.1 SUMMARY

- A. Section includes procedures for preparing and submitting closeout submittals:
 - 1. Project Record Documents.
 - 2. Operation and maintenance manuals and data.
 - 3. Warranties.
 - 4. Insurance information.
 - 5. Certificates of inspection and compliance.
 - 6. Maintenance tools.
 - 7. Extra materials.
 - 8. Keys.
- B. Related documents and sections:
 - 1. General Conditions of the Contract
 - 2. Section 01 3000 – Administrative Requirements: Submittal of shop drawings, product data, samples, installation instruction, reports and other submittals during construction prior to closeout.
 - 3. Section 01 9113 – Fundamental and Enhanced Commissioning: Comply with requirements of the commissioning plan.

1.1 OPERATION AND MAINTENANCE DATA

- A. Provide operation and maintenance data for as described in the individual specification section
- B. Provide written sequence of operations for each automated building system, including those related to the following:
 - 2. Life safety system(s).
 - 3. Electrical system(s).
 - 3. Mechanical system(s).
 - 4. Other automated building systems and components.
- C. Submission:
 - 1. Submit data to Design Professional in one or more binders. Submit to Commissioning agent in pdf format.
 - 2. Submit for review one draft copy 30 days prior to need date or as otherwise specified. This copy will be returned after review with Design Professional's comments. Revise content as required.
 - 3. Once approved, submit 5 copies of final operation and maintenance manuals as follows:
 - a. 5 (five) hard copies and one 1 electronic disk of entire manual to A/E.
 - b. One (1) electronic disk of entire manual to Commissioning Agent.
 - 4. All manuals shall be submitted prior to or in conjunction with Contractor's request for Substantial Completion and prior to demonstration and training session.
- D. Contents:
 - 1. Appropriate design criteria.
 - 2. Equipment parts list.
 - 3. Equipment inventory data (on Owner-provided electronic forms) and parts lists.

4. Roofing data.
5. Operating instructions.
6. Maintenance instruction for equipment and finishes.
7. Shop drawings and product data.
8. Written sequence of operations for each automated building system [including those related to the following:]
 - a. Life safety system(s).
 - b. Electrical system(s).
 - c. Mechanical system(s).
9. Testing, balancing, and other field quality reports.
10. Copies of warranties.
11. Directory listings
12. Other material and information as indicated in individual specification sections and as necessary for operation and maintenance by Owner's personnel.

E. Form:

1. Hard copies of manuals shall be 8-1/2 x 11 inch text pages bound in three ring expansion binders with a hard durable plastic cover. All documents to be originals unless otherwise noted.
2. Prepare binder covers with printed subject title of manual, title of project, date, and volume number when multiple binders are required. Printing shall be on face and spine.
3. Internally subdivide the binder contents with divider sheets with typed tab titles under reinforced plastic tabs. Place dividers at beginning of each chapter, part, section, and appendix.

4. Provide a table of contents for each volume.
5. Provide directory listing as appropriate with names addresses, and telephone numbers of Design Professional, Contractor, subcontractors, equipment suppliers, and nearest service representatives. Provide emergency 24-hour service contact information for all subcontractors, service contractors and principal vendors.
6. Provide electronic data disk(s) with each manual including all data required to be submitted electronically. Include hard copy with each manual.

1.2 WARRANTIES

- A. Provide duplicate notarized copies of special and extended warranties as required by individual specifications sections.
- B. Submit warranties to Design Professional prior to or in conjunction with submission of Notice of Substantial Completion.
- C. Execute and assemble warranties from subcontractors, suppliers, and manufacturers.
- D. Provide Table of Contents and assemble in three ring binder with a hard durable plastic cover. Internally subdivide the binder contents with permanent page dividers, with tab titling clearly typed under reinforced laminated plastic tabs.
- E. For items of work delayed beyond date of Substantial Completion, provide updated warranty submittal within ten days after acceptance, listing date of acceptance as start of warranty period.

1.3 CERTIFICATES OF INSPECTION AND COMPLIANCE

- A. For inspections throughout the construction period required by regulatory agencies, obtain and maintain certificates issued to show compliance.
- B. Assemble certificates and any formal written evidence of regulatory compliance in three ring binder with table of contents and submit to Design Professional prior to or in conjunction with submission of Notice of Substantial Completion.
- C. Obtain letter from Commissioning Agent that commissioned systems are in compliance with parameters set forth in contract documents.

- D. Certificate of Occupancy: Obtain from authorities having jurisdiction Certificate of Occupancy. Submit with Record Documents.

1.4 INSURANCE INFORMATION

- A. Submit prior to or in conjunction with submission of Contractor's request for Substantial Completion information regarding insurance including change over requirements and insurance extensions.

1.5 MAINTENANCE TOOLS

- A. Provide all special tools, instruments, and other implements required for the functional operation and maintenance of equipment, systems, and other components installed as part of this project. Include screw drivers, crescent wrenches, pliers, and Allen wrenches as well as more unique and atypical tools.
- B. Tools shall be as provided or recommended by manufacturers of installed equipment and systems. Types and sizes shall be as specifically required for installed products.
- C. Tools shall be available and their use demonstrated during training sessions..
- D. Prior to or concurrent with Contractor's request for Substantial Completion, deliver maintenance tools to Owner's representative. Prepare inventory of tools provided and obtain receipt from Owner's representative.

1.6 EXTRA MATERIALS

- A. Provide spare parts and maintenance materials in quantities specified in individual sections.
- B. Extra materials shall be produced by the same manufacturer of and compatible with the installed products.
- C. Prior to or concurrent with submission of Notice of Substantial Completion deliver extra materials in unopened containers to Owner's representative at designated storage area at project site and place in location as directed. Obtain receipt from Owner's representative
- D. During one year correction period:
 - 1. Extra materials may be used by Contractor to replace expendable and normally worn parts.

2. Extra materials used by Contractor for replacement of defective products shall be replaced at no additional cost to Owner.

1.7 KEYS

- A. Prior to or in conjunction with submission of Contractor's request for Substantial Completion, provide Owner with all keys for:
 1. Door hardware locks after re-keying
 2. Access doors and panels.
 3. Electrical panel boards and other equipment.
- B. Provide a minimum of two keys for each lock.
- C. Clearly label each key as to function and location of lock.
- D. Obtain receipt from Owner's representative.
- E. Prior to, or in conjunction with Final Completion, return all keys lent out by Owner to Contractor for access to existing spaces, gates, etc. for the Work. Obtain receipt from Owner.

1.10 MISCELLANEOUS SECURITY-RELATED MATERIALS AND COMPONENTS

- A. Prior to or in conjunction with Final Completion and in accordance with General Requirements of the Contract, deliver to Owner and obtain receipt for:
 1. Security document log

PART 2 - PRODUCTS

Not Used.

PART3- EXECUTION

Not Used.

END OF SECTION

SECTION 01 7823 - OPERATION AND MAINTENANCE DATA

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes administrative and procedural requirements for preparing operation and maintenance manuals, including the following:
 - 1. Operation and maintenance documentation directory.
 - 2. Emergency manuals.
 - 3. Operation manuals for systems, subsystems, and equipment.
 - 4. Product maintenance manuals.
 - 5. Systems and equipment maintenance manuals.
- B. Related Requirements:
 - 1. Section 01 3000
 - 2. Section 01 9113

1.3 DEFINITIONS

- A. System: An organized collection of parts, equipment, or subsystems united by regular interaction.
- B. Subsystem: A portion of a system with characteristics similar to a system.

1.4 CLOSEOUT SUBMITTALS

- A. Manual Content: Operations and maintenance manual content is specified in individual Specification Sections to be reviewed at the time of Section submittals. Submit reviewed manual content formatted and organized as required by this Section.
 - 1. Architect and Commissioning Authority will comment on whether content of operations and maintenance submittals are acceptable.
 - 2. Where applicable, clarify and update reviewed manual content to correspond to revisions and field conditions.
- B. Format: Submit operations and maintenance manuals in the following format:

1. PDF electronic file. Assemble each manual into a composite electronically indexed file. Submit on digital media acceptable to Architect.
 - a. Name each indexed document file in composite electronic index with applicable item name. Include a complete electronically linked operation and maintenance directory.
 - b. Enable inserted reviewer comments on draft submittals.
 2. **Five** paper copies. Include a complete operation and maintenance directory. Enclose title pages and directories in clear plastic sleeves..
- C. Initial Manual Submittal: Submit draft copy of each manual at least **30** days before commencing demonstration and training. Architect and Commissioning Authority will comment on whether general scope and content of manual are acceptable.
- D. Final Manual Submittal: Submit each manual in final form prior to requesting inspection for Substantial Completion and at least **15** days before commencing demonstration and training. Architect and Commissioning Authority will return copy with comments.
1. Correct or revise each manual to comply with Architect's **and Commissioning Authority's** comments. Submit copies of each corrected manual within **15** days of receipt of Architect's **and Commissioning Authority's** comments and prior to commencing demonstration and training.

PART 2 - PRODUCTS

2.1 OPERATION AND MAINTENANCE DOCUMENTATION DIRECTORY

- A. Directory: Prepare a single, comprehensive directory of emergency, operation, and maintenance data and materials, listing items and their location to facilitate ready access to desired information. Include a section in the directory for each of the following:
1. List of documents.
 2. List of systems.
 3. List of equipment.
 4. Table of contents.
- B. List of Systems and Subsystems: List systems alphabetically. Include references to operation and maintenance manuals that contain information about each system.
- C. List of Equipment: List equipment for each system, organized alphabetically by system. For pieces of equipment not part of system, list alphabetically in separate list.
- D. Tables of Contents: Include a table of contents for each emergency, operation, and maintenance manual.

- E. Identification: In the documentation directory and in each operation and maintenance manual, identify each system, subsystem, and piece of equipment with same designation used in the Contract Documents. If no designation exists, assign a designation according to ASHRAE Guideline 4, "Preparation of Operating and Maintenance Documentation for Building Systems."

2.2 REQUIREMENTS FOR EMERGENCY, OPERATION, AND MAINTENANCE MANUALS A.

Organization: Unless otherwise indicated, organize each manual into a separate section for each system and subsystem, and a separate section for each piece of equipment not part of a system. Each manual shall contain the following materials, in the order listed:

1. Title page.
2. Table of contents.
3. Manual contents.

- B. Title Page: Include the following information:

1. Subject matter included in manual.
2. Name and address of Project.
3. Name and address of Owner.
4. Date of submittal.
5. Name and contact information for Contractor.
6. Name and contact information for Construction Manager.
7. Name and contact information for Architect.
8. Name and contact information for Commissioning Authority.
9. Names and contact information for major consultants to the Architect that designed the systems contained in the manuals.
10. Cross-reference to related systems in other operation and maintenance manuals.

- C. Table of Contents: List each product included in manual, identified by product name, indexed to the content of the volume, and cross-referenced to Specification Section number in Project Manual.

1. If operation or maintenance documentation requires more than one volume to accommodate data, include comprehensive table of contents for all volumes in each volume of the set.

- D. Manual Contents: Organize into sets of manageable size. Arrange contents alphabetically by system, subsystem, and equipment. If possible, assemble instructions for subsystems, equipment, and components of one system into a single binder.

- E. Manuals, Electronic Files: Submit manuals in the form of a multiple file composite electronic PDF file for each manual type required.

1. Electronic Files: Use electronic files prepared by manufacturer where available. Where scanning of paper documents is required, configure scanned file for minimum readable file size.

2. File Names and Bookmarks: Enable bookmarking of individual documents based on file names. Name document files to correspond to system, subsystem, and equipment names used in manual directory and table of contents. Group documents for each system and subsystem into individual composite bookmarked files, then create composite manual, so that resulting bookmarks reflect the system, subsystem, and equipment names in a readily navigated file tree. Configure electronic manual to display bookmark panel on opening file.

F. Manuals, Paper Copy: Submit manuals in the form of hard copy, bound and labeled volumes.

1. Binders: Heavy-duty, three-ring, vinyl-covered, **loose-leaf** binders, in thickness necessary to accommodate contents, sized to hold 8-1/2-by-11-inch paper; with clear plastic sleeve on spine to hold label describing contents and with pockets inside covers to hold folded oversize sheets.
 - a. If two or more binders are necessary to accommodate data of a system, organize data in each binder into groupings by subsystem and related components. Cross-reference other binders if necessary to provide essential information for proper operation or maintenance of equipment or system.
 - b. Identify each binder on front and spine, with printed title "OPERATION AND MAINTENANCE MANUAL," Project title or name, and subject matter of contents, and indicate Specification Section number on bottom of spine. Indicate volume number for multiple-volume sets.
2. Dividers: Heavy-paper dividers with plastic-covered tabs for each section of the manual. Mark each tab to indicate contents. Include typed list of products and major components of equipment included in the section on each divider, cross-referenced to Specification Section number and title of Project Manual.
3. Protective Plastic Sleeves: Transparent plastic sleeves designed to enclose diagnostic software storage media for computerized electronic equipment.
4. Supplementary Text: Prepared on 8-1/2-by-11-inch (215-by-280-mm) white bond paper.
5. Drawings: Attach reinforced, punched binder tabs on drawings and bind with text.
 - a. If oversize drawings are necessary, fold drawings to same size as text pages and use as foldouts.
 - b. If drawings are too large to be used as foldouts, fold and place drawings in labeled envelopes and bind envelopes in rear of manual. At appropriate locations in manual, insert typewritten pages indicating drawing titles, descriptions of contents, and drawing locations.

2.3 EMERGENCY MANUALS

A. Content: Organize manual into a separate section for each of the following:

1. Type of emergency.
2. Emergency instructions.
3. Emergency procedures.

- B. Type of Emergency: Where applicable for each type of emergency indicated below, include instructions and procedures for each system, subsystem, piece of equipment, and component:
1. Fire.
 2. Flood.
 3. Gas leak.
 4. Water leak.
 5. Power failure.
 6. Water outage.
 7. System, subsystem, or equipment failure.
 8. Chemical release or spill.
- C. Emergency Instructions: Describe and explain warnings, trouble indications, error messages, and similar codes and signals. Include responsibilities of Owner's operating personnel for notification of Installer, supplier, and manufacturer to maintain warranties.
- D. Emergency Procedures: Include the following, as applicable:
1. Instructions on stopping.
 2. Shutdown instructions for each type of emergency.
 3. Operating instructions for conditions outside normal operating limits.
 4. Required sequences for electric or electronic systems.
 5. Special operating instructions and procedures.

2.4 OPERATION MANUALS

- A. Content: In addition to requirements in this Section, include operation data required in individual Specification Sections and the following information:
1. System, subsystem, and equipment descriptions. Use designations for systems and equipment indicated on Contract Documents.
 2. Performance and design criteria if Contractor has delegated design responsibility.
 3. Operating standards.
 4. Operating procedures.
 5. Operating logs.
 6. Wiring diagrams.
 7. Control diagrams.
 8. Piped system diagrams.
 9. Precautions against improper use.
 10. License requirements including inspection and renewal dates.
- B. Descriptions: Include the following:
1. Product name and model number. Use designations for products indicated on Contract Documents.
 2. Manufacturer's name.
 3. Equipment identification with serial number of each component.
 4. Equipment function.

5. Operating characteristics.
6. Limiting conditions.
7. Performance curves.
8. Engineering data and tests.
9. Complete nomenclature and number of replacement parts.

C. Operating Procedures: Include the following, as applicable:

1. Startup procedures.
2. Equipment or system break-in procedures.
3. Routine and normal operating instructions.
4. Regulation and control procedures.
5. Instructions on stopping.
6. Normal shutdown instructions.
7. Seasonal and weekend operating instructions.
8. Required sequences for electric or electronic systems.
9. Special operating instructions and procedures.

D. Systems and Equipment Controls: Describe the sequence of operation, and diagram controls as installed.

E. Piped Systems: Diagram piping as installed, and identify color-coding where required for identification.

2.5 PRODUCT MAINTENANCE MANUALS

A. Content: Organize manual into a separate section for each product, material, and finish. Include source information, product information, maintenance procedures, repair materials and sources, and warranties and bonds, as described below.

B. Source Information: List each product included in manual, identified by product name and arranged to match manual's table of contents. For each product, list name, address, and telephone number of Installer or supplier and maintenance service agent, and cross-reference Specification Section number and title in Project Manual and drawing or schedule designation or identifier where applicable.

C. Product Information: Include the following, as applicable:

1. Product name and model number.
2. Manufacturer's name.
3. Color, pattern, and texture.
4. Material and chemical composition.
5. Reordering information for specially manufactured products.

D. Maintenance Procedures: Include manufacturer's written recommendations and the following:

1. Inspection procedures.
2. Types of cleaning agents to be used and methods of cleaning.

3. List of cleaning agents and methods of cleaning detrimental to product.
 4. Schedule for routine cleaning and maintenance.
 5. Repair instructions.
- E. Repair Materials and Sources: Include lists of materials and local sources of materials and related services.
- F. Warranties and Bonds: Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.
1. Include procedures to follow and required notifications for warranty claims.

2.6 SYSTEMS AND EQUIPMENT MAINTENANCE MANUALS

- A. Content: For each system, subsystem, and piece of equipment not part of a system, include source information, manufacturers' maintenance documentation, maintenance procedures, maintenance and service schedules, spare parts list and source information, maintenance service contracts, and warranty and bond information, as described below.
- B. Source Information: List each system, subsystem, and piece of equipment included in manual, identified by product name and arranged to match manual's table of contents. For each product, list name, address, and telephone number of Installer or supplier and maintenance service agent, and cross-reference Specification Section number and title in Project Manual and drawing or schedule designation or identifier where applicable.
- C. Manufacturers' Maintenance Documentation: Manufacturers' maintenance documentation including the following information for each component part or piece of equipment:
1. Standard maintenance instructions and bulletins.
 2. Drawings, diagrams, and instructions required for maintenance, including disassembly and component removal, replacement, and assembly.
 3. Identification and nomenclature of parts and components.
 4. List of items recommended to be stocked as spare parts.
- D. Maintenance Procedures: Include the following information and items that detail essential maintenance procedures:
1. Test and inspection instructions.
 2. Troubleshooting guide.
 3. Precautions against improper maintenance.
 4. Disassembly; component removal, repair, and replacement; and reassembly instructions.
 5. Aligning, adjusting, and checking instructions.
 6. Demonstration and training video recording, if available.
- E. Maintenance and Service Schedules: Include service and lubrication requirements, list of required lubricants for equipment, and separate schedules for preventive and routine maintenance and service with standard time allotment.

1. Scheduled Maintenance and Service: Tabulate actions for daily, weekly, monthly, quarterly, semiannual, and annual frequencies.
 2. Maintenance and Service Record: Include manufacturers' forms for recording maintenance.
- F. Spare Parts List and Source Information: Include lists of replacement and repair parts, with parts identified and cross-referenced to manufacturers' maintenance documentation and local sources of maintenance materials and related services.
- G. Maintenance Service Contracts: Include copies of maintenance agreements with name and telephone number of service agent.
- H. Warranties and Bonds: Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.
1. Include procedures to follow and required notifications for warranty claims.

PART 3 - EXECUTION

3.1 MANUAL PREPARATION

- A. Operation and Maintenance Documentation Directory: Prepare a separate manual that provides an organized reference to emergency, operation, and maintenance manuals.
- B. Emergency Manual: Assemble a complete set of emergency information indicating procedures for use by emergency personnel and by Owner's operating personnel for types of emergencies indicated.
- C. Product Maintenance Manual: Assemble a complete set of maintenance data indicating care and maintenance of each product, material, and finish incorporated into the Work.
- D. Operation and Maintenance Manuals: Assemble a complete set of operation and maintenance data indicating operation and maintenance of each system, subsystem, and piece of equipment not part of a system.
1. Engage a factory-authorized service representative to assemble and prepare information for each system, subsystem, and piece of equipment not part of a system.
 2. Prepare a separate manual for each system and subsystem, in the form of an instructional manual for use by Owner's operating personnel.
- E. Manufacturers' Data: Where manuals contain manufacturers' standard printed data, include only sheets pertinent to product or component installed. Mark each sheet to identify each product or component incorporated into the Work. If data include more than one item in a tabular format, identify each item using appropriate references from the Contract Documents. Identify data applicable to the Work and delete references to information not applicable.

1. Prepare supplementary text if manufacturers' standard printed data are not available and where the information is necessary for proper operation and maintenance of equipment or systems.
- F. Drawings: Prepare drawings supplementing manufacturers' printed data to illustrate the relationship of component parts of equipment and systems and to illustrate control sequence and flow diagrams. Coordinate these drawings with information contained in record Drawings to ensure correct illustration of completed installation.
1. Do not use original project record documents as part of operation and maintenance manuals.
 2. Comply with requirements of newly prepared record Drawings in Section 017839 "Project Record Documents."
- G. Comply with Section 017700 "Closeout Procedures" for schedule for submitting operation and maintenance documentation.

END OF SECTION 01 7823

SECTION 01 7847 - EQUIPMENT FOR CONFINED SPACE ENTRY

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Furnish protective equipment for the sole use of the Owner's Representative, Architect/Engineer and Commissioning Agent. Include a minimum 2 hours of protective equipment training in accordance with governing regulations for no more than 10 persons on the Town of Miami Garden's Project Manager's staff.

1.02 SUBMITTALS

- A. Waiver of Submittals: The "Waiver of Certain Submittal Requirements" does not apply to this Section.
- B. Submittals Package: Submit the product data and quality control submittals specified below at the same time as a package.
- C. Product Data: Catalog sheets, specifications, and installation or use instructions. Submit within 5 days after award of Contract.
- D. Quality Control Submittals:
 - 1. Training Firm's Qualifications Data: Name, business address, and telephone number of the firm who will be performing the protective equipment training.

1.03 SCHEDULING

- A. Provide protective equipment training and furnish protective equipment, ready for use by the Owner's Representative, Architect-Engineer and Commissioning Agents within 30 days after award of Contract.

PART 2 PRODUCTS

2.01 PROTECTIVE EQUIPMENT

- A. Portable Gas Monitor: Four-gas portable monitor (LEL, O2, CO, H2S), Passport Kit No. 801092 by MSA Company, PO Box 426, Pittsburgh, PA 15230, (800) 672-2222.
 - 1. Kit Includes: Remote sampling pump, 110V charger, one foot sample probe with hydrophobic filter, and 10 foot sampling line.
- B. Calibration Kit: Complete kit, No. 477149 by MSA.
 - 1. Kit Includes: Flow control regulator, adapter hose, calibrations check gas (for all gases).

- C. Carrying Case: No. 633638 by MSA.
- D. Passport Video Tape: No. VT-SP-6 by MSA.
- E. Confined Space Retrieval Kit: No. 696540 by MSA.
 - 1. Kit Includes: Lowering/Arresting/Retrieving (L/A/R) device with full-arrest braking system, quick insert locking pins, 50 foot retractable lifeline with snaphook at one end and pulley with attachment carabiner. Work winch for use with L/A/R device for maneuvering material to tethered worker, complete with quick insert locking pins, 88 foot cable with carabiner. Tripod assembly complete with security chain, telescoping legs with quick insert locking pins and tripod head with attachment eyelets. Carrying bag to hold complete retrieval kit.
- F. Coverall/Harness: Quick-on Coverall/Harness, Part No. 495953 or 495954 Nomex III by MSA.
 - 1. Size as determined by the Owner's Representative.
- G. Escape Self Contained Breathing Apparatus (SCBA): Ten minute bottle, 2216 psi, plastic hood by Surviair, ISI, North, or Life air.
- H. Ventilation Blower: Minimum 600 CFM, 15 amp maximum, UL listed with 20 foot hose, 8 inch hose to hose coupler, 100 foot heavy duty extension cord, and GFI protection by Mopeco, Allegro, Coppus, or Pelsue.
 - 1. Operation: Gas.
 - 2. Operation: Electric.
- I. Hard Hat: ANSI Standard Z 89.1 brimless shell with peak, nylon web suspension and sweat band by American All Safe, Sentry III, or SN III.
 - 1. Color: Yellow.
- J. Gloves: Leather, sturdy and slip resistant work gloves by Pioneer, North, or Best.
 - 1. Size as determined by the Owner's Representative.
- K. Boots: 17 inch high waterproof rubber with top strap, buckle and sure grip cleated outsole by Rainfair or Servus by Lab Safety Supply (800) 356-0783.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Place equipment in storage, as necessary.

END OF SECTION

SECTION 01 7900 - DEMONSTRATION AND TRAINING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes administrative and procedural requirements for instructing Owner's personnel, including the following:
 - 1. Demonstration of operation of systems, subsystems, and equipment.
 - 2. Training in operation and maintenance of systems, subsystems, and equipment.
 - 3. Demonstration and training video recordings.

1.3 INFORMATIONAL SUBMITTALS

- A. Instruction Program: Submit outline of instructional program for demonstration and training, including a list of training modules and a schedule of proposed dates, times, length of instruction time, and instructors' names for each training module. Include learning objective and outline for each training module.
 - 1. Indicate proposed training modules using manufacturer-produced demonstration and training video recordings for systems, equipment, and products in lieu of video recording of live instructional module.
- B. Qualification Data: For **instructor**.
- C. Attendance Record: For each training module, submit list of participants and length of instruction time.
- D. Evaluations: For each participant and for each training module, submit results and documentation of performance-based test.

1.4 CLOSEOUT SUBMITTALS

- A. Demonstration and Training Video Recordings: Submit **two** copies within **seven** days of end of each training module.
 - 1. Identification: On each copy, provide an applied label with the following information:

- a. Name of Project.
 - b. Name and address of videographer.
 - c. Name of Architect.
 - d. Name of Construction Manager.
 - e. Name of Contractor.
 - f. Date of video recording.
2. Transcript: Prepared and bound in format matching operation and maintenance manuals. Mark appropriate identification on front and spine of each binder. Include a cover sheet with same label information as the corresponding video recording. Include name of Project and date of video recording on each page.
 3. Transcript: Prepared in PDF electronic format. Include a cover sheet with same label information as the corresponding video recording and a table of contents with links to corresponding training components. Include name of Project and date of video recording on each page.
 4. At completion of training, submit complete training manual(s) for Owner's use prepared and bound in format matching operation and maintenance manuals.

1.5 QUALITY ASSURANCE

- A. Facilitator Qualifications: A firm or individual experienced in training or educating maintenance personnel in a training program similar in content and extent to that indicated for this Project, and whose work has resulted in training or education with a record of successful learning performance.
- B. Instructor Qualifications: A factory-authorized service representative, complying with requirements in Section 01 4000 "Quality Requirements," experienced in operation and maintenance procedures and training.
- C. Videographer Qualifications: A professional videographer who is experienced photographing demonstration and training events similar to those required.
- D. Pre-instruction Conference: Conduct conference at Project site to comply with requirements in Section 01 3100 "Project Management and Coordination." Review methods and procedures related to demonstration and training including, but not limited to, the following:
 1. Inspect and discuss locations and other facilities required for instruction.
 2. Review and finalize instruction schedule and verify availability of educational materials, instructors' personnel, audiovisual equipment, and facilities needed to avoid delays.
 3. Review required content of instruction.
 4. For instruction that must occur outside, review weather and forecasted weather conditions and procedures to follow if conditions are unfavorable.

1.6 COORDINATION

- A. Coordinate instruction schedule with Owner's operations. Adjust schedule as required to minimize disrupting Owner's operations and to ensure availability of Owner's personnel.

- B. Coordinate instructors, including providing notification of dates, times, length of instruction time, and course content.
- C. Coordinate content of training modules with content of approved emergency, operation, and maintenance manuals. Do not submit instruction program until operation and maintenance data has been reviewed and approved by Architect.

PART 2 - PRODUCTS

2.1 INSTRUCTION PROGRAM

- A. Program Structure: Develop an instruction program that includes individual training modules for each system and for equipment not part of a system, as required by individual Specification Sections.
- B. Training Modules: Develop a learning objective and teaching outline for each module. Include a description of specific skills and knowledge that participant is expected to master. For each module, include instruction for the following as applicable to the system, equipment, or component:
 - 1. Basis of System Design, Operational Requirements, and Criteria: Include the following:
 - a. System, subsystem, and equipment descriptions.
 - b. Performance and design criteria if Contractor is delegated design responsibility.
 - c. Operating standards.
 - d. Regulatory requirements.
 - e. Equipment function.
 - f. Operating characteristics.
 - g. Limiting conditions.
 - h. Performance curves.
 - 2. Documentation: Review the following items in detail:
 - a. Emergency manuals.
 - b. Operations manuals.
 - c. Maintenance manuals.
 - d. Project record documents.
 - e. Identification systems.
 - f. Warranties and bonds.
 - g. Maintenance service agreements and similar continuing commitments.
 - 3. Emergencies: Include the following, as applicable:
 - a. Instructions on meaning of warnings, trouble indications, and error messages.
 - b. Instructions on stopping.
 - c. Shutdown instructions for each type of emergency.
 - d. Operating instructions for conditions outside of normal operating limits.

- e. Sequences for electric or electronic systems.
 - f. Special operating instructions and procedures.
4. Operations: Include the following, as applicable:
- a. Startup procedures.
 - b. Equipment or system break-in procedures.
 - c. Routine and normal operating instructions.
 - d. Regulation and control procedures.
 - e. Control sequences.
 - f. Safety procedures.
 - g. Instructions on stopping.
 - h. Normal shutdown instructions.
 - i. Operating procedures for emergencies.
 - j. Operating procedures for system, subsystem, or equipment failure.
 - k. Seasonal and weekend operating instructions.
 - l. Required sequences for electric or electronic systems.
 - m. Special operating instructions and procedures.
5. Adjustments: Include the following:
- a. Alignments.
 - b. Checking adjustments.
 - c. Noise and vibration adjustments.
 - d. Economy and efficiency adjustments.
6. Troubleshooting: Include the following:
- a. Diagnostic instructions.
 - b. Test and inspection procedures.
7. Maintenance: Include the following:
- a. Inspection procedures.
 - b. Types of cleaning agents to be used and methods of cleaning.
 - c. List of cleaning agents and methods of cleaning detrimental to product.
 - d. Procedures for routine cleaning
 - e. Procedures for preventive maintenance.
 - f. Procedures for routine maintenance.
 - g. Instruction on use of special tools.
8. Repairs: Include the following:
- a. Diagnosis instructions.
 - b. Repair instructions.
 - c. Disassembly; component removal, repair, and replacement; and reassembly instructions.
 - d. Instructions for identifying parts and components.
 - e. Review of spare parts needed for operation and maintenance.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Assemble educational materials necessary for instruction, including documentation and training module. Assemble training modules into a training manual organized in coordination with requirements in Section 01 7823 "Operation and Maintenance Data."
- B. Set up instructional equipment at instruction location.

3.2 INSTRUCTION

- A. Facilitator: Engage a qualified facilitator to prepare instruction program and training modules, to coordinate instructors, and to coordinate between Contractor and Owner for number of participants, instruction times, and location.
- B. Engage qualified instructors to instruct Owner's personnel to adjust, operate, and maintain systems, subsystems, and equipment not part of a system.
 - 1. Architect will furnish an instructor to describe basis of system design, operational requirements, criteria, and regulatory requirements.
 - 2. Owner will furnish an instructor to describe Owner's operational philosophy.
 - 3. Owner will furnish Contractor with names and positions of participants.
- C. Scheduling: Provide instruction at mutually agreed on times. For equipment that requires seasonal operation, provide similar instruction at start of each season.
 - 1. Schedule training with Owner with at least **seven** days' advance notice.
- D. Training Location and Reference Material: Conduct training on-site in the completed and fully operational facility using the actual equipment in-place. Conduct training using final operation and maintenance data submittals.
- E. Evaluation: At conclusion of each training module, assess and document each participant's mastery of module by use of **a demonstration** performance-based test.
- F. Cleanup: Collect used and leftover educational materials and **give to Owner**. Remove instructional equipment. Restore systems and equipment to condition existing before initial training use.

3.3 DEMONSTRATION AND TRAINING VIDEO RECORDINGS

- A. General: Engage a qualified commercial videographer to record demonstration and training video recordings. Record each training module separately. Include classroom instructions and demonstrations, board diagrams, and other visual aids, but not student practice.

1. At beginning of each training module, record each chart containing learning objective and lesson outline.
- B. Video: Provide minimum 640 x 480 video resolution converted to format file type acceptable to Owner, on electronic media.
1. Electronic Media: Read-only format compact disc acceptable to Owner, with commercial-grade graphic label.
 2. File Hierarchy: Organize folder structure and file locations according to project manual table of contents. Provide complete screen-based menu.
 3. File Names: Utilize file names based upon name of equipment generally described in video segment, as identified in Project specifications.
 4. Contractor and Installer Contact File: Using appropriate software, create a file for inclusion on the Equipment Demonstration and Training DVD that describes the following for each Contractor involved on the Project, arranged according to Project table of contents:
 - a. Name of Contractor/Installer.
 - b. Business address.
 - c. Business phone number.
 - d. Point of contact.
 - e. E-mail address.
- C. Recording: Mount camera on tripod before starting recording, unless otherwise necessary to adequately cover area of demonstration and training. Display continuous running time.
1. Film training session(s) in segments not to exceed 15 minutes.
 - a. Produce segments to present a single significant piece of equipment per segment.
 - b. Organize segments with multiple pieces of equipment to follow order of Project Manual table of contents.
 - c. Where a training session on a particular piece of equipment exceeds 15 minutes, stop filming and pause training session. Begin training session again upon commencement of new filming segment.
- D. Light Levels: Verify light levels are adequate to properly light equipment. Verify equipment markings are clearly visible prior to recording.
1. Furnish additional portable lighting as required.
- E. Narration: Describe scenes on video recording by **audio narration by microphone while** video recording is recorded. Include description of items being viewed.
- F. Transcript: Provide a transcript of the narration. Display images and running time captured from videotape opposite the corresponding narration segment.
- G. Preproduced Video Recordings: Provide video recordings used as a component of training modules in same format as recordings of live training.

END OF SECTION 01 7900

SECTION 01 8111 - SUSTAINABLE DESIGN REQUIREMENTS

PART 1 - GENERAL

1.1 SUMMARY

This Section describes general requirements and procedures to comply with the Guiding Principles for Leadership in High Performance and Sustainable Buildings Memorandum of Understanding incorporated in the Executive Orders 13423 and 13514; Energy Policy Act of 2005 (EPA 2005) and the Energy Independence and Security Act of 2007 (EISA 2007).

The Municipal Complex in Miami Gardens, FL is pursuing LEED Platinum certification from the United States Green Building Council. As a requirement for the certification, the General Contractor shall properly manage and account for all the non-hazardous waste generated during the construction process and track the quantity of waste that ends in a landfill. The intention of this project is to divert non-hazardous construction debris from disposal in landfills and incineration facilities, redirect recyclable recovered resources back to the manufacturing process and reuse materials at appropriate sites.

1.2 OBJECTIVES

- A. In order to minimize the environmental impacts of the construction of the new structure and associated site elements, the Contractor during the construction phase of this project shall implement the following procedures:
 - 1. Select products that minimize consumption of non-renewable resources, consume reduced amounts of energy and minimize amounts of pollution to produce, and employ recycled and/or recyclable materials. It is the intent of this project to conform with EPA's Five Guiding Principles on environmentally preferable purchasing. The five principles are:
 - a. Include environmental considerations as part of the normal purchasing process.
 - b. Emphasize pollution prevention early in the purchasing process.
 - c. Examine multiple environmental attributes throughout a product's or service's life cycle.
 - d. Compare relevant environmental impacts when selecting products and services.
 - e. Collect and base purchasing decisions on accurate and meaningful information about environmental performance.
 - 2. Select products and processes that achieve the above objectives to the extent currently possible and practical have been selected and included in these Construction Documents. The Contractor is responsible to maintain and support these objectives in developing means and

methods for performing the work of this Contract and in proposing product substitutions and/or changes to specified processes.

1.3 RELATED DOCUMENTS

- A. Section 01 7419 CONSTRUCTION WASTE MANAGEMENT
- B. LEED for New Construction v3.0 (2009)
- C. Section 01 3514 LEED CREDIT SUMMARY
- D. Section 01 3514.01 LEED NC 2009 CREDIT SUMMARY
- E. Section 01 3515 LEED CERTIFICATION PROCEDURES
- F. Section 01 3516 LEED SUBMITTAL FORMS
- G. Section 01 3516.01 LEED MATERIAL COST SUMMARY FORM H.
Section 01 3516.02 LEED WOOD-CONTAINING PRODUCT LIST I.
Section 01 3516.03 LEED METAL-CONTAINING PRODUCT LIST
- J. Section 01 3516.04 LEED MATERIAL CONTENT FORM
- K. Section 01 3516.05 LEED NEW PRODUCT SOURCE FORM
- L. Section 01 3516.06 LEED REUSED PRODUCT FORM
- M. Section 01 3516.07 LEED PROHIBITED CONTENT INSTALLER CERTIFICATION
- N. Section 01 9113 FUNDAMENTAL AND ENHANCED COMMISSIONING
- O. Section 01 3000 ADMINISTRATIVE REQUIREMENTS

1.4 DEFINITIONS

- A. Agrifiber Products: Composite panel products derived from agricultural fiber
- B. Biobased Product: As defined in the 2002 Farm Bill, a product determined by the Secretary to be a commercial or industrial product (other than food or feed) that is composed, in whole or in significant part, of biological products or renewable domestic agricultural materials (including plant, animal, and marine materials) or forestry materials
- C. Biobased Content: The weight of the biobased material divided by the total weight of the product and expressed as a percentage by weight
- D. Certificates of Chain-of-Custody: Certificates signed by manufacturers certifying that wood used to make products has been tracked through its extraction and fabrication to ensure that it was obtained from forests certified by a specified certification program

- E. Composite Wood: A product consisting of wood fiber or other plant particles bonded together by a resin or binder
- F. Construction and Demolition Waste: Includes solid wastes, such as building materials, packaging, rubbish, debris, and rubble resulting from construction, remodeling, repair and demolition operations. A construction waste management plan is to be provided by the Contractor as defined in Section 01 7419.
- G. Third Party Certification: Certification of levels of environmental achievement by nationally recognized sustainability rating system.
- H. Light Pollution: Light that extends beyond its source such that the additional light is wasted in an unwanted area or in an area where it inhibits view of the night sky
- I. Recycled Content Materials: Products that contain pre-consumer or post-consumer materials as all or part of their feedstock
- J. Post-Consumer Recycled Content: The percentage by weight of constituent materials that have been recovered or otherwise diverted from the solid-waste stream after consumer use
- K. Pre-Consumer Recycled Content: Materials that have been recovered or otherwise diverted from the solid-waste stream during the manufacturing process. Pre-consumer content must be material that would not have otherwise entered the waste stream as per Section 5 of the FTC Act, Part 260 “Guidelines for the Use of Environmental Marketing Claims”:
www.ftc.gov/bcp/grnrule/guides980427
- L. Regional Materials: Materials that are extracted, harvested, recovered, and manufactured within a radius of 250 miles from the Project site
- M. Salvaged or Reused Materials: Materials extracted from existing buildings and site in order to be reused in other buildings or sites without being manufactured.
- N. Sealant: Any material that fills and seals gaps between other materials
- O. Type 1 Finishes: Materials and finishes which have a potential for short-term levels of off gassing from chemicals inherent in their manufacturing process, or which are applied in a form requiring vehicles or carriers for spreading which release a high level of particulate matter in the process of installation and/or curing.
- P. Volatile Organic Compounds (VOCs): Any compound of carbon, excluding carbon monoxide, carbon dioxide, carbonic acid, metallic carbides or carbonates, and ammonium carbonate, which participates in atmospheric photochemical reactions. Compounds that have negligible photochemical reactivity, listed in EPA 40 CFR 51.100(s), are also excluded from this regulatory definition.

1.5 SUBMITTALS

A. Sustainable Design Submittals:

1. **Salvaged or Reused Materials:** Provide documentation that lists each salvaged or reused material, the source or vendor of the material, the purchase price, and the replacement cost if greater than the purchase price.
2. **Recycled Content:** Submittals for all materials with recycled content must include the following documentation:
 - a. Manufacturer's product data, product literature, or a letter from the manufacturer verifying the percentage of post-consumer and pre-consumer recycled content (by weight) of each material or product
 - b. An electronic spreadsheet that tabulates the Project's total materials cost and combined recycled content value (defined as the sum of the post-consumer recycled content value plus one-half of the pre-consumer recycled content value) expressed as a percentage of total materials cost. This spreadsheet shall be submitted every third month with the Contractor's Certificate and Application for Payment. It should indicate, on an ongoing basis, line items for each material, including cost, pre-consumer recycled content, post-consumer recycled content, and combined recycled content value.
3. **Regional Materials:** Submittals for all products or materials expected to contribute to the regional calculation must include the following documentation:
 - a. Cost of each material or product, excluding cost of labor and equipment for installation
 - b. Location of product manufacture and distance from point of manufacture to the Project Site
 - c. Location of point of extraction, harvest, or recovery for each raw material in each product and distance from the point of extraction, harvest, or recovery to the Project Site
 - d. Manufacturer's product data, product literature, or a letter from the manufacturer verifying the location and distance from the Project Site to the point of manufacture for each regional material
 - e. Manufacturer's product data, product literature, or a letter from the manufacturer verifying the location and distance from the Project Site to the point of extraction, harvest, or recovery for each regional material or product, including, at a minimum, gravel and fill, planting materials, concrete, masonry, and GWB

- f. An electronic spreadsheet that tabulates the Project's total materials cost and regional materials value, expressed as a percentage of total materials cost. This spreadsheet shall be submitted every month with the Contractor's Certificate and Application for Payment. It should indicate on an ongoing basis, line items for each material, including cost, location of manufacture, distance from manufacturing plant to the Project Site, location of raw material extraction, and distance from extraction point to the Project Site.
 - g. LEED Documentation shall be provided with each application for payment.
 - 4. Biobased Products:
 - a. Rapidly Renewable Products: Submittals must include written documentation from the manufacturer declaring that rapidly renewable materials are made from plants harvested within a ten-year or shorter cycle and must indicate the percentage (by weight) of these rapidly renewable components contained in the candidate products, along with the costs of each of these materials, excluding labor and delivery costs.
 - b. Certified Wood: Submittals for all wood-based materials must include a statement indicating the cost of each product containing FSC Certified wood, exclusive of labor and delivery costs, and third party verification of certification from one of the following:
 - 1) Documentation from the supplier verifying that 100% of the wood-based content originates from SFI third-party certified forest lands, identifying the company or companies that performed the SFI third-party certification for both the forest land management and the certified product content.
- 5. Blended Cement: It is the intent of this specification to reduce CO2 emissions and other environmentally detrimental effects resulting from the production of portland cement by requiring that all concrete mixes, in aggregate, utilize blended cement mixes to displace 40% of the portland cement typically included in conventional construction. Provide the following submittals:
 - a. Copies of concrete design mixes for all installed concrete
 - b. Copies of typical regional baseline concrete design mixes for all compressive strengths used on the Project
 - c. Quantities in cubic yards of each installed concrete mix
- 6. Green Housekeeping: Provide documentation that all cleaning products and janitorial paper products meet the VOC limits and content requirements of this specification section.
- 7. Project Construction Management Plan: identifying diversion goals, implementation protocols, and parties (General Contractor or Subcontractors) responsible for implementation.

8. Construction Waste Log: a detailed listing of waste generation by type, quantity and their destination.
- B. Project Materials Cost Data: Provide a spreadsheet in an electronic file indicating the total cost for the Project and the total cost of building materials used for the Project, as follows:
1. Not more than 30 days after the Preconstruction Meeting, the General Contractor shall provide to the Owner and Architect a preliminary schedule of materials costs for all materials used for the Project organized by specification section. Include the following:
 - a. Identify each reused or salvaged material, its cost, and its replacement value.
 - b. Identify each recycled-content material, its post-consumer and pre-consumer recycled content as a percentage the product's weight, its cost, its combined recycled content value (defined as the sum of the post-consumer recycled content value plus one-half of the pre-consumer recycled content value), and the total combined recycled content value for all materials as a percentage of total materials costs.
 - c. Identify each regional material, its cost, its manufacturing location, the distance of this location from the Project site, the source location for each raw material component of the material, the distance of these extraction locations from the Project site, and the total value of regional materials as a percentage of total materials costs.
 - d. Identify each biobased material, its source, its cost, and the total value of biobased materials as a percentage of total materials costs. Also provide the total value of rapidly renewable materials (materials made from plants that are harvested in less than a 10-year cycle) as a percentage of total materials costs.
 - e. Identify each wood-based material, its cost, the total wood-based materials cost, each FSC Certified wood material, its cost, and the total value of Certified wood as a percentage of total wood-based materials costs.
 2. Provide final versions of the above spreadsheets to the Owner and Architect not more than 14 days after Substantial Completion.
- C. Construction Waste Management: See Section 01 74 19 "Construction Waste Management" for submittal requirements.
1. The final waste management report shall be submitted to the design team. The LEED AP on the design team shall submit the USGBC LEED Template for LEED credit award.

1.6 QUALITY ASSURANCE

- A. Preconstruction Meeting: After award of Contract and prior to the commencement of the Work, schedule and conduct meeting with Owner, Architect, and all Subcontractors to discuss the Construction Waste Management Plan, and all other Sustainable Design Requirements. The purpose of this meeting is to develop a mutual understanding of the Project's Sustainable Design Requirements and coordination of the Contractor's management of these requirements with the Contracting Officer and the Construction Quality Manager.
- B. Construction Job Conferences: The status of compliance with the Sustainable Design Requirements of these specifications will be an agenda item at all regular job meetings conducted during the course of work at the site.

PART 2 - PRODUCTS

2.1 PRODUCT ENVIRONMENTAL REQUIREMENTS

- A. Site Clearing: Topsoil shall be provided by the Contractor from on-site material which has been stockpiled for reuse. Off-site borrow should only be used when on-site sources are exhausted. Chip and/or compost on site all vegetated material identified for removal.
- B. Do not burn rubbish, organic matter, etc. or any material on the site. Dispose of legally in accordance with Specifications Sections 01 74 19.
- C. Herbicides and Pest Control: Herbicides shall not be permitted, and pest control measures shall utilize EPA-registered biopesticides only. See <http://www.epa.gov/pesticides/ipm>.
- D. The materials in the following list must contain the minimum recycled content indicated:

Category	Minimum Recycled Content
Compost/mulch	100% post-consumer
Cast-in-Place Concrete	6% pre-consumer

PART 3 – EXECUTION

3.1 PREPARATION

A. Planning

1. Create a construction Waste Management Plan
2. General Contractor (GC) to identify on-site recycling locations and review recycling requirements with all subcontractors.
3. Create Diversion / Recycling List

3.2 FIELD QUALITY CONTROL

A. Implementation

1. Execute Waste Management Plan
 - a. The General Contractor shall keep a detailed and updated log of all construction and demolition waste generated by type, the quantity of each type, and the final destination of the waste, recycled, reused or landfilled.
 - b. The General Contractor shall also track the percentage of waste diverted from landfills.
 - c. The General Contractor shall ensure that all subcontractors are properly following the Waste Management Plan
 - d. The General Contractor shall submit detail weekly reports to the project team. Hazardous material (i.e. asbestos) and excavation debris should be excluded from all calculations.

3.3 DIVERSION AND RECYCLING LIST

A. A Diversion and Recycling List with the items to be diverted/recycled and a potential recycling agent is provided. The General Contractor shall prepare a complete list with all of the recycling agencies that are used for the project.

Sample Diversion/Recycling List

LEED Diversion and Recycling List			
City of Miami Gardens- Municipal Complex			
Item	Divesion/Recycling Agent	Contact No	Quantity of Recycling
Cast-in-Place Structural Concrete	Miami-Dade Trash & Recycling Center	305-594-1500	
Concrete Light Post	Miami-Dade Trash & Recycling Center	305-594-1500	
CMU Exterior wall	Miami-Dade Trash & Recycling Center	305-594-1500	
Structural Steel	River Recycling	305-633-1050	
Misc Metal Fabrication	River Recycling	305-633-1050	
Posts & Panels	River Recycling	305-633-1050	
Misc Plumbing Equipment	River Recycling	305-633-1050	
Plumbing Piping	River Recycling	305-633-1050	
Electrical Wiring			
Light Fixtures			
Electrical Panel Board			
Electrical Misc			
Asphalt Paving	Miami-Dade Trash & Recycling Center	305-594-1500	
Concrete Curb	Miami-Dade Trash & Recycling Center	305-594-1500	

3.4 CONSTRUCTION WASTE MANAGEMENT DIVERSION SUMMARY

A. A Construction Waste Management Diversion Summary Table with the items to be diverted or recycled is provided. The General Contractor shall prepare a complete list of all of the elements that were recycled or diverted during the course of the project.

Construction Waste Management Diversion Summary Table

Construction Waste Management Diversion Summary				
City of Miami Gardens- Municipal Complex				
Item	Diversion/Recycling Hauler	Diverted/Recycled Waste (Weight)	Total Waste (Weight)	% Diverted/Recycled
Cast-in-Place Structural Concrete	ABC Recycling Co	1250	2500	50.00
CMU Exterior wall				
Structural Steel				
Misc Plumbing Equipment				
Plumbing Piping				
Electrical Wiring				
Electrical Panel Board				
Electrical Misc				
Asphalt Paving				
Concrete Curb				
Concrete Paving				
	Grand Total	1250	2500	50.00

E N D OF SECTION

SECTION 01 9113- FUNDAMENTAL AND ENHANCED COMMISSIONING REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.
- B. OPR and BOD documentation are included by reference for information only.

1.2 SUMMARY

- A. Section includes general requirements that apply to implementation of commissioning without regard to specific systems, assemblies, or components.

1.3 DEFINITIONS

- A. BOD: Basis of Design: A document that records concepts, calculations, decisions, and product selections used to meet the OPR and to satisfy applicable regulatory requirements, standards, and guidelines. The document includes both narrative descriptions and lists of individual items that support the design process.
- B. Commissioning Agent (CxA): Owner compensated independent agent, not otherwise associated with the Commissioning team members or the Contractor. The CxA directs and coordinates the day-to-day commissioning activities.
- C. Cx: Commissioning.
- D. Commissioning Plan: Overall plan that provides the structure, schedule and coordination planning for the commissioning process.
- E. Functional Performance Test: Test of the function and operation of equipment and systems. Functional testing is the dynamic and interactive testing of systems under full operation. Systems are tested under various modes, such as during low cooling or heating loads, high loads, component failures, unoccupied, varying outside air temperatures, power failure, etc. The systems are run through all the control system's sequences of operation and components are verified to be responding as the sequences state. The commissioning agent develops the functional test procedures in a sequential written form, coordinates, oversees and documents the actual testing, which is performed by the installing contractor or vendor. Functional tests are performed after prefunctional checklists and startup are complete. Functional Performance Testing is not traditional air or water test and balancing.

- F. Prefunctional Checklist: A list of items to inspect and elementary component tests to conduct to verify proper installation of equipment, provided by the CxA to the Contractor. Prefunctional checklists are primarily static inspections and procedures to prepare the equipment or system for initial operation. Some prefunctional checklist items entail simple testing of the function of a component, a piece of equipment or system. Prefunctional checklists augment and are combined with the manufacturer's start-up checklist. The commissioning process requires that the procedures be documented in writing, and that CxA witness much of the prefunctional work and all of the larger or more critical pieces of equipment.
- G. OPR: Owner's Project Requirements: A document that details the functional requirements of a project and the expectations of how it will be used and operated. These include Project goals, measurable performance criteria, cost considerations, benchmarks, success criteria, and supporting information.
- H. Startup: Initial starting or activating of dynamic equipment, including executing prefunctional checklists.
- I. Systems, Subsystems, Equipment, and Components: Where these terms are used together or separately, they shall mean "as-built" systems, subsystems, equipment, and components.

1.4 COMMISSIONING TEAM

- A. Members Appointed by Contractor(s): Individuals, each having the authority to act on behalf of the entity he or she represents, explicitly organized to implement the commissioning process through coordinated action. The commissioning team shall consist of, but not be limited to, representatives of Contractor, including Project superintendent and subcontractors, installers, suppliers, and specialists deemed appropriate by the CxA.
- B. Members Appointed by Owner: Include CxA, Representatives of the facility user and operation and maintenance personnel, and Architect and engineering design professionals.

1.5 SUBMITTALS

- A. Documents: For all systems to be commissioned, the following shall be distributed to the CxA prior to equipment purchase and concurrently with Architect and Engineer of Record. CxA's review of submittal does not alter the scope or responsibility of the Architect or the Engineer of Record.
 - 1. Manufacture's cut sheets.
 - 2. Performance data including but not limited to the following:
 - a. Fan curves.
 - b. Pump curves.
 - 3. Installation and startup manual.

4. Operation, troubleshooting, and maintenance manuals.
 5. Shop drawings.
- B. Documents: For all systems to be commissioned, the following shall be distributed to the CxA prior to the drafting of Prefunctional Checklists and Functional Test Procedures.
1. Sequence of operations including but not limited to the following:
 - a. An overview narrative of the system describing its purpose, components and function.
 - b. All interactions and interlocks with other systems.
 - c. Detailed delineation of control between any packaged controls and the building automation system.
 - d. Written sequences of control for packaged controlled equipment.
 - e. Start-up sequences.
 - f. Warm-up mode sequences.
 - g. Normal operating mode sequences.
 - h. Unoccupied mode sequences.
 - i. Shutdown sequences.
 - j. Temperature and pressure control: setbacks, setups, resets.
 - k. Effects of power or equipment failure with all standby component functions.
 - l. All alarms and emergency shut downs.
 - m. Seasonal operational differences and recommendations.
 - n. Initial and recommended values for all adjustable settings, set-points and parameters that are typically set or adjusted by operating staff; and any other control settings or fixed values, and delays, that shall be useful during testing and operating the equipment.
 - o. Schedules.
 2. Factory test reports.
 3. Start-up and checkout materials that are shipped inside the equipment and the field checkout sheet forms to be used by the factory or field technicians.
 4. Pipe flushing procedures.
 5. Test and balance plan.
 6. Test and balance reports.
 7. Training Plan: Provide plan for and presentation materials related to training of building personnel on the commissioned systems.
 8. Warranty information, including all responsibilities of the Owner to keep the warranty in force clearly identified.
 9. Updated as-built versions of the control drawings and sequences of operation.
- C. Provide the CxA with requested additional documentation in order to complete the commissioning process.

1.6 OWNER'S RESPONSIBILITIES

- A. Provide the OPR documentation to the CxA and Contractor for information and use.

- B. Assign operation and maintenance personnel and schedule them to participate in commissioning team activities.
- C. Provide the BOD documentation, prepared by Architect and approved by Owner, to the CxA and Contractor for use in developing the commissioning plan, systems manual, and operation and maintenance training plan.

1.7 CONTRACTOR'S RESPONSIBILITIES

- A. Contractor shall assign representatives with expertise and authority to act on its behalf and shall schedule them to participate in and perform commissioning process activities including, but not limited to, the following:
 - 1. Evaluate performance deficiencies identified in test reports and, in collaboration with entity responsible for system and equipment installation, recommend corrective action.
 - 2. Cooperate with the CxA for resolution of issues recorded in the Issues Log.
 - 3. Attend commissioning team meetings held on a monthly basis.
 - 4. Integrate and coordinate commissioning process activities with construction schedule.
 - 5. Review and accept construction checklists provided by the CxA.
 - 6. Complete paper and electronic construction checklists as Work is completed and provide to the Commissioning Authority on a biweekly basis.
 - 7. Review and accept commissioning process test procedures provided by the Commissioning Authority.
 - 8. Complete current Architect, Engineer of Record, and Issues Log punch list items before functional testing.
 - 9. Complete commissioning process test procedures.

1.8 CxA'S RESPONSIBILITIES

- A. Organize and lead the commissioning team.
- B. Provide commissioning plan.
- C. Convene commissioning team meetings.
- D. Provide Project-specific construction checklists and commissioning process test procedures.
- E. Verify the execution of commissioning process activities using random sampling. The sampling rate may vary from 1 to 100 percent. Verification will include, but is not limited to, equipment submittals, construction checklists, training, operating and maintenance data, tests, and test reports to verify compliance with the OPR. When a random sample does not meet the requirement, the CxA will report the failure in the Issues Log.

- F. Witness systems, assemblies, equipment, and component startup.
- G. Compile test data, inspection reports, and certificates; include them in the systems manual and commissioning process report.
- H. The CxA will be responsible for overseeing and approving the content and adequacy of the training of Owner personnel for commissioned equipment.

PART 2 - PRODUCTS

2.1 TEST EQUIPMENT

- A. All standard testing equipment required to perform startup and initial checkout and required Prefunctional and Functional performance testing shall be provided by the Division 21, 22, 23, 26, 27, and 28 Sub-Contractors for the equipment and control systems being tested.

PART 3 - EXECUTION

3.1 PREFUNCTIONAL CHECKOUT

- A. Execution of Prefunctional Checklists and Startup.
 - 1. Seven days prior to startup, the Contractor through the Subs and vendors shall schedule startup and checkout with the CxA. The performance of the Prefunctional checklists, startup and checkout are executed by the Contractor's Sub or vendor. When executing Prefunctional checklists, signatures may be required of other Subs for verification of completion of their work.
 - 2. The CxA will observe, at minimum, the procedures for each piece of primary equipment, unless there are multiple units, in which case a sampling strategy may be used.
 - 3. For lower-level components of equipment, such as, VAV boxes, sensors, controllers, the CxA will observe a sampling of the Prefunctional and start-up procedures.
 - 4. The Contractor shall execute startup and provide the CxA with a signed and dated copy of the completed start-up and Prefunctional tests and checklists.
 - 5. Only individuals that have direct knowledge and witnessed that a line item task on the Prefunctional checklist was actually performed shall initial or check that item off. It is not acceptable for witnessing supervisors to fill out these forms.
- B. Deficiencies, Non-Conformance and Approval in Checklists and Startup
 - 1. Contractor shall clearly list any outstanding items of the initial start-up and Prefunctional procedures that were not completed successfully, at the bottom of the procedures form or on an attached sheet. The procedures form and any

outstanding deficiencies are provided to the CxA within two days of test completion.

2. Contractor shall correct all areas that are deficient or incomplete in the checklists and tests in a timely manner, and shall notify the CxA as soon as outstanding items have been corrected and resubmit an updated start-up report and a Statement of Correction on the original non-compliance report.

3.2 CONTROLS CHECKOUT

- A. Contractor shall notify CxA of controls check-out procedures 7 days prior to work being preformed. At completion of controls checkout, Contractor shall provide CxA with any checklists and/or summary reports.

3.3 TAB

- A. TAB shall be preformed after controls check-out has been approved by the CxA.
- B. Contractor shall notify CxA of TAB 7 days prior to the work being performed. At the completion of TAB Contractor shall provide CxA with the Tab report.

3.4 FUNCTIONAL PERFORMANCE TESTING

- A. Contractor shall schedule and execute the functional tests. Functional testing is conducted after TAB has been completed and approved by CxA.

3.5 TRAINING OF PERSONNEL

- A. Contractor shall schedule and conduct training of Owner designated personnel.
- B. Contractor shall record training sessions on video and provide in format acceptable to CxA.

3.6 DEFERRED TESTING

- A. Contractor shall provide prefunctional checkout, controls checkout, TAB, functional performance testing and training of personnel for any tests deferred due to reasons of building structure, required occupancy conditions or other deficiency determined by the CxA. These tests shall be conducted in the same manner as non deferred activities.

END OF SECTION

SECTION 024116 - STRUCTURE DEMOLITION

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. Demolition and removal of buildings and site improvements.

- B. Related Requirements:

- 1. Section 011000 "Summary" for use of the premises and phasing requirements.
 - 2. Section 013200 "Construction Progress Documentation" for preconstruction photographs taken before building demolition.
 - 3. Section 024119 "Selective Demolition" for partial demolition of buildings, structures, and site improvements.
 - 4. Section 311000 "Site Clearing" for site clearing and removal of above- and below-grade site improvements not part of building demolition.

1.3 DEFINITIONS

- A. Remove: Detach items from existing construction and dispose of them off-site unless indicated to be salvaged.
- B. Remove and Salvage: Detach items from existing construction, in a manner to prevent damage, and deliver to Owner ready for reuse. Include fasteners or brackets needed for reattachment elsewhere.

1.4 MATERIALS OWNERSHIP

- A. Unless otherwise indicated, demolition waste becomes property of Contractor.
- B. Historic items, relics, antiques, and similar objects including, but not limited to, cornerstones and their contents, commemorative plaques and tablets, and other items of interest or value to Owner that may be uncovered during demolition remain the property of Owner.
 - 1. Carefully salvage in a manner to prevent damage and promptly return to Owner.

1.5 PREINSTALLATION MEETINGS

- A. Predemolition Conference: Conduct conference at owner's selected location.
 - 1. Inspect and discuss condition of construction to be demolished.
 - 2. Review structural load limitations of existing structures.
 - 3. Review and finalize building demolition schedule and verify availability of demolition personnel, equipment, and facilities needed to make progress and avoid delays.
 - 4. Review and finalize protection requirements.
 - 5. Review procedures for noise control and dust control.
 - 6. Review procedures for protection of adjacent buildings.
 - 7. Review items to be salvaged and returned to Owner.

1.6 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For refrigerant recovery technician.
- B. Engineering Survey: Submit engineering survey of condition of building.
- C. Proposed Protection Measures: Submit report, including Drawings, that indicates the measures proposed for protecting individuals and property. Indicate proposed locations and construction of barriers.
 - 1. Adjacent Buildings: Detail special measures proposed to protect adjacent buildings to remain.
- D. Schedule of Building Demolition Activities: Indicate the following:
 - 1. Detailed sequence of demolition work, with starting and ending dates for each activity.
 - 2. Temporary interruption of utility services.
 - 3. Shutoff and capping of utility services.
- E. Predemolition Photographs or Video: Show existing conditions of adjoining construction and site improvements, including finish surfaces, that might be misconstrued as damage caused by demolition operations. Comply with Section 013233 "Photographic Documentation." Submit before the Work begins.
- F. Statement of Refrigerant Recovery: Signed by refrigerant recovery technician responsible for recovering refrigerant, stating that all refrigerant that was present was recovered and that recovery was performed according to EPA regulations. Include name and address of technician and date refrigerant was recovered.

1.7 CLOSEOUT SUBMITTALS

- A. Inventory: Submit a list of items that have been removed and salvaged.

1.8 QUALITY ASSURANCE

- A. Refrigerant Recovery Technician Qualifications: Certified by EPA-approved certification program.

1.9 FIELD CONDITIONS

- A. Buildings to be demolished will be vacated and their use discontinued before start of the Work.
- B. Buildings immediately adjacent to demolition area will be occupied. Conduct building demolition so operations of occupied buildings will not be disrupted.
 - 1. Provide not less than 72 hours' notice of activities that will affect operations of adjacent occupied buildings.
 - 2. Maintain access to existing walkways, exits, and other facilities used by occupants of adjacent buildings.
 - a. Do not close or obstruct walkways, exits, or other facilities used by occupants of adjacent buildings without written permission from authorities having jurisdiction.
- C. Conditions existing at time of inspection for bidding purpose will be maintained by Owner as far as practical.
 - 1. Before building demolition, Owner will remove the following items:
 - a. **<Insert items to be removed by Owner>.**
- D. Hazardous Materials: It is not expected that hazardous materials will be encountered in the Work.
 - 1. Hazardous materials will be removed by Owner before start of the Work.
 - 2. If materials suspected of containing hazardous materials are encountered, do not disturb; immediately notify Architect and Owner. Hazardous materials will be removed by Owner under a separate contract.
- E. Hazardous Materials: Present in buildings and structures to be demolished. A report on the presence of hazardous materials is on file for review and use. Examine report to become aware of locations where hazardous materials are present.
 - 1. Hazardous material remediation is specified elsewhere in the Contract Documents.
 - 2. Do not disturb hazardous materials or items suspected of containing hazardous materials except under procedures specified elsewhere in the Contract Documents.
 - 3. Owner will provide material safety data sheets for materials that are known to be present in buildings and structures to be demolished because of building operations or processes performed there.
- F. On-site storage or sale of removed items or materials is not permitted.

1.10 COORDINATION

- A. Arrange demolition schedule so as not to interfere with Owner's on-site operations or operations of adjacent occupied buildings.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Regulatory Requirements: Comply with governing EPA notification regulations before beginning demolition. Comply with hauling and disposal regulations of authorities having jurisdiction.
- B. Standards: Comply with ASSE A10.6 and NFPA 241.

2.2 SOIL MATERIALS

- A. Satisfactory Soils: Comply with requirements in Section 312000 "Earth Moving."

PART 3 - EXECUTION

3.1 DEMOLITION CONTRACTOR

- A. Demolition Contractor:
 - 1. **<Insert, in separate subparagraphs, name of Contractor prequalified to perform the Work of this Section>.**

3.2 EXAMINATION

- A. Verify that utilities have been disconnected and capped before starting demolition operations.
- B. Review Project Record Documents of existing construction or other existing condition and hazardous material information provided by Owner. Owner does not guarantee that existing conditions are same as those indicated in Project Record Documents.
- C. Engage a professional engineer to perform an engineering survey of condition of building to determine whether removing any element might result in structural deficiency or unplanned collapse of any portion of structure or adjacent structures during building demolition operations.
- D. Steel Tendons: Locate tensioned steel tendons and include recommendations for de-tensioning.
- E. Verify that hazardous materials have been remediated before proceeding with building demolition operations.
- F. Inventory and record the condition of items to be removed and salvaged. Provide photographs or video of conditions that might be misconstrued as damage caused by salvage operations. Comply with Section 013233 "Photographic Documentation."

3.3 PREPARATION

- A. Refrigerant: Before starting demolition, remove refrigerant from mechanical equipment according to 40 CFR 82 and regulations of authorities having jurisdiction.
- B. Salvaged Items: Comply with the following:
 - 1. Clean salvaged items of dirt and demolition debris.
 - 2. Pack or crate items after cleaning. Identify contents of containers.
 - 3. Store items in a secure area until delivery to Owner.
 - 4. Transport items to storage area designated by Owner.
 - 5. Protect items from damage during transport and storage.

3.4 UTILITY SERVICES AND MECHANICAL/ELECTRICAL SYSTEMS

- A. Existing Utilities to be Disconnected: Locate, identify, disconnect, and seal or cap off utilities serving buildings and structures to be demolished.
 - 1. Owner will arrange to shut off utilities when requested by Contractor.
 - 2. Arrange to shut off utilities with utility companies.
 - 3. If removal, relocation, or abandonment of utility services will affect adjacent occupied buildings, then provide temporary utilities that bypass buildings and structures to be demolished and that maintain continuity of service to other buildings and structures.
 - 4. Cut off pipe or conduit a minimum of [24 inches (610 mm)] <Insert depth> below grade. Cap, valve, or plug and seal remaining portion of pipe or conduit after bypassing according to requirements of authorities having jurisdiction.
 - 5. Do not start demolition work until utility disconnecting and sealing have been completed and verified in writing.

3.5 PROTECTION

- A. Existing Facilities: Protect adjacent walkways, loading docks, building entries, and other building facilities during demolition operations. Maintain exits from existing buildings.
- B. Temporary Shoring: Provide and maintain interior and exterior shoring, bracing, or structural support to preserve stability and prevent unexpected movement or collapse of construction being demolished.
 - 1. Strengthen or add new supports when required during progress of demolition.
- C. Existing Utilities to Remain: Maintain utility services to remain and protect from damage during demolition operations.
 - 1. Do not interrupt existing utilities serving adjacent occupied or operating facilities unless authorized in writing by Owner and authorities having jurisdiction.
 - 2. Provide temporary services during interruptions to existing utilities, as acceptable to Owner and authorities having jurisdiction.

- a. Provide at least 72 hours' notice to occupants of affected buildings if shutdown of service is required during changeover.

D. Temporary Protection: Erect temporary protection, such as walks, fences, railings, canopies, and covered passageways, where required by authorities having jurisdiction and as indicated. Comply with requirements in Section 015000 "Temporary Facilities and Controls."

1. Protect adjacent buildings and facilities from damage due to demolition activities.
2. Protect existing site improvements, appurtenances, and landscaping to remain.
3. Erect a plainly visible fence around drip line of individual trees or around perimeter drip line of groups of trees to remain.
4. Provide temporary barricades and other protection required to prevent injury to people and damage to adjacent buildings and facilities to remain.
5. Provide protection to ensure safe passage of people around building demolition area and to and from occupied portions of adjacent buildings and structures.
6. Protect walls, windows, roofs, and other adjacent exterior construction that are to remain and that are exposed to building demolition operations.
7. Erect and maintain dustproof partitions and temporary enclosures to limit dust, noise, and dirt migration to occupied portions of adjacent buildings.

E. Remove temporary barriers and protections where hazards no longer exist. Where open excavations or other hazardous conditions remain, leave temporary barriers and protections in place.

3.6 DEMOLITION, GENERAL

A. General: Demolish indicated buildings and site improvements completely. Use methods required to complete the Work within limitations of governing regulations and as follows:

1. Do not use cutting torches until work area is cleared of flammable materials. Maintain portable fire-suppression devices during flame-cutting operations.
2. Maintain fire watch during and for at least **<Insert number>** hours after flame-cutting operations.
3. Maintain adequate ventilation when using cutting torches.
4. Locate building demolition equipment and remove debris and materials so as not to impose excessive loads on supporting walls, floors, or framing.

B. Site Access and Temporary Controls: Conduct building demolition and debris-removal operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.

1. Do not close or obstruct streets, walks, walkways, or other adjacent occupied or used facilities without permission from Owner and authorities having jurisdiction. Provide alternate routes around closed or obstructed trafficways if required by authorities having jurisdiction.
2. Use water mist and other suitable methods to limit spread of dust and dirt. Comply with governing environmental-protection regulations. Do not use water when it may damage adjacent construction or create hazardous or objectionable conditions, such as ice, flooding, and pollution.

C. Explosives: Use of explosives is not permitted.

3.7 DEMOLITION BY EXPLOSIVES

- A. Explosives: Perform explosive demolition according to governing regulations.
 - 1. Obtain written permission from authorities having jurisdiction before bringing explosives to, or using explosives on, Project site.
 - 2. Do not damage adjacent structures, property, or site improvements when using explosives.
- B. Comply with recommendation in specialty explosives consultant's report.

3.8 DEMOLITION BY MECHANICAL MEANS

- A. Proceed with demolition of structural framing members systematically, from higher to lower level. Complete building demolition operations above each floor or tier before disturbing supporting members on the next lower level.
- B. Remove debris from elevated portions of the building by chute, hoist, or other device that will convey debris to grade level in a controlled descent.
 - 1. Remove structural framing members and lower to ground by method suitable to minimize ground impact and dust generation.
- C. Salvage: Items to be removed and salvaged are indicated to be discussed with owner.
- D. Below-Grade Construction: Abandon foundation walls and other below-grade construction. Cut below-grade construction flush with grade.
- E. Below-Grade Construction: Demolish foundation walls and other below-grade construction that are within footprint of new construction and extending **[5 feet (1.5 m)]** <Insert dimension> outside footprint indicated for new construction. Abandon below-grade construction outside this area.
 - 1. Remove below-grade construction, including basements, foundation walls, and footings, **[completely] [to at least 6 inches (150 mm) below grade] [to at least 12 inches (300 mm) below grade] [to depths indicated]**.
- F. Below-Grade Construction: Demolish foundation walls and other below-grade construction.
 - 1. Remove below-grade construction, including basements, foundation walls, and footings, **[completely] [to at least 6 inches (150 mm) below grade] [to at least 12 inches (300 mm) below grade] [to depths indicated]**.
- G. Existing Utilities: Abandon existing utilities and below-grade utility structures. Cut utilities flush with grade.
- H. Existing Utilities: Demolish existing utilities and below-grade utility structures that are within **[5 feet (1.5 m)]** <Insert dimension> outside footprint indicated for new construction. Abandon utilities outside this area.
 - 1. Fill abandoned utility structures with **[satisfactory soil materials] [recycled pulverized concrete]** according to backfill requirements in Section 312000 "Earth Moving."

- I. Existing Utilities: Demolish and remove existing utilities and below-grade utility structures.
- J. Hydraulic Elevator Systems: Demolish and remove elevator system, including cylinder, plunger, well assembly, steel well casing and liner, oil supply lines, and tanks.

3.9 SITE RESTORATION

- A. Below-Grade Areas: Rough grade below-grade areas ready for further excavation or new construction.
- B. Below-Grade Areas: Completely fill below-grade areas and voids resulting from building demolition operations with **[satisfactory soil materials] [recycled pulverized concrete] [recycled pulverized masonry]** according to backfill requirements in Section 312000 "Earth Moving."
- C. Site Grading: Uniformly rough grade area of demolished construction to a smooth surface, free from irregular surface changes. Provide a smooth transition between adjacent existing grades and new grades.

3.10 REPAIRS

- A. Promptly repair damage to adjacent buildings caused by demolition operations.

3.11 DISPOSAL OF DEMOLISHED MATERIALS

- A. Remove demolition waste materials from Project site and dispose of them in an EPA-approved construction and demolition waste landfill acceptable to authorities having jurisdiction. **[and recycle or dispose of them according to Section 017419 "Construction Waste Management and Disposal."]**
 - 1. Do not allow demolished materials to accumulate on-site.
 - 2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.
- B. Do not burn demolished materials.

3.12 CLEANING

- A. Clean adjacent structures and improvements of dust, dirt, and debris caused by building demolition operations. Return adjacent areas to condition existing before building demolition operations began.
 - 1. Clean roadways of debris caused by debris transport.

END OF SECTION 024116

SECTION 055000 - METAL FABRICATIONS

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. Miscellaneous steel trim including steel angle corner guards, steel edgings and loading-dock edge angles.
 - 2. Metal bollards.
 - 3. Wire rope parking garage guards.
 - 4. Downspout guards.
 - 5. Metal downspout boots.
 - 6. Loose bearing and leveling plates for applications where they are not specified in other Sections.
- B. Products furnished, but not installed, under this Section include the following:
 - 1. Loose steel lintels.
 - 2. Anchor bolts, steel pipe sleeves, slotted-channel inserts, and wedge-type inserts indicated to be cast into concrete or built into unit masonry.
 - 3. Steel weld plates and angles for casting into concrete for applications where they are not specified in other Sections.
- C. Related Requirements:
 - 1. Section 033000 "Cast-in-Place Concrete" for installing anchor bolts, steel pipe sleeves, slotted-channel inserts, wedge-type inserts, and other items cast into concrete.
 - 2. Section 042000 "Unit Masonry" for installing loose lintels, anchor bolts, and other items built into unit masonry.
 - 3. Section 051200 "Structural Steel Framing."
 - 4. Section 129300 "Site Furnishings" for bicycle racks.
 - 5. Section 329300 "Plants" for tree grates.

1.3 COORDINATION

- A. Coordinate selection of shop primers with topcoats to be applied over them. Comply with paint and coating manufacturers' written recommendations to ensure that shop primers and topcoats are compatible with one another.

- B. Coordinate installation of metal fabrications that are anchored to or that receive other work. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.

1.4 ACTION SUBMITTALS

- A. Product Data: For the following:
 - 1. Nonslip aggregates and nonslip-aggregate surface finishes.
 - 2. Prefabricated building columns.
 - 3. Metal nosings and treads.
 - 4. Paint products.
 - 5. Grout.
- B. Shop Drawings: Show fabrication and installation details. Include plans, elevations, sections, and details of metal fabrications and their connections. Show anchorage and accessory items. Provide Shop Drawings for the following:
 - 1. Miscellaneous steel trim including steel angle corner guards, steel edgings and loading-dock edge angles.
 - 2. Metal bollards.
 - 3. Wire rope parking garage guards.
 - 4. Downspout guards.
 - 5. Metal downspout boots.
 - 6. Loose bearing and leveling plates for applications where they are not specified in other Sections.

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For professional engineer.
- B. Mill Certificates: Signed by stainless-steel manufacturers, certifying that products furnished comply with requirements.
- C. Welding certificates.
- D. Paint Compatibility Certificates: From manufacturers of topcoats applied over shop primers, certifying that shop primers are compatible with topcoats.
- E. Research/Evaluation Reports: For post-installed anchors, from ICC-ES.

1.6 QUALITY ASSURANCE

- A. Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."

B. Welding Qualifications: Qualify procedures and personnel according to the following:

1. AWS D1.1/D1.1M, "Structural Welding Code - Steel."
2. AWS D1.2/D1.2M, "Structural Welding Code - Aluminum."
3. AWS D1.6/D1.6M, "Structural Welding Code - Stainless Steel."

1.7 FIELD CONDITIONS

A. Field Measurements: Verify actual locations of walls and other construction contiguous with metal fabrications by field measurements before fabrication.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Engage a qualified professional engineer, as defined in Section 014000 "Quality Requirements," to design **[ladders]** **[and]** **[alternating tread devices]**.
- B. Structural Performance of Aluminum Ladders: Aluminum ladders[, **including landings,**] shall withstand the effects of loads and stresses within limits and under conditions specified in ANSI A14.3.
- C. Structural Performance of Alternating Tread Devices: Alternating tread devices shall withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated.
1. Uniform Load: 100 lbf/sq. ft. (4.79 kN/sq. m).
 2. Concentrated Load: 300 lbf (1.33 kN) applied on an area of 4 sq. in. (2580 sq. mm).
 3. Uniform and concentrated loads need not be assumed to act concurrently.
 4. Alternating Tread Device Framing: Capable of withstanding stresses resulting from railing loads in addition to loads specified above.
- D. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes acting on exterior metal fabrications by preventing buckling, opening of joints, overstressing of components, failure of connections, and other detrimental effects.
1. Temperature Change: **[120 deg F (67 deg C), ambient; 180 deg F (100 deg C), material surfaces]** **<Insert temperature change>**.

2.2 METALS

A. Metal Surfaces, General: Provide materials with smooth, flat surfaces unless otherwise indicated. For metal fabrications exposed to view in the completed Work, provide materials without seam marks, roller marks, rolled trade names, or blemishes.

- B. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.
- C. Stainless-Steel Sheet, Strip, and Plate: ASTM A 240/A 240M or ASTM A 666, **[Type 304]** **[Type 316L]**.
- D. Stainless-Steel Bars and Shapes: ASTM A 276, **[Type 304]** **[Type 316L]**.
- E. Rolled-Steel Floor Plate: ASTM A 786/A 786M, rolled from plate complying with ASTM A 36/A 36M or ASTM A 283/A 283M, Grade C or D.
- F. Rolled-Stainless-Steel Floor Plate: ASTM A 793.
- G. Round steel tubing and pipe are sized differently. Pipe is designated by the terms "nominal pipe size (NPS)" in inches or "diameter nominal (DN)" in millimeters, and by "weight" or "schedule number." The NPS is approximately equal to the ID for Schedule 40 or Standard Weight pipe; the DN is a rounded conversion of the NPS. For other weights, the size is neither OD nor ID because the OD is kept the same for all weights (to allow use of the same pipe fittings) and the ID is varied to provide the required wall thickness. Round tube is designated by OD and wall thickness. Although the size designations are different, only the round tube sizes that match pipe sizes are generally available.
- H. Steel Tubing: ASTM A 500/A 500M, cold-formed steel tubing.
- I. Steel Pipe: ASTM A 53/A 53M, Standard Weight (Schedule 40) unless otherwise indicated.
- J. Zinc-Coated Steel Wire Rope: ASTM A 741.
 - 1. Wire-Rope Fittings: Hot-dip galvanized-steel connectors with capability to sustain, without failure, a load equal to minimum breaking strength of wire rope with which they are used.
- K. Slotted Channel Framing: Cold-formed metal box channels (struts) complying with MFMA-4.
 - 1. Size of Channels: **[1-5/8 by 1-5/8 inches (41 by 41 mm)] [As indicated] <Insert size>**.
 - 2. Material: Galvanized steel, ASTM A 653/A 653M, **[commercial steel, Type B] [structural steel, Grade 33 (Grade 230)]**, with G90 (Z275) coating; **[0.108-inch (2.8-mm)] [0.079-inch (2-mm)] [0.064-inch (1.6-mm)]** nominal thickness.
 - 3. Material: Cold-rolled steel, ASTM A 1008/A 1008M, **[commercial steel, Type B] [structural steel, Grade 33 (Grade 230)]**; **[0.0966-inch (2.5-mm)] [0.0677-inch (1.7-mm)] [0.0528-inch (1.35-mm)]** minimum thickness; **[unfinished] [coated with rust-inhibitive, baked-on, acrylic enamel] [hot-dip galvanized after fabrication]**.
- L. Cast Iron: Either gray iron, ASTM A 48/A 48M, or malleable iron, ASTM A 47/A 47M, unless otherwise indicated.
- M. Aluminum Plate and Sheet: ASTM B 209 (ASTM B 209M), Alloy 6061-T6.
- N. Aluminum Extrusions: ASTM B 221 (ASTM B 221M), Alloy 6063-T6.

- O. Aluminum-Alloy Rolled Tread Plate: ASTM B 632/B 632M, Alloy 6061-T6.
- P. Aluminum Castings: ASTM B 26/B 26M, Alloy 443.0-F.
- Q. Bronze Extrusions: ASTM B 455, Alloy UNS No. C38500 (extruded architectural bronze).
- R. Bronze Castings: ASTM B 584, Alloy UNS No. C83600 (lead red brass) or No. C84400 (lead semired brass).
- S. Nickel Silver Extrusions: ASTM B 151/B 151M, Alloy UNS No. C74500.
- T. Nickel Silver Castings: ASTM B 584, Alloy UNS No. C97600 (20 percent lead nickel bronze).

2.3 FASTENERS

- A. General: Unless otherwise indicated, provide [**Type 304**] [**Type 316**] stainless-steel fasteners for exterior use and zinc-plated fasteners with coating complying with ASTM B 633 or ASTM F 1941 (ASTM F 1941M), Class Fe/Zn 5, at exterior walls. Select fasteners for type, grade, and class required.
 - 1. Provide stainless-steel fasteners for fastening aluminum.
 - 2. Provide stainless-steel fasteners for fastening stainless steel.
 - 3. Provide stainless-steel fasteners for fastening nickel silver.
 - 4. Provide bronze fasteners for fastening bronze.
- B. Steel Bolts and Nuts: Regular hexagon-head bolts, ASTM A 307, Grade A (ASTM F 568M, Property Class 4.6); with hex nuts, ASTM A 563 (ASTM A 563M); and, where indicated, flat washers.
- C. Steel Bolts and Nuts: Regular hexagon-head bolts, ASTM A 325, Type 3 (ASTM A 325M, Type 3); with hex nuts, ASTM A 563, Grade C3 (ASTM A 563M, Class 8S3); and, where indicated, flat washers.
- D. Stainless-Steel Bolts and Nuts: Regular hexagon-head annealed stainless-steel bolts, ASTM F 593 (ASTM F 738M); with hex nuts, ASTM F 594 (ASTM F 836M); and, where indicated, flat washers; Alloy [**Group 1 (A1)**] [**Group 2 (A4)**].
- E. Anchor Bolts: ASTM F 1554, Grade 36, of dimensions indicated; with nuts, ASTM A 563 (ASTM A 563M); and, where indicated, flat washers.
 - 1. Hot-dip galvanize or provide mechanically deposited, zinc coating where item being fastened is indicated to be galvanized.
- F. Anchors, General: Anchors capable of sustaining, without failure, a load equal to six times the load imposed when installed in unit masonry and four times the load imposed when installed in concrete, as determined by testing according to ASTM E 488/E 488M, conducted by a qualified independent testing agency.

- G. Cast-in-Place Anchors in Concrete: Either threaded type or wedge type unless otherwise indicated; galvanized ferrous castings, either ASTM A 47/A 47M malleable iron or ASTM A 27/A 27M cast steel. Provide bolts, washers, and shims as needed, all hot-dip galvanized per ASTM F 2329.
- H. Post-Installed Anchors: [**Torque-controlled expansion anchors**] [or] [**chemical anchors**].
 - 1. Material for Interior Locations: Carbon-steel components zinc plated to comply with ASTM B 633 or ASTM F 1941 (ASTM F 1941M), Class Fe/Zn 5, unless otherwise indicated.
 - 2. Material for Exterior Locations and Where Stainless Steel Is Indicated: Alloy [**Group 1 (A1)**] [**Group 2 (A4)**] stainless-steel bolts, ASTM F 593 (ASTM F 738M), and nuts, ASTM F 594 (ASTM F 836M).
- I. Slotted-Channel Inserts: Cold-formed, hot-dip galvanized-steel box channels (struts) complying with MFMA-4, 1-5/8 by 7/8 inches (41 by 22 mm) by length indicated with anchor straps or studs not less than 3 inches (75 mm) long at not more than 8 inches (200 mm) o.c. Provide with temporary filler and tee-head bolts, complete with washers and nuts, all zinc-plated to comply with ASTM B 633, Class Fe/Zn 5, as needed for fastening to inserts.

2.4 MISCELLANEOUS MATERIALS

- A. Shop Primers: Provide primers that comply with [**Section 099113 "Exterior Painting."**] [**Section 099123 Interior Painting."**] [**Section 099600 "High-Performance Coatings."**] [**Section 099113 "Exterior Painting," Section 099123 Interior Painting," and Section 099600 "High-Performance Coatings."**]
- B. Universal Shop Primer: Fast-curing, lead- and chromate-free, universal modified-alkyd primer complying with MPI#79 and compatible with topcoat.
 - 1. Use primer containing pigments that make it easily distinguishable from zinc-rich primer.
- C. Water-Based Primer: Emulsion type, anticorrosive primer for mildly corrosive environments that is resistant to flash rusting when applied to cleaned steel, complying with MPI#107 and compatible with topcoat.
 - 1. <Double click here to find, evaluate, and insert list of manufacturers and products.>
- D. Epoxy Zinc-Rich Primer: Complying with MPI#20 and compatible with topcoat.
 - 1. <Double click here to find, evaluate, and insert list of manufacturers and products.>
- E. Shop Primer for Galvanized Steel: Primer formulated for exterior use over zinc-coated metal and compatible with finish paint systems indicated.
- F. Galvanizing Repair Paint: High-zinc-dust-content paint complying with SSPC-Paint 20 and compatible with paints specified to be used over it.

- G. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D 1187/D 1187M.
- H. Nonshrink, Nonmetallic Grout: Factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C 1107/C 1107M. Provide grout specifically recommended by manufacturer for interior and exterior applications.
- I. Concrete: Comply with requirements in Section 033000 "Cast-in-Place Concrete" for normal-weight, air-entrained, concrete with a minimum 28-day compressive strength of 3000 psi (20 MPa).

2.5 FABRICATION, GENERAL

- A. Shop Assembly: Preassemble items in the shop to greatest extent possible. Disassemble units only as necessary for shipping and handling limitations. Use connections that maintain structural value of joined pieces. Clearly mark units for reassembly and coordinated installation.
- B. Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges to a radius of approximately 1/32 inch (1 mm) unless otherwise indicated. Remove sharp or rough areas on exposed surfaces.
- C. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing work.
- D. Form exposed work with accurate angles and surfaces and straight edges.
- E. Weld corners and seams continuously to comply with the following:
 - 1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
 - 2. Obtain fusion without undercut or overlap.
 - 3. Remove welding flux immediately.
 - 4. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing[**and contour of welded surface matches that of adjacent surface**].
- F. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners or welds where possible. Where exposed fasteners are required, use Phillips flat-head (countersunk) fasteners unless otherwise indicated. Locate joints where least conspicuous.
- G. Fabricate seams and other connections that are exposed to weather in a manner to exclude water. Provide weep holes where water may accumulate.
- H. Cut, reinforce, drill, and tap metal fabrications as indicated to receive finish hardware, screws, and similar items.
- I. Provide for anchorage of type indicated; coordinate with supporting structure. Space anchoring devices to secure metal fabrications rigidly in place and to support indicated loads.

- J. Where units are indicated to be cast into concrete or built into masonry, equip with integrally welded steel strap anchors, 1/8 by 1-1/2 inches (3.2 by 38 mm), with a minimum 6-inch (150-mm) embedment and 2-inch (50-mm) hook, not less than 8 inches (200 mm) from ends and corners of units and 24 inches (600 mm) o.c., unless otherwise indicated.

2.6 MISCELLANEOUS FRAMING AND SUPPORTS

- A. General: Provide steel framing and supports not specified in other Sections as needed to complete the Work.
- B. Fabricate units from steel shapes, plates, and bars of welded construction unless otherwise indicated. Fabricate to sizes, shapes, and profiles indicated and as necessary to receive adjacent construction.
 - 1. Fabricate units from slotted channel framing where indicated.
 - 2. Furnish inserts for units installed after concrete is placed.
- C. Fabricate supports for operable partitions from continuous steel beams of sizes **[indicated]** **[recommended by partition manufacturer]** with attached bearing plates, anchors, and braces as **[indicated]** **[recommended by partition manufacturer]**. Drill or punch bottom flanges of beams to receive partition track hanger rods; locate holes where indicated on operable partition Shop Drawings.
- D. Fabricate steel girders for wood frame construction from continuous steel shapes of sizes indicated.
 - 1. Provide bearing plates welded to beams where indicated.
 - 2. Drill or punch girders and plates for field-bolted connections where indicated.
 - 3. Where wood nailers are attached to girders with bolts or lag screws, drill or punch holes at 24 inches (600 mm) o.c.
- E. Fabricate steel pipe columns for supporting wood frame construction from steel pipe with steel baseplates and top plates as indicated. Drill or punch baseplates and top plates for anchor and connection bolts and weld to pipe with fillet welds all around. Make welds the same size as pipe wall thickness unless otherwise indicated.
 - 1. Unless otherwise indicated, fabricate from Schedule 40 steel pipe.
 - 2. Unless otherwise indicated, provide 1/2-inch (12.7-mm) baseplates with four 5/8-inch (16-mm) anchor bolts and 1/4-inch (6.4-mm) top plates.
- F. Galvanize miscellaneous framing and supports where indicated.
- G. Prime miscellaneous framing and supports with **[zinc-rich primer]** **[primer specified in Section 099600 "High-Performance Coatings"]** where indicated.

2.7 PREFABRICATED BUILDING COLUMNS

- A. <Double click here to find, evaluate, and insert list of manufacturers and products.>
- B. General: Provide prefabricated building columns consisting of load-bearing structural-steel members protected by concrete fireproofing encased in an outer non-load-bearing steel shell. Fabricate connections to comply with details shown or as needed to suit type of structure indicated.
- C. Fire-Resistance Ratings: Provide prefabricated building columns listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction for ratings indicated, based on testing according to ASTM E 119.
 - 1. Fire-Resistance Rating: **[4 hours]** **[3 hours]** **[2 hours]** **[As indicated]**.

2.8 SHELF ANGLES

- A. Fabricate shelf angles from steel angles of sizes indicated and for attachment to concrete framing. Provide horizontally slotted holes to receive 3/4-inch (19-mm) bolts, spaced not more than 6 inches (150 mm) from ends and 24 inches (600 mm) o.c., unless otherwise indicated.
 - 1. Provide mitered and welded units at corners.
 - 2. Provide open joints in shelf angles at expansion and control joints. Make open joint approximately 2 inches (50 mm) larger than expansion or control joint.
- B. For cavity walls, provide vertical channel brackets to support angles from backup masonry and concrete.
- C. Galvanize[**and prime**] shelf angles located in exterior walls.
- D. Prime shelf angles located in exterior walls with [**zinc-rich primer.**] [**primer specified in Section 099600 "High-Performance Coatings."**]
- E. Furnish wedge-type concrete inserts, complete with fasteners, to attach shelf angles to cast-in-place concrete.

2.9 METAL LADDERS

- A. General:
 - 1. Comply with ANSI A14.3[, **except for elevator pit ladders**].
 - 2. For elevator pit ladders, comply with ASME A17.1/CSA B44.
- B. Steel Ladders:
 - 1. Space siderails [**16 inches (406 mm)**] [**18 inches (457 mm)**] apart unless otherwise indicated.

2. Siderails: Continuous, **[3/8-by-2-1/2-inch (9.5-by-64-mm)] [1/2-by-2-1/2-inch (12.7-by-64-mm)]** steel flat bars, with eased edges.
3. Rungs: **[3/4-inch- (19-mm-) diameter] [3/4-inch- (19-mm-) square] [1-inch- (25-mm-) diameter] [1-inch- (25-mm-) square]** steel bars.
4. Fit rungs in centerline of siderails; plug-weld and grind smooth on outer rail faces.
5. Provide nonslip surfaces on top of each rung, either by coating rung with aluminum-oxide granules set in epoxy-resin adhesive or by using a type of manufactured rung filled with aluminum-oxide grout.
6. Provide nonslip surfaces on top of each rung by coating with abrasive material metallically bonded to rung.
 - a. <Double click here to find, evaluate, and insert list of manufacturers and products.>
7. Provide platforms as indicated fabricated from welded or pressure-locked steel bar grating, supported by steel angles. Limit openings in gratings to no more than **[1/2 inch (12 mm)] [3/4 inch (19 mm)]** in least dimension.
8. Support each ladder **[at top and bottom and not more than 60 inches (1500 mm) o.c.]** with welded or bolted steel brackets.
9. Galvanize **[and prime] [exterior]** ladders, including brackets.
10. Prime **[exterior]** ladders, including brackets and fasteners, with **[zinc-rich primer.] [primer specified in Section 099600 "High-Performance Coatings."]**

C. Aluminum Ladders:

1. <Double click here to find, evaluate, and insert list of manufacturers and products.>
2. Space siderails **[16 inches (406 mm)] [18 inches (457 mm)]** apart unless otherwise indicated.
3. Siderails: Continuous extruded-aluminum channels or tubes, not less than 2-1/2 inches (64 mm) deep, 3/4 inch (19 mm) wide, and 1/8 inch (3.2 mm) thick.
4. Rungs: Extruded-aluminum tubes, not less than 3/4 inch (19 mm) deep and not less than 1/8 inch (3.2 mm) thick, with ribbed tread surfaces.
5. Fit rungs in centerline of siderails; fasten by welding or with stainless-steel fasteners or brackets and aluminum rivets.
6. Provide platforms as indicated fabricated from **[pressure-locked aluminum bar grating] [or] [extruded-aluminum plank grating]**, supported by extruded-aluminum framing. Limit openings in gratings to no more than **[1/2 inch (12 mm)] [3/4 inch (19 mm)]** in least dimension.
7. Support each ladder **[at top and bottom and not more than 60 inches (1500 mm) o.c.]** with welded or bolted aluminum brackets.
8. Provide minimum 72-inch- (1830-mm-) high, hinged security door with padlock hasp at foot of ladder to prevent unauthorized ladder use.

2.10 LADDER SAFETY CAGES

A. General:

1. Fabricate ladder safety cages to comply with ANSI A14.3. Assemble by welding or with stainless-steel fasteners.
2. Provide primary hoops at tops and bottoms of cages and spaced not more than 20 feet (6 m) o.c. Provide secondary intermediate hoops spaced not more than 48 inches (1200 mm) o.c. between primary hoops.
3. Fasten assembled safety cage to ladder rails and adjacent construction by welding or with stainless-steel fasteners unless otherwise indicated.

B. Steel Ladder Safety Cages:

1. Primary Hoops: 1/4-by-4-inch (6.4-by-100-mm) flat bar hoops.
2. Secondary Intermediate Hoops: 1/4-by-2-inch (6.4-by-50-mm) flat bar hoops.
3. Vertical Bars: 3/16-by-1-1/2-inch (4.8-by-38-mm) flat bars secured to each hoop.
4. Galvanize[**and prime**] ladder safety cages, including brackets and fasteners.
5. Prime ladder safety cages, including brackets and fasteners, with [**zinc-rich primer.**] [**primer specified in Section 099600 "High-Performance Coatings."**]

C. Aluminum Ladder Safety Cages:

1. Primary Hoops: 1/4-by-4-inch (6.4-by-100-mm) flat bar hoops.
2. Secondary Intermediate Hoops: 1/4-by-2-inch (6.4-by-50-mm) flat bar hoops.
3. Vertical Bars: 1/4-by-2-inch (6.4-by-50-mm) flat bars secured to each hoop.

2.11 ALTERNATING TREAD DEVICES

A. Alternating Tread Devices: Fabricate alternating tread devices of open-type construction with channel or plate stringers and pipe and tube railings unless otherwise indicated. Provide brackets and fittings for installation.

1. <Double click here to find, evaluate, and insert list of manufacturers and products.>
2. Tread depth shall be not less than 5 inches (127 mm) exclusive of nosing or less than 8-1/2 inches (216 mm) including the nosing, tread width shall be not less than 7 inches (178 mm), and riser height shall be not more than 9-1/2 inches (241 mm).
3. Tread depth shall be not less than 8-1/2 inches (216 mm) exclusive of nosing or less than 10-1/2 inches (267 mm) including the nosing, tread width shall be not less than 7 inches (178 mm), and riser height shall be not more than 8 inches (203 mm).
4. Fabricate from [**steel**] [**stainless steel**] [**aluminum**] and assemble by welding or with stainless-steel fasteners.
5. Comply with applicable railing requirements in Section 055213 "Pipe and Tube Railings."

B. Galvanize[**and prime**] [**exterior**] steel alternating tread devices, including treads, railings, brackets, and fasteners.

C. Prime [**exterior**] steel alternating tread devices, including treads, railings, brackets, and fasteners, with [**zinc-rich primer.**] [**primer specified in Section 099600 "High-Performance Coatings."**]

2.12 METAL [SHIPS' LADDERS] [AND] [PIPE CROSSOVERS]

- A. Provide metal **[ships' ladders]** **[and]** **[pipe crossovers]** where indicated. Fabricate of open-type construction with channel or plate stringers and pipe and tube railings unless otherwise indicated. Provide brackets and fittings for installation.
1. Treads shall be not less than 5 inches (127 mm) exclusive of nosing or less than 8-1/2 inches (216 mm) including the nosing, and riser height shall be not more than 9-1/2 inches (241 mm).
 2. Fabricate **[ships' ladders]** **[and]** **[pipe crossovers]**, including railings from **[steel]** **[stainless steel]** **[aluminum]**.
 3. Fabricate treads **[and platforms]** from **[welded or pressure-locked steel bar grating]** **[pressure-locked stainless-steel bar grating]** **[pressure-locked aluminum bar grating]** **[extruded-aluminum plank grating]**. Limit openings in gratings to no more than **[1/2 inch (12 mm)]** **[3/4 inch (19 mm)]** in least dimension.
 4. Fabricate treads **[and platforms]** from **[rolled-steel floor plate]** **[rolled-stainless-steel floor plate]** **[rolled-aluminum-alloy tread plate]** **[abrasive-surface floor plate]**.
 5. Comply with applicable railing requirements in Section 055213 "Pipe and Tube Railings."
- B. Galvanize **[and prime]** **[exterior]** steel **[ships' ladders]** **[and]** **[pipe crossovers]**, including treads, railings, brackets, and fasteners.
- C. Prime **[exterior]** steel **[ships' ladders]** **[and]** **[pipe crossovers]**, including treads, railings, brackets, and fasteners, with **[zinc-rich primer.]** **[primer specified in Section 099600 "High-Performance Coatings."]**

2.13 METAL FLOOR PLATE

- A. Fabricate from **[rolled-steel floor]** **[rolled-stainless-steel floor]** **[rolled-aluminum-alloy tread]** **[abrasive-surface floor]** plate of thickness indicated below:
1. Thickness: **[1/8 inch (3.2 mm)]** **[3/16 inch (4.8 mm)]** **[1/4 inch (6.4 mm)]** **[5/16 inch (8 mm)]** **[3/8 inch (9.5 mm)]** **[As indicated]**.
- B. Provide grating sections where indicated fabricated from **[welded or pressure-locked steel bar grating]** **[pressure-locked stainless steel bar grating]** **[pressure-locked aluminum bar grating]** **[extruded-aluminum plank grating]**. Limit openings in gratings to no more than **[1/2 inch (12 mm)]** **[3/4 inch (19 mm)]** **[1 inch (25 mm)]** in least dimension.
- C. Provide **[steel]** **[stainless-steel]** **[aluminum]** angle supports as indicated.
- D. Include **[steel]** **[stainless-steel]** **[aluminum]** angle stiffeners, and fixed and removable sections as indicated.
- E. Provide flush **[steel]** **[stainless-steel]** **[aluminum]** bar drop handles for lifting removable sections, one at each end of each section.

2.14 ELEVATOR PIT SUMP COVERS

- A. Fabricate from [**1/8-inch (3.2-mm)**] [**3/16-inch (4.8-mm)**] [**rolled-steel floor**] [**abrasive-surface floor**] plate with four 1-inch- (25-mm-) diameter holes for water drainage and for lifting.
- B. Fabricate from welded or pressure-locked steel bar grating Limit openings in gratings to no more than [**1/2 inch (12 mm)**] [**3/4 inch (19 mm)**] [**1 inch (25 mm)**] in least dimension.
- C. Provide steel angle supports as indicated.

2.15 STRUCTURAL-STEEL DOOR FRAMES

- A. Fabricate structural-steel door frames from steel shapes, plates, and bars of size and to dimensions indicated, fully welded together, with 5/8-by-1-1/2-inch (16-by-38-mm) steel channel stops, unless otherwise indicated. Plug-weld built-up members and continuously weld exposed joints. Secure removable stops to frame with countersunk machine screws, uniformly spaced at not more than 10 inches (250 mm) o.c. Reinforce frames and drill and tap as necessary to accept finish hardware.
 - 1. Provide with integrally welded steel strap anchors for securing door frames into adjoining concrete or masonry.
- B. Extend bottom of frames to floor elevation indicated with steel angle clips welded to frames for anchoring frame to floor with expansion shields and bolts.
- C. Galvanize[**and prime**] [**exterior**] steel frames.
- D. Prime [**exterior**] steel frames with [**zinc-rich primer.**] [**primer specified in Section 099600 "High-Performance Coatings."**]

2.16 MISCELLANEOUS STEEL TRIM

- A. Unless otherwise indicated, fabricate units from steel shapes, plates, and bars of profiles shown with continuously welded joints and smooth exposed edges. Miter corners and use concealed field splices where possible.
- B. Provide cutouts, fittings, and anchorages as needed to coordinate assembly and installation with other work.
 - 1. Provide with integrally welded steel strap anchors for embedding in concrete or masonry construction.
- C. Galvanize[**and prime**] [**exterior**] miscellaneous steel trim.
- D. Prime [**exterior**] miscellaneous steel trim with [**zinc-rich primer.**] [**primer specified in Section 099600 "High-Performance Coatings."**]

2.17 METAL BOLLARDS

- A. Fabricate metal bollards from [**Schedule 40 steel pipe**] [**Schedule 80 steel pipe**] [**1/4-inch (6.4-mm) wall-thickness rectangular steel tubing**] [**steel shapes, as indicated**].
 - 1. Cap bollards with 1/4-inch- (6.4-mm-) thick steel plate.
 - 2. Where bollards are indicated to receive controls for door operators, provide cutouts for controls and holes for wire.
 - 3. Where bollards are indicated to receive light fixtures, provide cutouts for fixtures and holes for wire.
- B. Fabricate bollards with 3/8-inch- (9.5-mm-) thick steel baseplates for bolting to concrete slab. Drill baseplates at all four corners for 3/4-inch (19-mm) anchor bolts.
 - 1. Where bollards are to be anchored to sloping concrete slabs, angle baseplates for plumb alignment of bollards.
- C. Fabricate sleeves for bollard anchorage from steel [**pipe**] [**or**] [**tubing**] with 1/4-inch- (6.4-mm-) thick steel plate welded to bottom of sleeve. Make sleeves not less than 8 inches (200 mm) deep and 3/4 inch (19 mm) larger than OD of bollard.
- D. Fabricate internal sleeves for removable bollards from Schedule 40 steel pipe or 1/4-inch (6.4-mm) wall-thickness steel tubing with an OD approximately 1/16 inch (1.5 mm) less than ID of bollards. Match drill sleeve and bollard for 3/4-inch (19-mm) steel machine bolt.
- E. Prime bollards with [**zinc-rich primer.**] [**primer specified in Section 099600 "High-Performance Coatings."**]

2.18 WIRE ROPE PARKING GARAGE GUARDS

- A. Wire Rope Parking Garage Guards: 3/4-inch- (19-mm-) diameter, zinc-coated steel wire ropes with wire rope fittings for securing to parking garage columns and walls and for tightening wire rope.

2.19 [**PIPE**] [**DOWNSPOUT**] GUARDS

- A. Fabricate [**pipe**] [**downspout**] guards from 3/8-inch- (9.5-mm-) thick by 12-inch- (300-mm-) wide steel plate, bent to fit flat against the wall or column at both ends and to fit around pipe with 2-inch (50-mm) clearance between pipe and pipe guard. Drill each end for two 3/4-inch (19-mm) anchor bolts.
- B. Galvanize[**and prime**] [**pipe**] [**downspout**] guards.
- C. Prime [**pipe**] [**downspout**] guards with [**zinc-rich primer.**] [**primer specified in Section 099600 "High-Performance Coatings."**]

2.20 ABRASIVE METAL [NOSINGS] [TREADS] [AND] [THRESHOLDS]

- A. Cast-Metal Units: Cast [**iron**] [**aluminum**] [**bronze (lead red or semired brass)**] [**nickel silver (lead nickel bronze)**], with an integral-abrasive, as-cast finish consisting of aluminum oxide, silicon carbide, or a combination of both. Fabricate units in lengths necessary to accurately fit openings or conditions.
1. <Double click here to find, evaluate, and insert list of manufacturers and products.>
 2. Nosings: Cross-hatched units, 4 inches (100 mm) wide with [**1/4-inch (6-mm)**] [**1-inch (25-mm)**] lip, for casting into concrete.
 3. Nosings: Cross-hatched units, 1-1/2 by 1-1/2 inches (38 by 38 mm), for casting into concrete.
 4. Treads: Cross-hatched units, full depth of tread with 3/4-by-3/4-inch (19-by-19-mm) nosing, for application over bent plate treads or existing stairs.
 5. Thresholds: Fluted-saddle-type units, 5 inches (125 mm) wide by 1/2 inch (12 mm) high, with tapered edges.
 6. Thresholds: Fluted-interlocking- (hook-strip-) type units, 5 inches (125 mm) wide by 5/8 inch (16 mm) high, with tapered edge.
 7. Thresholds: Plain-stepped- (stop-) type units, 5 inches (125 mm) wide by 1/2 inch (12 mm) high, with 1/2-inch (12-mm) step.
- B. Extruded Units: [**Aluminum**] [**Bronze**], with abrasive filler consisting of aluminum oxide, silicon carbide, or a combination of both, in an epoxy-resin binder. Fabricate units in lengths necessary to accurately fit openings or conditions.
1. <Double click here to find, evaluate, and insert list of manufacturers and products.>
 2. Provide ribbed units, with abrasive filler strips projecting 1/16 inch (1.5 mm) above aluminum extrusion.
 3. Provide solid-abrasive-type units without ribs.
 4. Nosings: Square-back units, [**1-7/8 inches (48 mm)**] [**3 inches (75 mm)**] [**4 inches (100 mm)**] wide, for casting into concrete steps.
 5. Nosings: Beveled-back units, [**3 inches (75 mm)**] [**4 inches (100 mm)**] wide with 1-3/8-inch (35-mm) lip, for surface mounting on existing stairs.
 6. Nosings: Two-piece units, 3 inches (75 mm) wide, with subchannel for casting into concrete steps.
 7. Treads: [**Square**] [**Beveled**]-back units, full depth of tread with 1-3/8-inch (35-mm) lip, for application over existing stairs.
- C. Provide anchors for embedding units in concrete, either integral or applied to units, as standard with manufacturer.
- D. Drill for mechanical anchors and countersink. Locate holes not more than 4 inches (100 mm) from ends and not more than 12 inches (300 mm) o.c., evenly spaced between ends, unless otherwise indicated. Provide closer spacing if recommended by manufacturer.
1. Provide two rows of holes for units more than 5 inches (125 mm) wide, with two holes aligned at ends and intermediate holes staggered.
- E. Apply bituminous paint to concealed surfaces of cast-metal units.

- F. Apply clear lacquer to concealed surfaces of extruded units.

2.21 CAST-IRON WHEEL GUARDS

- A. Provide wheel guards made from cast-iron, 3/4-inch- (19-mm-) thick, hollow-core construction, of size and shape indicated. Provide holes for countersunk anchor bolts and grouting.
- B. Prime cast-iron wheel guards with **[zinc-rich primer.] [primer specified in Section 099600 "High-Performance Coatings."]**

2.22 METAL DOWNSPOUT BOOTS

- A. Provide downspout boots made from cast **[iron] [aluminum]** in heights indicated with inlets of size and shape to suit downspouts. Provide units with flanges and holes for countersunk anchor bolts.
 - 1. Outlet: **[Vertical, to discharge into pipe] [Horizontal, to discharge into pipe] [At 35 degrees from horizontal, to discharge onto splash block or pavement].**
- B. Prime cast-iron downspout boots with **[zinc-rich primer.] [primer specified in Section 099600 "High-Performance Coatings."]**

2.23 LOOSE BEARING AND LEVELING PLATES

- A. Provide loose bearing and leveling plates for steel items bearing on masonry or concrete construction. Drill plates to receive anchor bolts and for grouting.
- B. Galvanize plates.
- C. Prime plates with **[zinc-rich primer.] [primer specified in Section 099600 "High-Performance Coatings."]**

2.24 LOOSE STEEL LINTELS

- A. Fabricate loose steel lintels from steel angles and shapes of size indicated for openings and recesses in masonry walls and partitions at locations indicated. Fabricate in single lengths for each opening unless otherwise indicated. Weld adjoining members together to form a single unit where indicated.
- B. Size loose lintels to provide bearing length at each side of openings equal to 1/12 of clear span, but not less than 8 inches (200 mm) unless otherwise indicated.
- C. Galvanize**[and prime]** loose steel lintels located in exterior walls.
- D. Prime loose steel lintels located in exterior walls with zinc-rich primer.

2.25 STEEL WELD PLATES AND ANGLES

- A. Provide steel weld plates and angles not specified in other Sections, for items supported from concrete construction as needed to complete the Work. Provide each unit with no fewer than two integrally welded steel strap anchors for embedding in concrete.

2.26 FINISHES, GENERAL

- A. Finish metal fabrications after assembly.
- B. Finish exposed surfaces to remove tool and die marks and stretch lines, and to blend into surrounding surface.

2.27 STEEL AND IRON FINISHES

- A. Galvanizing: Hot-dip galvanize items as indicated to comply with ASTM A 153/A 153M for steel and iron hardware and with ASTM A 123/A 123M for other steel and iron products.
 - 1. Do not quench or apply post galvanizing treatments that might interfere with paint adhesion.
- B. Preparation for Shop Priming Galvanized Items: After galvanizing, thoroughly clean railings of grease, dirt, oil, flux, and other foreign matter, and treat with metallic phosphate process.
- C. Shop prime iron and steel items[**not indicated to be galvanized**] unless they are to be embedded in concrete, sprayed-on fireproofing, or masonry, or unless otherwise indicated.
 - 1. Shop prime with [**universal shop primer**] [**primers specified in Section 099113 "Exterior Painting"**] [**primers specified in Section 099123 "Interior Painting"**] unless [**zinc-rich primer is**] [**primers specified in Section 099600 "High-Performance Coatings" are**] indicated.
- D. Preparation for Shop Priming: Prepare surfaces to comply with [**SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."**] [**SSPC-SP 3, "Power Tool Cleaning."**] [**requirements indicated below:**]
 - 1. Exterior Items: SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
 - 2. Items Indicated to Receive Zinc-Rich Primer: SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
 - 3. Items Indicated to Receive Primers Specified in Section 099600 "High-Performance Coatings": SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
 - 4. Other Items: SSPC-SP 3, "Power Tool Cleaning."
- E. Shop Priming: Apply shop primer to comply with SSPC-PA 1, "Paint Application Specification No. 1: Shop, Field, and Maintenance Painting of Steel," for shop painting.
 - 1. Stripe paint corners, crevices, bolts, welds, and sharp edges.

2.28 ALUMINUM FINISHES

- A. As-Fabricated Finish: AA-M12.
- B. Clear Anodic Finish: AAMA 611, Class I, AA-M12C22A41.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

- A. Cutting, Fitting, and Placement: Perform cutting, drilling, and fitting required for installing metal fabrications. Set metal fabrications accurately in location, alignment, and elevation; with edges and surfaces level, plumb, true, and free of rack; and measured from established lines and levels.
- B. Fit exposed connections accurately together to form hairline joints. Weld connections that are not to be left as exposed joints but cannot be shop welded because of shipping size limitations. Do not weld, cut, or abrade surfaces of exterior units that have been hot-dip galvanized after fabrication and are for bolted or screwed field connections.
- C. Field Welding: Comply with the following requirements:
 - 1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
 - 2. Obtain fusion without undercut or overlap.
 - 3. Remove welding flux immediately.
 - 4. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing and contour of welded surface matches that of adjacent surface.
- D. Fastening to In-Place Construction: Provide anchorage devices and fasteners where metal fabrications are required to be fastened to in-place construction. Provide threaded fasteners for use with concrete and masonry inserts, toggle bolts, through bolts, lag screws, wood screws, and other connectors.
- E. Provide temporary bracing or anchors in formwork for items that are to be built into concrete, masonry, or similar construction.
- F. Corrosion Protection: Coat concealed surfaces of aluminum that come into contact with grout, concrete, masonry, wood, or dissimilar metals with the following:
 - 1. Cast Aluminum: Heavy coat of bituminous paint.
 - 2. Extruded Aluminum: Two coats of clear lacquer.

3.2 INSTALLING MISCELLANEOUS FRAMING AND SUPPORTS

- A. General: Install framing and supports to comply with requirements of items being supported, including manufacturers' written instructions and requirements indicated on Shop Drawings.
- B. Anchor supports for **[ceiling hung toilet partitions]** **[operable partitions]** **[overhead doors]** **[and]** **[overhead grilles]** securely to, and rigidly brace from, building structure.
- C. Support steel girders on solid grouted masonry, concrete, or steel pipe columns. Secure girders with anchor bolts embedded in grouted masonry or concrete or with bolts through top plates of pipe columns.
 - 1. Where grout space under bearing plates is indicated for girders supported on concrete or masonry, install as specified in "Installing Bearing and Leveling Plates" Article.
- D. Install pipe columns on concrete footings with grouted baseplates. Position and grout column baseplates as specified in "Installing Bearing and Leveling Plates" Article.
 - 1. Grout baseplates of columns supporting steel girders after girders are installed and leveled.

3.3 INSTALLING PREFABRICATED BUILDING COLUMNS

- A. Install prefabricated building columns to comply with AISC 360, "Specifications for Structural Steel Buildings," and with requirements applicable to listing and labeling for fire-resistance rating indicated.

3.4 INSTALLING METAL BOLLARDS

- A. Fill metal-capped bollards solidly with concrete and allow concrete to cure seven days before installing.
 - 1. Do not fill removable bollards with concrete.
- B. Anchor bollards to existing construction with **[expansion anchors]** **[anchor bolts]** **[through bolts]**. Provide four 3/4-inch (19-mm) bolts at each bollard unless otherwise indicated.
 - 1. Embed anchor bolts at least 4 inches (100 mm) in concrete.
- C. Anchor bollards in concrete **[with pipe sleeves preset and anchored into concrete]** **[in formed or core-drilled holes not less than 8 inches (200 mm) deep and 3/4 inch (19 mm) larger than OD of bollard]**. Fill annular space around bollard solidly with nonshrink grout; mixed and placed to comply with grout manufacturer's written instructions. Slope grout up approximately 1/8 inch (3 mm) toward bollard.

- D. Anchor bollards in place with concrete footings. Center and align bollards in holes 3 inches (75 mm) above bottom of excavation. Place concrete and vibrate or tamp for consolidation. Support and brace bollards in position until concrete has cured.
- E. Anchor internal sleeves for removable bollards in [**concrete by inserting in pipe sleeves preset into concrete**] [**formed or core-drilled holes not less than 8 inches (200 mm) deep and 3/4 inch (19 mm) larger than OD of sleeve**]. Fill annular space around internal sleeves solidly with nonshrink grout; mixed and placed to comply with grout manufacturer's written instructions. Slope grout up approximately 1/8 inch (3 mm) toward internal sleeve.
- F. Anchor internal sleeves for removable bollards in place with concrete footings. Center and align sleeves in holes 3 inches (75 mm) above bottom of excavation. Place concrete and vibrate or tamp for consolidation. Support and brace sleeves in position until concrete has cured.
- G. Place removable bollards over internal sleeves and secure with 3/4-inch (19-mm) machine bolts and nuts. After tightening nuts, drill holes in bolts for inserting padlocks. Owner furnishes padlocks.
- H. Fill bollards solidly with concrete, mounding top surface to shed water.
 - 1. Do not fill removable bollards with concrete.

3.5 INSTALLING WIRE ROPE PARKING GARAGE GUARDS

- A. Install wire rope parking garage guards at locations indicated, mounted at 18 and 27 inches (457 and 686 mm) above the parking surface. Secure wire ropes to parking garage columns and walls and tighten to remove slack.

3.6 INSTALLING PIPE GUARDS

- A. Provide pipe guards at exposed vertical pipes in parking garage where not protected by curbs or other barriers. Install by bolting to wall or column with expansion anchors. Provide four 3/4-inch (19-mm) bolts at each pipe guard. Mount pipe guards with top edge 26 inches (660 mm) above driving surface.

3.7 INSTALLING NOSINGS, TREADS, AND THRESHOLDS

- A. Center nosings on tread widths unless otherwise indicated.
- B. For nosings embedded in concrete steps or curbs, align nosings flush with riser faces and level with tread surfaces.
- C. Seal thresholds exposed to exterior with elastomeric sealant complying with Section 079200 "Joint Sealants" to provide a watertight installation.

3.8 INSTALLING CAST-IRON WHEEL GUARDS

- A. Anchor wheel guards to concrete or masonry construction to comply with manufacturer's written instructions. Fill cores solidly with concrete.

3.9 INSTALLING BEARING AND LEVELING PLATES

- A. Clean concrete and masonry bearing surfaces of bond-reducing materials, and roughen to improve bond to surfaces. Clean bottom surface of plates.
- B. Set bearing and leveling plates on wedges, shims, or leveling nuts. After bearing members have been positioned and plumbed, tighten anchor bolts. Do not remove wedges or shims but, if protruding, cut off flush with edge of bearing plate before packing with nonshrink grout. Pack grout solidly between bearing surfaces and plates to ensure that no voids remain.

3.10 ADJUSTING AND CLEANING

- A. Touchup Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas. Paint uncoated and abraded areas with the same material as used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.
 - 1. Apply by brush or spray to provide a minimum 2.0-mil (0.05-mm) dry film thickness.
- B. Touchup Painting: Cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint are specified in [**Section 099113 "Exterior Painting."**]
[**Section 099123 "Interior Painting."**]
- C. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing to comply with ASTM A 780/A 780M.

END OF SECTION 055000

SECTION 071113 - BITUMINOUS DAMPPROOFING

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. Cold-applied, cut-back-asphalt dampproofing.
 - 2. Cold-applied, emulsified-asphalt dampproofing.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.

1.4 FIELD CONDITIONS

- A. Weather Limitations: Proceed with application only when existing and forecasted weather conditions permit dampproofing to be performed according to manufacturers' written instructions.
- B. Ventilation: Provide adequate ventilation during application of dampproofing in enclosed spaces. Maintain ventilation until dampproofing has cured.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Source Limitations: Obtain primary dampproofing materials and primers from single source from single manufacturer. Provide [**protection course**] [**drainage panels**] [**and**] auxiliary materials recommended in writing by manufacturer of primary materials.

2.2 PERFORMANCE REQUIREMENTS

- A. VOC Content: Products shall comply with VOC content limits of authorities having jurisdiction unless otherwise indicated.

2.3 COLD-APPLIED, CUT-BACK-ASPHALT DAMPPROOFING

- A. Trowel Coats: ASTM D 4586/D 4586M, Type I, Class 1, fibered.
- B. Brush and Spray Coats: ASTM D 4479/D 4479M, Type I, fibered.

2.4 COLD-APPLIED, EMULSIFIED-ASPHALT DAMPPROOFING

- A. Trowel Coats: ASTM D 1227, Type II, Class 1.
- B. Fibered Brush and Spray Coats: ASTM D 1227, Type II, Class 1.
- C. Brush and Spray Coats: ASTM D 1227, Type III, Class 1.

2.5 AUXILIARY MATERIALS

- A. Furnish auxiliary materials recommended in writing by dampproofing manufacturer for intended use and compatible with bituminous dampproofing.
- B. Cut-Back-Asphalt Primer: ASTM D 41/D 41M.
- C. Emulsified-Asphalt Primer: ASTM D 1227, Type III, Class 1, except diluted with water as recommended in writing by manufacturer.
- D. Asphalt-Coated Glass Fabric: ASTM D 1668/D 1668M, Type I.
- E. Patching Compound: Epoxy or latex-modified repair mortar of type recommended in writing by dampproofing manufacturer.
- F. Protection Course: ASTM D 6506, semirigid sheets of fiberglass or mineral-reinforced-asphaltic core, pressure laminated between two asphalt-saturated fibrous liners.
 - 1. Thickness: Nominal [**1/8 inch (3 mm)**] [**1/4 inch (6 mm)**].
 - 2. Adhesive: Rubber-based solvent type recommended in writing by waterproofing manufacturer for protection course type.
- G. Protection Course: Fan folded, with a core of extruded-polystyrene board insulation faced on [**one side**] [**or**] [**both sides**] with plastic film, nominal thickness 1/4 inch (6 mm), with a compressive strength of not less than 8 psi (55 kPa) per ASTM D 1621, and maximum water absorption by volume of 0.6 percent per ASTM C 272/C 272M.
- H. Protection Course: Extruded-polystyrene board insulation, unfaced, ASTM C 578, Type X, 1/2 inch (13 mm) thick.
- I. Protection Course: Smooth-surfaced roll roofing complying with ASTM D 6380/D 6380M, Class S, Type III.

2.6 MOLDED-SHEET DRAINAGE PANELS

- A. Molded-Sheet Drainage Panel: Comply with Section 334600 "Subdrainage."
- B. Nonwoven-Geotextile-Faced, Molded-Sheet Drainage Panel: Composite subsurface drainage panel acceptable to dampproofing manufacturer and consisting of a studded, nonbiodegradable, molded-plastic-sheet drainage core; with a nonwoven, needle-punched geotextile facing with an apparent opening size not exceeding No. 70 (0.21-mm) sieve laminated to one side of the core, with or without a polymeric film bonded to the other side; and with a vertical flow rate through the core of **[9 to 21 gpm per ft. (112 to 261 L/min. per m)]** <Insert value>.

2.7 INSULATION DRAINAGE PANELS

- A. Insulation Drainage Panels: Comply with Section 072100 "Thermal Insulation" for insulation drainage panels.
- B. Insulation Drainage Panels: Unfaced or geotextile-faced, extruded-polystyrene board insulation according to ASTM C 578, Type IV, 25-psi (173-kPa), or Type VI, 40-psi (276-kPa), minimum compressive strength; fabricated with shiplap or channel edges and with one side having grooved drainage channels.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Applicator present, for compliance with requirements for surface smoothness, maximum surface moisture content, and other conditions affecting performance of the Work.
- B. Proceed with application only after substrate construction and penetrating work have been completed and unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Clean, prepare, and treat substrates according to manufacturer's written instructions. Provide clean, dust-free, and dry substrates for dampproofing application.
- B. Mask or otherwise protect adjoining exposed surfaces from being stained, spotted, or coated with dampproofing. Prevent dampproofing materials from entering and clogging weep holes and drains.
- C. Clean substrates of projections and substances detrimental to dampproofing work; fill voids, seal joints, and remove bond breakers if any.

- D. Apply patching compound to patch and fill tie holes, honeycombs, reveals, and other imperfections[; **cover with asphalt-coated glass fabric**].

3.3 APPLICATION, GENERAL

- A. Comply with manufacturer's written instructions for dampproofing application, cure time between coats, and drying time before backfilling unless otherwise indicated.
 - 1. Apply dampproofing to provide continuous plane of protection.
 - 2. Apply additional coats if recommended in writing by manufacturer or to achieve a smooth surface and uninterrupted coverage.
- B. Where dampproofing footings and foundation walls, apply from finished-grade line to top of footing; extend over top of footing and down a minimum of 6 inches (150 mm) over outside face of footing.
 - 1. Extend dampproofing 12 inches (300 mm) onto intersecting walls and footings, but do not extend onto surfaces exposed to view when Project is completed.
 - 2. Install flashings and corner protection stripping at internal and external corners, changes in plane, construction joints, cracks, and where indicated as "reinforced," by embedding an 8-inch- (200-mm-) wide strip of asphalt-coated glass fabric in a heavy coat of dampproofing. Dampproofing coat for embedding fabric is in addition to other coats required.
- C. Where dampproofing exterior face of inner wythe of exterior masonry cavity walls, lap dampproofing at least 1/4 inch (6 mm) onto flashing, masonry reinforcement, veneer ties, and other items that penetrate inner wythe.
 - 1. Extend dampproofing over outer face of structural members and concrete slabs that interrupt inner wythe.
 - 2. Lap dampproofing at least 1/4 inch (6 mm) onto shelf angles supporting veneer.
- D. Where dampproofing interior face of above-grade, exterior [**concrete**] [**and**] [**masonry**] [**single-wythe masonry**] walls, continue dampproofing through intersecting walls by keeping vertical mortar joints at intersection temporarily open or by dampproofing wall before constructing intersecting walls.

3.4 COLD-APPLIED, CUT-BACK-ASPHALT DAMPPROOFING

- A. Concrete Foundations[**and Parged Masonry Foundation Walls**]: Apply [**two brush or spray coats at not less than 1.25 gal./100 sq. ft. (0.5 L/sq. m) for first coat and 1 gal./100 sq. ft. (0.4 L/sq. m) for second coat**] [**or**] [**one trowel coat at not less than 4 gal./100 sq. ft. (1.6 L/sq. m)**].
- B. Unparged Masonry Foundation Walls: Apply [**primer and two brush or spray coats at not less than 1.25 gal./100 sq. ft. (0.5 L/sq. m) for first coat and 1 gal./100 sq. ft. (0.4 L/sq. m)**]

for second coat] [or] [primer and one trowel coat at not less than 4 gal./100 sq. ft. (1.6 L/sq. m)].

- C. Unexposed Face of Concrete Retaining Walls: Apply one brush or spray coat at not less than 1.25 gal./100 sq. ft. (0.5 L/sq. m).
- D. Unexposed Face of Masonry Retaining Walls: Apply primer and one brush or spray coat at not less than 1.25 gal./100 sq. ft. (0.5 L/sq. m).
- E. Concrete Backup for **[Brick Veneer Assemblies] [Stone Veneer Assemblies] [and] [Dimension Stone Cladding]**: Apply one brush or spray coat at not less than 1 gal./100 sq. ft. (0.4 L/sq. m).
- F. Masonry Backup for **[Brick Veneer Assemblies] [Stone Veneer Assemblies] [and] [Dimension Stone Cladding]**: Apply primer and one brush or spray coat at not less than 1 gal./100 sq. ft. (0.4 L/sq. m).
- G. Exterior Face of Inner Wythe of Cavity Walls: Apply primer and one brush or spray coat at not less than 1 gal./100 sq. ft. (0.4 L/sq. m).

3.5 COLD-APPLIED, EMULSIFIED-ASPHALT DAMPPROOFING

- A. Concrete Foundations[**and Parged Masonry Foundation Walls**]: Apply **[two brush or spray coats at not less than 1.5 gal./100 sq. ft. (0.6 L/sq. m) for first coat and 1 gal./100 sq. ft. (0.4 L/sq. m) for second coat] [one fibered brush or spray coat at not less than 3 gal./100 sq. ft. (1.2 L/sq. m)] [or] [one trowel coat at not less than 4 gal./100 sq. ft. (1.6 L/sq. m)].**
- B. Unparged Masonry Foundation Walls: Apply **[primer and two brush or spray coats at not less than 1.5 gal./100 sq. ft. (0.6 L/sq. m) for first coat and 1 gal./100 sq. ft. (0.4 L/sq. m) for second coat] [primer and one fibered brush or spray coat at not less than 3 gal./100 sq. ft. (1.2 L/sq. m)] [or] [primer and one trowel coat at not less than 5 gal./100 sq. ft. (2 L/sq. m)].**
- C. Unexposed Face of Concrete Retaining Walls: Apply one brush or spray coat at not less than 1.25 gal./100 sq. ft. (0.5 L/sq. m).
- D. Unexposed Face of Masonry Retaining Walls: Apply primer and one brush or spray coat at not less than 1.25 gal./100 sq. ft. (0.5 L/sq. m).
- E. Concrete Backup for **[Brick Veneer Assemblies] [Stone Veneer Assemblies] [and] [Dimension Stone Cladding]**: Apply one brush or spray coat at not less than 1 gal./100 sq. ft. (0.4 L/sq. m).
- F. Exterior Face of Inner Wythe of Cavity Walls: Apply primer and one brush or spray coat at not less than 1 gal./100 sq. ft. (0.4 L/sq. m).
- G. Interior Face of Exterior Concrete Walls: Where above grade and indicated to be furred and finished, apply one brush or spray coat at not less than 1 gal./100 sq. ft. (0.4 L/sq. m).

- H. Interior Face of [**Single-Wythe**]Exterior Masonry Walls: Where above grade and indicated to be furred and finished, apply primer and one brush or spray coat at not less than 1 gal./100 sq. ft. (0.4 L/sq. m).

3.6 PROTECTION COURSE INSTALLATION

- A. Install protection course over completed-and-cured dampproofing. Comply with dampproofing-material and protection-course manufacturers' written instructions for attaching protection course.
 - 1. Support protection course over cured coating with spot application of adhesive type recommended in writing by protection-board manufacturer.
 - 2. Install protection course within 24 hours of dampproofing installation (while coating is tacky) to ensure adhesion.

3.7 DRAINAGE PANEL INSTALLATION

- A. Molded- Sheet Drainage Panels: Install panels, with geotextile facing away from wall substrate, according to manufacturer's written instructions. Use adhesive or another method that does not penetrate dampproofing. Lap edges and ends of geotextile to maintain continuity. Protect installed molded-sheet drainage panels during subsequent construction.
 - 1. Install thermal insulation before installing drainage panels.
- B. Insulation Drainage Panels: Install panels over dampproofed surfaces. Use adhesive or another method that does not penetrate dampproofing. Cut and fit panels to within 3/4 inch (19 mm) of projections and penetrations.
 - 1. Ensure that drainage channels are aligned and free of obstructions.

3.8 PROTECTION

- A. Protect installed insulation drainage panels from damage due to UV light, harmful weather exposures, physical abuse, and other causes. Provide temporary coverings where panels are subject to abuse and cannot be concealed and protected by permanent construction immediately after installation.
- B. Correct dampproofing that does not comply with requirements; repair substrates, and reapply dampproofing.

END OF SECTION 071113

SECTION 071416 - COLD FLUID-APPLIED WATERPROOFING

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. Polyurethane waterproofing.
 - 2. Polyester waterproofing.
 - 3. Latex-rubber waterproofing.

- B. Related Requirements:

- 1. Section 071800 "Traffic Coatings" for exposed, fluid-applied membrane with an integral wearing surface.
 - 2. Section 079100 "Preformed Joint Seals" for foundation-wall expansion joints that interface with waterproofing.
 - 3. Section 079513.19 "Parking Deck Expansion Joint Cover Assemblies" for plaza expansion-joint assemblies that interface with waterproofing.
 - 4. Section 093013 "Ceramic Tiling" for fluid-applied waterproof membranes beneath ceramic tiles.
 - 5. Section 093033 "Stone Tiling" for fluid-applied waterproof membranes beneath ceramic tiles.

1.3 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at owner's designated location.

- 1. Review waterproofing requirements including, but not limited to, the following:
 - a. Surface preparation specified in other Sections.
 - b. Minimum curing period.
 - c. Forecasted weather conditions.
 - d. Special details and sheet flashings.
 - e. Repairs.
 - f. **<Insert agenda items>.**

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include construction details, material descriptions, and tested physical and performance properties of waterproofing.
2. Include manufacturer's written instructions for evaluating, preparing, and treating substrate.

B. Shop Drawings:

1. Show locations and extent of waterproofing.
2. Include details for substrate joints and cracks, sheet flashings, penetrations, inside and outside corners, tie-ins with adjoining waterproofing, and other termination conditions.
3. Include setting drawings showing layout, sizes, sections, profiles, and joint details of pedestal-supported concrete pavers.

C. Samples: For each exposed product and for each color and texture specified, including the following products:

1. Flashing sheet, 8 by 8 inches (200 by 200 mm).
2. Membrane-reinforcing fabric, 8 by 8 inches (200 by 200 mm).
3. Insulation, 8 by 8 inches (200 by 200 mm).
4. Drainage panel, 4 by 4 inches (100 by 100 mm).
5. Plaza-deck paver, [**4 by 4 inches (100 by 100 mm) square**] [**full sized**] in each color and texture required.
6. Paver pedestal assembly.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer.

B. Field quality-control reports.

C. Sample Warranties: For special warranties.

1.6 QUALITY ASSURANCE

A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by waterproofing manufacturer.

B. Mockups: Build mockups to verify selections made under Sample submittals and to set quality standards for installation.

1. Build mockup for each typical waterproofing installation including accessories to demonstrate surface preparation, crack and joint treatments, inside and outside corner treatments, and protection.

- a. Size: **[100 sq. ft. (9.3 sq. m) in area]** **[As indicated on Drawings]**.
 - b. Description: Each type of **[wall]** **[deck]** **[and]** **[plaza]** **<Insert description>** installation.
2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
3. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.7 FIELD CONDITIONS

- A. Environmental Limitations: Apply waterproofing within the range of ambient and substrate temperatures recommended in writing by waterproofing manufacturer.
 1. Do not apply waterproofing to a damp or wet substrate, when relative humidity exceeds 85 percent, or when temperatures are less than 5 deg F (3 deg C) above dew point.
 2. Do not apply waterproofing in snow, rain, fog or mist, or when such weather conditions are imminent during application and curing period.
- B. Maintain adequate ventilation during application and curing of waterproofing materials.

1.8 WARRANTY

- A. Manufacturer's Special Warranty: Manufacturer agrees to repair or replace waterproofing that fails in materials or workmanship within specified warranty period.
 1. Warranty Period: **[Five]** **[10]** **<Insert number>** years from date of Substantial Completion.
- B. Installer's Special Warranty: Specified form, **[on warranty form at end of this Section]**, signed by Installer, covering Work of this Section, for warranty period of **[two]** **<Insert number>** years.
 1. Warranty includes removing and reinstalling protection board, drainage panels, insulation, pedestals, and pavers on plaza decks.

PART 2 - PRODUCTS

2.1 MATERIALS, GENERAL

- A. Source Limitations for Waterproofing System: Obtain waterproofing materials[, **protection course,**] **[and]** **[molded-sheet drainage panels]** from single source from single manufacturer.

2.2 SINGLE-COMPONENT POLYURETHANE WATERPROOFING

- A. Single-Component, Modified Polyurethane Waterproofing: [ASTM C 836/C 836M] [and] [coal-tar free].
- B. Single-Component, Reinforced, Modified Polyurethane Waterproofing: [ASTM C 836/C 836M] [and] [coal-tar free].

2.3 TWO-COMPONENT POLYURETHANE WATERPROOFING

- A. Two-Component, Modified Polyurethane Waterproofing: [ASTM C 836/C 836M] [and] [coal-tar free].
 - 1. <Double click here to find, evaluate, and insert list of manufacturers and products.>
- B. Two-Component, Unmodified Polyurethane Waterproofing:[ASTM C 836/C 836M.] Retain option in "Two-Component, Reinforced, Unmodified Polyurethane Waterproofing" Paragraph below if manufacturers can confirm compliance.
- C. Two-Component, Reinforced, Unmodified Polyurethane Waterproofing:[ASTM C 836/C 836M.]

2.4 POLYESTER WATERPROOFING

- A. Multicomponent, Reinforced, Unsaturated Polyester Waterproofing:[ASTM C 836/C 836M.]

2.5 LATEX-RUBBER WATERPROOFING

- A. Two-Component, Unreinforced, Latex-Rubber Waterproofing: ASTM C 836/C 836M; coal-tar free.
 - 1. Hydrostatic-Head Resistance: [65 feet (20 m)] <Insert value> minimum; ASTM D 5385.
- B. Two-Component, Reinforced, Latex-Rubber Waterproofing: ASTM C 836/C 836M; coal-tar free.
 - 1. Hydrostatic-Head Resistance: [197 feet (60 m)] <Insert value> minimum; ASTM D 5385.

2.6 AUXILIARY MATERIALS

- A. General: Provide auxiliary materials recommended in writing by waterproofing manufacturer for intended use and compatible with one another and with waterproofing.
 - 1. Furnish liquid-type auxiliary materials that comply with VOC limits of authorities having jurisdiction.

- B. Primer: Manufacturer's standard primer, sealer, or surface conditioner; factory-formulated acrylic latex, polyurethane, or epoxy.
- C. Sheet Flashing: 50-mil- (1.3-mm-) minimum, nonstaining, uncured sheet neoprene.
 - 1. Adhesive: Manufacturer's recommended contact adhesive.
- D. Membrane-Reinforcing Fabric: Manufacturer's recommended fiberglass mesh or polyester fabric, [**manufacturer's standard weight**] <**Insert weight**>.
- E. Joint Reinforcing Strip: Manufacturer's recommended fiberglass mesh or polyester fabric.
- F. Joint Sealant: Multicomponent polyurethane sealant, compatible with waterproofing; [**ASTM C 920, Type M, Class 25 or greater; Grade NS for sloping and vertical applications and Grade P for deck applications; Use NT exposure**] [as specified in **Section 079200 "Joint Sealants"**] <**Insert requirement**>; and as recommended by manufacturer for substrate and joint conditions.
 - 1. Backer Rod: Closed-cell polyethylene foam.

2.7 PROTECTION COURSE

- A. Protection Course: ASTM D 6506, semirigid sheets of fiberglass or mineral-reinforced-asphaltic core, pressure laminated between two asphalt-saturated fibrous liners and as follows:
 - 1. Thickness: [**1/8 inch (3 mm)**] [**1/4 inch (6 mm)**], nominal.
 - 2. Thickness: 1/8 inch (3 mm), nominal, for vertical applications; 1/4 inch (6 mm), nominal, elsewhere.
 - 3. Adhesive: Rubber-based solvent type recommended in writing by waterproofing manufacturer.
- B. Protection Course: Fan folded, with a core of extruded-polystyrene board insulation faced on one side with plastic film, nominal thickness of 1/4 inch (6 mm), with compressive strength of not less than 8 psi (55 kPa) according to ASTM D 1621 and maximum water absorption by volume of 0.6 percent according to ASTM C 272.
- C. Protection Course: Fan folded, with a core of extruded-polystyrene board insulation faced on both sides with plastic film, nominal thickness of 1/4 inch (6 mm), with compressive strength of not less than 8 psi (55 kPa) according to ASTM D 1621 and maximum water absorption by volume of 0.6 percent according to ASTM C 272.
- D. Protection Course: Extruded-polystyrene board insulation with continuous surface skins on both faces intact, unfaced; ASTM C 578, Type X, 1/2 inch (13 mm) thick.
- E. Protection Course: Molded-polystyrene board insulation, ASTM C 578, Type I, 0.90-lb/cu. ft. (15-kg/cu. m) minimum density, 1-inch (25-mm) minimum thickness.

2.8 MOLDED-SHEET DRAINAGE PANELS

- A. Molded-Sheet Drainage Panel: Comply with Section 334600 "Subdrainage."
- B. Nonwoven-Geotextile-Faced, Molded-Sheet Drainage Panel: Composite subsurface drainage panel consisting of a studded, nonbiodegradable, molded-plastic-sheet drainage core; with a nonwoven, needle-punched geotextile facing with an apparent opening size not exceeding No. 70 (0.21-mm) sieve laminated to one side of the core and a polymeric film bonded to the other side; and with a vertical flow rate of 9 to 18 gpm per ft. (112 to 220 L/min. per m).
- C. Nonwoven-Geotextile-Faced, Molded-Sheet Drainage Panel: Composite subsurface drainage panel consisting of a studded, nonbiodegradable, molded-plastic-sheet drainage core; with a nonwoven, needle-punched geotextile facing with an apparent opening size not exceeding No. 70 (0.21-mm) sieve laminated to one side of the core, without a polymeric film bonded to the other side; and with a vertical flow rate of 9 to 18 gpm per ft. (112 to 220 L/min. per m).
- D. Woven-Geotextile-Faced, Molded-Sheet Drainage Panel: Composite subsurface drainage panels consisting of a studded, nonbiodegradable, molded-plastic-sheet drainage core; with a woven-geotextile facing with an apparent opening size not exceeding No. 40 (0.43-mm) sieve, laminated to one side of the core and a polymeric film bonded to the other side; and with a horizontal flow rate of not less than 2.8 gpm per ft. (35 L/min. per m).
- E. Woven-Geotextile-Faced, Molded-Sheet Drainage Panel: Composite subsurface drainage panels consisting of a studded, nonbiodegradable, molded-plastic-sheet drainage core; with a woven-geotextile facing with an apparent opening size not exceeding No. 40 (0.43-mm) sieve, laminated to one side of the core, without a polymeric film bonded to the other side; and with a horizontal flow rate of not less than 2.8 gpm per ft. (35 L/min. per m).
- F. Molded-Sheet Collector-Panel System: Composite subsurface collector-panel system by same manufacturer as primary molded-sheet drainage panels; consisting of a high-profile, studded, nonbiodegradable, molded-plastic-sheet drainage core; with a woven-geotextile facing with an apparent opening size not exceeding No. 40 (0.425-mm) sieve laminated to one side of the core and a polymeric film bonded to the other side; and with a vertical flow rate of **[9 to 15 gpm per ft. (112 to 188 L/min. per m)]** <Insert value> and a horizontal flow rate of <Insert value>. Provide system with manufacturer's outlets, connectors, tapes, and other accessories to connect primary molded-sheet drainage panels with piped subdrainage system specified in Section 334600 "Subdrainage."
- G. Molded-Sheet Collector-Panel System: Composite subsurface collector-panel system by same manufacturer as primary molded-sheet drainage panels; consisting of a high-profile, studded, nonbiodegradable, molded-plastic-sheet drainage core; with a woven-geotextile facing with an apparent opening size not exceeding No. 40 (0.425-mm) sieve laminated to one side of the core, without a polymeric film bonded to the other side; and with a vertical flow rate of **[9 to 15 gpm per ft. (112 to 188 L/min. per m)]** <Insert value> and a horizontal flow rate of <Insert value>. Provide system with manufacturer's outlets, connectors, tapes, and other accessories to connect primary molded-sheet drainage panels with piped subdrainage system specified in Section 334600 "Subdrainage."

2.9 INSULATION

- A. Insulation, General: Comply with Section 072100 "Thermal Insulation."
- B. Board Insulation: Extruded-polystyrene board insulation according to ASTM C 578, [square] [or] [shiplap] edged.
 - 1. Type IV, 25-psi (173-kPa) minimum compressive strength.
 - 2. Type VI, 40-psi (276-kPa) minimum compressive strength.
 - 3. Type VII, 60-psi (414-kPa) minimum compressive strength.
 - 4. Type V, 100-psi (690-kPa) minimum compressive strength.

2.10 INSULATION DRAINAGE PANELS

- A. Insulation Drainage Panels, General: Comply with Section 072100 "Thermal Insulation."
- B. Unfaced, Wall-Insulation Drainage Panels: Extruded-polystyrene board insulation according to ASTM C 578, Type IV, 25-psi (173-kPa) minimum compressive strength; unfaced; fabricated with shiplap or channel edges and with one side having grooved drainage channels.
- C. Unfaced, Wall-Insulation Drainage Panels: Extruded-polystyrene board insulation according to ASTM C 578, Type VI, 40-psi (276-kPa) minimum compressive strength; unfaced; fabricated with shiplap or channel edges and with one side having grooved drainage channels.
- D. Geotextile-Faced, Wall-Insulation Drainage Panels: Extruded-polystyrene board insulation according to ASTM C 578, Type IV, 25-psi (173-kPa) minimum compressive strength; fabricated with tongue-and-groove edges and with one side having grooved drainage channels faced with a nonwoven-geotextile filter fabric.
- E. Geotextile-Faced, Wall-Insulation Drainage Panels: Extruded-polystyrene board insulation according to ASTM C 578, Type VI, 40-psi (276-kPa) minimum compressive strength; fabricated with tongue-and-groove edges and with one side having grooved drainage channels faced with a nonwoven-geotextile filter fabric.
- F. Unfaced, Plaza-Deck, Insulation Drainage Panels: Extruded-polystyrene board insulation according to ASTM C 578, Type VI, 40-psi (276-kPa) minimum compressive strength; unfaced; fabricated with shiplapped or channel edges and with one side having ribbed drainage channels.
- G. Unfaced, Plaza-Deck, Insulation Drainage Panels: Extruded-polystyrene board insulation according to ASTM C 578, Type VII, 60-psi (414-kPa) minimum compressive strength; unfaced; fabricated with shiplapped or channel edges and with one side having ribbed drainage channels.
- H. Geotextile-Faced, Plaza-Deck, Insulation Drainage Panels: Extruded-polystyrene board insulation according to ASTM C 578, Type VI, 40-psi (276-kPa) minimum compressive strength; fabricated with tongue-and-groove edges, with one side having grooved drainage channels, and faced with manufacturer's standard, nonwoven-geotextile filter fabric.

- I. Geotextile-Faced, Plaza-Deck, Insulation Drainage Panels: Extruded-polystyrene board insulation according to ASTM C 578, Type VII, 60-psi (414-kPa) minimum compressive strength; fabricated with tongue-and-groove edges, with one side having grooved drainage channels, and faced with manufacturer's standard, nonwoven-geotextile filter fabric.

2.11 PLAZA-DECK PAVERS

- A. Plaza-Deck Pavers: **[Brick]** **[Concrete]** **[Asphalt-block]** **<Insert type>** pavers specified in Section 321400 "Unit Paving."
- B. Stone Plaza-Deck Pavers: **[Granite]** **[Limestone]** **[Marble]** **[Quartz-based stone]** **[Slate]** **[Travertine]** **<Insert type>** pavers specified in Section 321400 "Unit Paving."
- C. Concrete Plaza-Deck Pavers: Solid, hydraulically pressed, standard-weight concrete units, **[square edged]** **[with top edges beveled 3/16 inch (5 mm)]**, manufactured for use as plaza-deck pavers; minimum compressive strength of **[7500 psi (52 MPa)]** **[6500 psi (45 MPa)]** **<Insert value>**, ASTM C 140; absorption not greater than 5 percent, ASTM C 140; no breakage and maximum 1 percent mass loss when tested for freeze-thaw resistance according to ASTM C 67.
 1. Thickness: **[1-5/8 inches (41 mm)]** **[1-3/4 inches (45 mm)]** **[2 inches (51 mm)]** **[2-3/8 inches (60 mm)]** **<Insert dimension>**.
 2. Face Size: **[8-7/8 inches (225 mm) square]** **[9 inches (229 mm) square]** **[9 by 18 inches (229 by 457 mm)]** **[12 inches (305 mm) square]** **[12 by 24 inches (305 by 610 mm)]** **[18 inches (457 mm) square]** **[24 inches (610 mm) square]** **[As indicated]** **<Insert dimensions and shape>**.
 3. Color: **[As indicated by manufacturer's designations]** **[Match Architect's sample]** **[As selected by Architect from manufacturer's full range]** **<Insert color>**.
- D. Paver Pedestals: Paver-support assembly, **[standard with paver manufacturer]** **[or]** **[listed below]**, including **[fixed-height]** **[adjustable or stackable]** pedestals, shims, and spacer tabs for joint spacing of **[1/8 inch (3 mm)]** **[3/16 inch (5 mm)]** **[1/8 to 3/16 inch (3 to 5 mm)]**.
 1. Concrete Fill: ACI 301, compressive strength of 5000 psi (34 MPa) at 28 days and air content of 6 percent.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements and other conditions affecting performance of the Work.
 1. Verify that concrete has cured and aged for minimum time period recommended in writing by waterproofing manufacturer.
 2. Verify that substrate is visibly dry and within the moisture limits recommended in writing by manufacturer. Test for capillary moisture by plastic sheet method according to ASTM D 4263.

- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Clean, prepare, and treat substrates according to manufacturer's written instructions. Provide clean, dust-free, and dry substrates for waterproofing application.
- B. Mask off adjoining surfaces not receiving waterproofing to prevent spillage and overspray affecting other construction.
- C. Close off deck drains and other deck penetrations to prevent spillage and migration of waterproofing fluids.
- D. Remove grease, oil, bitumen, form-release agents, paints, curing compounds, acid residues, and other penetrating contaminants or film-forming coatings from concrete.
 - 1. Abrasive blast clean concrete surfaces uniformly to expose top surface of fine aggregate according to ASTM D 4259 with a self-contained, recirculating, blast-cleaning apparatus. Remove material to provide a sound surface free of laitance, glaze, efflorescence, curing compounds, concrete hardeners, or form-release agents. Remove remaining loose material and clean surfaces according to ASTM D 4258.
- E. Remove fins, ridges, and other projections, and fill honeycomb, aggregate pockets, holes, and other voids.

3.3 PREPARATION AT TERMINATIONS, PENETRATIONS, AND CORNERS

- A. Prepare surfaces at terminations and penetrations through waterproofing and at expansion joints, drains, sleeves, and corners according to waterproofing manufacturer's written instructions and to recommendations in [ASTM C 898/C 898M] [and] [ASTM C 1471].
- B. Apply waterproofing in two separate applications, and embed a joint reinforcing strip in the first preparation coat when recommended by waterproofing manufacturer.

3.4 JOINT AND CRACK TREATMENT

- A. Prepare, treat, rout, and fill joints and cracks in substrate according to waterproofing manufacturer's written instructions and to recommendations in [ASTM C 898/C 898M] [and] [ASTM C 1471]. Before coating surfaces, remove dust and dirt from joints and cracks according to ASTM D 4258.
 - 1. Comply with ASTM C 1193 for joint-sealant installation.
 - 2. Apply bond breaker on sealant surface, beneath preparation strip.
 - 3. Prime substrate along each side of joint and apply a single thickness of preparation strip at least 6 inches (150 mm) wide along each side of joint. Apply waterproofing in two separate applications and embed a joint reinforcing strip in the first preparation coat.

- B. Install sheet flashing and bond to deck and wall substrates where required according to waterproofing manufacturer's written instructions.
 - 1. Extend sheet flashings for **[4 inches (100 mm)] <Insert dimension>** onto perpendicular surfaces and items penetrating substrate.

3.5 WATERPROOFING APPLICATION

- A. Apply waterproofing according to manufacturer's written instructions and to recommendations in **[ASTM C 898/C 898M] [and] [ASTM C 1471]**.
- B. Start installing waterproofing in presence of manufacturer's technical representative.
- C. Apply primer over prepared substrate unless otherwise instructed in writing by waterproofing manufacturer.
- D. Unreinforced Waterproofing Applications: Mix materials and apply waterproofing by spray, roller, notched squeegee, trowel, or other application method suitable to slope of substrate.
 - 1. Apply one or more coats of waterproofing to obtain a seamless membrane free of entrapped gases and pinholes, with a dry film thickness of **[60 mils (1.5 mm)] [90 mils (2.25 mm)] [120 mils (3 mm)] <Insert dimension>**.
 - 2. Apply waterproofing to prepared wall terminations and vertical surfaces.
 - 3. Verify manufacturer's recommended wet film thickness of waterproofing every 100 sq. ft. (9.3 sq. m).
- E. Reinforced Waterproofing Applications: Mix materials and apply waterproofing by roller, notched squeegee, trowel, or other suitable application method.
 - 1. Apply first coat of waterproofing, embed membrane-reinforcing fabric, and apply second coat of waterproofing to completely saturate reinforcing fabric and to obtain a seamless reinforced membrane free of entrapped gases and pinholes, with an average dry film total thickness of **[70 mils (1.8 mm)] [80 mils (2 mm)] [120 mils (3 mm)] <Insert dimension>**.
 - 2. Apply reinforced waterproofing to prepared wall terminations and vertical surfaces.
 - 3. Verify manufacturer's recommended wet film thickness of waterproofing every 100 sq. ft. (9.3 sq. m).
- F. Cure waterproofing, taking care to prevent contamination and damage during application and curing.
- G. Install protection course with butted joints over waterproofing before starting subsequent construction operations.
 - 1. For horizontal applications, install protection course loose laid over fully cured membrane.

2. For vertical applications, set protection course in nominally cured membrane, which will act as an adhesive. If membrane cures before application of protection course, use adhesive.
3. **[Molded-sheet drainage panels] [Insulation drainage panels] [Board insulation]** may be used in place of a separate protection course for vertical applications when approved in writing by waterproofing manufacturer.

3.6 MOLDED-SHEET DRAINAGE PANEL INSTALLATION

- A. Place and secure molded-sheet drainage panels, with geotextile facing away from wall or deck substrate, according to manufacturer's written instructions. Use adhesive or another method that does not penetrate waterproofing. Lap edges and ends of geotextile to maintain continuity. Protect installed molded-sheet drainage panels during subsequent construction.
 1. For vertical applications, install **[board insulation] [protection course]** before installing drainage panels.
- B. Molded-Sheet Collector-Panel System: Install according to manufacturer's written instructions. Connect to piped subdrainage system specified in Section 334600 "Subdrainage."

3.7 INSULATION INSTALLATION

- A. Install one or more layers of board insulation to achieve required thickness over waterproofed surfaces. Cut and fit to within 3/4 inch (19 mm) of projections and penetrations.
- B. On vertical surfaces, set insulation units in adhesive applied according to manufacturer's written instructions.
- C. On horizontal surfaces, loosely lay insulation units according to manufacturer's written instructions. Stagger end joints and tightly abut insulation units.

3.8 INSULATION DRAINAGE PANEL INSTALLATION

- A. Install drainage panels over waterproofed surfaces. Cut and fit to within 3/4 inch (19 mm) of projections and penetrations.
- B. Ensure that drainage channels are aligned and free of obstructions.
- C. On vertical surfaces, set insulation drainage panels in adhesive or tape applied according to manufacturer's written instructions.
- D. On horizontal surfaces, loosely lay insulation drainage panels according to manufacturer's written instructions. Stagger end joints and tightly abut insulation units.

3.9 PLAZA-DECK PAVER INSTALLATION

- A. Install pavers according to manufacturer's written instructions.
- B. Install **[fixed]** **[adjustable]**-height paver pedestals to elevations required. Adjust for final level and slope of paved surface.
 - 1. Fill paver pedestal with concrete mix, strike smooth with top of pedestal, and cure according to ACI 301.
- C. Loosely lay pavers on pedestals, maintaining a uniform open joint width. Tightly seat pavers against spacers to eliminate lateral movement or drift of paving assembly. Align joint patterns parallel in each direction.
 - 1. Lay out pavers to avoid less-than-half-width pavers at perimeter or other terminations.
- D. Install pavers to vary no more than 1/16 inch (1.6 mm) in elevation between adjacent pavers and no more than 1/16 inch (1.6 mm) from surface plane elevation of individual paver.
- E. Limit variation in paving installation to within **[1/4 inch in 10 feet (6 mm in 3 m)]** **<Insert dimensions>** of surface plane in any direction; noncumulative.

3.10 FIELD QUALITY CONTROL

- A. Testing Agency: **[Owner will engage]** **[Engage]** a qualified testing agency to perform tests and inspections:
 - 1. Testing agency shall verify thickness of waterproofing during application for each **[600 sq. ft. (56 sq. m)]** **<Insert dimension>** of installed waterproofing or part thereof.
 - 2. Flood Testing: Flood test each deck area for leaks, according to recommendations in ASTM D 5957, after completing waterproofing but before overlaying construction is placed. Install temporary containment assemblies, plug or dam drains, and flood with potable water.
 - a. Flood to an average depth of 2-1/2 inches (64 mm) with a minimum depth of 1 inch (25 mm) and not exceeding a depth of 4 inches (100 mm). Maintain 2 inches (50 mm) of clearance from top of sheet flashings.
 - b. Flood each area for **[24]** **[48]** **[72]** hours.
 - c. After flood testing, repair leaks, repeat flood tests, and make further repairs until waterproofing installation is watertight.
 - 3. Electronic Leak-Detection Testing:
 - a. Testing agency shall test **[each deck area]** **[each deck area indicated for testing on Drawings]** **<Insert area to be tested>** for leaks using an electronic leak-detection method that locates discontinuities in the waterproofing membrane.
 - b. Testing agency shall perform tests on abutting or overlapping smaller areas as necessary to cover entire test area.

- c. Testing agency shall create a conductive electronic field over the area of waterproofing to be tested and electronically determine locations of discontinuities or leaks, if any, in the waterproofing.
 - d. Testing agency shall provide survey report indicating locations of discontinuities, if any.
- B. Manufacturer's Field Service: Engage a **[full-time]** site representative qualified by waterproofing membrane manufacturer to inspect substrate conditions, surface preparation, membrane application, flashings, protection, and drainage components and to furnish daily reports to Architect.
- C. If test results or inspections show waterproofing does not comply with requirements, remove and replace or repair the waterproofing as recommended in writing by manufacturer, and make further repairs after retesting and inspecting until waterproofing installation passes.
- D. Prepare test and inspection reports.

3.11 PROTECTION

- A. Do not permit foot or vehicular traffic on unprotected membrane.
- B. Protect waterproofing from damage and wear during remainder of construction period.
- C. Protect installed **[board insulation]** **[insulation drainage panels]** from damage due to UV light, harmful weather exposures, physical abuse, and other causes. Provide temporary coverings where insulation is subject to abuse and cannot be concealed and protected by permanent construction immediately after installation.
- D. Correct deficiencies in or remove waterproofing that does not comply with requirements; repair substrates, reapply waterproofing, and repair sheet flashings.
- E. Clean spillage and soiling from adjacent construction using cleaning agents and procedures recommended in writing by manufacturer of affected construction.

END OF SECTION 071416

SECTION 071800 - TRAFFIC COATINGS

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 traffic coatings and pavement **markings** for the following applications:
 - 1. Pedestrian traffic.
 - 2. Vehicular traffic.
 - 3. Equipment-room floor.

1.3 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at owner's designated location.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include installation instructions and details, material descriptions, dry or wet film thickness requirements, and finish.
- B. Shop Drawings: For traffic coatings.
 - 1. Include details for treating substrate joints and cracks, flashings, deck penetrations, and other termination conditions that are not included in manufacturer's product data.
 - 2. Include plans showing layout of pavement markings, lane separations, and defined parking spaces. Indicate, with international symbol of accessibility, spaces allocated for people with disabilities.
- C. Samples for Initial Selection: For each type of exposed finish.
- D. Samples for Verification: For each type of exposed finish, prepared on rigid backing.
 - 1. Provide stepped Samples on backing to illustrate buildup of traffic coatings.

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer.
- B. Product Certificates: For each type of traffic coating.
- C. Field quality-control reports.
- D. Sample Warranty: For manufacturer's warranty.

1.6 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For traffic coatings to include in maintenance manuals.

1.7 QUALITY ASSURANCE

- A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer.
- B. Mockups: Build mockups to set quality standards for materials and execution.
 - 1. Build mockup for each traffic coating and substrate to receive traffic coatings.
 - 2. Size: [200 sq. ft. (18.5 sq. m)] of each substrate to demonstrate surface preparation, joint and crack treatment, thickness, texture, color, and standard of workmanship.
 - 3. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
 - 4. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.8 FIELD CONDITIONS

- A. Environmental Limitations: Apply traffic coatings within the range of ambient and substrate temperatures recommended in writing by manufacturer. Do not apply traffic coatings to damp or wet substrates, when temperatures are below 40 deg F (5 deg C), when relative humidity exceeds 85 percent, or when temperatures are less than 5 deg F (3 deg C) above dew point.
 - 1. Do not apply traffic coatings in snow, rain, fog, or mist, or when such weather conditions are imminent during the application and curing period. Apply only when frost-free conditions occur throughout the depth of substrate.
- B. Do not install traffic coating until items that penetrate membrane have been installed.
- C. Pavement-Marking Paint: Proceed with pavement marking only on clean, dry surfaces and at a minimum ambient or surface temperature of [40 deg F (4.4 deg C) for oil-based materials] [50 deg F (10 deg C) for water-based materials], and not exceeding 95 deg F (35 deg C).

1.9 WARRANTY

- A. Manufacturer's Warranty: Manufacturer agrees to repair or replace traffic coating that fails in materials or workmanship within specified warranty period.
 - 1. Failures include, but are not limited to, the following:
 - a. Adhesive or cohesive failures.
 - b. Abrasion or tearing failures.
 - c. Surface crazing or spalling.
 - d. Intrusion of water, oils, gasoline, grease, salt, deicer chemicals, or acids into deck substrate.
 - 2. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Source Limitations:
 - 1. Obtain traffic coatings from single source from single manufacturer.
 - 2. Obtain primary traffic-coating materials, including primers, from traffic-coating manufacturer. Obtain accessory materials including aggregates, sheet flashings, joint sealants, and substrate repair materials of types and from sources recommended in writing by primary material manufacturer.
 - 3. Obtain pavement-marking paint from single source from single manufacturer.

2.2 PERFORMANCE REQUIREMENTS

- A. Material Compatibility: Provide primers; base coat, intermediate coat, and topcoat; and accessory materials that are compatible with one another and with substrate under conditions of service and application, as demonstrated by manufacturer based on testing and field experience.

2.3 TRAFFIC COATING

- A. Traffic Coating: Manufacturer's standard, traffic-bearing, seamless, high-solids-content, cold liquid-applied, elastomeric, water-resistant membrane system with integral wearing surface for vehicular traffic; according to ASTM C 957/C 957M.
- B. Primer: Liquid primer as recommended in writing for substrate and conditions by traffic-coating manufacturer.
 - 1. Material: Polyurethane.

- C. Preparatory and Base Coats: **[Polyurethane] [Aromatic urethane] [Aliphatic urethane] [or] [epoxy]**.
1. Thicknesses: Minimum **[dry-] [or] [wet-]** film thickness **[as recommended in writing by manufacturer for substrate and service conditions indicated]** **<Insert thickness>**.
- D. Intermediate Coat: **[Polyurethane] [Aromatic urethane] [Aliphatic urethane] [or] [epoxy]**.
1. Thicknesses: Minimum **[dry-] [or] [wet-]** film thickness **[as recommended in writing by manufacturer for substrate and service conditions indicated]** **<Insert thickness>**, measured excluding aggregate.
 2. Aggregate Content: **[As recommended in writing by traffic-coating manufacturer for substrate and service conditions indicated]** **[Not less than 8 to 10 lb/100 sq. ft. (3.9 to 4.9 kg/10 sq. m)]** **[To refusal]** **<Insert requirement>**.
- E. Topcoat: **[Polyurethane] [Aromatic urethane] [Aliphatic urethane] [Aromatic urethane with UV inhibitors] [or] [epoxy]**.
1. Thicknesses: Minimum **[dry-] [or] [wet-]** film thickness **[as recommended in writing by manufacturer for substrate and service conditions indicated]** **<Insert thickness>**, measured excluding aggregate.
 2. Aggregate Content: **[As recommended in writing by traffic-coating manufacturer for substrate and service conditions indicated]** **[As required to achieve slip-resistant finish]** **[8 to 10 lb/100 sq. ft. (3.9 to 4.9 kg/10 sq. m)]** **[To refusal]** **<Insert requirement>**.
 3. Color: **[As selected by Architect from manufacturer's full range]** **[Match Architect's sample]** **<Insert color>**.
- F. Aggregate: **[Manufacturer's standard aggregate for each use indicated]** **[Uniformly graded, washed silicon carbide sand]** **[Uniformly graded, washed silica sand]** **[Uniformly graded, washed flint shot silica]** **[Walnut shell granules]** **[or]** **[Aluminum-oxide grit]** **<Insert aggregate>** of particle sizes, shape, and minimum hardness recommended in writing by traffic-coating manufacturer.
- G. Fire-Test-Response Characteristics: Provide traffic-coating materials with the fire-test-response characteristics as determined by testing identical products according to test method below for deck type and slopes indicated by an independent testing and inspecting agency that is acceptable to authorities having jurisdiction.
1. **[Class A] [Class B] [Class C]** roof covering according to ASTM E 108.
 2. **<Insert test requirement>**.
- H. ENERGY STAR Listing: Provide traffic coating that is listed on the DOE's ENERGY STAR "Roof Products Qualified Product List" for low-slope roof products.
- I. Energy Performance: Provide traffic coating with an initial Solar Reflectance Index of **[not less than 0.70]** **<Insert value>** and emissivity of **[not less than 0.75]** **<Insert value>** when tested according to CRRC-1.

2.4 ACCESSORY MATERIALS

- A. Joint Sealants: [As specified in Section 079200 "Joint Sealants."] [ASTM C 920.] <Insert requirement.>
- B. Sheet Flashing: Nonstaining [sheet material recommended in writing by traffic-coating manufacturer] [, uncured neoprene sheet] [, cured neoprene sheet] <Insert material>.
 - 1. Thickness: Minimum [60 mils (1.5 mm)] [50 mils (1.3 mm)] <Insert value>.
- C. Adhesive: Contact adhesive recommended in writing by traffic-coating manufacturer.
- D. Reinforcing Strip: Fiberglass mesh recommended in writing by traffic-coating manufacturer.

2.5 PAVEMENT MARKINGS

- A. Pavement-Marking Paint: Comply with Section 321723 "Pavement Markings."
- B. Pavement-Marking Paint: Alkyd-resin type, lead and chromate free, ready mixed, complying with AASHTO M 248, [Type N] [Type F] [Type S]; colors complying with FS TT-P-1952.
 - 1. Color: [White] [Yellow] [Blue] [As indicated] <Insert color>.
- C. Pavement-Marking Paint: MPI #32 Alkyd Traffic Marking Paint.
 - 1. Color: [White] [Yellow] [Blue] [As indicated] <Insert color>.
- D. Pavement-Marking Paint: Latex, waterborne emulsion, lead and chromate free, ready mixed, complying with FS TT-P-1952, Type II, with drying time of less than [three] [45] minutes.
 - 1. Color: [White] [Yellow] [Blue] [As indicated] <Insert color>.
- E. Pavement-Marking Paint: MPI #97 Latex Traffic Marking Paint.
 - 1. Color: [White] [Yellow] [Blue] [As indicated] <Insert color>.
- F. Glass Beads: [AASHTO M 247, Type 1] [FS TT-B-1325, Type 1A].

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for maximum moisture content, surface smoothness, and other conditions affecting performance of traffic-coating work.

- B. Verify that substrates are visibly dry and free of moisture.
 - 1. Test for moisture according to ASTM D 4263.
 - 2. Test for moisture content by **[measuring with an electronic moisture meter] [method recommended in writing by traffic-coating manufacturer] <Insert test method>.**
- C. Prepare written report, endorsed by Installer, listing conditions detrimental to performance of traffic-coating work.
- D. Proceed with installation only after unsatisfactory conditions have been corrected.
 - 1. Begin coating application only after substrate construction and penetrating work have been completed.
 - 2. Begin coating application only after minimum concrete-curing and -drying period recommended in writing by traffic-coating manufacturer has passed and after substrates are dry.
 - 3. Application of coating indicates acceptance of surfaces and conditions.

3.2 PREPARATION

- A. Clean and prepare substrates according to ASTM C 1127 and manufacturer's written instructions to produce clean, dust-free, dry substrate for traffic-coating application. Remove projections, fill voids, and seal joints if any, as recommended in writing by traffic-coating manufacturer.
- B. Priming: Unless manufacturer recommends in writing against priming, prime substrates according to manufacturer's written instructions.
 - 1. Limit priming to areas that will be covered by traffic-coating material on same day. Reprime areas exposed for more time than recommended by manufacturer.
- C. Schedule preparation work so dust and other contaminants from process do not fall on wet, newly coated surfaces.
- D. Mask adjoining surfaces not receiving traffic coatings to prevent overspray, spillage, leaking, and migration of coatings. Prevent traffic-coating materials from entering deck substrate penetrations and clogging weep holes and drains.
- E. Concrete Substrates: **[Mechanically abrade surface to a uniform profile acceptable to manufacturer, according to ASTM D 4259.]**Do not acid etch.
 - 1. Remove grease, oil, paints, and other penetrating contaminants from concrete.
 - 2. Remove concrete fins, ridges, and other projections.
 - 3. Remove laitance, glaze, efflorescence, curing compounds, concrete hardeners, form-release agents, and other incompatible materials that might affect coating adhesion.
 - 4. Remove remaining loose material to provide a sound surface, and clean surfaces according to ASTM D 4258.

3.3 TERMINATIONS AND PENETRATIONS

- A. Prepare vertical and horizontal surfaces at terminations and penetrations through traffic coatings and at expansion joints, drains, and sleeves according to ASTM C 1127 and manufacturer's written instructions.
- B. Provide sealant cants at penetrations and at reinforced and nonreinforced, deck-to-wall butt joints.
- C. Terminate edges of deck-to-deck expansion joints with preparatory base-coat strip.
- D. Install sheet flashings at deck-to-wall expansion and dynamic joints, and bond to deck and wall substrates according to manufacturer's written recommendations.

3.4 JOINT AND CRACK TREATMENT

- A. Prepare, treat, rout, and fill joints and cracks in substrates according to ASTM C 1127 and manufacturer's written recommendations. Before coating surfaces, remove dust and dirt from joints and cracks according to ASTM D 4258.
 - 1. Comply with recommendations in ASTM C 1193 for joint-sealant installation.
- B. Apply reinforcing strip in traffic-coating system where recommended in writing by traffic-coating manufacturer.

3.5 TRAFFIC-COATING APPLICATION

- A. Apply traffic coating according to ASTM C 1127 and manufacturer's written instructions.
- B. Apply coats of specified compositions for each type of traffic coating at locations as indicated on Drawings.
- C. Start traffic-coating application in presence of manufacturer's technical representative.
- D. Verify that wet-film thickness of each coat complies with requirements every [100 sq. ft. (9 sq. m)] <Insert dimension>.
- E. Uniformly broadcast and embed aggregate in each coat indicated to receive aggregate according to manufacturer's written instructions. After coat dries, sweep away excess aggregate.
- F. Apply traffic coatings to prepared wall terminations and vertical surfaces to height indicated; omit aggregate on vertical surfaces.
- G. Cure traffic coatings. Prevent contamination and damage during coating application and curing.

3.6 PAVEMENT MARKINGS

- A. Do not apply pavement-marking paint for striping and other markings until layout, colors, and placement have been verified with Architect and traffic coating has cured.
- B. Sweep and clean surface to eliminate loose material and dust.
- C. Apply pavement-marking paint with mechanical equipment to produce markings of dimensions indicated with uniform straight edges. Apply at manufacturer's recommended rates for a minimum wet-film thickness of **15-mils (0.4-mm)**.
 - 1. Apply graphic symbols and lettering with paint-resistant, die-cut stencils, firmly secured to surface. Mask an extended area beyond edges of each stencil to prevent paint application beyond stencil. Apply paint so that it cannot run beneath stencil.
 - 2. Broadcast glass beads uniformly into wet pavement-marking paint at a rate of **6 lb/gal. (0.72 kg/L)**.

3.7 FIELD QUALITY CONTROL

- A. Testing Agency: **[Owner will engage] [Engage]** a qualified testing agency to perform the following field tests and inspections:
 - 1. Materials Testing:
 - a. Samples of material delivered to Project site shall be taken, identified, sealed, and certified in presence of **[Owner and]**Contractor.
 - b. Testing agency shall perform tests for characteristics specified, using applicable referenced testing procedures.
 - c. Testing agency shall verify thickness of coatings during traffic-coating application for each **[600 sq. ft. (56 sq. m)]** **<Insert dimension>** of installed traffic coating or part thereof.
 - 2. Electronic Leak-Detection Testing:
 - a. Testing agency shall test **[each deck area] [each deck area indicated for testing on Drawings]** **<Insert area to be tested>** for leaks using an electronic leak-detection method that locates discontinuities in the traffic-coating membrane.
 - b. Testing agency shall perform tests on abutting or overlapping smaller areas as necessary to cover entire test area.
 - c. Testing agency shall create a conductive electronic field over the area of traffic coating to be tested and electronically determine locations of discontinuities or leaks, if any, in the traffic coating.
 - d. Testing agency shall provide survey report indicating locations of discontinuities, if any.
- B. Final Traffic-Coating Inspection: Arrange for traffic-coating manufacturer's technical personnel to inspect membrane installation on completion.

1. Notify Architect or Owner 48 hours in advance of date and time of inspection.
- C. Waterproofing will be considered defective if it does not pass tests and inspections.
- D. Prepare test and inspection reports.

3.8 PROTECTING AND CLEANING

- A. Protect traffic coatings from damage and wear during remainder of construction period.
- B. Clean spillage and soiling from adjacent construction using cleaning agents and procedures recommended by manufacturer of affected construction.

END OF SECTION 071800

SECTION 099113 - EXTERIOR PAINTING

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 surface preparation and the application of paint systems on exterior substrates.
 - 1. Concrete.
 - 2. Fiber-cement board.
 - 3. Clay masonry.
 - 4. Concrete masonry units (CMUs).
 - 5. Steel and iron.
 - 6. Galvanized metal.
 - 7. Aluminum (not anodized or otherwise coated).
 - 8. Copper.
 - 9. Stainless steel.
 - 10. Wood.
 - 11. Fiberglass.
 - 12. Plastic.
 - 13. Portland cement plaster (stucco).
 - 14. Gypsum board.
 - 15. Cotton or canvas insulation covering.
 - 16. Bituminous-coated surfaces.
- B. Related Requirements:
 - 1. **[Section 051200 "Structural Steel Framing"] [Section 051213 "Architecturally Exposed Structural Steel Framing"]** for shop priming of metal substrates.
 - 2. Section 055000 "Metal Fabrications" for shop priming metal fabrications.
 - 3. Section 055116 "Metal Floor Plate Stairs" for shop priming metal floor plate stairs.
 - 4. Section 055119 "Metal Grating Stairs" for shop priming metal grating stairs.
 - 5. Section 055213 "Pipe and Tube Railings" for shop **[priming] [painting]** pipe and tube railings.
 - 6. **[Section 055313 "Bar Gratings"] [Section 055316 "Plank Gratings"] [Section 055319 "Expanded Metal Gratings"]** for shop priming metal gratings.
 - 7. Section 099600 "High-Performance Coatings" for tile-like coatings.
 - 8. Section 099300 "Staining and Transparent Finishing" for surface preparation and the application of wood stains and transparent finishes on exterior wood substrates.

1.3 DEFINITIONS

- A. MPI Gloss Level 1: Not more than five units at 60 degrees and 10 units at 85 degrees, according to ASTM D 523.
- B. MPI Gloss Level 3: 10 to 25 units at 60 degrees and 10 to 35 units at 85 degrees, according to ASTM D 523.
- C. MPI Gloss Level 4: 20 to 35 units at 60 degrees and not less than 35 units at 85 degrees, according to ASTM D 523.
- D. MPI Gloss Level 5: 35 to 70 units at 60 degrees, according to ASTM D 523.
- E. MPI Gloss Level 6: 70 to 85 units at 60 degrees, according to ASTM D 523.
- F. MPI Gloss Level 7: More than 85 units at 60 degrees, according to ASTM D 523.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product. Include preparation requirements and application instructions.
 - 1. Include printout of current "MPI Approved Products List" for each product category specified, with the proposed product highlighted.
 - 2. Indicate VOC content.
- B. Samples for Initial Selection: For each type of topcoat product.
- C. Samples for Verification: For each type of paint system and each color and gloss of topcoat.
 - 1. Submit Samples on rigid backing, 8 inches (200 mm) square.
 - 2. Apply coats on Samples in steps to show each coat required for system.
 - 3. Label each coat of each Sample.
 - 4. Label each Sample for location and application area.
- D. Product List: Cross-reference to paint system and locations of application areas. Use same designations indicated on Drawings and in schedules. Include color designations.

1.5 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials[, **from the same product run,**] that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Paint: [5] <Insert number> percent, but not less than [1 gal. (3.8 L)] <Insert value> of each material and color applied.

1.6 QUALITY ASSURANCE

- A. Mockups: Apply mockups of each paint system indicated and each color and finish selected to verify preliminary selections made under Sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.
 - 1. Architect will select one surface to represent surfaces and conditions for application of each paint system.
 - a. Vertical and Horizontal Surfaces: Provide samples of at least 100 sq. ft. (9 sq. m).
 - b. Other Items: Architect will designate items or areas required.
 - 2. Final approval of color selections will be based on mockups.
 - a. If preliminary color selections are not approved, apply additional mockups of additional colors selected by Architect at no added cost to Owner.
 - 3. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
 - 4. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Store materials not in use in tightly covered containers in well-ventilated areas with ambient temperatures continuously maintained at not less than 45 deg F (7 deg C).
 - 1. Maintain containers in clean condition, free of foreign materials and residue.
 - 2. Remove rags and waste from storage areas daily.

1.8 FIELD CONDITIONS

- A. Apply paints only when temperature of surfaces to be painted and ambient air temperatures are between 50 and 95 deg F (10 and 35 deg C).
- B. Do not apply paints in snow, rain, fog, or mist; when relative humidity exceeds 85 percent; at temperatures less than 5 deg F (3 deg C) above the dew point; or to damp or wet surfaces.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

2.2 Retain "Products" Paragraph below and insert lists of manufacturers and products in Exterior Painting Schedule to require specific products or a comparable product from other manufacturers.

- A. Products: Subject to compliance with requirements, **[provide product] [provide one of the products] [available products that may be incorporated into the Work include, but are not limited to products]** listed in the Exterior Painting Schedule for the paint category indicated.

2.3 PAINT, GENERAL

- A. MPI Standards: Products shall comply with MPI standards indicated and shall be listed in its "MPI Approved Products Lists."

- B. Material Compatibility:

1. Materials for use within each paint system shall be compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.
2. For each coat in a paint system, products shall be recommended in writing by topcoat manufacturers for use in paint system and on substrate indicated.

- C. Colors: **[As selected by Architect from manufacturer's full range] [Match Architect's samples] [As indicated in a color schedule] <Insert requirements>**.

1. **[Ten] [Twenty] [Thirty] <Insert number>** percent of surface area will be painted with deep tones.

2.4 SOURCE QUALITY CONTROL

- A. Testing of Paint Materials: Owner reserves the right to invoke the following procedure:

1. Owner will engage the services of a qualified testing agency to sample paint materials. Contractor will be notified in advance and may be present when samples are taken. If paint materials have already been delivered to Project site, samples may be taken at Project site. Samples will be identified, sealed, and certified by testing agency.
2. Testing agency will perform tests for compliance with product requirements.
3. Owner may direct Contractor to stop applying paints if test results show materials being used do not comply with product requirements. Contractor shall remove noncomplying paint materials from Project site, pay for testing, and repaint surfaces painted with rejected materials. Contractor will be required to remove rejected materials from

previously painted surfaces if, on repainting with complying materials, the two paints are incompatible.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.
- B. Maximum Moisture Content of Substrates: When measured with an electronic moisture meter as follows:
 - 1. Concrete: 12 percent.
 - 2. Fiber-Cement Board: 12 percent.
 - 3. Masonry (Clay and CMUs): 12 percent.
 - 4. Wood: 15 percent.
 - 5. Portland Cement Plaster: 12 percent.
 - 6. Gypsum Board: 12 percent.
- C. Portland Cement Plaster Substrates: Verify that plaster is fully cured.
- D. Exterior Gypsum Board Substrates: Verify that finishing compound is sanded smooth.
- E. Verify suitability of substrates, including surface conditions and compatibility, with existing finishes and primers.
- F. Proceed with coating application only after unsatisfactory conditions have been corrected.
 - 1. Application of coating indicates acceptance of surfaces and conditions.

3.2 PREPARATION

- A. Comply with manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual" applicable to substrates and paint systems indicated.
- B. Remove hardware, covers, plates, and similar items already in place that are removable and are not to be painted. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and painting.
 - 1. After completing painting operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection.
- C. Clean substrates of substances that could impair bond of paints, including dust, dirt, oil, grease, and incompatible paints and encapsulants.

1. Remove incompatible primers and reprime substrate with compatible primers or apply tie coat as required to produce paint systems indicated.
- D. Concrete Substrates: Remove release agents, curing compounds, efflorescence, and chalk. Do not paint surfaces if moisture content or alkalinity of surfaces to be painted exceeds that permitted in manufacturer's written instructions.
- E. Masonry Substrates: Remove efflorescence and chalk. Do not paint surfaces if moisture content or alkalinity of surfaces or mortar joints exceeds that permitted in manufacturer's written instructions.
- F. Steel Substrates: Remove rust, loose mill scale, and shop primer if any. Clean using methods recommended in writing by paint manufacturer[.] [**but not less than the following:**]
1. SSPC-SP 2.
 2. SSPC-SP 3.
 3. SSPC-SP 7/NACE No. 4.
 4. SSPC-SP 11.
- G. Shop-Primed Steel Substrates: Clean field welds, bolted connections, and areas where shop paint is abraded. Paint exposed areas with the same material as used for shop priming to comply with SSPC-PA 1 for touching up shop-primed surfaces.
- H. Galvanized-Metal Substrates: Remove grease and oil residue from galvanized sheet metal by mechanical methods to produce clean, lightly etched surfaces that promote adhesion of subsequently applied paints.
- I. Aluminum Substrates: Remove loose surface oxidation.
- J. Wood Substrates:
1. Scrape and clean knots. Before applying primer, apply coat of knot sealer recommended in writing by topcoat manufacturer for exterior use in paint system indicated.
 2. Sand surfaces that will be exposed to view, and dust off.
 3. Prime edges, ends, faces, undersides, and backsides of wood.
 4. After priming, fill holes and imperfections in the finish surfaces with putty or plastic wood filler. Sand smooth when dried.
- K. Plastic Trim Fabrication Substrates: Remove dust, dirt, and other foreign material that might impair bond of paints to substrates.

3.3 APPLICATION

- A. Apply paints according to manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual."
1. Use applicators and techniques suited for paint and substrate indicated.

2. Paint surfaces behind movable items same as similar exposed surfaces. Before final installation, paint surfaces behind permanently fixed items with prime coat only.
 3. Paint both sides and edges of exterior doors and entire exposed surface of exterior door frames.
 4. Paint entire exposed surface of window frames and sashes.
 5. Do not paint over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates.
 6. Primers specified in painting schedules may be omitted on items that are factory primed or factory finished if acceptable to topcoat manufacturers.
- B. Tint undercoats same color as topcoat, but tint each undercoat a lighter shade to facilitate identification of each coat if multiple coats of same material are to be applied. Provide sufficient difference in shade of undercoats to distinguish each separate coat.
- C. If undercoats or other conditions show through topcoat, apply additional coats until cured film has a uniform paint finish, color, and appearance.
- D. Apply paints to produce surface films without cloudiness, spotting, holidays, laps, brush marks, roller tracking, runs, sags, ropiness, or other surface imperfections. Cut in sharp lines and color breaks.
- E. Painting Fire Suppression, Plumbing, HVAC, Electrical, Communication, and Electronic Safety and Security Work:
1. Paint the following work where exposed to view:
 - a. Equipment, including panelboards[**and switch gear**].
 - b. Uninsulated metal piping.
 - c. Uninsulated plastic piping.
 - d. Pipe hangers and supports.
 - e. Metal conduit.
 - f. Plastic conduit.
 - g. Tanks that do not have factory-applied final finishes.
 - h. **<Insert mechanical items to be painted>.**

3.4 FIELD QUALITY CONTROL

- A. Dry Film Thickness Testing: Owner may engage the services of a qualified testing and inspecting agency to inspect and test paint for dry film thickness.
1. Contractor shall touch up and restore painted surfaces damaged by testing.
 2. If test results show that dry film thickness of applied paint does not comply with paint manufacturer's written recommendations, Contractor shall pay for testing and apply additional coats as needed to provide dry film thickness that complies with paint manufacturer's written recommendations.

3.5 CLEANING AND PROTECTION

- A. At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site.
- B. After completing paint application, clean spattered surfaces. Remove spattered paints by washing, scraping, or other methods. Do not scratch or damage adjacent finished surfaces.
- C. Protect work of other trades against damage from paint application. Correct damage to work of other trades by cleaning, repairing, replacing, and refinishing, as approved by Architect, and leave in an undamaged condition.
- D. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces.

3.6 EXTERIOR PAINTING SCHEDULE

A. Concrete Substrates, Nontraffic Surfaces:

- 1. Latex System [**MPI EXT 3.1A**] [**MPI EXT 3.1K**]:
 - a. Prime Coat: Primer, alkali resistant, water based[, **MPI #3**].
 - b. Prime Coat: Latex, exterior, matching topcoat.
 - c. Intermediate Coat: Latex, exterior, matching topcoat.
 - d. Topcoat: Latex, exterior, flat (MPI Gloss Level 1)[, **MPI #10**].
 - e. Topcoat: Latex, exterior, low sheen (MPI Gloss Level 3-4)[, **MPI #15**].
 - f. Topcoat: Latex, exterior, semi-gloss (MPI Gloss Level 5)[, **MPI #11**].
 - g. Topcoat: Latex, exterior, gloss (MPI Gloss Level 6)[, **MPI #119**].
- 2. Latex over Latex Aggregate System[**MPI EXT 3.1B**]:
 - a. Prime Coat: Textured coating, latex, flat[, **MPI #42**].
 - b. Intermediate Coat: Latex, exterior, matching topcoat.
 - c. Topcoat: Latex, exterior, flat (MPI Gloss Level 1)[, **MPI #10**].
 - d. Topcoat: Latex, exterior, low sheen (MPI Gloss Level 3-4)[, **MPI #15**].
 - e. Topcoat: Latex, exterior, semi-gloss (MPI Gloss Level 5)[, **MPI #11**].
 - f. Topcoat: Latex, exterior, gloss (MPI Gloss Level 6)[, **MPI #119**].
 - 1) <Insert manufacturer's name; product name or designation>.

3. Latex Aggregate System[**MPI EXT 3.1N**]:
 - a. Prime Coat: As recommended in writing by topcoat manufacturer.
 - b. Intermediate Coat: As recommended in writing by topcoat manufacturer.
 - c. Topcoat: Textured coating, latex, nonflat[, **MPI #41**].
 - d. Topcoat: Textured coating, latex, flat[, **MPI #42**].
4. High-Build Latex System[**MPI EXT 3.1L**]: Dry film thickness of not less than **10 mils** (0.25 mm).
 - a. Prime Coat: As recommended in writing by topcoat manufacturer.
 - b. Intermediate Coat: As recommended in writing by topcoat manufacturer.
 - c. Topcoat: Latex, exterior, high build[, **MPI #40**].
5. Water-Based Light Industrial Coating System[**MPI EXT 3.1C**]:
 - a. Prime Coat: Primer, alkali resistant, water based[, **MPI #3**].
 - b. Intermediate Coat: Light industrial coating, exterior, water based, matching topcoat.
 - c. Topcoat: Light industrial coating, exterior, water based (MPI Gloss Level 3)[, **MPI #161**].
 - d. Topcoat: Light industrial coating, exterior, water based, semi-gloss (MPI Gloss Level 5)[, **MPI #163**].
 - e. Topcoat: Light industrial coating, exterior, water based, gloss (MPI Gloss Level 6)[, **MPI #164**].

B. Concrete Substrates, Traffic Surfaces:

1. Latex Floor Paint System[**MPI EXT 3.2A**]:
 - a. Prime Coat: Floor paint, latex, matching topcoat.
 - b. Intermediate Coat: Floor paint, latex, matching topcoat.
 - c. Topcoat: Floor paint, latex, low gloss (maximum MPI Gloss Level 3)[, **MPI #60**].
2. Latex Deck Coating System[**MPI EXT 3.2B**]:
 - a. Prime Coat: As recommended in writing by topcoat manufacturer.
 - b. Intermediate Coat: As recommended in writing by topcoat manufacturer.
 - c. Topcoat: Deck coating, latex[, **MPI #127**].
3. Alkyd Floor Enamel System[**MPI EXT 3.2D**]:
 - a. Prime Coat: Floor enamel, matching topcoat.
 - b. Intermediate Coat: Floor enamel, matching topcoat.
 - c. Topcoat: Floor enamel, alkyd, gloss (MPI Gloss Level 6)[, **MPI #27**].

- d. Additive: Manufacturer's standard additive to increase skid resistance of painted surface.
- 4. Clear Water-Based Sealer System[**MPI EXT 3.2H**]:
 - a. Prime Coat: Sealer, water based, matching topcoat.
 - b. Intermediate Coat: Sealer, water based, matching topcoat.
 - c. Topcoat: Sealer, water based, for concrete floors[, **MPI #99**].
- 5. Clear Sealer System[**MPI EXT 3.2G**]:
 - a. Prime Coat: Sealer, solvent based, matching topcoat.
 - b. Intermediate Coat: Sealer, solvent based, matching topcoat.
 - c. Topcoat: Sealer, solvent based, for concrete floors[, **MPI #104**].
- C. Cement Board Substrates:
 - 1. Latex System [**MPI EXT 3.3A**] [**MPI EXT 3.3J**]:
 - a. Prime Coat: Latex, exterior, matching topcoat.
 - b. Prime Coat: Primer, alkali resistant, water based[, **MPI #3**].
 - c. Intermediate Coat: Latex, exterior, matching topcoat.
 - d. Topcoat: Latex, exterior, flat (MPI Gloss Level 1)[, **MPI #10**].
 - e. Topcoat: Latex, exterior, low sheen (MPI Gloss Level 3-4)[, **MPI #15**].
 - f. Topcoat: Latex, exterior, semi-gloss (MPI Gloss Level 5)[, **MPI #11**].
 - g. Topcoat: Latex, exterior, gloss (MPI Gloss Level 6)[, **MPI #119**].
 - 2. Latex Aggregate System[**MPI EXT 3.3G**]:
 - a. Prime Coat: As recommended in writing by topcoat manufacturer.
 - b. Intermediate Coat: As recommended in writing by topcoat manufacturer.
 - c. Topcoat: Textured coating, latex, nonflat[, **MPI #41**].
 - d. Topcoat: Textured coating, latex, flat[, **MPI #42**].
 - 3. High-Build Latex System[**MPI EXT 3.3H**]: Dry film thickness of not less than **10 mils** (0.25 mm).
 - a. Prime Coat: As recommended in writing by topcoat manufacturer.
 - b. Intermediate Coat: As recommended in writing by topcoat manufacturer.
 - c. Topcoat: Latex, exterior, high build[, **MPI #40**].
 - 4. Water-Based Light Industrial Coating System[**MPI EXT 3.3C**]:
 - a. Prime Coat: Primer, alkali resistant, water based[, **MPI #3**].

- b. Intermediate Coat: Light industrial coating, exterior, water based, matching topcoat.
 - c. Topcoat: Light industrial coating, exterior, water based (MPI Gloss Level 3)[, **MPI #161**].
 - d. Topcoat: Light industrial coating, exterior, water based, semi-gloss (MPI Gloss Level 5)[, **MPI #163**].
 - e. Topcoat: Light industrial coating, exterior, water based, gloss (MPI Gloss Level 6)[, **MPI #164**].
5. Alkyd System[**MPI EXT 3.3B**]:
- a. Prime Coat: Primer, latex for exterior wood[, **MPI #6**].
 - b. Intermediate Coat: Exterior, alkyd enamel, matching topcoat.
 - c. Topcoat: Alkyd, exterior, flat (MPI Gloss Level 5)[, **MPI #8**].
 - d. Topcoat: Alkyd, exterior, semi-gloss (MPI Gloss Level 5)[, **MPI #94**].
 - e. Topcoat: Alkyd, exterior, gloss (MPI Gloss Level 6)[, **MPI #9**].

D. Clay Masonry Substrates:

- 1. Latex System[**MPI EXT 4.1A**]:
 - a. Prime Coat: Latex, exterior, matching topcoat.
 - b. Intermediate Coat: Latex, exterior, matching topcoat.
 - c. Topcoat: Latex, exterior, flat (MPI Gloss Level 1)[, **MPI #10**].
 - d. Topcoat: Latex, exterior, low sheen (MPI Gloss Level 3-4)[, **MPI #15**].
 - e. Topcoat: Latex, exterior, semi-gloss (MPI Gloss Level 5)[, **MPI #11**].
 - f. Topcoat: Latex, exterior, gloss (MPI Gloss Level 6)[, **MPI #119**].
- 2. Latex Aggregate System[**MPI EXT 4.1B**]:
 - a. Prime Coat: As recommended in writing by topcoat manufacturer.
 - b. Intermediate Coat: As recommended in writing by topcoat manufacturer.
 - c. Topcoat: Textured coating, latex, nonflat[, **MPI #41**].
 - d. Topcoat: Textured coating, latex, flat[, **MPI #42**].
- 3. High-Build Latex System[**MPI EXT 4.1H**]: Dry film thickness of not less than **10 mils (0.25 mm)**.
 - a. Prime Coat: As recommended in writing by topcoat manufacturer.
 - b. Intermediate Coat: As recommended in writing by topcoat manufacturer.

- c. Topcoat: Latex, exterior, high build[, **MPI #40**].
- 4. Water-Based Light Industrial Coating System[**MPI EXT 4.1C**]:
 - a. Prime Coat: Light industrial coating, exterior, water based, matching topcoat.
 - b. Intermediate Coat: Light industrial coating, exterior, water based, matching topcoat.
 - c. Topcoat: Light industrial coating, exterior, water based (MPI Gloss Level 3)[, **MPI #161**].
 - d. Topcoat: Light industrial coating, exterior, water based, semi-gloss (MPI Gloss Level 5)[, **MPI #163**].
 - e. Topcoat: Light industrial coating, exterior, water based, gloss (MPI Gloss Level 6)[, **MPI #164**].
- E. CMU Substrates:
 - 1. Latex System[**MPI EXT 4.2A**]:
 - a. Prime Coat: Block filler, latex, interior/exterior[, **MPI #4**].
 - b. Intermediate Coat: Latex, exterior, matching topcoat.
 - c. Topcoat: Latex, exterior, flat (MPI Gloss Level 1)[, **MPI #10**].
 - d. Topcoat: Latex, exterior, low sheen (MPI Gloss Level 3-4)[, **MPI #15**].
 - e. Topcoat: Latex, exterior, semi-gloss (MPI Gloss Level 5)[, **MPI #11**].
 - f. Topcoat: Latex, exterior, gloss (MPI Gloss Level 6)[, **MPI #119**].
 - 2. Latex over Alkali-Resistant Primer System[**MPI EXT 4.2L**]:
 - a. Prime Coat: Primer, alkali resistant, water based[, **MPI #3**].
 - b. Intermediate Coat: Latex, exterior, matching topcoat.
 - c. Topcoat: Latex, exterior, flat (MPI Gloss Level 1)[, **MPI #10**].
 - d. Topcoat: Latex, exterior, low sheen (MPI Gloss Level 3-4)[, **MPI #15**].
 - e. Topcoat: Latex, exterior, semi-gloss (MPI Gloss Level 5)[, **MPI #11**].
 - f. Topcoat: Latex, exterior, gloss (MPI Gloss Level 6)[, **MPI #119**].
 - 3. Latex Aggregate System[**MPI EXT 4.2B**]:
 - a. Prime Coat: As recommended in writing by topcoat manufacturer.
 - b. Intermediate Coat: As recommended in writing by topcoat manufacturer.
 - c. Topcoat: Textured coating, latex, nonflat[, **MPI #41**].

- d. Topcoat: Textured coating, latex, flat[, **MPI #42**].
- 4. High-Build Latex System[**MPI EXT 4.2K**]: Dry film thickness of not less than **10 mils (0.25 mm)**.
 - a. Prime Coat: As recommended in writing by topcoat manufacturer.
 - b. Intermediate Coat: As recommended in writing by topcoat manufacturer.
 - c. Topcoat: Latex, exterior, high build[, **MPI #40**].
- 5. Water-Based Light Industrial Coating System[**MPI EXT 4.2C**]:
 - a. Prime Coat: Block filler, latex, interior/exterior[, **MPI #4**].
 - b. Intermediate Coat: Light industrial coating, exterior, water based, matching topcoat.
 - c. Topcoat: Light industrial coating, exterior, water based (MPI Gloss Level 3)[, **MPI #161**].
 - d. Topcoat: Light industrial coating, exterior, water based, semi-gloss (MPI Gloss Level 5)[, **MPI #163**].
 - e. Topcoat: Light industrial coating, exterior, water based, gloss (MPI Gloss Level 6)[, **MPI #164**].

F. Steel and Iron Substrates:

- 1. Water-Based Light Industrial Coating System[**MPI EXT 5.1B**] [**MPI EXT 5.1C**] [**MPI EXT 5.1M**] [**MPI EXT 5.1N**]:
 - a. Prime Coat: Primer, zinc rich, inorganic[, **MPI #19**].
 - b. Prime Coat: Primer, alkyd, anti-corrosive for metal[, **MPI #79**].
 - c. Prime Coat: Primer, rust inhibitive, water based[**MPI #107**].
 - d. Prime Coat: Primer, epoxy, anti-corrosive[**MPI #101**].
 - e. Prime Coat: Shop primer specified in Section where substrate is specified.
 - f. Intermediate Coat: Light industrial coating, exterior, water based, matching topcoat.
 - g. Topcoat: Light industrial coating, exterior, water based (MPI Gloss Level 3)[, **MPI #161**].
 - h. Topcoat: Light industrial coating, exterior, water based, semi-gloss (MPI Gloss Level 5)[, **MPI #163**].
 - i. Topcoat: Light industrial coating, exterior, water based, gloss (MPI Gloss Level 6)[, **MPI #164**].

2. Water-Based Light Industrial Coating over Epoxy System[**MPI EXT 5.1R**]:
 - a. Prime Coat: Primer, epoxy, anti-corrosive[**MPI #101**].
 - b. Intermediate Coat: Epoxy, high build, low gloss[**MPI #108**].
 - c. Topcoat: Light industrial coating, exterior, water based (MPI Gloss Level 3)[, **MPI #161**].
 - d. Topcoat: Light industrial coating, exterior, water based, semi-gloss (MPI Gloss Level 5)[, **MPI #163**].
 - e. Topcoat: Light industrial coating, exterior, water based, gloss (MPI Gloss Level 6)[, **MPI #164**].
3. Alkyd System [**MPI EXT 5.1D**] [**MPI EXT 5.1Q**]:
 - a. Prime Coat: Primer, alkyd, anticorrosive, for metal[, **MPI #79**].
 - b. Prime Coat: Shop primer specified in Section where substrate is specified.
 - c. Prime Coat: Primer, metal, surface tolerant[, **MPI #23**].
 - d. Intermediate Coat: Exterior, alkyd enamel, matching topcoat.
 - e. Topcoat: Alkyd, exterior, flat (MPI Gloss Level 1)[, **MPI #8**].
 - f. Topcoat: Alkyd, exterior, semi-gloss (MPI Gloss Level 5)[, **MPI #94**].
 - g. Topcoat: Alkyd, exterior, gloss (MPI Gloss Level 6)[, **MPI #9**].
4. Quick-Dry Enamel System[**MPI EXT 5.1A**]:
 - a. Prime Coat: Primer, alkyd, quick dry, for metal[, **MPI #76**].
 - b. Intermediate Coat: Alkyd, quick dry, matching topcoat.
 - c. Topcoat: Alkyd, quick dry, semi-gloss (MPI Gloss Level 5)[, **MPI #81**].
 - d. Topcoat: Alkyd, quick dry, gloss (MPI Gloss Level 7)[, **MPI #96**].
5. Aluminum Paint System[**MPI EXT 5.1K**]:
 - a. Prime Coat: Primer, alkyd, anti-corrosive, for metal[, **MPI #79**].
 - b. Prime Coat: Shop primer specified in Section where substrate is specified.
 - c. Intermediate Coat: Aluminum paint, matching topcoat.
 - d. Topcoat: Aluminum paint[, **MPI #1**].

G. Galvanized-Metal Substrates:

1. Latex System [**MPI EXT 5.3A**] [**MPI EXT 5.3H**]:

- a. Prime Coat: Primer, galvanized, cementitious[, **MPI #26**].
 - b. Prime Coat: Primer, galvanized, water based[, **MPI #134**].
 - c. Intermediate Coat: Latex, exterior, matching topcoat.
 - d. Topcoat: Latex, exterior, flat (MPI Gloss Level 1)[, **MPI #10**].
 - e. Topcoat: Latex, exterior, low sheen (MPI Gloss Level 3-4)[, **MPI #15**].
 - f. Topcoat: Latex, exterior, semi-gloss (MPI Gloss Level 5)[, **MPI #11**].
 - g. Topcoat: Latex, exterior, gloss (MPI Gloss Level 6)[, **MPI #119**].
2. Water-Based Light Industrial Coating System [**MPI EXT 5.3G**] [**MPI EXT 5.3J**] [**MPI EXT 5.3K**]:
- a. Prime Coat: Primer, galvanized, cementitious[, **MPI #26**].
 - b. Prime Coat: Primer, galvanized, water based[, **MPI #134**].
 - c. Prime Coat: Primer, epoxy, anti-corrosive[, **MPI #101**].
 - d. Intermediate Coat: Light industrial coating, exterior, water based, matching topcoat.
 - e. Topcoat: Light industrial coating, exterior, water based (MPI Gloss Level 3)[, **MPI #161**].
 - f. Topcoat: Light industrial coating, exterior, water based, semi-gloss (MPI Gloss Level 5)[, **MPI #163**].
 - g. Topcoat: Light industrial coating, exterior, water based, gloss (MPI Gloss Level 6)[, **MPI #164**].
3. Alkyd System[**MPI EXT 5.3B**]:
- a. Prime Coat: Primer, galvanized, cementitious[, **MPI #26**].
 - b. Intermediate Coat: Exterior, alkyd enamel, matching topcoat.
 - c. Topcoat: Alkyd, exterior, flat (MPI Gloss Level 5)[, **MPI #8**].
 - d. Topcoat: Alkyd, exterior, semi-gloss (MPI Gloss Level 5)[, **MPI #94**].
 - e. Topcoat: Alkyd, exterior, gloss (MPI Gloss Level 6)[, **MPI #9**].
4. Aluminum Paint System[**MPI EXT 5.3F**]:
- a. Prime Coat: Primer, galvanized, cementitious[, **MPI #26**].
 - b. Intermediate Coat: Aluminum paint, matching topcoat.

- c. Topcoat: Aluminum paint[, **MPI #1**].

H. Aluminum Substrates:

1. Latex System[**MPI EXT 5.4H**]:

- a. Prime Coat: Primer, quick dry, for aluminum[, **MPI #95**].
- b. Intermediate Coat: Latex, exterior, matching topcoat.
- c. Topcoat: Latex, exterior, flat (MPI Gloss Level 1)[, **MPI #10**].
- d. Topcoat: Latex, exterior, low sheen (MPI Gloss Level 3-4)[, **MPI #15**].
- e. Topcoat: Latex, exterior, semi-gloss (MPI Gloss Level 5)[, **MPI #11**].
- f. Topcoat: Latex, exterior, gloss (MPI Gloss Level 6)[, **MPI #119**].

2. Water-Based Light Industrial Coating System[**MPI EXT 5.4G**]:

- a. Prime Coat: Primer, quick dry, for aluminum[, **MPI #95**].
- b. Intermediate Coat: Light industrial coating, exterior, water based, matching topcoat.
- c. Topcoat: Light industrial coating, exterior, water based (MPI Gloss Level 3)[, **MPI #161**].
- d. Topcoat: Light industrial coating, exterior, water based, semi-gloss (MPI Gloss Level 5)[, **MPI #163**].
- e. Topcoat: Light industrial coating, exterior, water based, gloss (MPI Gloss Level 6)[, **MPI #164**].

3. Alkyd System [**MPI EXT 5.4A**] [**MPI EXT 5.4F**]:

- a. Pretreatment Prime Coat: Vinyl wash primer[, **MPI #80**].
- b. Prime Coat: Primer, quick dry, for aluminum[, **MPI #95**].
- c. Intermediate Coat: Exterior, alkyd enamel, matching topcoat.
- d. Topcoat: Alkyd, exterior, flat (MPI Gloss Level 5)[, **MPI #8**].
- e. Topcoat: Alkyd, exterior, semi-gloss (MPI Gloss Level 5)[, **MPI #94**].
- f. Topcoat: Alkyd, exterior, gloss (MPI Gloss Level 6)[, **MPI #9**].

I. Copper Substrates:

1. Latex System[**MPI EXT 5.5H**]:

- a. Prime Coat: Primer, quick dry, for aluminum[, **MPI #95**].
 - b. Intermediate Coat: Latex, exterior, matching topcoat.
 - c. Topcoat: Latex, exterior, flat (MPI Gloss Level 1)[, **MPI #10**].
 - d. Topcoat: Latex, exterior, low sheen (MPI Gloss Level 3-4)[, **MPI #15**].
 - e. Topcoat: Latex, exterior, semi-gloss (MPI Gloss Level 5)[, **MPI #11**].
 - f. Topcoat: Latex, exterior, gloss (MPI Gloss Level 6)[, **MPI #119**].
2. Water-Based Light Industrial Coating System[**MPI EXT 5.5G**]:
- a. Prime Coat: Primer, quick dry, for aluminum[, **MPI #95**].
 - b. Intermediate Coat: Light industrial coating, exterior, water based, matching topcoat.
 - c. Topcoat: Light industrial coating, exterior, water based (MPI Gloss Level 3)[, **MPI #161**].
 - d. Topcoat: Light industrial coating, exterior, water based, semi-gloss (MPI Gloss Level 5)[, **MPI #163**].
 - e. Topcoat: Light industrial coating, exterior, water based, gloss (MPI Gloss Level 6)[, **MPI #164**].
3. Alkyd System [**MPI EXT 5.5A**] [**MPI EXT 5.5F**]:
- a. Prime Coat: Vinyl wash primer[, **MPI #80**].
 - b. Prime Coat: Primer, quick dry, for aluminum[, **MPI #95**].
 - c. Intermediate Coat: Exterior, alkyd enamel, matching topcoat.
 - d. Topcoat: Alkyd, exterior, flat (MPI Gloss Level 5)[, **MPI #8**].
 - e. Topcoat: Alkyd, exterior, semi-gloss (MPI Gloss Level 5)[, **MPI #94**].
 - f. Topcoat: Alkyd, exterior, gloss (MPI Gloss Level 6)[, **MPI #9**].

J. Stainless-Steel Substrates:

1. Latex System[**MPI EXT 5.6F**]:
- a. Prime Coat: Primer, bonding, solvent based[, **MPI #69**].
 - b. Intermediate Coat: Latex, exterior, matching topcoat.
 - c. Topcoat: Latex, exterior, flat (MPI Gloss Level 1)[, **MPI #10**].
 - d. Topcoat: Latex, exterior, low sheen (MPI Gloss Level 3-4)[, **MPI #15**].

- e. Topcoat: Latex, exterior, semi-gloss (MPI Gloss Level 5)[, **MPI #11**].
 - f. Topcoat: Latex, exterior, gloss (MPI Gloss Level 6)[, **MPI #119**].
2. Water-Based Light Industrial Coating System[**MPI EXT 5.6G**]:
- a. Prime Coat: Primer, quick dry, for aluminum[, **MPI #95**].
 - b. Intermediate Coat: Light industrial coating, exterior, water based, matching topcoat.
 - c. Topcoat: Light industrial coating, exterior, water based (MPI Gloss Level 3)[, **MPI #161**].
 - d. Topcoat: Light industrial coating, exterior, water based, semi-gloss (MPI Gloss Level 5)[, **MPI #163**].
 - e. Topcoat: Light industrial coating, exterior, water based, gloss (MPI Gloss Level 6)[, **MPI #164**].
3. Alkyd System[**MPI EXT 5.6A**]:
- a. Prime Coat: Vinyl wash primer[, **MPI #80**].
 - b. Intermediate Coat: Exterior, alkyd enamel, matching topcoat.
 - c. Topcoat: Alkyd, exterior, flat (MPI Gloss Level 5)[, **MPI #8**].
 - d. Topcoat: Alkyd, exterior, semi-gloss (MPI Gloss Level 5)[, **MPI #94**].
 - e. Topcoat: Alkyd, exterior, gloss (MPI Gloss Level 6)[, **MPI #9**].

K. Wood Substrates: Glued-laminated construction.

1. Latex over Latex Primer System[**MPI EXT 6.1L**]:
- a. Prime Coat: Primer, latex for exterior wood[, **MPI #6**].
 - b. Intermediate Coat: Latex, exterior, matching topcoat.
 - c. Topcoat: Latex, exterior, flat (MPI Gloss Level 1)[, **MPI #10**].
 - d. Topcoat: Latex, exterior, low sheen (MPI Gloss Level 3-4)[, **MPI #15**].
 - e. Topcoat: Latex, exterior, semi-gloss (MPI Gloss Level 5)[, **MPI #11**].
 - f. Topcoat: Latex, exterior, gloss (MPI Gloss Level 6)[, **MPI #119**].
2. Latex over Alkyd Primer System[**MPI EXT 6.1A**]:
- a. Prime Coat: Primer, alkyd for exterior wood[, **MPI #5**].

- b. Intermediate Coat: Latex, exterior, matching topcoat.
 - c. Topcoat: Latex, exterior, flat (MPI Gloss Level 1)[, **MPI #10**].
 - d. Topcoat: Latex, exterior, low sheen (MPI Gloss Level 3-4)[, **MPI #15**].
 - e. Topcoat: Latex, exterior, semi-gloss (MPI Gloss Level 5)[, **MPI #11**].
 - f. Topcoat: Latex, exterior, gloss (MPI Gloss Level 6)[, **MPI #119**].
3. Alkyd System[**MPI EXT 6.1B**]:
- a. Prime Coat: Primer, alkyd for exterior wood[, **MPI #5**].
 - b. Intermediate Coat: Exterior, alkyd enamel, matching topcoat.
 - c. Topcoat: Alkyd, exterior, flat (MPI Gloss Level 5)[, **MPI #8**].
 - d. Topcoat: Alkyd, exterior, semi-gloss (MPI Gloss Level 5)[, **MPI #94**].
 - e. Topcoat: Alkyd, exterior, gloss (MPI Gloss Level 6)[, **MPI #9**].

L. Wood Substrates: Exposed framing.

1. Latex over Latex Primer System[**MPI EXT 6.2M**]:
- a. Prime Coat: Primer, latex for exterior wood[, **MPI #6**].
 - b. Intermediate Coat: Latex, exterior, matching topcoat.
 - c. Topcoat: Latex, exterior, flat (MPI Gloss Level 1)[, **MPI #10**].
 - d. Topcoat: Latex, exterior, low sheen (MPI Gloss Level 3-4)[, **MPI #15**].
 - e. Topcoat: Latex, exterior, semi-gloss (MPI Gloss Level 5)[, **MPI #11**].
 - f. Topcoat: Latex, exterior, gloss (MPI Gloss Level 6)[, **MPI #119**].
2. Latex over Alkyd Primer System[**MPI EXT 6.2A**]:
- a. Prime Coat: Primer, alkyd for exterior wood[, **MPI #5**].
 - 1) <Insert manufacturer's name; product name or designation>.
 - b. Intermediate Coat: Latex, exterior, matching topcoat.
 - c. Topcoat: Latex, exterior, flat (MPI Gloss Level 1)[, **MPI #10**].
 - d. Topcoat: Latex, exterior, low sheen (MPI Gloss Level 3-4)[, **MPI #15**].
 - e. Topcoat: Latex, exterior, semi-gloss (MPI Gloss Level 5)[, **MPI #11**].
 - f. Topcoat: Latex, exterior, gloss (MPI Gloss Level 6)[, **MPI #119**].

3. Alkyd System[**MPI EXT 6.2C**]:
 - a. Prime Coat: Primer, alkyd for exterior wood[, **MPI #5**].
 - b. Intermediate Coat: Exterior, alkyd enamel, matching topcoat.
 - c. Topcoat: Alkyd, exterior, flat (MPI Gloss Level 5)[, **MPI #8**].
 - d. Topcoat: Alkyd, exterior, semi-gloss (MPI Gloss Level 5)[, **MPI #94**].
 - e. Topcoat: Alkyd, exterior, gloss (MPI Gloss Level 6)[, **MPI #9**].
- M. Wood Substrates: [**Wood trim**] [**Architectural woodwork**] [**Doors**] [**Windows**] [**Wood board siding**] [**and**] [**wood fences**].
 1. Latex over Latex Primer System[**MPI EXT 6.3L**]:
 - a. Prime Coat: Primer, latex for exterior wood[, **MPI #6**].
 - b. Intermediate Coat: Latex, exterior, matching topcoat.
 - c. Topcoat: Latex, exterior, flat (MPI Gloss Level 1)[, **MPI #10**].
 - d. Topcoat: Latex, exterior, low sheen (MPI Gloss Level 3-4)[, **MPI #15**].
 - e. Topcoat: Latex, exterior, semi-gloss (MPI Gloss Level 5)[, **MPI #11**].
 - f. Topcoat: Latex, exterior, gloss (MPI Gloss Level 6)[, **MPI #119**].
 2. Latex System[**MPI EXT 6.3A**]:
 - a. Prime Coat: Primer, alkyd for exterior wood[, **MPI #5**].
 - b. Intermediate Coat: Latex, exterior, matching topcoat.
 - c. Topcoat: Latex, exterior, flat (MPI Gloss Level 1)[, **MPI #10**].
 - d. Topcoat: Latex, exterior, low sheen (MPI Gloss Level 3-4)[, **MPI #15**].
 - e. Topcoat: Latex, exterior, semi-gloss (MPI Gloss Level 5)[, **MPI #11**].
 - f. Topcoat: Latex, exterior, gloss (MPI Gloss Level 6)[, **MPI #119**].
 3. Water-Based Light Industrial Coating System[**MPI EXT 6.3J**]:
 - a. Prime Coat: Primer, alkyd for exterior wood[, **MPI #5**].
 - b. Intermediate Coat: Light industrial coating, exterior, water based, matching topcoat.
 - c. Topcoat: Light industrial coating, exterior, water based, semi-gloss (MPI Gloss Level 5)[, **MPI #163**].

- d. Topcoat: Light industrial coating, exterior, water based, gloss (MPI Gloss Level 6)[, **MPI #164**].
4. Alkyd System[**MPI EXT 6.3B**]:
- a. Prime Coat: Primer, alkyd for exterior wood[, **MPI #5**].
 - b. Intermediate Coat: Exterior, alkyd enamel, matching topcoat.
 - c. Topcoat: Alkyd, exterior, flat (MPI Gloss Level 5)[, **MPI #8**].
 - d. Topcoat: Alkyd, exterior, semi-gloss (MPI Gloss Level 5)[, **MPI #94**].
 - e. Topcoat: Alkyd, exterior, gloss (MPI Gloss Level 6)[, **MPI #9**].
- N. Wood Substrates: Wood-based panel products.
1. Latex over Latex Primer System[**MPI EXT 6.4K**]:
- a. Prime Coat: Primer, latex for exterior wood[, **MPI #6**].
 - b. Intermediate Coat: Latex, exterior, matching topcoat.
 - c. Topcoat: Latex, exterior, flat (MPI Gloss Level 1)[, **MPI #10**].
 - d. Topcoat: Latex, exterior, low sheen (MPI Gloss Level 3-4)[, **MPI #15**].
 - e. Topcoat: Latex, exterior, semi-gloss (MPI Gloss Level 5)[, **MPI #11**].
 - f. Topcoat: Latex, exterior, gloss (MPI Gloss Level 6)[, **MPI #119**].
2. Latex over Alkyd Primer System[**MPI EXT 6.4G**]:
- a. Prime Coat: Primer, alkyd for exterior wood[, **MPI #5**].
 - b. Intermediate Coat: Latex, exterior, matching topcoat.
 - c. Topcoat: Latex, exterior, flat (MPI Gloss Level 1)[, **MPI #10**].
 - d. Topcoat: Latex, exterior, low sheen (MPI Gloss Level 3-4)[, **MPI #15**].
 - e. Topcoat: Latex, exterior, semi-gloss (MPI Gloss Level 5)[, **MPI #11**].
 - f. Topcoat: Latex, exterior, gloss (MPI Gloss Level 6)[, **MPI #119**].
3. Alkyd System[**MPI EXT 6.4B**]:
- a. Prime Coat: Primer, alkyd for exterior wood[, **MPI #5**].
 - b. Intermediate Coat: Exterior, alkyd enamel, matching topcoat.
 - c. Topcoat: Alkyd, exterior, flat (MPI Gloss Level 5)[, **MPI #8**].

- d. Topcoat: Alkyd, exterior, semi-gloss (MPI Gloss Level 5)[, **MPI #94**].
 - e. Topcoat: Alkyd, exterior, gloss (MPI Gloss Level 6)[, **MPI #9**].
- O. Wood Substrates: Traffic surfaces, including [**lumber decking**] [**and**] [**stairs**].
- 1. Latex Porch and Floor Paint over Latex Primer System[**MPI EXT 6.5E**]:
 - a. Prime Coat: Primer, latex for exterior wood[, **MPI #6**].
 - b. Intermediate Coat: Latex floor paint, matching topcoat.
 - c. Topcoat: Latex floor paint, low gloss[, **MPI #60**].
 - d. Additive: Manufacturer's standard additive to increase skid resistance of painted surface.
 - 2. Latex Porch and Floor Paint over Alkyd Primer System[**MPI EXT 6.5A**]:
 - a. Prime Coat: Primer, alkyd for exterior wood[, **MPI #5**].
 - b. Intermediate Coat: Latex floor paint, matching topcoat.
 - c. Topcoat: Latex floor paint, low gloss[, **MPI #60**].
 - d. Additive: Manufacturer's standard additive to increase skid resistance of painted surface.
 - 3. Latex Deck Coating System (for Plywood Decks)[**MPI EXT 6.5G**]:
 - a. Prime Coat: As recommended in writing by topcoat manufacturer.
 - b. Intermediate Coat: As recommended in writing by topcoat manufacturer.
 - c. Topcoat: Latex Deck Coating[, **MPI #127**].
 - 4. Alkyd Floor Enamel System[**MPI EXT 6.5B**]:
 - a. Prime Coat: Floor enamel, alkyd, gloss, matching topcoat.
 - b. Intermediate Coat: Floor enamel, alkyd, gloss, matching topcoat.
 - c. Topcoat: Floor enamel, alkyd, gloss (MPI Gloss Level 6)[, **MPI #27**].
 - d. Additive: Manufacturer's standard additive to increase skid resistance of painted surface.
 - 5. Alkyd Floor Enamel over Wood Preservative System[**MPI EXT 6.5C**]:
 - a. Preservative Coat: Preservative, for exterior wood[, **MPI #37**].
 - b. Prime Coat: Floor enamel, alkyd, gloss, matching topcoat.
 - c. Intermediate Coat: Floor enamel, alkyd, gloss, matching topcoat.
 - d. Topcoat: Floor enamel, alkyd, gloss (MPI Gloss Level 6)[, **MPI #27**].

- e. Additive: Manufacturer's standard additive to increase skid resistance of painted surface.
- P. Wood Substrates: Wood shingles and shakes (excluding roofs).
- 1. Latex over Latex Primer System[**MPI EXT 6.6E**]:
 - a. Prime Coat: Primer, latex for exterior wood[, **MPI #6**].
 - b. Intermediate Coat: Latex, exterior, matching topcoat.
 - c. Topcoat: Latex, exterior, flat (MPI Gloss Level 1)[, **MPI #10**].
 - d. Topcoat: Latex, exterior, low sheen (MPI Gloss Level 3-4)[, **MPI #15**].
 - e. Topcoat: Latex, exterior, semi-gloss (MPI Gloss Level 5)[, **MPI #11**].
 - f. Topcoat: Latex, exterior, gloss (MPI Gloss Level 6)[, **MPI #119**].
 - 2. Latex over Alkyd Primer System[**MPI EXT 6.6A**]:
 - a. Prime Coat: Primer, alkyd for exterior wood[, **MPI #5**].
 - b. Intermediate Coat: Latex, exterior, matching topcoat.
 - c. Topcoat: Latex, exterior, flat (MPI Gloss Level 1)[, **MPI #10**].
 - d. Topcoat: Latex, exterior, low sheen (MPI Gloss Level 3-4)[, **MPI #15**].
 - e. Topcoat: Latex, exterior, semi-gloss (MPI Gloss Level 5)[, **MPI #11**].
 - f. Topcoat: Latex, exterior, gloss (MPI Gloss Level 6)[, **MPI #119**].
 - 3. Alkyd System[**MPI EXT 6.6B**]:
 - a. Prime Coat: Primer, alkyd for exterior wood[, **MPI #5**].
 - b. Intermediate Coat: Exterior, alkyd enamel, matching topcoat.
 - c. Topcoat: Alkyd, exterior, flat (MPI Gloss Level 5)[, **MPI #8**].
 - d. Topcoat: Alkyd, exterior, semi-gloss (MPI Gloss Level 5)[, **MPI #94**].
 - e. Topcoat: Alkyd, exterior, gloss (MPI Gloss Level 6)[, **MPI #9**].
- Q. Fiberglass Substrates:
- 1. Latex System[**MPI EXT 6.7A**]:
 - a. Prime Coat: Primer, bonding, solvent based[, **MPI #69**].
 - b. Intermediate Coat: Latex, exterior, matching topcoat.

- c. Topcoat: Latex, exterior, flat (MPI Gloss Level 1)[, **MPI #10**].
 - d. Topcoat: Latex, exterior, low sheen (MPI Gloss Level 3-4)[, **MPI #15**].
 - e. Topcoat: Latex, exterior, semi-gloss (MPI Gloss Level 5)[, **MPI #11**].
 - f. Topcoat: Latex, exterior, gloss (MPI Gloss Level 6)[, **MPI #119**].
2. Water-Based Light Industrial Coating System[**MPI EXT 6.7C**]:
- a. Prime Coat: Primer, bonding, solvent based[, **MPI #69**].
 - b. Intermediate Coat: Light industrial coating, exterior, water based, matching topcoat.
 - c. Topcoat: Light industrial coating, exterior, water based (MPI Gloss Level 3)[, **MPI #161**].
 - d. Topcoat: Light industrial coating, exterior, water based, semi-gloss (MPI Gloss Level 5)[, **MPI #163**].
 - e. Topcoat: Light industrial coating, exterior, water based, gloss (MPI Gloss Level 6)[, **MPI #164**].
3. Alkyd System[**MPI EXT 6.7B**]:
- a. Prime Coat: Primer, bonding, solvent based[, **MPI #69**].
 - b. Intermediate Coat: Exterior, alkyd enamel, matching topcoat.
 - c. Topcoat: Alkyd, exterior, flat (MPI Gloss Level 5)[, **MPI #8**].
 - d. Topcoat: Alkyd, exterior, semi-gloss (MPI Gloss Level 5)[, **MPI #94**].
 - e. Topcoat: Alkyd, exterior, gloss (MPI Gloss Level 6)[, **MPI #9**].

R. Plastic Trim Fabrication Substrates:

1. Latex System[**MPI EXT 6.8A**]:
- a. Prime Coat: Primer, bonding, water based[, **MPI #17**].
 - b. Prime Coat: Primer, bonding, solvent based[, **MPI #69**].
 - c. Intermediate Coat: Latex, exterior, matching topcoat.
 - d. Topcoat: Latex, exterior, flat (MPI Gloss Level 1)[, **MPI #10**].
 - e. Topcoat: Latex, exterior, low sheen (MPI Gloss Level 3-4)[, **MPI #15**].
 - f. Topcoat: Latex, exterior, semi-gloss (MPI Gloss Level 5)[, **MPI #11**].

- g. Topcoat: Latex, exterior, gloss (MPI Gloss Level 6)[, **MPI #119**].
- 2. Water-Based Light Industrial Coating System[**MPI EXT 6.8C**]:
 - a. Prime Coat: Primer, bonding, water based[, **MPI #17**].
 - b. Prime Coat: Primer, bonding, solvent based[, **MPI #69**].
 - c. Intermediate Coat: Light industrial coating, exterior, water based, matching topcoat.
 - d. Topcoat: Light industrial coating, exterior, water based (MPI Gloss Level 3)[, **MPI #161**].
 - e. Topcoat: Light industrial coating, exterior, water based, semi-gloss (MPI Gloss Level 5)[, **MPI #163**].
 - f. Topcoat: Light industrial coating, exterior, water based, gloss (MPI Gloss Level 6)[, **MPI #164**].
- 3. Alkyd System[**MPI EXT 6.8B**]:
 - a. Prime Coat: Primer, bonding, water based[, **MPI #17**].
 - b. Prime Coat: Primer, bonding, solvent based[, **MPI #69**].
 - c. Intermediate Coat: Exterior, alkyd enamel, matching topcoat.
 - d. Topcoat: Alkyd, exterior, flat (MPI Gloss Level 5)[, **MPI #8**].
 - e. Topcoat: Alkyd, exterior, semi-gloss (MPI Gloss Level 5)[, **MPI #94**].
 - f. Topcoat: Alkyd, exterior, gloss (MPI Gloss Level 6)[, **MPI #9**].
- S. Portland Cement Plaster Substrates:
 - 1. Latex System [**MPI EXT 9.1A**] [**MPI EXT 9.1J**]:
 - a. Prime Coat: Latex, exterior, matching topcoat.
 - b. Prime Coat: Primer, alkali resistant, water based[, **MPI #3**].
 - c. Intermediate Coat: Latex, exterior, matching topcoat.
 - d. Topcoat: Latex, exterior, flat (MPI Gloss Level 1)[, **MPI #10**].
 - e. Topcoat: Latex, exterior, low sheen (MPI Gloss Level 3-4)[, **MPI #15**].
 - f. Topcoat: Latex, exterior, semi-gloss (MPI Gloss Level 5)[, **MPI #11**].
 - g. Topcoat: Latex, exterior, gloss (MPI Gloss Level 6)[, **MPI #119**].

2. High-Build Latex System[**MPI EXT 9.1H**]: Dry film thickness of not less than **10 mils (0.25 mm)**.
 - a. Prime Coat: As recommended in writing by topcoat manufacturer.
 - b. Intermediate Coat: As recommended in writing by topcoat manufacturer.
 - c. Topcoat: Latex, exterior, high build[, **MPI #40**].
3. Water-Based Light Industrial Coating System[**MPI EXT 9.1B**]:
 - a. Prime Coat: Primer, alkali resistant, water based[, **MPI #3**].
 - b. Intermediate Coat: Light industrial coating, exterior, water based, matching topcoat.
 - c. Topcoat: Light industrial coating, exterior, water based (MPI Gloss Level 3)[, **MPI #161**].
 - d. Topcoat: Light industrial coating, exterior, water based, semi-gloss (MPI Gloss Level 5)[, **MPI #163**].
 - e. Topcoat: Light industrial coating, exterior, water based, gloss (MPI Gloss Level 6)[, **MPI #164**].

T. Exterior Gypsum Board Substrates:

1. Latex System[**MPI EXT 9.2A**]:
 - a. Prime Coat: Primer, latex for exterior wood (reduced)[, **MPI #6**].
 - b. Intermediate Coat: Latex, exterior, matching topcoat.
 - c. Topcoat: Latex, exterior, flat (MPI Gloss Level 1)[, **MPI #10**].
 - d. Topcoat: Latex, exterior, low sheen (MPI Gloss Level 3-4)[, **MPI #15**].
 - e. Topcoat: Latex, exterior, semi-gloss (MPI Gloss Level 5)[, **MPI #11**].
 - f. Topcoat: Latex, exterior, gloss (MPI Gloss Level 6)[, **MPI #119**].
2. Latex Aggregate System[**MPI EXT 9.2C**]:
 - a. Prime Coat: As recommended in writing by topcoat manufacturer.
 - b. Intermediate Coat: As recommended in writing by topcoat manufacturer.
 - c. Topcoat: Textured coating, latex, nonflat[, **MPI #41**].
 - d. Topcoat: Textured coating, latex, flat[, **MPI #42**].
3. High-Build Latex System[**MPI EXT 9.2D**]: Dry film thickness of not less than **10 mils (0.25 mm)**.
 - a. Prime Coat: As recommended in writing by topcoat manufacturer.

- b. Intermediate Coat: As recommended in writing by topcoat manufacturer.
 - c. Topcoat: Latex, exterior, high build[, **MPI #40**].
- 4. Alkyd System[**MPI EXT 9.2B**]:
 - a. Prime Coat: Primer, latex for exterior wood (reduced)[, **MPI #6**].
 - b. Intermediate Coat: Exterior, alkyd enamel, matching topcoat.
 - c. Topcoat: Alkyd, exterior, flat (MPI Gloss Level 5)[, **MPI #8**].
 - d. Topcoat: Alkyd, exterior, semi-gloss (MPI Gloss Level 5)[, **MPI #94**].
 - e. Topcoat: Alkyd, exterior, gloss (MPI Gloss Level 6)[, **MPI #9**].
- U. Exterior Canvas Substrates:
 - 1. Latex System[**MPI EXT 10.1A**]:
 - a. Prime Coat: Latex, exterior, matching topcoat.
 - b. Intermediate Coat: Latex, exterior, matching topcoat.
 - c. Topcoat: Latex, exterior, flat (MPI Gloss Level 1)[, **MPI #10**].
 - d. Topcoat: Latex, exterior, low sheen (MPI Gloss Level 3-4)[, **MPI #15**].
 - e. Topcoat: Latex, exterior, semi-gloss (MPI Gloss Level 5)[, **MPI #11**].
 - f. Topcoat: Latex, exterior, gloss (MPI Gloss Level 6)[, **MPI #119**].
 - 2. Water-Based Light Industrial Coating System[**MPI EXT 10.1B**]:
 - a. Prime Coat: Light industrial coating, exterior, water based, matching topcoat.
 - b. Intermediate Coat: Light industrial coating, exterior, water based, matching topcoat.
 - c. Topcoat: Light industrial coating, exterior, water based (MPI Gloss Level 3)[, **MPI #161**].
 - d. Topcoat: Light industrial coating, exterior, water based, semi-gloss (MPI Gloss Level 5)[, **MPI #163**].
 - e. Topcoat: Light industrial coating, exterior, water based, gloss (MPI Gloss Level 6)[, **MPI #164**].
 - 3. Alkyd System[**MPI EXT 10.1C**]:
 - a. Prime Coat: Latex, exterior, flat (MPI Gloss Level 1)[, **MPI #10**].
 - b. Intermediate Coat: Exterior, alkyd enamel, matching topcoat.
 - c. Topcoat: Alkyd, exterior, flat (MPI Gloss Level 5)[, **MPI #8**].

- d. Topcoat: Alkyd, exterior, semi-gloss (MPI Gloss Level 5)[, **MPI #94**].
 - e. Topcoat: Alkyd, exterior, gloss (MPI Gloss Level 6)[, **MPI #9**].
 - 4. Aluminum Paint System[**MPI EXT 10.1D**]:
 - a. Prime Coat: Latex, exterior, flat (MPI Gloss Level 1)[, **MPI #10**].
 - b. Intermediate Coat: Aluminum paint, matching topcoat.
 - c. Topcoat: Aluminum paint[, **MPI #1**].
- V. Exterior Bituminous-Coated Substrates:
- 1. Latex System[**MPI EXT 10.2A**]:
 - a. Prime Coat: Primer, rust inhibitive, water based[, **MPI #107**].
 - b. Intermediate Coat: Latex, exterior, matching topcoat.
 - c. Topcoat: Latex, exterior, flat (MPI Gloss Level 1)[, **MPI #10**].
 - d. Topcoat: Latex, exterior, low sheen (MPI Gloss Level 3-4)[, **MPI #15**].
 - e. Topcoat: Latex, exterior, semi-gloss (MPI Gloss Level 5)[, **MPI #11**].
 - f. Topcoat: Latex, exterior, gloss (MPI Gloss Level 6)[, **MPI #119**].
 - 2. Latex Aggregate Coating System[**MPI EXT 10.2B**]:
 - a. Prime Coat: As recommended in writing by topcoat manufacturer.
 - b. Intermediate Coat: As recommended in writing by topcoat manufacturer.
 - c. Topcoat: Textured coating, latex, nonflat[, **MPI #41**].
 - d. Topcoat: Textured coating, latex, flat[, **MPI #42**].
 - 3. Alkyd System[**MPI EXT 10.2C**]:
 - a. Prime Coat: Primer, rust inhibitive, water based[, **MPI #107**].
 - b. Intermediate Coat: Exterior, alkyd enamel, matching topcoat.
 - c. Topcoat: Alkyd, exterior, flat (MPI Gloss Level 5)[, **MPI #8**].
 - d. Topcoat: Alkyd, exterior, semi-gloss (MPI Gloss Level 5)[, **MPI #94**].
 - e. Topcoat: Alkyd, exterior, gloss (MPI Gloss Level 6)[, **MPI #9**].
 - 4. Aluminum Paint System[**MPI EXT 10.2D**]:
 - a. Prime Coat: Primer, rust inhibitive, water based[, **MPI #107**].

- b. Intermediate Coat: Aluminum paint, matching topcoat.
- c. Topcoat: Aluminum paint[, **MPI #1**].

END OF SECTION 099113

SECTION 099600 - HIGH-PERFORMANCE COATINGS

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 surface preparation and the application of high-performance coating systems[.][**on the following substrates:**]

- 1. Exterior Substrates:

- a. Concrete, [**vertical**] [**and**] [**horizontal**] surfaces.
- b. Fiber-cement board.
- c. Clay masonry.
- d. Concrete masonry units (CMUs).
- e. Steel.
- f. Galvanized metal.
- g. Aluminum (not anodized or otherwise coated).
- h. Copper.
- i. Stainless steel.
- j. Wood.
- k. Fiberglass.
- l. Portland cement plaster (stucco).

- 2. Interior Substrates:

- a. Concrete, [**vertical**] [**and**] [**horizontal**] surfaces.
- b. Cement board.
- c. Clay masonry.
- d. Concrete masonry units (CMUs).
- e. Steel.
- f. Galvanized metal.
- g. Aluminum (not anodized or otherwise coated).
- h. Wood.
- i. Fiberglass.
- j. Gypsum board.
- k. Plaster.

- B. Related Requirements:

1. [Section 051200 "Structural Steel Framing"] [Section 051213 "Architecturally Exposed Structural Steel Framing"] for shop priming of structural steel with primers specified in this Section.
2. Section 055213 "Pipe and Tube Railings" for shop [priming] [painting] pipe and tube railings with coatings specified in this Section.
3. Section 099113 "Exterior Painting" for general field painting.
4. Section 099123 "Interior Painting" for general field painting.

1.3 DEFINITIONS

- A. MPI Gloss Level 5: 35 to 70 units at 60 degrees, according to ASTM D 523.
- B. MPI Gloss Level 6: 70 to 85 units at 60 degrees, according to ASTM D 523.
- C. MPI Gloss Level 7: More than 85 units at 60 degrees, according to ASTM D 523.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product. Include preparation requirements and application instructions.
 1. Include printout of current "MPI Approved Products List" for each product category specified, with the proposed product highlighted.
 2. Indicate VOC content.
- B. Samples for Initial Selection: For each type of topcoat product indicated.
- C. Samples for Verification: For each type of coating system and each color and gloss of topcoat indicated.
 1. Submit Samples on rigid backing, 8 inches (200 mm) square.
 2. Apply coats on Samples in steps to show each coat required for system.
 3. Label each coat of each Sample.
 4. Label each Sample for location and application area.
- D. Product List: Cross-reference to coating system and locations of application areas. Use same designations indicated on Drawings and in schedules. Include color designations.

1.5 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials[, from the same product run,] that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 1. Coatings: [5] <Insert number> percent, but not less than [1 gal. (3.8 L)] <Insert number> of each material and color applied.

1.6 QUALITY ASSURANCE

- A. Mockups: Apply mockups of each coating system indicated to verify preliminary selections made under Sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.
 - 1. Architect will select one surface to represent surfaces and conditions for application of each coating system.
 - a. Wall and Ceiling Surfaces: Provide samples of at least 100 sq. ft. (9 sq. m).
 - b. Other Items: Architect will designate items or areas required.
 - 2. Final approval of color selections will be based on mockups.
 - a. If preliminary color selections are not approved, apply additional mockups of additional colors selected by Architect at no added cost to Owner.
 - 3. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
 - 4. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Store materials not in use in tightly covered containers in well-ventilated areas with ambient temperatures continuously maintained at not less than 45 deg F (7 deg C).
 - 1. Maintain containers in clean condition, free of foreign materials and residue.
 - 2. Remove rags and waste from storage areas daily.

1.8 FIELD CONDITIONS

- A. Apply coatings only when temperature of surfaces to be coated and ambient air temperatures are between 50 and 95 deg F (10 and 35 deg C).
- B. Do not apply coatings when relative humidity exceeds 85 percent; at temperatures less than 5 deg F (3 deg C) above the dew point; or to damp or wet surfaces.
- C. Do not apply exterior coatings in snow, rain, fog, or mist.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. <Double click here to find, evaluate, and insert list of manufacturers and products.>
- B. Products: Subject to compliance with requirements, [**provide product**] [**provide one of the products**] [**available products that may be incorporated into the Work include, but are not limited to products**] listed in the Exterior High-Performance Coating Schedule or Interior High-Performance Coating Schedule for the coating category indicated.

2.2 HIGH-PERFORMANCE COATINGS, GENERAL

- A. MPI Standards: Products shall comply with MPI standards indicated and shall be listed in its "MPI Approved Products Lists."
- B. Material Compatibility:
 - 1. Materials for use within each paint system shall be compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.
 - 2. For each coat in a paint system, products shall be recommended in writing by topcoat manufacturers for use in paint system and on substrate indicated.
 - 3. Products shall be of same manufacturer for each coat in a coating system.
- C. <Double click to insert sustainable design text for coatings.>
- D. Colors: [**As selected by Architect from manufacturer's full range**] [**Match Architect's samples**] [**As indicated in color schedule**] <Insert requirements>.

2.3 SOURCE QUALITY CONTROL

- A. Testing of Coating Materials: Owner reserves the right to invoke the following procedure:
 - 1. Owner will engage the services of a qualified testing agency to sample coating materials. Contractor will be notified in advance and may be present when samples are taken. If coating materials have already been delivered to Project site, samples may be taken at Project site. Samples will be identified, sealed, and certified by testing agency.
 - 2. Testing agency will perform tests for compliance with product requirements.
 - 3. Owner may direct Contractor to stop applying coatings if test results show materials being used do not comply with product requirements. Contractor shall remove noncomplying coating materials from Project site, pay for testing, and recoat surfaces coated with rejected materials. Contractor will be required to remove rejected materials from previously coated surfaces if, on recoating with complying materials, the two coatings are incompatible.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.
- B. Maximum Moisture Content of Substrates: When measured with an electronic moisture meter as follows:
 - 1. Concrete: 12 percent.
 - 2. Fiber-Cement Board: 12 percent.
 - 3. Masonry (Clay and CMUs): 12 percent.
 - 4. Wood: 15 percent.
 - 5. Gypsum Board: 12 percent.
 - 6. Plaster: 12 percent.
- C. Gypsum Board Substrates: Verify that finishing compound is sanded smooth.
- D. Plaster Substrates: Verify that plaster is fully cured.
- E. Verify suitability of substrates, including surface conditions and compatibility, with existing finishes and primers.
- F. Proceed with coating application only after unsatisfactory conditions have been corrected.
 - 1. Application of coating indicates acceptance of surfaces and conditions.

3.2 PREPARATION

- A. Comply with manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual" applicable to substrates and coating systems indicated.
- B. Remove hardware, covers, plates, and similar items already in place that are removable and are not to be painted. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and painting.
 - 1. After completing painting operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection if any.
- C. Clean substrates of substances that could impair bond of coatings, including dust, dirt, oil, grease, and incompatible paints and encapsulants.
 - 1. Remove incompatible primers and reprime substrate with compatible primers or apply tie coat as required to produce coating systems indicated.

- D. Concrete Substrates: Remove release agents, curing compounds, efflorescence, and chalk. Do not coat surfaces if moisture content or alkalinity of surfaces to be coated exceeds that permitted in manufacturer's written instructions.
1. Clean surfaces with pressurized water. Use pressure range of [**1500 to 4000 psi (10 350 to 27 580 kPa)**] [**4000 to 10,000 psi (27 580 to 68 950 kPa)**] at 6 to 12 inches (150 to 300 mm).
 2. Abrasive blast clean surfaces to comply with SSPC-SP 7/NACE No. 4.
- E. Masonry Substrates: Remove efflorescence and chalk. Do not coat surfaces if moisture content, alkalinity of surfaces, or alkalinity of mortar joints exceeds that permitted in manufacturer's written instructions.
1. Clean surfaces with pressurized water. Use pressure range of [**100 to 600 psi (690 to 4140 kPa)**] [**1500 to 4000 psi (10 350 to 27 580 kPa)**] at 6 to 12 inches (150 to 300 mm).
- F. Steel Substrates: Remove rust, loose mill scale, and shop primer if any. Clean using methods recommended in writing by paint manufacturer[.][**but not less than the following:**]
1. SSPC-SP 7/NACE No. 4.
 2. SSPC-SP 11.
 3. SSPC-SP 6/NACE No. 3.
 4. SSPC-SP 10/NACE No. 2.
 5. SSPC-SP 5/NACE No. 1.
- G. Shop-Primed Steel Substrates: Clean field welds, bolted connections, and areas where shop paint is abraded. Paint exposed areas with the same material as used for shop priming to comply with SSPC-PA 1 for touching up shop-primed surfaces.
- H. Galvanized-Metal Substrates: Remove grease and oil residue from galvanized sheet metal by mechanical methods to produce clean, lightly etched surfaces that promote adhesion of subsequently applied coatings.
- I. Aluminum Substrates: Remove loose surface oxidation.
- J. Wood Substrates:
1. Scrape and clean knots. Before applying primer, apply coat of knot sealer that is recommended in writing by topcoat manufacturer for coating system indicated.
 2. Sand surfaces that will be exposed to view and dust off.
 3. Prime edges, ends, faces, undersides, and backsides of wood.
 4. After priming, fill holes and imperfections in the finish surfaces with filler that is recommended in writing by topcoat manufacturer for coating system indicated. Sand smooth when dried.

3.3 APPLICATION

- A. Apply high-performance coatings according to manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual."
 - 1. Use applicators and techniques suited for coating and substrate indicated.
 - 2. Coat surfaces behind movable equipment and furniture same as similar exposed surfaces. Before final installation, coat surfaces behind permanently fixed equipment or furniture with prime coat only.
 - 3. Coat backsides of access panels, removable or hinged covers, and similar hinged items to match exposed surfaces.
 - 4. Do not apply coatings over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates.
- B. Tint each undercoat a lighter shade to facilitate identification of each coat if multiple coats of the same material are to be applied. Tint undercoats to match color of finish coat, but provide sufficient difference in shade of undercoats to distinguish each separate coat.
- C. If undercoats or other conditions show through final coat, apply additional coats until cured film has a uniform coating finish, color, and appearance.
- D. Apply coatings to produce surface films without cloudiness, spotting, holidays, laps, brush marks, runs, sags, ropiness, or other surface imperfections. Produce sharp glass lines and color breaks.

3.4 FIELD QUALITY CONTROL

- A. Dry Film Thickness Testing: Owner may engage the services of a qualified testing and inspecting agency to inspect and test coatings for dry film thickness.
 - 1. Contractor shall touch up and restore coated surfaces damaged by testing.
 - 2. If test results show that dry film thickness of applied coating does not comply with coating manufacturer's written recommendations, Contractor shall pay for testing and apply additional coats as needed to provide dry film thickness that complies with coating manufacturer's written recommendations.

3.5 CLEANING AND PROTECTION

- A. At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site.
- B. After completing coating application, clean spattered surfaces. Remove spattered coatings by washing, scraping, or other methods. Do not scratch or damage adjacent finished surfaces.
- C. Protect work of other trades against damage from coating operation. Correct damage to work of other trades by cleaning, repairing, replacing, and recoating, as approved by Architect, and leave in an undamaged condition.

- D. At completion of construction activities of other trades, touch up and restore damaged or defaced coated surfaces.

This Section is intended to be edited using ARCOM's SpecBuilder and the MPI Architectural Painting Decision Tree, located at www.ARCOMone.com/MPI. <Double click here to connect.>

3.6 EXTERIOR HIGH-PERFORMANCE COATING SCHEDULE

A. Concrete Substrates, Vertical Surfaces:

1. Epoxy System [**MPI EXT 3.1D**]:
 - a. Prime Coat: Epoxy, matching topcoat.
 - b. Intermediate Coat: Epoxy, matching topcoat.
 - c. Topcoat: Epoxy, gloss[, **MPI #77**].
 - 1) <Insert manufacturer's name; product name or designation>.
2. Epoxy-Modified Latex System [**MPI EXT 3.1E**]:
 - a. Prime Coat: Epoxy-modified latex, matching topcoat.
 - b. Intermediate Coat: Epoxy-modified latex, matching topcoat.
 - c. Topcoat: Epoxy-modified latex, semi-gloss (MPI Gloss Level 5)[, **MPI #215**].
 - 1) <Insert manufacturer's name; product name or designation>.
 - d. Topcoat: Epoxy-modified latex, gloss (MPI Gloss Level 6)[, **MPI #115**].
 - 1) <Insert manufacturer's name; product name or designation>.
3. Pigmented Polyurethane over Epoxy System [**MPI EXT 3.1M**]:
 - a. Prime Coat: Epoxy, matching intermediate coat.
 - b. Intermediate Coat: Epoxy, gloss[, **MPI #77**].
 - 1) <Insert manufacturer's name; product name or designation>.
 - c. Topcoat: Polyurethane, two component, pigmented, gloss (MPI Gloss Level 6)[, **MPI #72**].
 - 1) <Insert manufacturer's name; product name or designation>.

B. Concrete Substrates, Horizontal Surfaces:

1. Epoxy Non-Slip Deck Coating System [**MPI EXT 3.2C**]:
 - a. Prime Coat: As recommended in writing by topcoat manufacturer.
 - b. Intermediate Coat: As recommended in writing by topcoat manufacturer.

c. Topcoat: Epoxy deck coating (slip resistant)[, **MPI #82**].

1) **<Insert manufacturer's name; product name or designation>.**

C. Cement Board Substrates:

1. Epoxy System [**MPI EXT 3.3E**]:

- a. Prime Coat: Epoxy, matching topcoat.
- b. Intermediate Coat: Epoxy, matching topcoat.
- c. Topcoat: Epoxy, gloss[, **MPI #77**].

1) **<Insert manufacturer's name; product name or designation>.**

2. Epoxy-Modified Latex System [**MPI EXT 3.3D**]

- a. Prime Coat: Epoxy-modified latex, matching topcoat.
- b. Intermediate Coat: Epoxy-modified latex, matching topcoat.
- c. Topcoat: Epoxy-modified latex, semi-gloss (MPI Gloss Level 5)[, **MPI #215**].

1) **<Insert manufacturer's name; product name or designation>.**

- d. Topcoat: Epoxy-modified latex, gloss (MPI Gloss Level 6)[, **MPI #115**].

1) **<Insert manufacturer's name; product name or designation>.**

3. Pigmented Polyurethane over Epoxy System [**MPI EXT 3.3F**]:

- a. Prime Coat: Epoxy, gloss[, **MPI #77**].
1) **<Insert manufacturer's name; product name or designation>.**
- b. Intermediate Coat: Epoxy, matching prime coat.
- c. Topcoat: Polyurethane, two component, pigmented, gloss (MPI Gloss Level 6)[, **MPI #72**].

1) **<Insert manufacturer's name; product name or designation>.**

D. Clay Masonry Substrates:

1. Epoxy System [**MPI EXT 4.1D**]:

- a. Prime Coat: Epoxy, matching topcoat.
- b. Intermediate Coat: Epoxy, matching topcoat.
- c. Topcoat: Epoxy, gloss[, **MPI #77**].

1) **<Insert manufacturer's name; product name or designation>.**

2. Pigmented Polyurethane over Epoxy System [**MPI EXT 4.1J**]:

- a. Prime Coat: Epoxy, matching intermediate coat.
- b. Intermediate Coat: Epoxy, gloss[, **MPI #77**].
 - 1) <Insert manufacturer's name; product name or designation>.
- c. Topcoat: Polyurethane, two component, pigmented, gloss (MPI Gloss Level 6)[, **MPI #72**].
 - 1) <Insert manufacturer's name; product name or designation>.

E. CMU Substrates:

- 1. Epoxy System [**MPI EXT 4.2E**]:
 - a. Block Filler: Block filler, epoxy[, **MPI #116**].
 - 1) <Insert manufacturer's name; product name or designation>.
 - b. Intermediate Coat: Epoxy, matching topcoat.
 - c. Topcoat: Epoxy, gloss[, **MPI #77**].
 - 1) <Insert manufacturer's name; product name or designation>.
- 2. Pigmented Polyurethane over High-Build Epoxy System [**MPI EXT 4.2G**]:
 - a. Block Filler: Block filler, epoxy[, **MPI #116**].
 - 1) <Insert manufacturer's name; product name or designation>.
 - b. Intermediate Coat: Epoxy, high build, low gloss[, **MPI #108**].
 - 1) <Insert manufacturer's name; product name or designation>.
 - c. Topcoat: Polyurethane, two component, pigmented, gloss (MPI Gloss Level 6)[, **MPI #72**].
 - 1) <Insert manufacturer's name; product name or designation>.

F. Steel Substrates:

- 1. Epoxy System [**MPI EXT 5.1F**]:
 - a. Prime Coat: Primer, epoxy, anti-corrosive, for metal[, **MPI #101**].
 - 1) <Insert manufacturer's name; product name or designation>.
 - b. Intermediate Coat: Epoxy, high build, low gloss[, **MPI #108**].
 - 1) <Insert manufacturer's name; product name or designation>.

- c. Topcoat: Epoxy, gloss[, **MPI #77**].
 - 1) **<Insert manufacturer's name; product name or designation>**.
- 2. Epoxy over Self-Priming Epoxy System [**MPI EXT 5.1S**]:
 - a. Prime Coat: Epoxy, high build, self-priming [, **MPI #120**].
 - 1) **<Insert manufacturer's name; product name or designation>**.
 - b. Intermediate Coat: Epoxy, matching topcoat.
 - c. Topcoat: Epoxy, gloss[, **MPI #77**].
 - 1) **<Insert manufacturer's name; product name or designation>**.
- 3. Epoxy Deck Coating over Epoxy Primer and High-Build Epoxy System [**MPI EXT 5.1V**]:
 - a. Prime Coat: Primer, epoxy, anti-corrosive, for metal[, **MPI #101**].
 - 1) **<Insert manufacturer's name; product name or designation>**.
 - b. Intermediate Coat: Epoxy, high build, low gloss[, **MPI #108**].
 - 1) **<Insert manufacturer's name; product name or designation>**.
 - c. Topcoat: Epoxy deck coating[, **MPI #82**].
 - 1) **<Insert manufacturer's name; product name or designation>**.
- 4. Epoxy Deck Coating over Self-Priming Epoxy System [**MPI EXT 5.1X**]:
 - a. Prime Coat: Epoxy, high build, self-priming [, **MPI #120**].
 - 1) **<Insert manufacturer's name; product name or designation>**.
 - b. Topcoat: Epoxy deck coating[, **MPI #82**].
 - 1) **<Insert manufacturer's name; product name or designation>**.
- 5. Pigmented Polyurethane over Epoxy System [**MPI EXT 5.1H**]:
 - a. Prime Coat: Primer, epoxy, anti-corrosive, for metal[, **MPI #101**].
 - 1) **<Insert manufacturer's name; product name or designation>**.
 - b. Intermediate Coat: Epoxy, gloss[, **MPI #77**].
 - 1) **<Insert manufacturer's name; product name or designation>**.

- c. **[First and Second]**Topcoat: Polyurethane, two component, pigmented, gloss (MPI Gloss Level 6)[, **MPI #72**].
 - 1) **<Insert manufacturer's name; product name or designation>.**
- 6. Pigmented Polyurethane over High-Build Epoxy System [**MPI EXT 5.1J**]:
 - a. Prime Coat: Primer, epoxy, anti-corrosive, for metal[, **MPI #101**].
 - 1) **<Insert manufacturer's name; product name or designation>.**
 - b. Intermediate Coat: Epoxy, high build, low gloss[, **MPI #108**].
 - 1) **<Insert manufacturer's name; product name or designation>.**
 - c. Topcoat: Polyurethane, two component, pigmented, gloss (MPI Gloss Level 6)[, **MPI #72**].
 - 1) **<Insert manufacturer's name; product name or designation>.**
- 7. Pigmented Polyurethane over Self-Priming Epoxy System [**MPI EXT 5.1T**]:
 - a. Prime Coat: Epoxy, high build, self-priming [, **MPI #120**].
 - 1) **<Insert manufacturer's name; product name or designation>.**
 - b. Intermediate Coat: Polyurethane, two component, pigmented, matching topcoat.
 - c. Topcoat: Polyurethane, two component, pigmented, gloss (MPI Gloss Level 6)[, **MPI #72**].
 - 1) **<Insert manufacturer's name; product name or designation>.**
- 8. Pigmented Polyurethane over Epoxy Zinc-Rich Primer System [**MPI EXT 5.1P**]:
 - a. Prime Coat: Primer, zinc rich, epoxy[, **MPI #20**].
 - 1) **<Insert manufacturer's name; product name or designation>.**
 - b. Intermediate Coat: Epoxy, gloss[, **MPI #77**].
 - 1) **<Insert manufacturer's name; product name or designation>.**
 - c. Topcoat: Polyurethane, two component, pigmented, gloss (MPI Gloss Level 6)[, **MPI #72**].
 - 1) **<Insert manufacturer's name; product name or designation>.**
- 9. Pigmented Polyurethane over Epoxy Zinc-Rich Primer and High-Build Epoxy System [**MPI EXT 5.1G**]:

- a. Prime Coat: Primer, zinc rich, epoxy[, **MPI #20**].
 - 1) <Insert manufacturer's name; product name or designation>.
 - b. Intermediate Coat: Epoxy, high build, low gloss[, **MPI #108**].
 - 1) <Insert manufacturer's name; product name or designation>.
 - c. **[First and Second]**Topcoat: Polyurethane, two component, pigmented, gloss (MPI Gloss Level 6)[, **MPI #72**].
 - 1) <Insert manufacturer's name; product name or designation>.
10. Pigmented Polyurethane over Inorganic Zinc-Rich Primer and High-Build Epoxy System [**MPI EXT 5.1L**]:
- a. Prime Coat: Primer, zinc rich, inorganic[, **MPI #19**].
 - 1) <Insert manufacturer's name; product name or designation>.
 - b. Intermediate Coat: Epoxy, high build, low gloss[, **MPI #108**].
 - 1) <Insert manufacturer's name; product name or designation>.
 - c. Topcoat: Polyurethane, two component, pigmented, gloss (MPI Gloss Level 6)[, **MPI #72**].
 - 1) <Insert manufacturer's name; product name or designation>.

G. Galvanized-Metal Substrates:

- 1. Epoxy System [**MPI EXT 5.3C**]:
 - a. Prime Coat: Primer, epoxy, anti-corrosive, for metal[, **MPI #101**].
 - 1) <Insert manufacturer's name; product name or designation>.
 - b. Intermediate Coat: Epoxy, matching topcoat.
 - c. Topcoat: Epoxy, gloss[, **MPI #77**].
 - 1) <Insert manufacturer's name; product name or designation>.
- 2. Pigmented Polyurethane over Epoxy Primer System [**MPI EXT 5.3L**]:
 - a. Prime Coat: Primer, epoxy, anti-corrosive, for metal[, **MPI #101**].
 - 1) <Insert manufacturer's name; product name or designation>.

- b. Intermediate Coat: Polyurethane, two component, pigmented, gloss matching topcoat.
 - c. Topcoat: Polyurethane, two component, pigmented, gloss (MPI Gloss Level 6)[, **MPI #72**].
 - 1) <Insert manufacturer's name; product name or designation>.
 - 3. Pigmented Polyurethane over Vinyl Wash Primer and Epoxy Primer System [**MPI EXT 5.3D**]:
 - a. Prime Coat: Primer, vinyl wash[, **MPI #80**].
 - 1) <Insert manufacturer's name; product name or designation>.
 - b. Intermediate Coat: Primer, epoxy, anti-corrosive, for metal[, **MPI #101**].
 - 1) <Insert manufacturer's name; product name or designation>.
 - c. [**First and Second**] Topcoat: Polyurethane, two component, pigmented, gloss (MPI Gloss Level 6)[, **MPI #72**].
 - 1) <Insert manufacturer's name; product name or designation>.
- H. Aluminum (Not Anodized or Otherwise Coated) Substrates:
- 1. Epoxy System [**MPI EXT 5.4E**]:
 - a. Prime Coat: Primer, vinyl wash[, **MPI #80**].
 - 1) <Insert manufacturer's name; product name or designation>.
 - b. Intermediate Coat: Epoxy, matching topcoat.
 - c. Topcoat: Epoxy, gloss[, **MPI #77**].
 - 1) <Insert manufacturer's name; product name or designation>.
 - 2. Pigmented Polyurethane over Epoxy System [**MPI EXT 5.4B**]:
 - a. Prime Coat: Primer, vinyl wash[, **MPI #80**].
 - 1) <Insert manufacturer's name; product name or designation>.
 - b. Intermediate Coat: Primer, epoxy, anti-corrosive, for metal[, **MPI #101**].
 - c. [**First and Second**] Topcoat: Polyurethane, two component, pigmented, gloss (MPI Gloss Level 6)[, **MPI #72**].
 - 1) <Insert manufacturer's name; product name or designation>.
- I. Copper Substrates:

1. Epoxy System [**MPI EXT 5.5E**]:
 - a. Prime Coat: Primer, vinyl wash[, **MPI #80**].
 - 1) <Insert manufacturer's name; product name or designation>.
 - b. Intermediate Coat: Epoxy, matching topcoat.
 - c. Topcoat: Epoxy, gloss[, **MPI #77**].
 - 1) <Insert manufacturer's name; product name or designation>.
2. Pigmented Polyurethane over Epoxy System [**MPI EXT 5.5B**]:
 - a. Prime Coat: Primer, vinyl wash[, **MPI #80**].
 - 1) <Insert manufacturer's name; product name or designation>.
 - b. Intermediate Coat: Primer, epoxy, anti-corrosive, for metal[, **MPI #101**].
 - c. [**First and Second**] Topcoat: Polyurethane, two component, pigmented, gloss (MPI Gloss Level 6)[, **MPI #72**].
 - 1) <Insert manufacturer's name; product name or designation>.

J. Stainless-Steel Substrates:

1. Epoxy System [**MPI EXT 5.6D**]:
 - a. Prime Coat: Primer, epoxy, anti-corrosive, for metal[, **MPI #101**].
 - 1) <Insert manufacturer's name; product name or designation>.
 - b. Intermediate Coat: Epoxy, matching topcoat.
 - c. Topcoat: Epoxy, gloss[, **MPI #77**].
 - 1) <Insert manufacturer's name; product name or designation>.
2. Pigmented Polyurethane System [**MPI EXT 5.6B**]:
 - a. Prime Coat: Primer, vinyl wash[, **MPI #80**].
 - 1) <Insert manufacturer's name; product name or designation>.
 - b. Intermediate Coat: Primer, epoxy, anti-corrosive, for metal[, **MPI #101**].
 - c. [**First and Second**] Topcoat: Polyurethane, two component, pigmented, gloss (MPI Gloss Level 6)[, **MPI #72**].
 - 1) <Insert manufacturer's name; product name or designation>.

K. Wood Substrates: Glued-laminated construction.

1. Pigmented Polyurethane System [**MPI EXT 6.1J**]:

- a. Prime Coat: Polyurethane, two component, pigmented, gloss, matching topcoat.
- b. Intermediate Coat: Polyurethane, two component, pigmented, gloss, matching topcoat.
- c. Topcoat: Polyurethane, two component, pigmented, gloss (MPI Gloss Level 6)[, **MPI #72**].

1) <**Insert manufacturer's name; product name or designation**>.

L. Wood Substrates: Exposed framing.

1. Pigmented Polyurethane System [**MPI EXT 6.2J**]:

- a. Prime Coat: Polyurethane, two component, pigmented, gloss, matching topcoat.
- b. Intermediate Coat: Polyurethane, two component, pigmented, gloss, matching topcoat.
- c. Topcoat: Polyurethane, two component, pigmented, gloss (MPI Gloss Level 6)[, **MPI #72**].

1) <**Insert manufacturer's name; product name or designation**>.

M. Wood Substrates: [**Wood trim**] [**Architectural woodwork**] [**Doors**] [**Windows**] [**Wood board siding**] [**and**] [**wood fences**]

1. Pigmented Polyurethane System [**MPI EXT 6.3H**]:

- a. Prime Coat: Polyurethane, two component, pigmented, gloss, matching topcoat.
- b. Intermediate Coat: Polyurethane, two component, pigmented, gloss, matching topcoat.
- c. Topcoat: Polyurethane, two component, pigmented, gloss (MPI Gloss Level 6)[, **MPI #72**].

1) <**Insert manufacturer's name; product name or designation**>.

N. Fiberglass Substrates:

1. Epoxy System [**MPI EXT 6.7F**]:

- a. Prime Coat: Epoxy, matching topcoat.
- b. Intermediate Coat: Epoxy, matching topcoat.
- c. Topcoat: Epoxy, gloss[, **MPI #77**].

1) <**Insert manufacturer's name; product name or designation**>.

2. Epoxy-Modified Latex System [**MPI EXT 6.7E**]

- a. Prime Coat: Epoxy-modified latex, matching topcoat.
- b. Intermediate Coat: Epoxy-modified latex, matching topcoat.

- c. Topcoat: Epoxy-modified latex, semi-gloss (MPI Gloss Level 5)[, **MPI #215**].
 - 1) <Insert manufacturer's name; product name or designation>.
- d. Topcoat: Epoxy-modified latex, gloss (MPI Gloss Level 6)[, **MPI #115**].
 - 1) <Insert manufacturer's name; product name or designation>.
- 3. Pigmented Polyurethane over Epoxy System [**MPI EXT 6.7D**]:
 - a. Prime Coat: Epoxy, matching intermediate coat.
 - b. Intermediate Coat: Epoxy, gloss[, **MPI #77**].
 - 1) <Insert manufacturer's name; product name or designation>.
 - c. Topcoat: Polyurethane, two component, pigmented, gloss (MPI Gloss Level 6)[, **MPI #72**].
 - 1) <Insert manufacturer's name; product name or designation>.
- O. Portland Cement Plaster Substrates:
 - 1. Epoxy System [**MPI EXT 9.1D**]:
 - a. Prime Coat: Epoxy, matching topcoat.
 - b. Intermediate Coat: Epoxy, matching topcoat.
 - c. Topcoat: Epoxy, gloss[, **MPI #77**].
 - 1) <Insert manufacturer's name; product name or designation>.

This Section is intended to be edited using ARCOM's SpecBuilder and the MPI Architectural Painting Decision Tree, located at www.ARCOMone.com/MPI. <Double click here to connect.>

3.7 INTERIOR HIGH-PERFORMANCE COATING SCHEDULE

A. Concrete Substrates, Vertical Surfaces:

- 1. Epoxy System [**MPI INT 3.1F**]:
 - a. Prime Coat: Epoxy, matching topcoat.
 - b. Intermediate Coat: Epoxy, matching topcoat.
 - c. Topcoat: Epoxy, gloss[, **MPI #77**].
 - 1) <Insert manufacturer's name; product name or designation>.
- 2. Epoxy, High-Build System [**MPI INT 3.1P**]:
 - a. Prime Coat: High-build epoxy, matching topcoat (reduced).

- b. Intermediate Coat: High-build epoxy, matching topcoat.
 - c. Topcoat: High-build epoxy, low gloss[, **MPI #108**].
 - 1) <Insert manufacturer's name; product name or designation>.
 - d. Topcoat: High-build epoxy, gloss[, **MPI #98**].
 - 1) <Insert manufacturer's name; product name or designation>.
 - 3. Epoxy-Modified Latex System [**MPI INT 3.1G**]:
 - a. Prime Coat: Epoxy-modified latex, matching topcoat.
 - b. Intermediate Coat: Epoxy-modified latex, matching topcoat.
 - c. Topcoat: Epoxy-modified latex, semi-gloss (MPI Gloss Level 5)[, **MPI #215**].
 - 1) <Insert manufacturer's name; product name or designation>.
 - d. Topcoat: Epoxy-modified latex, gloss (MPI Gloss Level 6)[, **MPI #115**].
 - 1) <Insert manufacturer's name; product name or designation>.
- B. Concrete Substrates, Horizontal Surfaces.
- 1. Epoxy System [**MPI INT 3.2C**]:
 - a. Prime Coat: Epoxy, matching topcoat.
 - b. Intermediate Coat: Epoxy, matching topcoat.
 - c. Topcoat: Epoxy, gloss[, **MPI #77**].
 - 1) <Insert manufacturer's name; product name or designation>.
 - 2. Epoxy, High-Build System [**MPI INT 3.2L**]:
 - a. Prime Coat: High-build epoxy, matching topcoat (reduced).
 - b. Intermediate Coat: High-build epoxy, matching topcoat.
 - c. Topcoat: High-build epoxy, low gloss[, **MPI #108**].
 - 1) <Insert manufacturer's name; product name or designation>.
 - d. Topcoat: High-build epoxy, gloss[, **MPI #98**].
 - 1) <Insert manufacturer's name; product name or designation>.
 - 3. Pigmented Polyurethane System [**MPI INT 3.2D**]:
 - a. Prime Coat: Epoxy, gloss[, **MPI #77**].
 - 1) <Insert manufacturer's name; product name or designation>.

- b. Intermediate Coat: Polyurethane, two component, pigmented, gloss, matching topcoat.
- c. Topcoat: Polyurethane, two component, pigmented, gloss (MPI Gloss Level 6)[, **MPI #72**].

1) <Insert manufacturer's name; product name or designation>.

4. Clear (Two-Component) Polyurethane System [**MPI INT 3.2K**]:

- a. Prime Coat: Two-component polyurethane matching topcoat.
- b. Intermediate Coat: Two-component polyurethane, matching topcoat.
- c. Topcoat: Varnish, aliphatic polyurethane, two component (MPI Gloss Level 6 or MPI Gloss Level 7)[, **MPI #78**].

1) <Insert manufacturer's name; product name or designation>.

C. Cement Board Substrates:

1. Epoxy System [**MPI INT 3.3E**]:

- a. Prime Coat: Epoxy, matching topcoat.
- b. Intermediate Coat: Epoxy, matching topcoat.
- c. Topcoat: Epoxy, gloss[, **MPI #77**].

1) <Insert manufacturer's name; product name or designation>.

2. Epoxy-Modified Latex System [**MPI INT 3.3D**]:

- a. Prime Coat: Epoxy-modified latex, matching topcoat.
- b. Intermediate Coat: Epoxy-modified latex, matching topcoat.
- c. Topcoat: Epoxy-modified latex, semi-gloss (MPI Gloss Level 5)[, **MPI #215**].

1) <Insert manufacturer's name; product name or designation>.

- d. Topcoat: Epoxy-modified latex, gloss (MPI Gloss Level 6)[, **MPI #115**].

1) <Insert manufacturer's name; product name or designation>.

D. Clay Masonry Substrates:

1. Epoxy System [**MPI INT 4.1F**]:

- a. Prime Coat: Epoxy, matching topcoat.
- b. Intermediate Coat: Epoxy, matching topcoat.
- c. Topcoat: Epoxy, gloss[, **MPI #77**].

1) <Insert manufacturer's name; product name or designation>.

2. Epoxy-Modified Latex System [**MPI INT 4.1G**]:

- a. Prime Coat: Epoxy-modified latex, matching topcoat.
 - b. Intermediate Coat: Epoxy-modified latex, matching topcoat.
 - c. Topcoat: Epoxy-modified latex, semi-gloss (MPI Gloss Level 5)[, **MPI #215**].
 - 1) <Insert manufacturer's name; product name or designation>.
 - d. Topcoat: Epoxy-modified latex, gloss (MPI Gloss Level 6)[, **MPI #115**].
 - 1) <Insert manufacturer's name; product name or designation>.
 - 3. Clear (Two-Component) Polyurethane System [**MPI INT 4.1K**]:
 - a. Prime Coat: Two-component polyurethane, matching topcoat.
 - b. Intermediate Coat: Two-component polyurethane, matching topcoat.
 - c. Topcoat: Varnish, aliphatic polyurethane, two component (MPI Gloss Level 6 or MPI Gloss Level 7)[, **MPI #78**].
 - 1) <Insert manufacturer's name; product name or designation>.
- E. CMU Substrates:
- 1. Epoxy System [**MPI INT 4.2F**] [**MPI INT 4.2G**]:
 - a. Block Filler: Block filler, latex, interior/exterior[, **MPI #4**].
 - 1) <Insert manufacturer's name; product name or designation>.
 - b. Block Filler: Block filler, epoxy[, **MPI #116**].
 - 1) <Insert manufacturer's name; product name or designation>.
 - c. Intermediate Coat: Epoxy, matching topcoat.
 - d. Topcoat: Epoxy, gloss[, **MPI #77**].
 - 1) <Insert manufacturer's name; product name or designation>.
 - 2. Epoxy, High-Build System [**MPI INT 4.2R**]:
 - a. Prime Coat: Epoxy block filler[, **MPI #116**].
 - b. Intermediate Coat: High-build epoxy, matching topcoat.
 - c. Topcoat: High-build epoxy, low gloss[, **MPI #108**].
 - 1) <Insert manufacturer's name; product name or designation>.
 - d. Topcoat: High-build epoxy, gloss[, **MPI #98**].
 - 1) <Insert manufacturer's name; product name or designation>.
 - 3. Epoxy-Modified Latex System [**MPI INT 4.2J**]:

- a. Block Filler: Block filler, latex, interior/exterior[, **MPI #4**].
 - 1) <Insert manufacturer's name; product name or designation>.
- b. Intermediate Coat: Epoxy-modified latex, interior, matching topcoat.
- c. Topcoat: Epoxy-modified latex, semi-gloss (MPI Gloss Level 5)[, **MPI #215**].
 - 1) <Insert manufacturer's name; product name or designation>.
- d. Topcoat: Epoxy-modified latex, gloss (MPI Gloss Level 6)[, **MPI #115**].
 - 1) <Insert manufacturer's name; product name or designation>.
- 4. Clear (Two-Component) Polyurethane System [**MPI INT 4.2Q**]:
 - a. Prime Coat: Two-component polyurethane, matching topcoat.
 - b. Intermediate Coat: Two-component polyurethane, matching topcoat.
 - c. Topcoat: Varnish, aliphatic polyurethane, two component (MPI Gloss Level 6 or MPI Gloss Level 7)[, **MPI #78**].
 - 1) <Insert manufacturer's name; product name or designation>.

F. Steel Substrates:

- 1. Epoxy System [**MPI INT 5.1L**]:
 - a. Prime Coat: Primer, epoxy, anti-corrosive, for metal[, **MPI #101**].
 - 1) <Insert manufacturer's name; product name or designation>.
 - b. Intermediate Coat: Epoxy, matching topcoat.
 - c. Topcoat: Epoxy, gloss[, **MPI #77**].
 - 1) <Insert manufacturer's name; product name or designation>.
- 2. High-Build Epoxy over Epoxy Zinc-Rich Primer System [**MPI INT 5.1P**]:
 - a. Prime Coat: Primer, zinc-rich, epoxy[, **MPI #20**].
 - 1) <Insert manufacturer's name; product name or designation>.
 - b. Intermediate Coat: Epoxy, high build, low gloss[, **MPI #108**].
 - 1) <Insert manufacturer's name; product name or designation>.
 - c. Topcoat: Epoxy, gloss[, **MPI #77**].
 - 1) <Insert manufacturer's name; product name or designation>.

- d. Topcoat: Epoxy, high-build, low gloss[, **MPI #108**].
 - 1) <Insert manufacturer's name; product name or designation>.
- 3. Epoxy over Self-Priming Epoxy System [**MPI INT 5.1V**]:
 - a. Prime Coat: Epoxy, high build, self-priming [, **MPI #120**].
 - 1) <Insert manufacturer's name; product name or designation>.
 - b. Intermediate Coat: Epoxy, matching topcoat.
 - c. Topcoat: Epoxy, gloss[, **MPI #77**].
 - 1) <Insert manufacturer's name; product name or designation>.
- 4. Epoxy, High-Build System [**MPI INT 5.1Y**]:
 - a. Prime Coat: Primer, epoxy, anti-corrosive, for metal[, **MPI #101**].
 - 1) <Insert manufacturer's name; product name or designation>.
 - b. Intermediate Coat: High-build epoxy, matching topcoat.
 - c. Topcoat: High-build epoxy, low gloss[, **MPI #108**].
 - 1) <Insert manufacturer's name; product name or designation>.
 - d. Topcoat: High-build epoxy, gloss[, **MPI #98**].
 - 1) <Insert manufacturer's name; product name or designation>.
- 5. Epoxy Deck Coating System [**MPI INT 5.1LL**]:
 - a. Prime Coat: Primer, epoxy, anti-corrosive, for metal[, **MPI #101**].
 - 1) <Insert manufacturer's name; product name or designation>.
 - b. Intermediate Coat: Epoxy, gloss[, **MPI #77**].
 - 1) <Insert manufacturer's name; product name or designation>.
 - c. Topcoat: Epoxy deck coating (slip resistant)[, **MPI #82**].
 - 1) <Insert manufacturer's name; product name or designation>.
- 6. Epoxy-Modified Latex System [**MPI INT 5.1K**]:
 - a. Prime Coat: Primer, rust inhibitive, water based[, **MPI #107**].
 - 1) <Insert manufacturer's name; product name or designation>.

- b. Intermediate Coat: Epoxy-modified latex, interior, matching topcoat.
- c. Topcoat: Epoxy-modified latex, semi-gloss (MPI Gloss Level 5)[, **MPI #215**].
 - 1) <Insert manufacturer's name; product name or designation>.
- d. Topcoat: Epoxy-modified latex, gloss (MPI Gloss Level 6)[, **MPI #115**].
 - 1) <Insert manufacturer's name; product name or designation>.
- 7. Pigmented Polyurethane over Epoxy Primer System [**MPI INT 5.1F**]:
 - a. Prime Coat: Primer, epoxy, anti-corrosive, for metal[, **MPI #101**].
 - 1) <Insert manufacturer's name; product name or designation>.
 - b. Intermediate Coat: Polyurethane, two component, pigmented, matching topcoat.
 - c. Topcoat: Polyurethane, two component, pigmented, gloss (MPI Gloss Level 6)[, **MPI #72**].
 - 1) <Insert manufacturer's name; product name or designation>.
- 8. Pigmented Polyurethane over High-Build Epoxy System [**MPI INT 5.1G**]:
 - a. Prime Coat: Primer, epoxy, anti-corrosive, for metal[, **MPI #101**].
 - 1) <Insert manufacturer's name; product name or designation>.
 - b. Intermediate Coat: Epoxy, high build[, **MPI #108**].
 - 1) <Insert manufacturer's name; product name or designation>.
 - c. Topcoat: Polyurethane, two component, pigmented, gloss (MPI Gloss Level 6)[, **MPI #72**].
 - 1) <Insert manufacturer's name; product name or designation>.
- 9. Pigmented Polyurethane over Self-Priming Epoxy System [**MPI INT 5.1U**]:
 - a. Prime Coat: Epoxy, high build, self-priming [, **MPI #120**].
 - 1) <Insert manufacturer's name; product name or designation>.
 - b. Intermediate Coat: Polyurethane, two component, pigmented, matching topcoat.
 - c. Topcoat: Polyurethane, two component, pigmented, gloss (MPI Gloss Level 6)[, **MPI #72**].
 - 1) <Insert manufacturer's name; product name or designation>.
- 10. Pigmented Polyurethane over Inorganic Zinc and Epoxy System [**MPI INT 5.1H**]:

- a. Prime Coat: Primer, zinc rich, inorganic[, **MPI #19**].
 - 1) <Insert manufacturer's name; product name or designation>.
 - b. Intermediate Coat: Epoxy, gloss[, **MPI #77**].
 - 1) <Insert manufacturer's name; product name or designation>.
 - c. Topcoat: Polyurethane, two component, pigmented, gloss (MPI Gloss Level 6)[, **MPI #72**].
 - 1) <Insert manufacturer's name; product name or designation>.
11. Pigmented Polyurethane over Epoxy Zinc-Rich and Epoxy System [**MPI INT 5.1J**]:
- a. Prime Coat: Primer, zinc rich, epoxy[, **MPI #20**].
 - 1) <Insert manufacturer's name; product name or designation>.
 - b. Intermediate Coat: Epoxy, gloss[, **MPI #77**].
 - 1) <Insert manufacturer's name; product name or designation>.
 - c. Topcoat: Polyurethane, two component, pigmented, gloss (MPI Gloss Level 6)[, **MPI #72**].
 - 1) <Insert manufacturer's name; product name or designation>.

G. Galvanized-Metal Substrates:

- 1. Epoxy over Epoxy Primer System [**MPI INT 5.3D**]:
 - a. Prime Coat: Primer, epoxy, anti-corrosive, for metal[, **MPI #101**].
 - 1) <Insert manufacturer's name; product name or designation>.
 - b. Intermediate Coat: Epoxy, matching topcoat.
 - c. Topcoat: Epoxy, gloss[, **MPI #77**].
 - 1) <Insert manufacturer's name; product name or designation>.
- 2. Epoxy over Vinyl Wash Primer and Epoxy Primer System [**MPI INT 5.3E**]:
 - a. Prime Coat: Primer, vinyl wash[, **MPI #80**].
 - 1) <Insert manufacturer's name; product name or designation>.
 - b. Intermediate Coat: Primer, epoxy, anti-corrosive, for metal[, **MPI #101**].

- 1) <Insert manufacturer's name; product name or designation>.
- c. Topcoat: Epoxy, gloss[, **MPI #77**].
 - 1) <Insert manufacturer's name; product name or designation>.
- H. Aluminum (Not Anodized or Otherwise Coated) Substrates:
 - 1. Epoxy System [**MPI INT 5.4B**]:
 - a. Prime Coat: Primer, vinyl wash[, **MPI #80**].
 - 1) <Insert manufacturer's name; product name or designation>.
 - b. Intermediate Coat: Epoxy, matching topcoat.
 - c. Topcoat: Epoxy, gloss[, **MPI #77**].
 - 1) <Insert manufacturer's name; product name or designation>.
 - 2. Pigmented Polyurethane System [**MPI INT 5.4C**]:
 - a. Prime Coat: Primer, vinyl wash[, **MPI #80**].
 - 1) <Insert manufacturer's name; product name or designation>.
 - b. Intermediate Coat: Epoxy, gloss[, **MPI #77**].
 - 1) <Insert manufacturer's name; product name or designation>.
 - c. Topcoat: Polyurethane, two-component, pigmented, gloss (MPI Gloss Level 6)[, **MPI #72**].
 - 1) <Insert manufacturer's name; product name or designation>.
- I. Copper Substrates:
 - 1. Epoxy System [**MPI INT 5.5B**]:
 - a. Prime Coat: Primer, vinyl wash[, **MPI #80**].
 - 1) <Insert manufacturer's name; product name or designation>.
 - b. Intermediate Coat: Epoxy, matching topcoat.
 - c. Topcoat: Epoxy, gloss[, **MPI #77**].
 - 1) <Insert manufacturer's name; product name or designation>.
 - 2. Pigmented Polyurethane System [**MPI INT 5.5C**]:

- a. Prime Coat: Primer, vinyl wash[, **MPI #80**].
 - 1) <Insert manufacturer's name; product name or designation>.
- b. Intermediate Coat: Epoxy, gloss[, **MPI #77**].
 - 1) <Insert manufacturer's name; product name or designation>.
- c. Topcoat: Polyurethane, two component, pigmented, gloss (MPI Gloss Level 6)[, **MPI #72**].
 - 1) <Insert manufacturer's name; product name or designation>.

J. Stainless-Steel Substrates:

- 1. Epoxy System [**MPI INT 5.6C**]:
 - a. Prime Coat: Primer, vinyl wash[, **MPI #80**].
 - 1) <Insert manufacturer's name; product name or designation>.
 - b. Intermediate Coat: Epoxy, matching topcoat.
 - c. Topcoat: Epoxy, gloss[, **MPI #77**].
 - 1) <Insert manufacturer's name; product name or designation>.
- 2. Pigmented Polyurethane System [**MPI INT 5.6D**]:
 - a. Prime Coat: Primer, vinyl wash[, **MPI #80**].
 - 1) <Insert manufacturer's name; product name or designation>.
 - b. Intermediate Coat: Epoxy, gloss[, **MPI #77**].
 - 1) <Insert manufacturer's name; product name or designation>.
 - c. Topcoat: Polyurethane, two component, pigmented, gloss (MPI Gloss Level 6)[, **MPI #72**].
 - 1) <Insert manufacturer's name; product name or designation>.

K. Wood Substrates: Glued-laminated construction.

- 1. Epoxy System [**MPI INT 6.1L**]:
 - a. Prime Coat: Epoxy, matching topcoat.
 - b. Intermediate Coat: Epoxy, matching topcoat.
 - c. Topcoat: Epoxy, gloss[, **MPI #77**].

- 1) <Insert manufacturer's name; product name or designation>.
2. Pigmented Polyurethane System [MPI INT 6.1E]:
 - a. Prime Coat: Polyurethane, two component, pigmented, matching topcoat.
 - b. Intermediate Coat: Polyurethane, two component, pigmented, matching topcoat.
 - c. Topcoat: Polyurethane, two component, pigmented, gloss (MPI Gloss Level 6)[, MPI #72].
 - 1) <Insert manufacturer's name; product name or designation>.
- L. Wood Substrates: [Wood trim] [Architectural woodwork] [Doors] [Windows] [and] [wood board paneling].
 1. Epoxy System [MPI INT 6.3L]:
 - a. Prime Coat: Epoxy, matching topcoat.
 - b. Intermediate Coat: Epoxy, matching topcoat.
 - c. Topcoat: Epoxy, gloss[, MPI #77].
 - 1) <Insert manufacturer's name; product name or designation>.
- M. Fiberglass Substrates:
 1. Epoxy System [MPI INT 6.7D]:
 - a. Prime Coat: Epoxy, matching topcoat.
 - b. Intermediate Coat: Epoxy, matching topcoat.
 - c. Topcoat: Epoxy, gloss[, MPI #77].
 - 1) <Insert manufacturer's name; product name or designation>.
 2. Pigmented Polyurethane System [MPI INT 6.7E]:
 - a. Prime Coat: Epoxy, gloss[, MPI #77].
 - 1) <Insert manufacturer's name; product name or designation>.
 - b. Intermediate Coat: Epoxy, matching prime coat.
 - c. Topcoat: Polyurethane, two component, pigmented, gloss (MPI Gloss Level 6)[, MPI #72].
 - 1) <Insert manufacturer's name; product name or designation>.
 3. Epoxy-Modified Latex System [MPI INT 6.7F]:
 - a. Block Filler: Block filler, latex, interior/exterior[, MPI #4].
 - 1) <Insert manufacturer's name; product name or designation>.

- b. Intermediate Coat: Epoxy-modified latex, interior, matching topcoat.
- c. Topcoat: Epoxy-modified latex, semi-gloss (MPI Gloss Level 5)[, **MPI #215**].
 - 1) <Insert manufacturer's name; product name or designation>.
- d. Topcoat: Epoxy-modified latex, gloss (MPI Gloss Level 6)[, **MPI #115**].
 - 1) <Insert manufacturer's name; product name or designation>.

N. **[Gypsum Board] [Plaster] Substrates:**

- 1. Epoxy System [**MPI INT 9.2E**]:
 - a. Prime Coat: Primer sealer, latex, interior[, **MPI #50**].
 - 1) <Insert manufacturer's name; product name or designation>.
 - b. Intermediate Coat: Epoxy, matching topcoat.
 - c. Topcoat: Epoxy, gloss[, **MPI #77**].
 - 1) <Insert manufacturer's name; product name or designation>.
- 2. Epoxy, High-Build System [**MPI INT 9.2N**]:
 - a. Prime Coat: Primer sealer, latex, interior[, **MPI #50**].
 - 1) <Insert manufacturer's name; product name or designation>.
 - b. Intermediate Coat: High-build epoxy, matching topcoat.
 - c. Topcoat: High-build epoxy, low gloss[, **MPI #108**].
 - 1) <Insert manufacturer's name; product name or designation>.
 - d. Topcoat: High-build epoxy, gloss[, **MPI #98**].
 - 1) <Insert manufacturer's name; product name or designation>.
- 3. Epoxy-Modified Latex System [**MPI INT 9.2F**]:
 - a. Prime Coat: Primer sealer, latex, interior[, **MPI #50**].
 - 1) <Insert manufacturer's name; product name or designation>.
 - b. Intermediate Coat: Epoxy-modified latex, matching topcoat.
 - c. Topcoat: Epoxy-modified latex, semi-gloss (MPI Gloss Level 5)[, **MPI #215**].
 - 1) <Insert manufacturer's name; product name or designation>.
 - d. Topcoat: Epoxy-modified latex, gloss (MPI Gloss Level 6)[, **MPI #115**].

- 1) <Insert manufacturer's name; product name or designation>.

END OF SECTION 099600

SECTION 129300 - SITE FURNISHINGS

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. Seating.
2. Tables.
3. Bicycle racks.
4. Bicycle lockers.
5. Trash receptacles.
6. Ash receptacles.
7. Planters.
8. Bollards.

- B. Related Requirements:

1. Section 033000 "Cast-in-Place Concrete" for **[installing pipe sleeves cast] [installing anchor bolts cast] [formed voids]** in concrete footings.
2. Section 312000 "Earth Moving" for excavation for installing concrete footings.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Samples: For each exposed product and for each color and texture specified.
- C. Samples for Initial Selection: For units with factory-applied finishes.
- D. Samples for Verification: For each type of exposed finish, not less than 6-inch- (152-mm-) long linear components and 4-inch- (102-mm-) square sheet components.
 1. Include full-size Samples of **[bench] [table] [bicycle rack] [trash receptacle] [ash receptacle] <Insert product>**. Approved samples may be incorporated into the Work.
- E. Product Schedule: For site furnishings. **[Use same designations indicated on Drawings]**.

1.4 INFORMATIONAL SUBMITTALS

- A. Material Certificates: For site furnishings manufactured with preservative-treated wood.
 - 1. Indicate type of preservative used and net amount of preservative retained.[**For products receiving a waterborne treatment, include statement that moisture content of treated materials was reduced to levels specified before shipment to Project site.**]

1.5 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For site furnishings to include in maintenance manuals.

1.6 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Bench Replacement [**Slats**] [**Planks**]: No fewer than [**two**] **<Insert number>** full-size units for each size indicated.
 - 2. Trash Receptacle Inner Containers: [**Five**] **<Insert number>** full-size units for each size indicated, but no fewer than [**two**] **<Insert number>** units.
 - 3. Anchors: **<Insert type and number>**.

PART 2 - PRODUCTS

2.1 SEATING **<Insert drawing designation>**

- A. **<Double click here to find, evaluate, and insert list of manufacturers and products.>**
- B. Frame: [**Cast aluminum**] [**Cast iron**] [**Steel**] [**Stainless steel**] [**Wrought iron**] [**Cedar**] [**Teak**] **<Insert material>**.
- C. Seat[**and Back**]:
 - 1. Material:
 - a. Aluminum Sheet: [**Perforated**] [**Expanded**] metal.
 - b. [**Painted**] Steel: [**Perforated metal**] [**Expanded metal**] [**Evenly spaced, parallel flat straps or bars**] [**Evenly woven, flat straps or bars**] [**Edge framed, evenly spaced, parallel rods or rolled bars**] **<Insert description>**.
 - c. Stainless Steel: [**Perforated metal**] [**Expanded metal**] [**Evenly spaced, parallel flat straps or bars**] [**Evenly woven, flat straps or bars**] [**Edge framed, evenly spaced, parallel rods or rolled bars**] **<Insert description>**.
 - d. Wood: [**Douglas fir**] [**Pine**] [**Cedar**] [**Redwood**] [**Teak**] **<Insert species>**; formed into [**evenly spaced parallel slats**] [**planks**] **<Insert description>**.

- e. **[Recycled] [Plastic] [Fiberglass]** Planks: **[Evenly spaced, parallel]** <Insert description>.
- f. **[Recycled] [Plastic] [Fiberglass]** Sheet: **[Solid] [Perforated]**.
- 2. Seat Height: **[As indicated]** <Insert dimension>.
- 3. Seat Surface Shape: **[Flat] [Contoured or dished]**.
- 4. Overall Height: **[As indicated]** <Insert dimension>.
- 5. Overall Width: **[As indicated]** <Insert dimension>.
- 6. Overall Depth: **[As indicated]** <Insert dimension>.
- 7. Arms: **[None] [One, as indicated] [Two, one at each end] [Three, one at each end and in center]** <Insert requirements>.
- a. Arm Material: Match **[frame] [seat]** <Insert component>.
- 8. Weight: <Insert weight>.
- 9. Seating Configuration: Multiple units **[as indicated]**.
- a. **[Straight] [Angled] [Curved]** shape.
- b. Closed **[hexagon] [circle] [shape indicated]** around a **[tree trunk] [planter] [light post]** <Insert central element>.
- D. Aluminum Finish: **[Mill finish] [Color coated]**.
- 1. Color: **[As indicated by manufacturer's designation] [Match Architect's samples] [As selected by Architect from manufacturer's full range] [As indicated in a site furnishing schedule]** <Insert color>.
- E. Steel Finish: **[Galvanized and] [color] [PVC-color]** coated.
- 1. Color: **[As indicated by manufacturer's designation] [Match Architect's samples] [As selected by Architect from manufacturer's full range] [As indicated in a site furnishing schedule]** <Insert color>.
- F. Stainless-Steel Finish: **[No. 6]** <Insert description>.
- G. Wood Finish: **[Unfinished] [Factory-applied transparent finish] [Factory-applied stain and transparent finish] [Factory-applied opaque finish] [Manufacturer's standard finish]**.
- 1. Stain: **[Manufacturer's standard]** <Insert stain type and color>.
- H. **[Fiberglass] [HDPE]** Color: **[As indicated by manufacturer's designation] [Match Architect's samples] [As selected by Architect from manufacturer's full range] [As indicated in a site furnishing schedule]** <Insert description>.
- I. Graphics: **[Surface-applied] [Engraved] [Attached brass plaque with engraved]** copy, content, and style **[according to manufacturer's standard] [as indicated on Drawings]**.

2.2 TABLES <Insert drawing designation>

- A. <Double click here to find, evaluate, and insert list of manufacturers and products.>
- B. Frame: [Cast aluminum] [Cast iron] [Steel] [Stainless steel] [Wrought iron] [Cedar] [Teak] <Insert material>.
- C. Table Top:
1. Material:
 - a. Aluminum Sheet: [Perforated] [Expanded] metal.
 - b. [Painted] Steel: [Perforated metal] [Expanded metal] [Evenly spaced, parallel flat straps or bars] [Evenly woven, flat straps or bars] [Edge framed, evenly spaced, parallel rods or rolled bars] <Insert description>.
 - c. Stainless Steel: [Perforated metal] [Expanded metal] [Evenly spaced, parallel flat straps or bars] [Evenly woven, flat straps or bars] [Edge framed, evenly spaced, parallel rods or rolled bars] <Insert description>.
 - d. Wood: [Douglas fir] [Pine] [Cedar] [Redwood] [Teak] <Insert species>; formed into [evenly spaced parallel slats] [planks] <Insert description>.
 - e. [Recycled] [Plastic] [Fiberglass] Planks: [Evenly spaced, parallel] <Insert description>.
 - f. [Recycled] [Plastic] [Fiberglass] Sheet: [Solid] [Perforated].
 2. Surface Shape: [Round] [Hexagon] [Shape indicated] <Insert shape>.
 3. Feature: [Center umbrella hole] <Insert feature>.
- D. Aluminum Finish: [Mill finish] [Color coated].
1. Color: [As indicated by manufacturer's designation] [Match Architect's samples] [As selected by Architect from manufacturer's full range] [As indicated in a site furnishing schedule] <Insert color>.
- E. Steel Finish: [Galvanized and] [color] [PVC-color] coated.
1. Color: [As indicated by manufacturer's designation] [Match Architect's samples] [As selected by Architect from manufacturer's full range] [As indicated in a site furnishing schedule] <Insert color>.
- F. Stainless-Steel Finish: [No. 6] <Insert description>.
- G. Wood Finish: [Unfinished] [Factory-applied transparent finish] [Factory-applied stain and transparent finish] [Factory-applied opaque finish] [Manufacturer's standard finish].
1. Stain: [Manufacturer's standard] <Insert stain type and color>.
- H. [Fiberglass] [HDPE] Color: [As indicated by manufacturer's designation] [Match Architect's samples] [As selected by Architect from manufacturer's full range] [As indicated in a site furnishing schedule] <Insert description>.

- I. Graphics: [**Surface-applied**] [**Engraved**] [**Attached brass plaque with engraved**] copy, content, and style [**per manufacturer's standard**] [**as indicated on Drawings**].

2.3 BICYCLE RACKS <Insert drawing designation>

- A. <Double click here to find, evaluate, and insert list of manufacturers and products.>

B. Bicycle Rack Construction:

1. Frame: [**Aluminum**] [**Steel**] [**Galvanized steel**] [**Stainless steel**] [**Steel and redwood**] [**Steel and pine**] <Insert description>.
 - a. [**Pipe**] [**Tubing**] OD: Not less than [**1-5/8 inches (41 mm)**] [**2-3/8 inches (60 mm)**] [**2-7/8 inches (73 mm)**] [**4-1/2 inches (115 mm)**] <Insert dimension>.
 - b. Locking Bars: Solid round bar, not less than [**3/4 inch (19 mm)**] [**1 inch (25 mm)**] in diameter.
2. Style: [**Single-side parking**] [**Double-side parking**] [**Bollard**] [**As indicated**] <Insert description>.
 - a. Overall Height: [**As indicated**] <Insert dimension>.
 - b. Overall Width: [**As indicated**] <Insert dimension>.
 - c. Overall Depth: [**As indicated**] <Insert dimension>.
 - d. Capacity: Designed to accommodate no fewer than [**two**] [**three**] [**four**] <Insert number> bicycles.
3. Security: Designed to lock [**wheel**] [**and**] [**frame**].
4. Accessories: [**Base covers for each pipe and tubing anchored end**] [**Wheel stops**] <Insert accessory>.
5. Installation Method: [**Freestanding**] [**Surface flange anchored at finished grade to substrate indicated**] [**Surface flange anchored below finished grade to substrate indicated**] [**Cast in concrete**] [**Bolted to cast-in anchor bolts**] [**Wall mounted**] [**As indicated**].

C. Aluminum Finish: [**Mill finish**] [**Color coated**].

1. Color: [**As indicated by manufacturer's designation**] [**Match Architect's samples**] [**As selected by Architect from manufacturer's full range**] [**As indicated in a site furnishing schedule**] <Insert description>.

D. Steel Finish: [**Galvanized**] [**Color coated**].

1. Color: [**As indicated by manufacturer's designation**] [**Match Architect's samples**] [**As selected by Architect from manufacturer's full range**] [**As indicated in a site furnishing schedule**] <Insert color>.

E. Stainless-Steel Finish: [**No. 4**] <Insert description>.

F. Wood Finish: **[Unfinished]** **[Manufacturer's standard finish]**.

2.4 BICYCLE LOCKERS **<Insert drawing designation>**

A. **<Double click here to find, evaluate, and insert list of manufacturers and products.>**

B. Bicycle Locker Construction:

1. Locker: **[Molded one-piece fiberglass]** **[Steel sheet, 0.053 inch (1.4 mm) thick]** **[Steel sheet, 0.053 inch (1.4 mm) thick, with perforated metal sides]** **[with welded tubular steel frame]** **<Insert material>**.
2. Door: **[Molded one-piece fiberglass]** **[Steel sheet, 0.053 inch (1.4 mm) thick]** **[with tubular steel frame]** **[Match locker]** **<Insert material>**.
3. View **[Window]** **[Grille]: [Lexan, 12 inches (305 mm) square]** **[Perforated metal]**.
4. Lock: **[Manufacturer's standard]** **[Key lock with internal locking bar]** **[Coin/token lock]** **<Insert description>**.

a. Provide **[four]** **<Insert number>** keys.

5. Overall Height: **[As indicated]** **<Insert dimension>**.
6. Overall Width: **[As indicated]** **<Insert dimension>**.
7. Overall Depth: **[As indicated]** **<Insert dimension>**.
8. Capacity: Designed to accommodate **[one]** **[two]** bicycle(s).
9. Installation Method: **[Locker anchored at finished grade to substrate indicated]** **[Locker anchored below finished grade to substrate indicated]** **[As indicated]**.
10. Locker Configuration: **[Multiple]** **[Four]** **<Insert number>** units **[as indicated]**, in **[straight row]** **[curved shape]** **[shape indicated]** **<Insert description>**.

C. Steel Finish: Color coated.

1. Color: **[As indicated by manufacturer's designation]** **[Match Architect's samples]** **[As selected by Architect from manufacturer's full range]** **[As indicated in a site furnishing schedule]** **<Insert description>**.

D. Fiberglass Color: **[As indicated by manufacturer's designation]** **[Match Architect's samples]** **[As selected by Architect from manufacturer's full range]** **[As indicated in a site furnishing schedule]** **<Insert description>**.

2.5 TRASH RECEPTACLES **<Insert drawing designation>**

A. **<Double click here to find, evaluate, and insert list of manufacturers and products.>**

B. Aluminum Facing Surrounds: **[Aluminum sheet]** **[Perforated aluminum sheet]** **[Grid in tubular frame]** **[Evenly patterned, parallel flat aluminum straps, bars, or tubular shapes]** **[Match benches]** **<Insert material and description>**.

- C. Steel Facing Surrounds: **[Steel sheet] [Perforated-steel sheet] [Evenly patterned, parallel flat steel straps, bars, or tubular shapes] [Evenly patterned, parallel round steel rods, bars, or tubular shapes] [Grid in tubular frame] [Match benches] <Insert material and description>.**
- D. Stainless-Steel Facing Surrounds: **[Steel sheet] [Perforated-steel sheet] [Evenly patterned, parallel flat steel straps, bars, or tubular shapes] [Evenly patterned, parallel round steel rods, bars, or tubular shapes] [Grid in tubular frame] [Match benches] <Insert material and description>.**
- E. Wood Facing Surrounds: **[Evenly spaced, Douglas fir slats] [Evenly spaced pine slats] [Evenly spaced cedar slats] [Redwood panels] [Evenly spaced redwood slats] [Teak panels] [Evenly spaced teak slats] [Match benches] <Insert wood type and description>.**
- F. Fiberglass Facing Surrounds: Molded fiberglass shape.
- G. Plastic Facing Surrounds: **[Molded HDPE shape] [Evenly spaced HDPE slats] [Evenly spaced, recycled HDPE slats] [Match benches] <Insert plastic type and description>.**
- H. Support Frames: **[Steel] [Galvanized steel]**; welded.
- I. Trash Receptacles:
 - 1. Receptacle Shape and Form: **[Round cylinder] [Round cylinder with tapered funnel top] [Round, tapered column] [Square column] [Rectangular column] [As indicated] <Insert shape and form>;** with opening for depositing trash in **[lid or top] [side of lid or top] [receptacle side]**.
 - 2. Lids and Tops: **[Matching facing panels] [Aluminum] [Steel] [HDPE] [Recycled HDPE] <Insert material and description>** secured by cable or chain, hinged, swiveled, or permanently secured.
 - a. Description: **[Flat rim ring lid with center opening] [Dome top] [Arched top] [Elevated flat or shallow dome rain-cap lid] [Combination ash sand pan and rim lid] [Combination ash sand pan and dome top] [Combination ash sand pan and elevated flat or shallow dome rain-cap lid] <Insert description>.**
 - b. Opening for depositing trash covered by **[self-closing, spring-loaded-hinged, push-in] [rotating]** weather flap.
 - 3. Receptacle Height: **[As indicated] <Insert dimension>.**
 - 4. Overall Width: **[As indicated] <Insert dimension>.**
 - 5. Weight: **<Insert weight>.**
 - 6. Inner Container: **[Aluminum] [Galvanized-steel sheet] [Perforated-metal] [Fiberglass] [Rigid plastic]** container with **[drain holes] [lift-out handles]**; designed to be removable and reusable.
 - 7. Disposable Liners: Provide receptacle designed to accommodate disposable liners.
 - 8. Capacity: Not less than **[22 gal. (83 L)] [28 gal. (106 L)] [30 gal. (114 L)] [32 gal. (121 L)] [40 gal. (151 L)] [55 gal. (208 L)] <Insert value>.**

9. Service Access: [**Removable lid or top**] [**Fixed lid or top, side access**]; inner container and disposable liner lift or slide-out for emptying[; **lockable with padlock hasps**] [; **keyed lock with two keys per receptacle**] [; **self-latching hinge**].
 10. Post Mount: [**Color-coated steel pipe; color to match receptacle**] [**Galvanized-steel pipe**] [**Wood**]; for mounting [**one**] [**two**] [**three**] receptacle(s).
- J. Aluminum Finish: [**Mill finish**] [**Color coated**].
1. Color: [**As indicated by manufacturer's designation**] [**Match Architect's samples**] [**As selected by Architect from manufacturer's full range**] [**As indicated in a site furnishing schedule**] <Insert description>.
- K. Steel Finish: [**Galvanized and**] [**color**] [**PVC-color**] coated.
1. Color: [**As indicated by manufacturer's designation**] [**Match Architect's samples**] [**As selected by Architect from manufacturer's full range**] [**As indicated in a site furnishing schedule**] <Insert description>.
- L. Stainless-Steel Finish: [**No. 6**] <Insert description>.
- M. Wood Finish: [**Unfinished**] [**Factory-applied transparent finish**] [**Factory-applied stain and transparent finish**] [**Factory-applied opaque finish**] [**Manufacturer's standard finish**].
1. Stain: [**Manufacturer's standard**] <Insert stain type and color>.
- N. [**Fiberglass**] [**HDPE**] Color: [**As indicated by manufacturer's designation**] [**Match Architect's samples**] [**As selected by Architect from manufacturer's full range**] [**As indicated in a site furnishing schedule**] <Insert description>.
- O. Graphics: [**Surface-applied**] [**Engraved**] [**Attached brass plaque with engraved**] copy, content, and style [**according to manufacturer's standard**] [**as indicated on Drawings**].
1. Copy: [**Litter**] [**Trash**] [**Waste**] [**Recycle**] <Insert term>.
- 2.6 ASH RECEPTACLES <Insert drawing designation>
- A. <Double click here to find, evaluate, and insert list of manufacturers and products.>
 - B. Aluminum Facing Surrounds: [**Aluminum sheet**] [**Perforated aluminum sheet**] [**Grid in tubular frame**] [**Evenly patterned, parallel flat aluminum straps, bars, or tubular shapes**] [**Match benches**] <Insert material and description>.
 - C. Steel Facing Surrounds: [**Steel sheet**] [**Perforated-steel sheet**] [**Evenly patterned, parallel flat steel straps, bars, or tubular shapes**] [**Evenly patterned, parallel round steel rods, bars, or tubular shapes**] [**Grid in tubular frame**] [**Match benches**] <Insert material and description>.

- D. Stainless-Steel Facing Surrounds: **[Steel sheet] [Perforated-steel sheet] [Evenly patterned, parallel flat steel straps, bars, or tubular shapes] [Evenly patterned, parallel round steel rods, bars, or tubular shapes] [Grid in tubular frame] [Match benches] <Insert material and description>.**
- E. Fiberglass Facing Surrounds: Molded fiberglass shape.
- F. Support Frames: **[Steel] [Galvanized steel]**; welded.
- G. Ash Receptacles:
 - 1. Receptacle Shape and Form: **[Round cylinder] [Round cylinder with tapered funnel top] [Round, tapered column] [Square column] [Rectangular column] [As indicated] <Insert shape and form>**; with opening for depositing trash in **[lid or top] [side of lid or top] [receptacle side]**.
 - 2. Function: **[Uncovered receptacle with sand pan] [Uncovered receptacle with bowl and funnel] [Covered receptacle with sand pan] [Covered receptacle with bowl and screen] [Covered receptacle with slots] [Uncovered receptacle with sand pan attaching to side of trash receptacle] <Insert description and accessories>** for depositing cigarette butts; fire-proof design; bowl and pan removable for cleaning.
 - 3. Lids and Tops: **[Matching facing panels] [Aluminum] [Steel] [HDPE] [Recycled HDPE] <Insert material and description>** secured by cable or chain, hinged, swiveled, or permanently secured.
 - a. Description: **[Flat rim ring lid with center opening] [Dome top] [Arched top] [Elevated flat or shallow dome rain-cap lid] [Combination ash sand pan and rim lid] [Combination ash sand pan and dome top] [Combination ash sand pan and elevated flat or shallow dome rain-cap lid] <Insert description>.**
 - 4. Receptacle Height: **[As indicated] <Insert dimension>.**
 - 5. Overall Width: **[As indicated] <Insert dimension>.**
 - 6. Weight: **<Insert weight>.**
 - 7. Post Mount: **[Color-coated steel pipe; color to match receptacle] [Galvanized-steel pipe] [Wood]**; for mounting **[one] [two] [three]** receptacle(s).
 - 8. Accessories: **[Sand sifter] [Butt stub-out] <Insert accessory>.**
- H. Aluminum Finish: **[Mill finish] [Color coated]**.
 - 1. Color: **[As indicated by manufacturer's designation] [Match Architect's samples] [As selected by Architect from manufacturer's full range] [As indicated in a site furnishing schedule] <Insert description>.**
- I. Steel Finish: **[Galvanized and] [color] [PVC-color]** coated.
 - 1. Color: **[As indicated by manufacturer's designation] [Match Architect's samples] [As selected by Architect from manufacturer's full range] [As indicated in a site furnishing schedule] <Insert description>.**
- J. Stainless-Steel Finish: **[No. 6] <Insert description>.**

- K. **[Fiberglass] [HDPE] Color: [As indicated by manufacturer's designation] [Match Architect's samples] [As selected by Architect from manufacturer's full range] [As indicated in a site furnishing schedule] <Insert description>.**

2.7 PLANTERS **<Insert drawing designation>**

- A. **<Double click here to find, evaluate, and insert list of manufacturers and products.>**
- B. Aluminum Facing Surrounds: **[Aluminum sheet] [Perforated aluminum sheet] [Grid in tubular frame] [Evenly patterned, parallel flat aluminum straps, bars, or tubular shapes] [Match benches] <Insert material and description>.**
- C. Steel Facing Surrounds: **[Steel sheet] [Perforated-steel sheet] [Evenly patterned, parallel flat steel straps, bars, or tubular shapes] [Evenly patterned, parallel round steel rods, bars, or tubular shapes] [Grid in tubular frame] [Match benches] <Insert material and description>.**
- D. Stainless-Steel Facing Surrounds: **[Steel sheet] [Perforated-steel sheet] [Evenly patterned, parallel flat steel straps, bars, or tubular shapes] [Evenly patterned, parallel round steel rods, bars, or tubular shapes] [Grid in tubular frame] [Match benches] <Insert material and description>.**
- E. Wood Facing Surrounds: **[Evenly spaced, Douglas fir slats] [Evenly spaced pine slats] [Evenly spaced cedar slats] [Redwood panels] [Evenly spaced redwood slats] [Teak panels] [Evenly spaced teak slats] [Match benches] <Insert wood type and description>.**
- F. Fiberglass Facing Surrounds: **Molded fiberglass shape.**
- G. Plastic Facing Surrounds: **[Molded HDPE shape] [Evenly spaced HDPE slats] [Evenly spaced, recycled HDPE slats] [Match benches] <Insert plastic type and description>.**
- H. Support Frames: **[Steel] [Galvanized steel]; welded.**
- I. Planter Shape and Form: **[Round cylinder] [Round cylinder with tapered funnel top] [Round, tapered column] [Square column] [Rectangular column] [As indicated] <Insert shape and form>.**
- J. Style: **[To match benches] [As indicated by manufacturer's designation].**
- K. Overall Height: **[As indicated] <Insert dimension>.**
- L. Overall **[Diameter] [Width]: [As indicated] <Insert dimension>.**
- M. Overall Depth: **[As indicated] <Insert dimension>.**
- N. Weight: **<Insert weight>.**

- O. Inner Container: **[Aluminum]** **[Galvanized-steel sheet]** **[Fiberglass]** **[Rigid plastic]** container**[with drain holes]**.
- P. Capacity: Not less than **[22 gal. (83 L)]** **[28 gal. (106 L)]** **[30 gal. (114 L)]** **[32 gal. (121 L)]** **[40 gal. (151 L)]** **[55 gal. (208 L)]** **<Insert value>**.
- Q. Installation Method: **[Freestanding]** **[Freestanding with weighted base]** **[Anchored to substrate indicated on Drawings]** **[Wall mounted]** **[Post mounted]** **[Mounted on elevated leg angles anchored at finished grade to substrate indicated on Drawings]** **[Mounted on elevated leg angles anchored below finished grade to substrate indicated on Drawings]** **[As indicated on Drawings]**.
 - 1. Post Mount: **[Color-coated steel pipe; color to match receptacle]** **[Galvanized-steel pipe]** **[Wood]**; for mounting **[one]** **[two]** **[three]** planter(s).
- R. Aluminum Finish: Color coated.
 - 1. Color: **[As indicated by manufacturer's designation]** **[Match Architect's samples]** **[As selected by Architect from manufacturer's full range]** **[As indicated in a site furnishing schedule]** **<Insert description>**.
- S. Steel Finish: **[Galvanized and]** **[color]** **[PVC-color]** coated.
 - 1. Color: **[As indicated by manufacturer's designation]** **[Match Architect's samples]** **[As selected by Architect from manufacturer's full range]** **[As indicated in a site furnishing schedule]** **<Insert description>**.
- T. Stainless-Steel Finish: **[No. 6]** **<Insert description>**.
- U. Wood Finish: **[Unfinished]** **[Factory-applied transparent finish]** **[Factory-applied stained and transparent finish]**.
 - 1. Stain: **<Insert stain type and color>**.
- V. **[Fiberglass]** **[HDPE]** Color: **[As indicated by manufacturer's designation]** **[Match Architect's samples]** **[As selected by Architect from manufacturer's full range]** **[As indicated in a site furnishing schedule]** **<Insert description>**.
 - 1. Finish: **[Smooth]** **[Textured]**.

2.8 BOLLARDS **<Insert drawing designation>**

- A. **<Double click here to find, evaluate, and insert list of manufacturers and products.>**
- B. Bollard Construction:
 - 1. **[Pipe]** **[Tubing]** **[Cast Iron]** OD: Not less than **[4-1/2 inches (115 mm)]** **<Insert dimension>****[, fluted]**.

- a. Steel: **[Schedule 40]** **[Schedule 80]** pipe.
 - b. Aluminum: **[Extruded pipe and tubes]** **[Castings]**.
 - c. Stainless Steel: **[Tubes]** **[Pipe]**.
 - d. Cast Iron: **[Tapered]** **[As indicated]**.
- 2. **[Round]** **[Square]** Wood: **[Cedar]** **<Insert material>**, **[8 inches (203 mm) square]** **[10 inches (254 mm) in diameter]**.
 - 3. Style: **[Manufacturer's standard]** **[Chamfered top]** **[Dome top]** **[Ornamental cap]** **[As indicated]** **<Insert description>**.
 - 4. Overall Height: **[As indicated]** **<Insert dimension>**.
 - 5. Overall Width: **[As indicated]** **<Insert dimension>**.
 - 6. Overall Depth: **[As indicated]** **<Insert dimension>**.
 - 7. Accessories: **[Eye bolts]** **<Insert accessory>**.
 - 8. Installation Method: **[Surface flange anchored at finished grade to substrate indicated]** **[Surface flange anchored below finished grade to substrate indicated]** **[Cast in concrete]** **[Bolted to cast-in anchor bolts]** **[As indicated]**.
- C. Aluminum Finish: **[Mill finish]** **[Color coated]**.
- 1. Color: **[As indicated by manufacturer's designation]** **[Match Architect's samples]** **[As selected by Architect from manufacturer's full range]** **[As indicated in a site furnishing schedule]** **<Insert description>**.
- D. Steel Finish: **[Galvanized]** **[Color coated]**.
- 1. Color: **[As indicated by manufacturer's designation]** **[Match Architect's samples]** **[As selected by Architect from manufacturer's full range]** **[As indicated in a site furnishing schedule]** **<Insert description>**.
- E. Cast-Iron Finish: **[Manufacturer's standard]** **[Galvanized]** **[Color coated]**.
- 1. Color: **[As indicated by manufacturer's designation]** **[Match Architect's samples]** **[As selected by Architect from manufacturer's full range]** **[As indicated in a site furnishing schedule]** **<Insert description>**.
- F. Stainless-Steel Finish: **[No. 4]** **<Insert description>**.
- G. Wood Finish: **[Unfinished]** **[Manufacturer's standard finish]**.

2.9 MATERIALS

- A. Aluminum: Alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated; free of surface blemishes and complying with the following:
- 1. Rolled or Cold-Finished Bars, Rods, and Wire: ASTM B 211 (ASTM B 211M).
 - 2. Extruded Bars, Rods, Wire, Profiles, and Tubes: ASTM B 221 (ASTM B 221M).
 - 3. Structural Pipe and Tube: ASTM B 429/B 429M.
 - 4. Sheet and Plate: ASTM B 209 (ASTM B 209M).

5. Castings: ASTM B 26/B 26M.
- B. Steel and Iron: Free of surface blemishes and complying with the following:
1. Plates, Shapes, and Bars: ASTM A 36/A 36M.
 2. Steel Pipe: Standard-weight steel pipe complying with ASTM A 53/A 53M, or electric-resistance-welded pipe complying with ASTM A 135/A 135M.
 3. Tubing: Cold-formed steel tubing complying with ASTM A 500/A 500M.
 4. Mechanical Tubing: Cold-rolled, electric-resistance-welded carbon or alloy steel tubing complying with ASTM A 513/A 513M, or steel tubing fabricated from steel complying with ASTM A 1011/A 1011M and complying with dimensional tolerances in ASTM A 500/A 500M; zinc coated internally and externally.
 5. Sheet: Commercial steel sheet complying with ASTM A 1011/A 1011M.
 6. Perforated Metal: From steel sheet not less than **[0.075-inch (1.9-mm)] [0.090-inch (2.3-mm)] [0.120-inch (3.0-mm)] <Insert dimension>** nominal thickness; manufacturer's standard perforation pattern.
 7. Expanded Metal: Carbon-steel sheets, deburred after expansion, and complying with ASTM F 1267.
 8. Malleable-Iron Castings: ASTM A 47/A 47M, grade as recommended by fabricator for type of use intended.
 9. Gray-Iron Castings: ASTM A 48/A 48M, Class 200.
- C. Stainless Steel: Free of surface blemishes and complying with the following:
1. Sheet, Strip, Plate, and Flat Bars: ASTM A 666.
 2. Pipe: Schedule 40 steel pipe complying with ASTM A 312/A 312M.
 3. Tubing: ASTM A 554.
- D. Wood: Surfaced smooth on four sides with eased edges; kiln dried, free of knots, solid stock of species indicated.
1. Wood Species:**[Manufacturer's standard.]**
 - a. Douglas Fir: Clear Grade, vertical grain.
 - b. Pine: Southern pine; No. 2 or better**[/b> **preservative treated, kiln dried after treatment****]**.**
 - c. **[Eastern White] [Red] [Yellow]** Cedar: Select Grade or better.
 - d. Redwood: **[Clear all heart] [Construction heart or better]**, free-of-heart center.
 - e. Teak (Tectona Grandis): Clear Grade.
 - f. **<Insert wood species>**: **<Insert grade, if applicable, and other requirements>**.
- E. **<Double click to insert sustainable design text for certified wood.>**
1. Finish: Manufacturer's standard **[stain] [and] [transparent sealer] [transparent wood-preservative treatment and sealer] <Insert treatment or finish>**.
- F. Fiberglass: Multiple laminations of glass-fiber-reinforced polyester resin with UV-light stable, colorfast, nonfading, weather- and stain-resistant, colored polyester gel coat, and with manufacturer's standard finish.

- G. Plastic: Color impregnated, color and UV-light stabilized, and mold resistant.
1. Polyethylene: Fabricated from virgin plastic HDPE resin.
 2. <Double click to insert sustainable design text for recycled polyethylene>
- H. Anchors, Fasteners, Fittings, and Hardware: **[Stainless steel] [Brass] [Galvanized steel] [Zinc-plated steel] [Manufacturer's standard, corrosion-resistant-coated or noncorrodible materials]**; commercial quality[, **tamperproof, vandal and theft resistant**] [, **concealed, recessed, and capped or plugged**].
1. Angle Anchors: For inconspicuously bolting legs of site furnishings to **[on] [below]**-grade substrate; **[one per leg] [extent as indicated] <Insert extent>**.
 2. Antitheft Hold-Down Brackets: For securing site furnishings to substrate; **[two per unit] [extent as indicated on Drawings] <Insert extent>**.
- I. Nonshrink, Nonmetallic Grout: Premixed, factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C 1107/C 1107M; recommended in writing by manufacturer, for exterior applications.
- J. Erosion-Resistant Anchoring Cement: Factory-packaged, nonshrink, nonstaining, hydraulic-controlled expansion cement formulation for mixing with potable water at Project site to create pourable anchoring, patching, and grouting compound; resistant to erosion from water exposure without needing protection by a sealer or waterproof coating; recommended in writing by manufacturer, for exterior applications.
- K. Galvanizing: Where indicated for steel and iron components, provide the following protective zinc coating applied to components after fabrication:
1. Zinc-Coated Tubing: External, zinc with organic overcoat, consisting of a minimum of 0.9 oz./sq. ft. (0.27 kg/sq. m) of zinc after welding, a chromate conversion coating, and a clear, polymer film. Internal, same as external or consisting of 81 percent zinc pigmented coating, not less than 0.3 mil (0.0076 mm) thick.
 2. Hot-Dip Galvanizing: According to ASTM A 123/A 123M, ASTM A 153/A 153M, or ASTM A 924/A 924M.

2.10 WOOD-PRESERVATIVE-TREATED MATERIALS

- A. Preservative Treatment: Pressure-treat wood according to AWPA U1, Use Category UC3b, and the following:
1. Use preservative chemicals acceptable to authorities having jurisdiction and containing no arsenic or chromium. Use chemical formulations that do not bleed through or otherwise adversely affect finishes. Do not use colorants to distinguish treated materials from untreated materials.
 2. Kiln-dry lumber and plywood after treatment to a maximum moisture content, respectively, of 19 and 15 percent. Do not use materials that are warped or do not comply with requirements for untreated materials.

2.11 FABRICATION

- A. Metal Components: Form to required shapes and sizes with true, consistent curves, lines, and angles. Separate metals from dissimilar materials to prevent electrolytic action.
- B. Welded Connections: Weld connections continuously. Weld solid members with full-length, full-penetration welds and hollow members with full-circumference welds. At exposed connections, finish surfaces smooth and blended, so no roughness or unevenness shows after finishing and welded surface matches contours of adjoining surfaces.
- C. Pipes and Tubes: Form simple and compound curves by bending members in jigs to produce uniform curvature for each repetitive configuration required; maintain cylindrical cross section of member throughout entire bend without buckling, twisting, cracking, or otherwise deforming exposed surfaces of handrail and railing components.
- D. Preservative-Treated Wood Components: Complete fabrication of treated items before treatment if possible. If cut after treatment, apply field treatment complying with AWPAC M4 to cut surfaces.
- E. Exposed Surfaces: Polished, sanded, or otherwise finished; all surfaces smooth, free of burrs, barbs, splinters, and sharpness; all edges and ends rolled, rounded, or capped.
- F. Factory Assembly: Factory assemble components to greatest extent possible to minimize field assembly. Clearly mark units for assembly in the field.

2.12 GENERAL FINISH REQUIREMENTS

- A. Appearance of Finished Work: Noticeable variations in same piece are unacceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

2.13 ALUMINUM FINISHES

- A. Powder-Coat Finish: Manufacturer's standard polyester powder-coat finish complying with finish manufacturer's written instructions for surface preparation, including pretreatment, application, baking, and minimum dry film thickness.

2.14 STEEL AND GALVANIZED-STEEL FINISHES

- A. Powder-Coat Finish: Manufacturer's standard polyester, powder-coat finish complying with finish manufacturer's written instructions for surface preparation, including pretreatment, application, baking, and minimum dry film thickness.
- B. PVC Finish: Manufacturer's standard, UV-light stabilized, mold-resistant, slip-resistant, matte-textured, dipped or sprayed-on, PVC-plastisol finish, with flame retardant added; complying

with coating manufacturer's written instructions for pretreatment, application, and minimum dry film thickness.

2.15 IRON FINISHES

- A. Powder-Coat Finish: Manufacturer's standard polyester powder-coat finish complying with finish manufacturer's written instructions for surface preparation, including pretreatment, application, baking, and minimum dry film thickness.

2.16 STAINLESS-STEEL FINISHES

- A. Surface Preparation: Remove tool and die marks and stretch lines, or blend into finish.
- B. Polished Finishes: Grind and polish surfaces to produce uniform finish, free of cross scratches.
 - 1. Run directional finishes with long dimension of each piece.
 - 2. Directional Satin Finish: No 4.
 - 3. Dull Satin Finish: No. 6.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas and conditions, with Installer present, 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]** **[positioned]** at locations indicated on Drawings.
- D. Post Setting: Set cast-in support posts in concrete footing with smooth top, shaped to shed water. Protect portion of posts above footing from concrete splatter. Verify that posts are set plumb or at correct angle and are aligned and at correct height and spacing. Hold posts in position during placement and finishing operations until concrete is sufficiently cured.

- E. Posts Set into Voids in Concrete: Form or core-drill holes for installing posts in concrete to depth recommended in writing by manufacturer of site furnishings and 3/4 inch (19 mm) larger than OD of post. Clean holes of loose material, insert posts, and fill annular space between post and concrete with [**nonshrink, nonmetallic grout**] [**or**] [**anchoring cement**], mixed and placed to comply with anchoring material manufacturer's written instructions, with top smoothed and shaped to shed water.
- F. Pipe Sleeves: Use steel pipe sleeves preset and anchored into concrete for installing posts. After posts have been inserted into sleeves, fill annular space between post and sleeve with [**nonshrink, nonmetallic grout**] [**or**] [**anchoring cement**], mixed and placed to comply with anchoring material manufacturer's written instructions, with top smoothed and shaped to shed water.

END OF SECTION 129300

SECTION 321216 - ASPHALT PAVING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:

1. Cold milling of existing asphalt pavement.
2. Hot-mix asphalt patching.
3. Hot-mix asphalt paving.
4. Hot-mix asphalt overlay.
5. Asphalt curbs.
6. Asphalt traffic-calming devices.
7. Asphalt surface treatments.

- B. Related Requirements:

1. **[Section 024116 "Structure Demolition"] [and] [Section 024119 "Selective Demolition"]** for demolition and removal of existing asphalt pavement.
2. Section 312000 "Earth Moving" for subgrade preparation, fill material, unbound-aggregate subbase and base courses, and aggregate pavement shoulders.
3. Section 321373 "Concrete Paving Joint Sealants" for joint sealants and fillers at pavement terminations.
4. Section 321400 "Unit Paving" for bituminous setting bed for pavers.

1.3 UNIT PRICES

- A. Work of this Section is affected by **<Insert name of unit price>**.

1.4 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at **[Project site] <Insert location>**.

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 requirements for protecting paving work, including restriction of traffic during installation period and for remainder of construction period.

1.5 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 1. Include technical data and tested physical and performance properties.
 2. Job-Mix Designs: Certification, by authorities having jurisdiction, of approval of each job mix proposed for the Work.
 3. Job-Mix Designs: For each job mix proposed for the Work.
- B. Samples for Verification: For the following product, in manufacturer's standard sizes unless otherwise indicated:
 1. Paving Fabric: 12 by 12 inches (300 by 300 mm) minimum.

1.6 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.
- D. Field quality-control reports.

1.7 QUALITY ASSURANCE

- A. Manufacturer Qualifications: **[A paving-mix manufacturer registered with and approved by authorities having jurisdiction or the DOT of state in which Project is located] <Insert requirement>.**
- B. Testing Agency Qualifications: Qualified according to ASTM D 3666 for testing indicated.
- C. Regulatory Requirements: Comply with materials, workmanship, and other applicable requirements of **<Insert applicable standards>** of **<Insert name of state or local DOT>** for asphalt paving work.
 1. Measurement and payment provisions and safety program submittals included in standard specifications do not apply to this Section.

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. Prime Coat: Minimum surface temperature of 60 deg F (15.6 deg C).
 2. Tack Coat: Minimum surface temperature of 60 deg F (15.6 deg C).
 3. Slurry Coat: Comply with weather limitations in ASTM D 3910.
 4. Asphalt Base Course: Minimum surface temperature of 40 deg F (4.4 deg C) and rising at time of placement.
 5. Asphalt Surface Course: Minimum surface temperature of 60 deg F (15.6 deg C) at time of placement.

PART 2 - PRODUCTS

2.1 AGGREGATES

- A. General: Use materials and gradations that have performed satisfactorily in previous installations.
- B. Coarse Aggregate: ASTM D 692/D 692M, sound; angular crushed stone, crushed gravel, or cured, crushed blast-furnace slag.
- C. Fine Aggregate: [ASTM D 1073] [or] [AASHTO M 29], sharp-edged natural sand or sand prepared from stone, gravel, cured blast-furnace slag, or combinations thereof.
1. For hot-mix asphalt, limit natural sand to a maximum of 20 percent by weight of the total aggregate mass.
- D. Mineral Filler: [ASTM D 242/D 242M] [or] [AASHTO M 17], rock or slag dust, hydraulic cement, or other inert material.

2.2 ASPHALT MATERIALS

- A. Asphalt Binder: AASHTO M 320, [PG 64-22] [PG 58-28] [PG 70-22] <Insert performance grade>.
- B. Asphalt Cement: [ASTM D 3381/D 3381M for viscosity-graded material] [ASTM D 946/D 946M for penetration-graded material].
- C. Cutback Prime Coat: ASTM D 2027, medium-curing cutback asphalt, [MC-30 or MC-70] [MC-250].

- D. Emulsified Asphalt Prime Coat: [ASTM D 977] [or] [AASHTO M 140] emulsified asphalt, or [ASTM D 2397] [or] [AASHTO M 208] cationic emulsified asphalt, slow setting, diluted in water, of suitable grade and consistency for application.
- E. Tack Coat: [ASTM D 977] [or] [AASHTO M 140] emulsified asphalt, or [ASTM D 2397] [or] [AASHTO M 208] cationic emulsified asphalt, slow setting, diluted in water, of suitable grade and consistency for application.
- F. Fog Seal: [ASTM D 977] [or] [AASHTO M 140] emulsified asphalt, or [ASTM D 2397] [or] [AASHTO M 208] cationic emulsified asphalt, slow setting, factory diluted in water, of suitable grade and consistency for application.
- G. Water: Potable.
- H. Undersealing Asphalt: ASTM D 3141/D 3141M; pumping consistency.

2.3 AUXILIARY MATERIALS

- A. Recycled Materials for Hot-Mix Asphalt Mixes: Reclaimed asphalt pavement; reclaimed, unbound-aggregate base material; and recycled [tires] [asphalt shingles] [or] [glass] from sources and gradations that have performed satisfactorily in previous installations, equal to performance of required hot-mix asphalt paving produced from all new materials.
- B. Herbicide: Commercial chemical for weed control, registered by the EPA, and not classified as "restricted use" for locations and conditions of application. Provide in granular, liquid, or wettable powder form.
- C. Sand: [ASTM D 1073] [or] [AASHTO M 29], Grade No. 2 or No. 3.
- D. Paving Geotextile: AASHTO M 288 paving fabric; nonwoven polypropylene; resistant to chemical attack, rot, and mildew; and specifically designed for paving applications.
- E. Joint Sealant: [ASTM D 6690] [or] [AASHTO M 324], [Type I] [Type II or III] [Type IV], hot-applied, single-component, polymer-modified bituminous sealant.

2.4 MIXES

- 1. Surface Course Limit: Recycled content no more than [10] <Insert number> percent by weight.
- B. Hot-Mix Asphalt: Dense-graded, hot-laid, hot-mix asphalt plant mixes [approved by authorities having jurisdiction] [; designed according to procedures in AIMS-2, "Mix Design Methods for Asphalt Concrete and Other Hot-Mix Types";] and complying with the following requirements:
 - 1. Provide mixes with a history of satisfactory performance in geographical area where Project is located.

2. Base Course: <Insert mix designation>.
 3. Surface Course: <Insert mix designation>.
- C. Emulsified-Asphalt Slurry: ASTM D 3910, [Type 1] [Type 2] [Type 3].

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 (5 km/h).
 2. Proof roll with a loaded 10-wheel, tandem-axle dump truck weighing not less than 15 tons (13.6 tonnes).
 3. Excavate soft spots, unsatisfactory soils, and areas of excessive pumping or rutting, as determined by Architect, and replace with compacted backfill or fill as directed.
- C. Proceed with paving only after unsatisfactory conditions have been corrected.

3.2 COLD MILLING

- A. Clean existing pavement surface of loose and deleterious material immediately before cold milling. Remove existing asphalt pavement by cold milling to grades and cross sections indicated.
 1. Mill to a depth of [1-1/2 inches (38 mm)] [2 inches (50 mm)] [3 inches (75 mm)] <Insert dimension>.
 2. Mill to a uniform finished surface free of excessive gouges, grooves, and ridges.
 3. Control rate of milling to prevent tearing of existing asphalt course.
 4. Repair or replace curbs, manholes, and other construction damaged during cold milling.
 5. Excavate and trim unbound-aggregate base course, if encountered, and keep material separate from milled hot-mix asphalt.
 6. Patch surface depressions deeper than 1 inch (25 mm) after milling, before wearing course is laid.
 7. Handle milled asphalt material according to approved waste management plan required in Section 017419 "Construction Waste Management and Disposal."
 8. Keep milled pavement surface free of loose material and dust.
 9. Do not allow milled materials to accumulate on-site.

3.3 PATCHING

- A. Asphalt Pavement: Saw cut perimeter of patch and excavate existing pavement section to sound base. Excavate rectangular or trapezoidal patches, extending 12 inches (300 mm) into perimeter of adjacent sound pavement, unless otherwise indicated. Cut excavation faces vertically. Remove excavated material. Recompact existing unbound-aggregate base course to form new subgrade.
- B. Portland Cement Concrete Pavement: Break cracked slabs and roll as required to reseat concrete pieces firmly.
 - 1. Pump hot undersealing asphalt under rocking slab until slab is stabilized or, if necessary, crack slab into pieces and roll to reseat pieces firmly.
 - 2. Remove disintegrated or badly cracked pavement. Excavate rectangular or trapezoidal patches, extending into perimeter of adjacent sound pavement, unless otherwise indicated. Cut excavation faces vertically. Recompact existing unbound-aggregate base course to form new subgrade.
- C. Tack Coat: Before placing patch material, apply tack coat uniformly to vertical asphalt surfaces abutting the patch. Apply at a rate of 0.05 to 0.15 gal./sq. yd. (0.2 to 0.7 L/sq. m).
 - 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.
- D. Placing Patch Material: Fill excavated pavement areas with hot-mix asphalt base mix for full thickness of patch and, while still hot, compact flush with adjacent surface.
- E. Placing Patch Material: Partially fill excavated pavements with hot-mix asphalt base mix and, while still hot, compact. Cover asphalt base course with compacted, hot-mix surface layer finished flush with adjacent surfaces.

3.4 REPAIRS

- A. Leveling Course: Install and compact leveling course consisting of hot-mix asphalt surface course to level sags and fill depressions deeper than 1 inch (25 mm) in existing pavements.
 - 1. Install leveling wedges in compacted lifts not exceeding 3 inches (75 mm) thick.
- B. Crack and Joint Filling: Remove existing joint filler material from cracks or joints to a depth of **[1/4 inch (6 mm)] <Insert dimension>**.
 - 1. Clean cracks and joints in existing hot-mix asphalt pavement.
 - 2. Use emulsified-asphalt slurry to seal cracks and joints less than 1/4 inch (6 mm) wide. Fill flush with surface of existing pavement and remove excess.
 - 3. Use hot-applied joint sealant to seal cracks and joints more than 1/4 inch (6 mm) wide. Fill flush with surface of existing pavement and remove excess.

3.5 SURFACE PREPARATION

- A. General: Immediately before placing asphalt materials, remove loose and deleterious material from substrate surfaces. Ensure that prepared subgrade is ready to receive paving.
- B. Herbicide Treatment: Apply herbicide according to manufacturer's recommended rates and written application instructions. Apply to dry, prepared subgrade or surface of compacted-aggregate base before applying paving materials.
 - 1. Mix herbicide with prime coat if formulated by manufacturer for that purpose.
- C. Cutback Prime Coat: Apply uniformly over surface of compacted unbound-aggregate base course at a rate of 0.15 to 0.50 gal./sq. yd. (0.7 to 2.3 L/sq. m). Apply enough material to penetrate and seal, but not flood, surface. Allow prime coat to cure.
 - 1. If prime coat is not entirely absorbed within 24 hours after application, spread sand over surface to blot excess asphalt. Use enough sand to prevent pickup under traffic. Remove loose sand by sweeping before pavement is placed and after volatiles have evaporated.
 - 2. Protect primed substrate from damage until ready to receive paving.
- D. Emulsified Asphalt Prime Coat: Apply uniformly over surface of compacted unbound-aggregate base course at a rate of 0.10 to 0.30 gal./sq. yd. per inch depth (0.5 to 1.40 L/sq. m per 25 mm depth). Apply enough material to penetrate and seal, but not flood, surface. Allow prime coat to cure.
 - 1. If prime coat is not entirely absorbed within 24 hours after application, spread sand over surface to blot excess asphalt. Use enough sand to prevent pickup under traffic. Remove loose sand by sweeping before pavement is placed and after volatiles have evaporated.
 - 2. Protect primed substrate from damage until ready to receive paving.
- E. Tack Coat: Apply uniformly to surfaces of existing pavement at a rate of 0.05 to 0.15 gal./sq. yd. (0.2 to 0.7 L/sq. m).
 - 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.

3.6 PAVING GEOTEXTILE INSTALLATION

- A. Apply [**tack coat**] [**asphalt binder**] [**asphalt cement**] uniformly to existing pavement surfaces at a rate of 0.20 to 0.30 gal./sq. yd. (0.8 to 1.2 L/sq. m).
- B. Place paving geotextile promptly according to manufacturer's written instructions. Broom or roll geotextile smooth and free of wrinkles and folds. Overlap longitudinal joints 4 inches (100 mm) and transverse joints 6 inches (150 mm).
- C. Protect paving geotextile from traffic and other damage, and place hot-mix asphalt overlay the same day.

3.7 PLACING HOT-MIX ASPHALT

- A. Machine place hot-mix asphalt on prepared surface, spread uniformly, and strike off. Place asphalt mix by hand in 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. Place hot-mix asphalt base course in number of lifts and thicknesses indicated.
 - 2. Place hot-mix asphalt surface course in single lift.
 - 3. Spread mix at a minimum temperature of 250 deg F (121 deg C).
 - 4. Begin applying mix along centerline of crown for crowned sections and on high side of one-way slopes unless otherwise indicated.
 - 5. Regulate paver machine speed to obtain smooth, continuous surface free of pulls and tears in asphalt-paving mat.
- B. Place paving in consecutive strips not less than 10 feet (3 m) 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. Overlap mix placement about 1 to 1-1/2 inches (25 to 38 mm) from strip to strip to ensure proper compaction of mix along longitudinal joints.
 - 2. Complete a section of asphalt base course before placing asphalt surface course.
- 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-mix asphalt to prevent segregation of mix; use suitable hand tools to smooth surface.

3.8 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 (150 mm).
 - 3. Offset transverse joints, in successive courses, a minimum of 24 inches (600 mm).
 - 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 AIMS-22, for both "Ending a Lane" and "Resumption of Paving Operations."]** **[as shown on Drawings.]** **<Insert joint requirement.>**
 - 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.

3.9 COMPACTION

- A. General: Begin compaction as soon as placed hot-mix paving will bear roller weight without excessive displacement. Compact hot-mix paving with hot, hand tampers or with vibratory-plate compactors in areas inaccessible to rollers.
 - 1. Complete compaction before mix temperature cools to 185 deg F (85 deg C).
- B. Breakdown Rolling: Complete breakdown or initial rolling immediately after rolling joints and outside edge. Examine surface immediately after breakdown rolling for indicated crown, grade, and smoothness. Correct laydown and rolling operations to comply with requirements.
- C. Intermediate Rolling: Begin intermediate rolling immediately after breakdown rolling while hot-mix asphalt is still hot enough to achieve specified density. Continue rolling until hot-mix asphalt course has been uniformly compacted to the following density:
 - 1. Average Density: 96 percent of reference laboratory density according to [ASTM D 6927] [or] [AASHTO T 245], but not less than 94 percent or greater than 100 percent.
 - 2. Average Density: 92 percent of reference maximum theoretical density according to ASTM D 2041, but not less than 90 percent or greater than 96 percent.
- D. Finish Rolling: Finish roll paved surfaces to remove roller marks while hot-mix asphalt is still warm.
- E. Edge Shaping: While surface is being compacted and finished, trim edges of pavement to proper alignment. Bevel edges while asphalt is still hot; compact thoroughly.
- F. Repairs: Remove paved areas that are defective or contaminated with foreign materials and replace with fresh, hot-mix asphalt. Compact by rolling to specified density and surface smoothness.
- G. Protection: After final rolling, do not permit vehicular traffic on pavement until it has cooled and hardened.
- H. Erect barricades to protect paving from traffic until mixture has cooled enough not to become marked.

3.10 ASPHALT CURBS

- A. Construct hot-mix asphalt curbs over compacted pavement surfaces. Apply a light tack coat unless pavement surface is still tacky and free from dust. Spread mix at a minimum temperature of 250 deg F (121 deg C).
 - 1. Asphalt Mix: Same as pavement surface-course mix.

- B. Place hot-mix asphalt to curb cross section indicated or, if not indicated, to local standard shapes, by machine or by hand in wood or metal forms. Tamp hand-placed materials and screed to smooth finish. Remove forms after hot-mix asphalt has cooled.

3.11 ASPHALT TRAFFIC-CALMING DEVICES

- A. Construct hot-mix asphalt speed **[bumps]** **[humps]** **[cushions]** **[and]** **[tables]** over compacted pavement surfaces. Apply a tack coat unless pavement surface is still tacky and free from dust. Spread mix at a minimum temperature of 250 deg F (121 deg C).
 - 1. Tack Coat Application: Apply uniformly to surfaces of existing pavement at a rate of 0.05 to 0.15 gal./sq. yd. (0.2 to 0.7 L/sq. m.)
 - 2. Asphalt Mix: Same as pavement surface-course mix.
 - 3. Before installation, mill pavement that will be in contact with bottom of traffic-calming device. Mill to a depth of 1 inch (25 mm) from top of pavement to a clean, rough profile.
- B. Place and compact hot-mix asphalt to cross section indicated, by machine or by hand in wood or metal forms. Tamp hand-placed materials and screed to smooth finish. Remove forms after hot-mix asphalt has cooled.

3.12 INSTALLATION TOLERANCES

- A. Pavement Thickness: Compact each course to produce the thickness indicated within the following tolerances:
 - 1. Base Course: Plus or minus 1/2 inch (13 mm).
 - 2. Surface Course: Plus 1/4 inch (6 mm), no minus.
- B. Pavement Surface Smoothness: Compact each course to produce a surface smoothness within the following tolerances as determined by using a 10-foot (3-m) straightedge applied transversely or longitudinally to paved areas:
 - 1. Base Course: **[1/4 inch (6 mm)]** **<Insert dimension>**.
 - 2. Surface Course: **[1/8 inch (3 mm)]** **<Insert dimension>**.
 - 3. Crowned Surfaces: Test with crowned template centered and at right angle to crown. Maximum allowable variance from template is 1/4 inch (6 mm).
- C. Asphalt Traffic-Calming Devices: Compact and form asphalt to produce the contour indicated and within a tolerance of plus or minus 1/8 inch (3 mm) of height indicated above pavement surface.

3.13 SURFACE TREATMENTS

- A. Fog Seals: Apply fog seal at a rate of 0.10 to 0.15 gal./sq. yd. (0.45 to 0.7 L/sq. m) to existing asphalt pavement and allow to cure. With fine sand, lightly dust areas receiving excess fog seal.

- B. Slurry Seals: Apply slurry coat in a uniform thickness according to ASTM D 3910 and allow to cure.

- 1. Roll slurry seal to remove ridges and provide a uniform, smooth surface.

3.14 FIELD QUALITY CONTROL

- A. Testing Agency: **[Owner will engage]** **[Engage]** a qualified testing agency to perform tests and inspections.
- B. Thickness: In-place compacted thickness of hot-mix asphalt courses will be determined according to ASTM D 3549.
- C. Surface Smoothness: Finished surface of each hot-mix asphalt course will be tested for compliance with smoothness tolerances.
- D. Asphalt Traffic-Calming Devices: Finished height of traffic-calming devices above pavement will be measured for compliance with tolerances.
- E. In-Place Density: Testing agency will take samples of uncompacted paving mixtures and compacted pavement according to **[ASTM D 979]** **[or]** **[AASHTO T 168]**.
 - 1. Reference maximum theoretical density will be determined by averaging results from four samples of hot-mix asphalt-paving mixture delivered daily to site, prepared according to ASTM D 2041, and compacted according to job-mix specifications.
 - 2. In-place density of compacted pavement will be determined by testing core samples according to ASTM D 1188 or ASTM D 2726.
 - a. One core sample will be taken for every 1000 sq. yd. (836 sq. m) or less of installed pavement, with no fewer than three cores taken.
 - b. Field density of in-place compacted pavement may also be determined by nuclear method according to ASTM D 2950 and correlated with ASTM D 1188 or ASTM D 2726.
- F. Replace and compact hot-mix asphalt where core tests were taken.
- G. Remove and replace or install additional hot-mix asphalt where test results or measurements indicate that it does not comply with specified requirements.

3.15 WASTE HANDLING

- A. General: Handle asphalt-paving waste according to approved waste management plan required in Section 017419 "Construction Waste Management and Disposal."

END OF SECTION 321216

SECTION 321443 - POROUS UNIT PAVING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:

- 1. Concrete grid pavers [**with aggregate fill**] [**with soil fill planted with grass seed**] [**for planting with ground cover plants**].
- 2. Solid concrete pavers with openings between pavers filled with aggregate.
- 3. Aggregate setting bed for pavers.
- 4. Edge restraints.
- 5. Precast concrete curbs.
- 6. Granite curbs.

- B. Related Requirements:

- 1. Section 312000 "Earth Moving" for excavation and compacted subgrade.
- 2. Section 321313 "Concrete Paving" for cast-in-place concrete curbs that serve as edge restraints for porous paving.
- 3. Section 321400 "Unit Paving" for nonporous unit paving, [**edge restraints**] [**precast concrete curbs**] [**and**] [**granite curbs**].
- 4. Section 329300 "Plants" for planting ground cover in porous paving.

1.3 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at [**Project site**] <**Insert location**>.

1.4 ACTION SUBMITTALS

- A. Product Data: For materials other than aggregates.
- B. Product Data: For the following:
 - 1. Pavers.
 - 2. Edge restraints.
 - 3. Precast concrete curbs.

4. Granite curbs.
5. Geotextiles.

C. Sustainable Design Submittals:

1. <Double click to insert sustainable design text for regional materials.>

D. Sieve Analyses: For aggregate materials, according to ASTM C 136.

E. Samples:

1. Full-size units of each type of unit paver indicated.
2. Exposed edge restraints.
3. Precast concrete curbs.
4. Granite curbs.
5. Aggregate fill.
6. Aggregate setting bed materials.

1.5 INFORMATIONAL SUBMITTALS

- A. Material Certificates: For unit pavers. Include statements of material properties indicating compliance with requirements, including compliance with standards. Provide for each type and size of unit.
- B. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for unit pavers, indicating compliance with requirements.
1. For grid paving units, include durability test data based on testing according to proven field performance requirements of ASTM C 1319 performed on units subjected to three years' exposure to same general type of environment, temperature range, and traffic volume as Project.
 2. For solid interlocking paving units, include test data for freezing and thawing according to ASTM C 67.

1.6 QUALITY ASSURANCE

- A. Mockups: Build mockups to verify selections made under Sample submittals, to demonstrate aesthetic effects, and to set quality standards for materials and execution.
1. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Store pavers on elevated platforms in a dry location. If units are not stored in an enclosed location, cover tops and sides of stacks with waterproof sheeting, securely tied.

- B. Store aggregates where grading and other required characteristics can be maintained and contamination can be avoided.

PART 2 - PRODUCTS

2.1 CONCRETE UNIT PAVERS

- A. Source Limitations: Obtain each type of paver from single source that has resources to provide materials and products of consistent quality in appearance and physical properties.
- B. Concrete Grid Pavers: Grid paving units complying with ASTM C 1319, made from normal-weight aggregates.
 - 1. Thickness: **[3-1/8 inches (80 mm)] [3-1/2 inches (90 mm)] [4 inches (100 mm)]** <Insert dimension>.
 - 2. Face Size and Shape: **[As indicated]** <Insert size and shape>.
 - 3. Opening Percentage: <Insert number>percent.
 - 4. Color: **[As indicated by manufacturer's designations] [Match Architect's sample] [As selected by Architect from manufacturer's full range]** <Insert color>.
- C. Solid Concrete Pavers for Porous Paving: Solid interlocking paving units of shapes that provide openings between units, complying with ASTM C 936/C 936M[, **resistant to freezing and thawing when tested according to ASTM C 67**], and made from normal-weight aggregates.
 - 1. Thickness: **[2-3/8 inches (60 mm)] [3-1/8 inches (80 mm)] [3-1/2 inches (90 mm)] [4 inches (100 mm)]** <Insert dimension>.
 - 2. Face Size and Shape: **[As indicated]** <Insert size and shape>.
 - 3. Opening Percentage: <Insert number>percent.
 - 4. Color: **[As indicated by manufacturer's designations] [Match Architect's sample] [As selected by Architect from manufacturer's full range]** <Insert color>.

2.2 ACCESSORIES

- A. Plastic Edge Restraints: Triangular PVC extrusions, **[1-3/4 inches (45 mm) high by 3-1/2 inches (90 mm) wide] [3-1/8 inches (80 mm) high by 9-1/2 inches (240 mm) wide]**, designed to serve as edge restraints for unit pavers; rigid type for straight edges and flexible type for curved edges, with pipe connectors and **3/8-inch- (9.5-mm-) diameter by 12-inch- (300-mm-) long steel spikes**.
 - 1. **<Double click here to find, evaluate, and insert list of manufacturers and products.>**
- B. Steel Edge Restraints: Painted steel edging, **[3/16 inch (4.8 mm) thick by 4 inches (100 mm) high] [1/4 inch (6.4 mm) thick by 5 inches (125 mm) high]**, with loops pressed from or welded to face to receive stakes at **36 inches (900 mm) o.c.**, and with steel stakes **15 inches (380 mm) long** for each loop.
 - 1. Color: **[As indicated by manufacturer's designations] [Match Architect's sample] [As selected by Architect from manufacturer's full range]** <Insert color>.

- C. Aluminum Edge Restraints: [Straight, 1/8 inch (3.2 mm) thick by 4 inches (100 mm) high] [Straight, 3/16 inch (4.8 mm) thick by 4 inches (100 mm) high] [L-shaped, 1/8 inch (3.2 mm) thick by 1-3/8 inches (35 mm) high] [L-shaped, 3/16 inch (4.8 mm) thick by 2-1/4 inches (57 mm) high] extruded-aluminum edging, with loops pressed from face to receive stakes at 12 inches (300 mm) o.c., and with aluminum stakes 12 inches (300 mm) long for each loop.
- D. Precast Concrete Curbs: Made from normal-weight concrete with a compressive strength not less than [5000 psi (35 MPa)] [6000 psi (41 MPa)] <Insert compressive strength> and water absorption not more than 5 percent, in shapes and sizes indicated.
 - 1. Color and Texture: [Match Architect's sample] [Match pavers] [As selected by Architect from manufacturer's full range] <Insert color and texture>.
- E. Granite Curbs: Granite curbing, with face battered 1 inch per foot (1:12), produced in random lengths not less than 36 inches (900 mm) from granite complying with ASTM C 615/C 615M.
 - 1. Granite Color and Grain: [Light gray] [Dark gray] [Buff] [White] [Black] [Pink] <Insert color> with [fine] [medium] [coarse] grain.
 - 2. Granite Color and Grain: Match Architect's sample.
 - 3. Top Width: [4 inches (100 mm)] [5 inches (125 mm)] [6 inches (150 mm)] <Insert width>.
 - 4. Face Height: [4 inches (100 mm)] [6 inches (150 mm)] [8 inches (200 mm)] <Insert height>.
 - 5. Total Height: [12 inches (300 mm)] [16 inches (400 mm)] [18 inches (450 mm)] <Insert height>.
 - 6. Top Finish: [Sawn] [Thermal] [Bushhammered] <Insert finish>.
 - 7. Face Finish: [Split] [Sawn] [Thermal] [Bushhammered] <Insert finish>.

2.3 AGGREGATE SETTING-BED MATERIALS

- A. Graded Aggregate for Subbase: Sound crushed stone or gravel complying with [ASTM D 448 for Size No. 57] [ASTM D 448 for Size No. 5] [ASTM D 2940/D 2940M, subbase material] [requirements in Section 312000 "Earth Moving" for subbase material].
- B. Graded Aggregate for Base Course: Sound crushed stone or gravel complying with [ASTM D 448 for Size No. 8] [ASTM D 448 for Size No. 57] [ASTM D 2940/D 2940M, base-course material] [requirements in Section 312000 "Earth Moving" for base-course material].
- C. Sand for Leveling Course: Sound, sharp, washed, natural sand or crushed stone complying with gradation requirements in ASTM C 33/C 33M for fine aggregate.
- D. Soil Mix for Leveling Course: Sound, sharp, washed, natural sand or crushed stone complying with gradation requirements in ASTM C 33/C 33M for fine aggregate blended with planting soil <Insert drawing designation> according to [Section 329113 "Soil Preparation."] [Section 329115 "Soil Preparation (Performance Specification)."] Use blend consisting of [1/2 sand and 1/2 planting soil mix] [2/3 sand and 1/3 planting soil mix] <Insert proportions>.

- E. Graded Aggregate for Leveling Course: Sound crushed stone or gravel complying with ASTM D 448 for Size No. [8] [9].
- F. Separation Geotextile: Woven geotextile fabric, manufactured for separation applications; made from polyolefins or polyesters, with elongation less than 50 percent; complying with AASHTO M 288 and the following, measured according to test methods referenced:
 - 1. Survivability: Class 2; AASHTO M 288.
 - 2. Apparent Opening Size: No. 60 (0.250-mm) sieve, maximum; ASTM D 4751.
 - 3. Permittivity: 0.02 per second, minimum; ASTM D 4491.
 - 4. UV Stability: 50 percent after 500 hours' exposure; ASTM D 4355.
- G. Drainage Geotextile: Nonwoven needle-punched geotextile, manufactured for subsurface drainage applications, made from polyolefins or polyesters; with elongation greater than 50 percent; complying with AASHTO M 288 and the following, measured according to test methods referenced:
 - 1. Survivability: Class 2; AASHTO M 288.
 - 2. Apparent Opening Size: No. 40 (0.425-mm) sieve, maximum; ASTM D 4751.
 - 3. Permittivity: 0.5 per second, minimum; ASTM D 4491.
 - 4. UV Stability: 50 percent after 500 hours' exposure; ASTM D 4355.

2.4 FILL MATERIALS

- A. Soil Fill for Porous Paving: Planting soil <Insert drawing designation> according to [Section 329113 "Soil Preparation."] [Section 329115 "Soil Preparation (Performance Specification)."]
- B. Aggregate Fill for Porous Paving: Graded, sound, crushed stone or gravel complying with ASTM D 448 for Size No. [8] [9].
 - 1. Color: [As indicated] [Match Architect's sample].
- C. Grass Seed: Comply with requirements in Section 329200 "Turf and Grasses."

PART 3 - EXECUTION

3.1 PREPARATION

- A. Proof-roll prepared subgrade according to requirements in Section 312000 "Earth Moving" to identify soft pockets and areas of excess yielding. Proceed with porous paver installation only after deficient subgrades have been corrected and are ready to receive [subbase and]base course for porous paving.

3.2 INSTALLATION, GENERAL

- A. Do not use unit pavers with chips, cracks, voids, discolorations, and other defects that might be structurally unsound or visible in finished work.
- B. Mix pavers from several pallets or cubes, as they are placed, to produce uniform blend of colors and textures.
- C. Cut unit pavers with motor-driven masonry saw equipment[**or a block splitter**] to provide clean, sharp, unchipped edges. Cut units to provide pattern indicated and to fit adjoining work neatly. Use full units without cutting where possible. Hammer cutting is not acceptable.
- D. Tolerances:
 - 1. Variation in Plane between Adjacent Units (Lipping): Do not exceed **1/16-inch (1.5-mm)** unit-to-unit offset from flush.
 - 2. Variation from Level or Indicated Slope: Do not exceed **1/8 inch in 24 inches (3 mm in 600 mm)** and **1/4 inch in 10 feet (6 mm in 3 m)** or a maximum of **1/2 inch (13 mm)**.
- E. Provide edge restraints as indicated. Install edge restraints before placing unit pavers.
 - 1. Install edge restraints to comply with manufacturer's written instructions. Install stakes at intervals required to hold edge restraints in place during and after porous paver installation.
 - 2. For metal edge restraints with top edge exposed, drive stakes at least **1 inch (25 mm)** below top edge.
- F. Provide curbs as indicated. Install curbs before placing unit pavers.
 - 1. Install [**precast concrete**] [**granite**] curbs on a bedding of compacted base-course material over compacted subgrade. Install curbs before placing base course for pavers. Set curbs at elevations indicated, accurately aligned, and place and compact base-course material behind curbs as indicated.
 - 2. Install precast concrete curbs on aggregate base course after placing and compacting base course for pavers. Set curbs with top edge **1 inch (25 mm)** below top of pavers. Anchor curbs with metal stakes driven through holes in curbs into base-course material.
 - 3. Install precast concrete curbs on aggregate-base course after placing and compacting base course for pavers. Set curbs with top surface [**1/2 inch (13 mm)**] [**2 inches (50 mm)**] [**4 inches (100 mm)**] above top of pavers. Anchor curbs with metal stakes driven behind curbs into base-course material.

3.3 SETTING-BED INSTALLATION

- A. Compact subgrade uniformly to at least [**95**] **<Insert number>** percent of [**ASTM D 698**] [**ASTM D 1557**] laboratory density.

- B. Proof-roll prepared subgrade to identify soft pockets and areas of excess yielding. Excavate soft spots, unsatisfactory soils, and areas of excessive pumping or rutting, as determined by Architect, and replace with compacted backfill or fill as directed.
- C. Place [separation] [drainage] geotextile over prepared subgrade, overlapping ends and edges at least 12 inches (300 mm).
- D. Place aggregate [subbase] [and] [base], compact by tamping with plate vibrator, and screed to depth indicated.
- E. Place aggregate [subbase] [and] [base], compact to [100] <Insert number> percent of ASTM D 1557 maximum laboratory density, and screed to depth indicated.
- F. Place drainage geotextile over compacted subbase, overlapping ends and edges at least 12 inches (300 mm).
- G. Place drainage geotextile over compacted base course, overlapping ends and edges at least 12 inches (300 mm).
- H. Place leveling course, and screed to a thickness of [1 to 1-1/2 inches (25 to 38 mm)] [2 to 2-1/2 inches (50 to 64 mm)] [3 inches (76 mm)] <Insert dimension>, taking care that moisture content remains constant and density is loose and constant until pavers are set and compacted.

3.4 PAVER INSTALLATION

- A. Set unit pavers on leveling course, being careful not to disturb leveling base. If pavers have lugs or spacer bars to control spacing, place pavers hand tight against lugs or spacer bars. If pavers do not have lugs or spacer bars, place pavers with a 1/16-inch- (1.6-mm-) minimum and 1/8-inch- (3.2-mm-) maximum joint width. Use string lines to keep straight lines. Fill gaps between units that exceed [3/8 inch (10 mm)] <Insert dimension> with pieces cut to fit from full-size pavers.
 - 1. When installation is performed with mechanical equipment, use only unit pavers with lugs or spacer bars on sides of each unit.
- B. Compact pavers into leveling course with a low-amplitude plate vibrator capable of a 3500- to 5000-lbf (16- to 22-kN) compaction force at 80 to 90 Hz. Use vibrator with neoprene mat on face of plate or other means as needed to prevent cracking and chipping of pavers. Perform at least three passes across paving with vibrator.
 - 1. Compact pavers when there is sufficient surface to accommodate operation of vibrator, leaving at least 36 inches (900 mm) of uncompacted pavers adjacent to temporary edges.
 - 2. Before ending each day's work, compact installed concrete pavers except for 36-inch (900-mm) width of uncompacted pavers adjacent to temporary edges (laying faces).
 - 3. As work progresses to perimeter of installation, compact installed pavers that are adjacent to permanent edges unless they are within 36 inches (90 mm) of laying face.

4. Before ending each day's work and when rain interrupts work, cover pavers that have not been compacted and leveling course on which pavers have not been placed with nonstaining plastic sheets to protect them from rain.
- C. Place soil fill as follows, immediately after vibrating pavers into leveling course. Spread and screed soil fill level with tops of pavers. Vibrate pavers and add soil fill until porous paving is filled to about **3/4 inch (19 mm)** from top surface; remove excess soil fill if any.
1. Before ending each day's work, place soil fill in installed porous paving except for **42-inch (1067-mm)** width of unfilled paving adjacent to temporary edges (laying faces).
 2. As work progresses to perimeter of installation, place soil fill in installed paving that is adjacent to permanent edges unless it is within **42 inches (1067 mm)** of laying face.
 3. Before ending each day's work and when rain interrupts work, cover paving that has not been filled with nonstaining plastic sheets to protect it from rain.
- D. After filling pavers with soil, sow seed according to Section 329200 "Turf and Grasses," except sow seed at half the rate specified for seeding lawns. Sweep seed from surfaces of pavers into voids and water with fine spray.
1. Within 24 hours after sowing seed, spread an additional **3/16 inch (4.8 mm)** of uncompacted soil fill over seed and soak with water.
- E. Place graded aggregate fill immediately after vibrating pavers into leveling course. Spread and screed aggregate fill level with tops of pavers.
1. Before ending each day's work, place aggregate fill in installed porous paving except for **42-inch (1067-mm)** width of unfilled paving adjacent to temporary edges (laying faces).
 2. As work progresses to perimeter of installation, place aggregate fill in installed paving that is adjacent to permanent edges unless it is within **42 inches (1067 mm)** of laying face.
 3. Before ending each day's work and when rain interrupts work, cover paving that has not been filled with nonstaining plastic sheets to protect it from rain.
- F. As work progresses, remove and replace pavers that are loose, chipped, broken, stained, or otherwise damaged or that do not match adjoining units. Provide new units to match adjoining units and install in same manner as original units, with same joint treatment and with no evidence of replacement.

3.5 MAINTENANCE AND PROTECTION

- A. Water newly planted grass and keep moist until grass is established. Maintain grass that is planted in paving to comply with requirements in Section 329200 "Turf and Grasses."
- B. Erect barricades and warning signs as required to protect newly planted areas from traffic. Maintain barricades for **[60] <Insert number>** days after planting.

END OF SECTION 321443

SECTION 321713 - PARKING BUMPERS

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 wheel stops.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Samples for Initial Selection: For each type of exposed finish requiring color selection.
- C. Samples for Verification: For wheel stops, **[6 inches (150 mm) long]** <Insert dimension>, showing color and cross section; with fasteners.

PART 2 - PRODUCTS

2.1 PARKING BUMPERS

- A. Concrete Wheel Stops: Precast, steel-reinforced, air-entrained concrete, **[4000-psi (27.6-MPa)]** <Insert value> minimum compressive strength, **[4-1/2 inches (115 mm) high by 9 inches (225 mm) wide by 72 inches (1800 mm) long]** <Insert dimensions>. Provide chamfered corners, transverse drainage slots on underside, and a minimum of **[two]** **[three]** factory-formed or -drilled vertical holes through wheel stop for anchoring to substrate.
 - 1. Surface Appearance: Free of pockets, sand streaks, honeycombs, and other obvious defects. Corners shall be uniform, straight, and sharp.
 - 2. Mounting Hardware: Galvanized-steel **[spike or dowel, 1/2-inch (13-mm) diameter, 10-inch (254-mm) minimum length]** **[lag screw, shield, and washers; 1/2-inch (13-mm) diameter, 8-inch (203-mm) minimum length]** **[hardware as standard with wheel-stop manufacturer]**.
- B. Resilient Wheel Stops: Solid, integrally colored, 96 percent postconsumer or commingled postconsumer and preconsumer recycled **[rubber]** **[or]** **[plastic]**; UV stabilized; **[4 inches (100 mm) high by 6 inches (150 mm) wide by 72 inches (1800 mm) long]** <Insert dimensions>.

Provide chamfered corners and a minimum of [two] [three] [four] factory-formed or -drilled vertical holes through wheel stop for anchoring to substrate.

1. Color: **[Black]** [Yellow] [Gray] [Green] [Blue] <Insert color>.
2. Embedded Markings: Molded-in, [blue] [white] [yellow] reflective markings, permanently inset in exposed surface.
3. Mounting Hardware: Galvanized-steel [**spike or dowel, 1/2-inch (13-mm) diameter, 10-inch (254-mm) minimum length**] [lag screw, shield, and washers; 1/2-inch (13-mm) diameter, 8-inch (203-mm) minimum length] [hardware as standard with wheel-stop manufacturer].
4. Adhesive: As recommended by wheel-stop manufacturer for adhesion to pavement.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify that pavement is in suitable condition to begin installation according to manufacturer's written instructions.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. General: Install wheel stops according to manufacturer's written instructions unless otherwise indicated.
- B. Install wheel stops in bed of adhesive before anchoring.
- C. Securely anchor wheel stops to pavement with hardware in each preformed vertical hole in wheel stop as recommended in writing by manufacturer. Recess head of hardware beneath top of wheel stop.

END OF SECTION 321713

SECTION 321723 - PAVEMENT MARKINGS

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 painted markings applied to **[asphalt]** **[and]** **[concrete]** pavement.
- B. Related Requirements:
 - 1. Section 099113 "Exterior Painting" for painting exterior concrete surfaces other than pavement.
 - 2. Section 099123 "Interior Painting" for painting interior concrete surfaces other than pavement.

1.3 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at owner designated location.
 - 1. Review methods and procedures related to marking pavement including, but not limited to, the following:
 - a. Pavement aging period before application of pavement markings.
 - b. Review requirements for protecting pavement markings, including restriction of traffic during installation period.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include technical data and tested physical and performance properties.
- B. Shop Drawings: For pavement markings.
 - 1. Indicate pavement markings, colors, lane separations, defined parking spaces, and dimensions to adjacent work.
 - 2. Indicate, with international symbol of accessibility, spaces allocated for people with disabilities.

- C. Samples: For each exposed product and for each color and texture specified; on rigid backing, 8 inches (200 mm) square.

1.5 QUALITY ASSURANCE

- A. Regulatory Requirements: Comply with materials, workmanship, and other applicable requirements of **<Insert applicable standards>** of **<Insert name of state or local DOT>** for pavement-marking work.
 - 1. Measurement and payment provisions and safety program submittals included in standard specifications do not apply to this Section.

1.6 FIELD CONDITIONS

- A. Environmental Limitations: Proceed with pavement marking only on clean, dry surfaces and at a minimum ambient or surface temperature of **[40 deg F (4.4 deg C) for alkyd materials] [55 deg F (12.8 deg C) for water-based materials]**, and not exceeding 95 deg F (35 deg C).

PART 2 - PRODUCTS

2.1 PAVEMENT-MARKING PAINT

- A. Pavement-Marking Paint: Alkyd-resin type, lead and chromate free, ready mixed, complying with AASHTO M 248, **[Type N] [Type F] [Type S]**; colors complying with FS TT-P-1952.
 - 1. Color: **[White] [Yellow] [Blue] [As indicated] <Insert color>**.
- B. Pavement-Marking Paint: MPI #32, alkyd traffic-marking paint.
 - 1. Color: **[White] [Yellow] [Blue] [As indicated] <Insert color>**.
- C. Pavement-Marking Paint: Latex, waterborne emulsion, lead and chromate free, ready mixed, complying with FS TT-P-1952, Type II, with drying time of less than **[three] [45]** minutes.
 - 1. Color: **[White] [Yellow] [Blue] [As indicated] <Insert color>**.
- D. Pavement-Marking Paint: MPI #97, latex traffic-marking paint.
 - 1. Color: **[White] [Yellow] [Blue] [As indicated] <Insert color>**.
- E. Glass Beads: AASHTO M 247, Type 1 **[made of 100 percent recycled glass]**.
 - 1. Roundness: Minimum **[75] [80]** percent true spheres by weight.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify that pavement is dry and in suitable condition to begin pavement marking according to manufacturer's written instructions.
- B. Proceed with pavement marking only after unsatisfactory conditions have been corrected.

3.2 PAVEMENT MARKING

- A. Do not apply pavement-marking paint until layout, colors, and placement have been verified with Architect.
- B. Allow paving to age for a minimum of [30] [90] <Insert number> days before starting pavement marking.
- C. Sweep and clean surface to eliminate loose material and dust.
- D. Apply paint with mechanical equipment to produce pavement markings, of dimensions indicated, with uniform, straight edges. Apply at manufacturer's recommended rates to provide a minimum wet film thickness of [15 mils (0.4 mm)] <Insert dimension>.
 - 1. Apply graphic symbols and lettering with paint-resistant, die-cut stencils, firmly secured to pavement. Mask an extended area beyond edges of each stencil to prevent paint application beyond the stencil. Apply paint so that it cannot run beneath the stencil.
 - 2. Broadcast glass beads uniformly into wet markings at a rate of 6 lb/gal. (0.72 kg/L).

3.3 PROTECTING AND CLEANING

- A. Protect pavement markings from damage and wear during remainder of construction period.
- B. Clean spillage and soiling from adjacent construction using cleaning agents and procedures recommended by manufacturer of affected construction.

END OF SECTION 321723

SECTION 323113 - CHAIN LINK FENCES AND GATES

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. Chain-link fences.
2. Swing[, **motor-operated**] gates.
3. Horizontal-slide[, **motor-operated**] gates.
4. Privacy slats.

- B. Related Requirements:

1. [Section 033000 "Cast-in-Place Concrete"] [Section 033053 "Miscellaneous Cast-in-Place Concrete"] for cast-in-place concrete [equipment bases/pads for gate operators and controls] [and] [post footings].
2. Section 281300 "Access Control" for gate controls.

1.3 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at [Project site] <Insert location>.

1. Inspect and discuss electrical roughing-in, equipment bases, and other preparatory work specified elsewhere.
2. Review sequence of operation for each type of gate operator.
3. Review coordination of interlocked equipment specified in this Section and elsewhere.
4. Review required testing, inspecting, and certifying procedures.
5. <Insert requirement>.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.

1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for the following:

- a. Fence and gate posts, rails, and fittings.
 - b. Chain-link fabric, reinforcements, and attachments.
 - c. Accessories: **[Privacy slats] [Barbed wire] [Barbed tape] <Insert item>**.
 - d. Gates and hardware.
 - e. Gate operators, including operating instructions and motor characteristics.
- B. Shop Drawings: For each type of fence and gate assembly.
 - 1. Include plans, elevations, sections, details, and attachments to other work.
 - 2. Include accessories, hardware, gate operation, and operational clearances.
 - 3. Gate Operator: Show locations and details for installing operator components, switches, and controls. Indicate motor size, electrical characteristics, drive arrangement, mounting, and grounding provisions.
 - 4. Wiring Diagrams: For power, signal, and control wiring.
- C. Samples for Initial Selection: For each type of factory-applied finish.
- D. Samples for Verification: For each type of component with factory-applied finish, prepared on Samples of size indicated below:
 - 1. Polymer-Coated Components: In 6-inch (150-mm) lengths for components and on full-sized units for accessories.
- E. Delegated-Design Submittal: For structural performance of chain-link fence and gate frameworks, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For **[professional engineer] [testing agency] [factory-authorized service representative]**.
- B. Product Certificates: For each type of chain-link fence, **[operator,]** and gate.
- C. Product Test Reports: For framework strength according to ASTM F 1043, for tests performed by **[manufacturer and witnessed by a qualified testing agency] [or] [a qualified testing agency]**.
- D. Field quality-control reports.
- E. Sample Warranty: For special warranty.

1.6 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For gate operators to include in emergency, operation, and maintenance manuals.

1.7 QUALITY ASSURANCE

- A. Testing Agency Qualifications: For testing fence grounding; member company of NETA or an NRTL.
 - 1. Testing Agency's Field Supervisor: Certified by NETA to supervise on-site testing.
- B. Emergency Access Requirements: According to requirements of authorities having jurisdiction for gates with automatic gate operators serving as a required means of access.
- C. Mockups: Build mockups to set quality standards for fabrication and installation.
 - 1. Build mockup for typical chain-link fence[**and gate**], including accessories.
 - a. Size: **[10-foot (3 m)]** **<Insert dimension>** length of fence.

1.8 FIELD CONDITIONS

- A. Field Measurements: Verify layout information for chain-link fences and gates shown on Drawings in relation to property survey and existing structures. Verify dimensions by field measurements.

1.9 WARRANTY

- A. Special Warranty: **[Manufacturer agrees]** **[Installer agrees]** to repair or replace components of chain-link fences and gates that fail in materials or workmanship within specified warranty period.
 - 1. Failures include, but are not limited to, the following:
 - a. Failure to comply with performance requirements.
 - b. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
 - c. Faulty operation of gate operators and controls.
 - d. **<Insert failure modes>**.
 - 2. Warranty Period: **[Five]** **[15]** **<Insert number>** years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Engage a qualified professional engineer, as defined in Section 014000 "Quality Requirements," to design chain-link fence and gate frameworks.

- B. Structural Performance: Chain-link fence and gate frameworks shall withstand the design wind loads and stresses for fence height(s) and under exposure conditions indicated according to [ASCE/SEI 7] <Insert requirement>.
1. Design Wind Load: [As indicated on Drawings] <Insert loads>.
 - a. Minimum Post Size: Determine according to ASTM F 1043 for post spacing not to exceed [10 feet (3 m)] <Insert dimension> for Material [Group IA, ASTM F 1043, Schedule 40 steel pipe] [Group IC, electric-resistance-welded round steel pipe] <Insert material group>.
 - b. Minimum Post Size and Maximum Spacing: Determine according to CLFMI WLG 2445, based on mesh size and pattern specified.
- C. Lightning Protection System: Maximum resistance-to-ground value of 25 ohms at each grounding location along fence under normal dry conditions.

2.2 CHAIN-LINK FENCE FABRIC

- A. General: Provide fabric in one-piece heights measured between top and bottom of outer edge of selvage knuckle or twist according to "CLFMI Product Manual" and requirements indicated below:
1. Fabric Height: <Insert dimension> [As indicated on Drawings].
 2. Steel Wire for Fabric: Wire diameter of [0.192 inch (4.88 mm)] [0.148 inch (3.76 mm)] [0.120 inch (3.05 mm)] [0.113 inch (2.87 mm)] <Insert dimension>.
 - a. Mesh Size: [2-1/8 inches (54 mm)] [2 inches (50 mm)] [1-3/4 inches (44 mm)] [1 inch (25 mm)] <Insert dimension>.
 - b. Aluminum-Coated Fabric: ASTM A 491, Type I, [0.40 oz./sq. ft. (122 g/sq. m)] [0.35 oz./sq. ft. (107 g/sq. m)] [0.30 oz./sq. ft. (92 g/sq. m)].
 - c. Zinc-Coated Fabric: ASTM A 392, Type II, [Class 1, 1.2 oz./sq. ft. (366 g/sq. m)] [Class 2, 2.0 oz./sq. ft. (610 g/sq. m)] with zinc coating applied [before] [after] weaving.
 - d. Zn-5-Al-MM Aluminum-Mischmetal-Coated Fabric: ASTM F 1345, Type III, [Class 1, 0.60 oz./sq. ft. (183 g/sq. m)] [Class 2, 1.0 oz./sq. ft. (305 g/sq. m)].
 - e. Polymer-Coated Fabric: ASTM F 668, [Class 1] [Class 2a] [Class 2b] over [aluminum] [zinc] [Zn-5-Al-MM-alloy]-coated steel wire.
 - 1) Color: [Dark green] [Olive green] [Brown] [Black] [As selected by Architect from manufacturer's full range], according to ASTM F 934.
 - f. Coat selvage ends of metallic-coated fabric before the weaving process with manufacturer's standard clear protective coating.
 3. Aluminum Wire Fabric: ASTM F 1183, with [mill] [caustic-cleaned or etched] finish, and wire diameter of [0.148 inch (3.76 mm)] [0.192 inch (4.88 mm)].
 - a. Mesh Size: [2 inches (50 mm)] [1 inch (25 mm)].

4. Selvage: **[Knuckled at both selvages]** **[Twisted top and knuckled bottom]**.

2.3 FENCE FRAMEWORK

- A. Posts and Rails **<Insert drawing designation>**: ASTM F 1043 for framework, including rails, braces, and line; terminal; and corner posts. Provide members with minimum dimensions and wall thickness according to ASTM F 1043**[or ASTM F 1083]** based on the following:
 1. Fence Height: **[72 inches (1830 mm)]** **[96 inches (2440 mm)]** **[As indicated on Drawings]** **<Insert dimension>**.
 2. Light-Industrial-Strength Material: **[Group IC-L, round steel pipe, electric-resistance-welded pipe]** **[Group II-L, roll-formed-steel C-section shapes]** **[Group III-L, hot-rolled H-beam shapes]** **[Group IV, Alternative Design]**.
 - a. Line Post: **[1.9 inches (48 mm) in diameter]** **[2.375 inches (60 mm) in diameter]** **[2.875 inches (73 mm) in diameter]** **[2.25 by 1.7 inches (57 by 43 mm)]** **<Insert dimension(s)>**.
 - b. End, Corner, and Pull Posts: **[2.375 inches (60 mm)]** **[2.875 inches (73 mm)]** **[4.0 inches (102 mm)]** **[2.25 by 1.7 inches (57 by 43 mm)]** **<Insert dimension(s)>**.
 3. Heavy-Industrial-Strength Material: **[Group IA, round steel pipe, Schedule 40]** **[Group IC, round steel pipe, electric-resistance-welded pipe]** **[Group II, roll-formed-steel C-section shapes]** **[Group III, hot-rolled H-beam shapes]** **[Group IV, Alternative Design]**.
 - a. Line Post: **[1.9 inches (48 mm) in diameter]** **[2.375 inches (60 mm) in diameter]** **[2.875 inches (73 mm) in diameter]** **[4.0 inches (102 mm) in diameter]** **[6.625 inches (168 mm) in diameter]** **[1.875 by 1.63 inches (48 by 41 mm)]** **[2.25 by 1.70 inches (57 by 43 mm)]** **[3.25 by 2.50 inches (83 by 64 mm)]** **<Insert dimension(s)>**.
 - b. End, Corner, and Pull Posts: **[2.375 inches (60 mm) in diameter]** **[2.875 inches (73 mm) in diameter]** **[4.0 inches (102 mm) in diameter]** **[6.625 inches (168 mm) in diameter]** **[2.25 by 1.70 inches (57 by 43 mm)]** **[3.25 by 2.50 inches (83 by 64 mm)]** **<Insert dimension(s)>**.
 4. Horizontal Framework Members: **[Intermediate]** **[top]** **[and]** **[bottom]** rails according to ASTM F 1043.
 - a. Top Rail: **[1.66 inches (42 mm) in diameter]** **[1.25 by 1.63 inches (32 by 41 mm)]** **<Insert dimension(s)>**.
 5. Brace Rails: ASTM F 1043.
 6. Metallic Coating for Steel Framework:
 - a. Type A: Not less than minimum 2.0-oz./sq. ft. (0.61-kg/sq. m) average zinc coating according to ASTM A 123/A 123M or 4.0-oz./sq. ft. (1.22-kg/sq. m) zinc coating according to ASTM A 653/A 653M.

- b. Type B: Zinc with organic overcoat, consisting of a minimum of 0.9 oz./sq. ft. (0.27 kg/sq. m) of zinc after welding, a chromate conversion coating, and a clear, verifiable polymer film.
 - c. External, Type B: Zinc with organic overcoat, consisting of a minimum of 0.9 oz./sq. ft. (0.27 kg/sq. m) of zinc after welding, a chromate conversion coating, and a clear, verifiable polymer film. Internal, Type D, consisting of 81 percent, not less than 0.3-mil- (0.0076-mm-) thick, zinc-pigmented coating.
 - d. Type C: Zn-5-Al-MM alloy, consisting of not less than 1.8-oz./sq. ft. (0.55-kg/sq. m) coating.
 - e. Coatings: Any coating above.
7. Polymer coating over metallic coating.
- a. Color: **[Match chain-link fabric] [Dark green] [Olive green] [Brown] [Black] [As selected by Architect from manufacturer's full range]**, according to ASTM F 934.

2.4 TENSION WIRE

- A. Metallic-Coated Steel Wire: 0.177-inch- (4.5-mm-) diameter, marcelled tension wire according to ASTM A 817 or ASTM A 824, with the following metallic coating:
- 1. Type I: Aluminum coated (aluminized).
 - 2. Type II: Zinc coated (galvanized) by **[hot-dip] [electrolytic]** process, with the following minimum coating weight:
 - a. Class 3: Not less than 0.8 oz./sq. ft. (244 g/sq. m) of uncoated wire surface.
 - b. Class 4: Not less than 1.2 oz./sq. ft. (366 g/sq. m) of uncoated wire surface.
 - c. Class 5: Not less than 2 oz./sq. ft. (610 g/sq. m) of uncoated wire surface.
 - d. Matching chain-link fabric coating weight.
 - 3. Type III: Zn-5-Al-MM alloy with the following minimum coating weight:
 - a. Class 60: Not less than 0.6 oz./sq. ft. (183 g/sq. m) of uncoated wire surface.
 - b. Class 100: Not less than 1 oz./sq. ft. (305 g/sq. m) of uncoated wire surface.
 - c. Matching chain-link fabric coating weight.
- B. Polymer-Coated Steel Wire: **[0.177-inch- (4.5-mm-)] [0.148-inch- (3.8-mm-)]** diameter, tension wire according to ASTM F 1664, **[Class 1] [Class 2a] [Class 2b]** over **[aluminum] [zinc] [Zn-5-Al-MM-alloy]**-coated steel wire.
- 1. Color: **[Match chain-link fabric] [Dark green] [Olive green] [Brown] [Black] [As selected by Architect from manufacturer's full range]**, according to ASTM F 934.
- C. Aluminum Wire: 0.192-inch- (4.88-mm-) diameter tension wire, mill finished, according to ASTM B 211 (ASTM B211M), Alloy 6061-T94 with 50,000-psi (344-MPa) minimum tensile strength.

2.5 SWING GATES

- A. General: ASTM F 900 for gate posts and [single] [double] swing gate types.[**Provide automated vehicular gates according to ASTM F 2200.**]
 - 1. Gate Leaf Width: [36 inches (914 mm)] [As indicated] <Insert width>.
 - 2. Framework Member Sizes and Strength: Based on gate fabric height [of 72 inches (1830 mm) or less] [of more than 72 inches (1830 mm)] [as indicated] <Insert dimension>.
- B. Pipe and Tubing:
 - 1. Zinc-Coated Steel: ASTM F 1043 and ASTM F 1083; [protective coating and finish to match fence framework] [manufacturer's standard protective coating and finish] <Insert finish>.
 - 2. Aluminum: ASTM B 429/B 429M; [mill] [manufacturer's standard] <Insert finish> finish.
 - 3. Gate Posts: [Round tubular steel] [Rectangular tubular steel] [Round tubular aluminum] [Rectangular tubular aluminum].
 - 4. Gate Frames and Bracing: [Round tubular steel] [Rectangular tubular steel] [Round tubular aluminum] [Rectangular tubular aluminum].
- C. Frame Corner Construction: [Welded] [or] [assembled with corner fittings].
- D. Extended Gate Posts and Frame Members: Fabricate gate posts and frame end members to extend [12 inches (300 mm)] [as indicated] <Insert dimension> above top of chain-link fabric at both ends of gate frame to attach barbed [wire] [tape] assemblies.
- E. Hardware:
 - 1. Hinges: [180-degree inward] [180-degree outward] [360-degree inward and outward] swing.
 - 2. Latch: Permitting operation from both sides of gate[with provision for padlocking accessible from both sides of gate].
 - 3. Lock: [Manufacturer's standard] <Insert requirement> internal device.
 - 4. Padlock and Chain: <Insert requirements>.
 - 5. Closer: [Manufacturer's standard] <Insert requirement>.
 - 6. <Insert hardware items and accessories>.

2.6 HORIZONTAL-SLIDE GATES

- A. General: ASTM F 1184 for gate posts and [single] [double] sliding gate types.[**Provide automated vehicular gates according to ASTM F 2200.**]
 - 1. Classification: Type I Overhead Slide.
 - a. Gate Leaf Width: [As indicated] <Insert width>.

- b. Framework Member Sizes and Strength: Based on gate fabric height [**of 72 inches (1830 mm) or less**] [**of more than 72 inches (1830 mm)**] [**as indicated**] **<Insert dimension>**.
 - 2. Classification: Type II Cantilever Slide, [**Class 1 with external**] [**Class 2 with internal**] roller assemblies.
 - a. Gate Frame Width and Height: [**48 inches (1220 mm) wide or less by 72 inches (1830 mm) high or less**] [**More than 48 inches (1220 mm) wide by any height**] [**As indicated**] **<Insert dimension>**.
- B. Pipe and Tubing:
 - 1. Zinc-Coated Steel: [**Protective coating and finish to match fence framework**] [**Manufacturer's standard protective coating and finish**] **<Insert finish>**.
 - 2. Aluminum: ASTM B 429/B 429M; [**mill**] [**manufacturer's standard**] **<Insert finish>** finish.
 - 3. Gate Posts: ASTM F 1184. Provide [**round tubular steel**] [**rectangular tubular steel**] [**round tubular aluminum**] [**rectangular tubular aluminum**] posts.
 - 4. Gate Frames and Bracing: [**Round tubular steel**] [**Rectangular tubular steel**] [**Round tubular aluminum**] [**Rectangular tubular aluminum**].
- C. Frame Corner Construction: [**Welded**] [**or**] [**assembled with corner fittings**].
- D. Extended Gate Posts and Frame Members: Extend gate posts and frame end members above top of chain-link fabric at both ends of gate frame [**12 inches (300 mm)**] [**as indicated**] **<Insert dimension>** as required to attach barbed [**wire**] [**tape**] assemblies.
- E. Overhead Track Assembly: Manufacturer's standard track, with overhead framework supports, bracing, and accessories, engineered to support size, weight, width, operation, and design of gate and roller assemblies.
- F. Hardware:
 - 1. Hangers, Roller Assemblies, and Stops: Fabricated from [**galvanized steel**] [**galvanized malleable iron**] [**mill-finished Grade 319 aluminum-alloy casting with stainless-steel fasteners**].
 - 2. Latch: Permitting operation from both sides of gate[**with provision for padlocking accessible from both sides of gate**].
 - 3. Lock: [**Manufacturer's standard**] **<Insert requirement>** internal device.
 - 4. Padlock and Chain: **<Insert requirements>**.
 - 5. **<Insert hardware items and accessories>**.

2.7 FITTINGS

- A. Provide fittings according to ASTM F 626.
- B. Post Caps: Provide for each post.

1. Provide line post caps with loop to receive tension wire or top rail.
- C. Rail and Brace Ends: For each gate, corner, pull, and end post.
- D. Rail Fittings: Provide the following:
 1. Top Rail Sleeves: [**Pressed-steel or round-steel tubing**] [**Aluminum Alloy 6063**] not less than 6 inches (152 mm) long.
 2. Rail Clamps: Line and corner boulevard clamps for connecting [**intermediate**] [**and**] [**bottom**] rails to posts.
- E. Tension and Brace Bands: [**Pressed steel**] [**Aluminum Alloy 6063**].
- F. Tension Bars: [**Steel**] [**Aluminum**] [**Fiberglass**], length not less than 2 inches (50 mm) shorter than full height of chain-link fabric. Provide one bar for each gate and end post, and two for each corner and pull post, unless fabric is integrally woven into post.
- G. Truss Rod Assemblies: [**Steel, hot-dip galvanized after threading**] [**Mill-finished aluminum**] rod and turnbuckle or other means of adjustment.
- H. Barbed Wire Arms: [**Pressed steel or cast iron**] [**Aluminum**], with clips, slots, or other means for attaching strands of barbed wire[, **and means for attaching to posts**] [, **integral with post cap**], for each post unless otherwise indicated, and as follows:
 1. Provide line posts with arms that accommodate top rail or tension wire.
 2. Provide corner arms at fence corner posts unless extended posts are indicated.
 3. Single-Arm Type: [**Type I, slanted arm**] [**Type II, vertical arm**].
 4. Double-Arm Type: [**Type III, V-shaped arm**] [**Type IV, A-shaped arm**].
- I. Tie Wires, Clips, and Fasteners: According to ASTM F 626.
 1. Standard Round Wire Ties: For attaching chain-link fabric to posts, rails, and frames, according to the following:
 - a. Hot-Dip Galvanized Steel: [**0.106-inch- (2.69-mm-)**] [**0.148-inch- (3.76-mm-)**] diameter wire[; **galvanized coating thickness matching coating thickness of chain-link fence fabric**].
 - b. Aluminum: ASTM B 211 (ASTM B 211M); Alloy 1350-H19; [**0.148-inch- (3.76-mm-)**] [**0.192-inch- (4.88-mm-)**] diameter, mill-finished wire.
- J. Finish:
 1. Metallic Coating for Pressed Steel or Cast Iron: Not less than 1.2 oz./sq. ft. (366 g/sq. m) of zinc.
 - a. Polymer coating over metallic coating.
 2. Aluminum: Mill finish.

2.8 PRIVACY SLATS

- A. Fiber-Glass-Reinforced Plastic Slats: UV-light-stabilized fiber-glass-reinforced plastic, not less than 0.06 inch (1.5 mm) thick, sized to fit mesh specified for direction indicated[, **with vandal-resistant fasteners and lock strips**].
- B. Tubular Polyethylene Slats: Minimum 0.023-inch (0.58-mm)-thick tubular polyethylene, manufactured for chain-link fences from virgin polyethylene with UV inhibitor, sized to fit mesh specified for direction indicated, with [**vandal-resistant fasteners and lock strips**] [**fins for increased privacy factor**].
- C. Aluminum Slats: Minimum 0.01-inch (0.25-mm)-thick aluminum, sized to fit mesh specified for direction indicated.
- D. Redwood Slats: 5/16-inch (7.9-mm)-thick redwood, sized to fit mesh specified for direction indicated.
- E. Hedge-Type Slats: UV-light-stabilized[, **flame-resistant**], PVC "needles" woven into braided, galvanized wire core, sized to fit mesh specified for direction indicated.
- F. Color: [**As indicated by manufacturer's designations**] [**Match Architect's samples**] [**As selected by Architect from manufacturer's full range**] [**As indicated on Drawings**] <Insert color>.

2.9 BARBED WIRE

- A. Steel Barbed Wire: ASTM A 121, two-strand barbed wire, 0.099-inch- (2.51-mm-) diameter line wire with 0.080-inch- (2.03-mm-) diameter, four-point round barbs spaced not more than 5 inches (127 mm) o.c.
 - 1. Aluminum Coating: Type A.
 - 2. Zinc Coating: Type Z, Class 3.
- B. Polymer-Coated, Galvanized-Steel Barbed Wire: ASTM F 1665, two-strand barbed wire, 0.080-inch- (2.03-mm-) diameter line wire with 0.080-inch- (2.03-mm-) diameter, four-point, round [**aluminum alloy**] [**galvanized-steel**] barbs spaced not more than 5 inches (127 mm) o.c.:
 - 1. Polymer Coating: [**Class 1**] [**Class 2a**] [**Class 2b**] over [**aluminum**] [**zinc**] [**Zn-5-Al-MM-alloy**]-coated steel wire.
 - a. Color: [**Match chain-link fabric**] [**Dark green**] [**Olive green**] [**Brown**] [**Black**] [**As selected by Architect from manufacturer's full range**] according to ASTM F 934.

2.10 BARBED TAPE

- A. Wire-Reinforced Tape: ASTM F 1910; continuous coils with four-point, needle-sharp barbs permanently cold clenched around a core wire.
1. Core Wire: High-tensile-strength, [**zinc-coated steel**] [or] [**stainless steel**].
 2. Configuration: [**Single**] [**Double**] coil.
 3. Style: [**Helical**] [**Concertina**] pattern.
 4. Coil Diameter(s): [**18-inch (457-mm)**] [**24 inches (610 mm)**] [**24-inch (610-mm) inner coil and 30-inch (762-mm) outer coil**] [**As indicated on Drawings**] <Insert diameter>.
 5. Coil Loop Spacing(s): [**12 inches (300 mm)**] [**Manufacturer's standard**] [**As indicated on Drawings**] <Insert spacing>.
 6. Barb Length Classification: [**Long, 1.2-inch (30.5-mm)**] [**Medium, 0.4-inch (10.2-mm)**] [**Short, 0.1875-inch (4.76-mm)**] barb.
 7. Barb Spacing: [**4 inches (102 mm)**] <Insert dimension> o.c.
 8. Barb Set: [**Straight**] [**Offset**] [**Manufacturer's standard**].
- B. Clips: Stainless steel, 0.065 inch (1.7 mm) thick by 0.375 inch (9.5 mm) wide, capable of withstanding a minimum 150-lbf (667-N) pull load to limit extension of coil, resulting in a concertina pattern when deployed.
- C. Tie Wires: Stainless steel, 0.065 inch (1.7 mm) in diameter.

2.11 GATE OPERATORS

- A. Operators: Factory-assembled, automatic, gate-operating system designed for gate size, type, weight, and frequency of use. Control system shall have characteristics suitable for Project conditions, with control stations, safety devices, and weatherproof enclosures.
1. Operator design shall allow for removal of cover or motor without disturbing limit-switch adjustment and without affecting auxiliary emergency operation.
 2. Electronic components shall have built-in troubleshooting diagnostic feature.
 3. Unit shall be designed and wired for both right-hand/left-hand opening, permitting universal installation.
- B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- C. UL Standard: Manufacture and label gate operators according to UL 325.
- D. Motors: Comply with NEMA MG 1.
1. Duty: Continuous duty at ambient temperature of 40 deg C and at altitude of 3300 feet (1000 m) above sea level.
 2. Capacity and Torque Characteristics: Sufficient to start, accelerate, and operate connected loads at designated speeds, at installed altitude and environment, with indicated operating sequence, and without exceeding nameplate ratings or considering service factor.
 3. Service Factor: 1.15.

4. Electrical Characteristics:
 - a. Horsepower: [1] [2] [5] <Insert horsepower>.
 - b. Voltage: [115 V ac] [208 V ac] [230 V ac], single phase, 60 hertz.
 - c. Voltage: [208 V ac] [230 V ac] [460 V ac], three phase, 60 hertz.

- E. Gate Operators: [Gate] [Equipment base/pad] [Pedestal post] [In ground] mounted and as follows:
 1. Hydraulic [Swing] [Slide] Gate Operators:
 - a. Duty: [Light] [Medium] [Heavy] duty, [residential] [commercial/industrial].
 - b. Gate Speed: Minimum [45 feet (13.7 m)] [60 feet (18.2 m)] per minute.
 - c. Maximum Gate Weight: [300 lb (137 kg)] <Insert value>.
 - d. Frequency of Use: [10 cycles per hour] [25 cycles per hour] [60 cycles per hour] [Continuous duty] <Insert requirement>.
 - e. Operating Type: [Crank arm] [Wheel and rail drive] [Roller chain], [with manual release].
 - f. Hydraulic Fluid: Of viscosity required for gate operation at ambient temperature range for Project.
 - g. Locking: Hydraulic in both directions.
 - h. Heater: Manufacturer's standard track and roller heater with thermostatic control.
 2. Mechanical [Swing] [Slide] Gate Operators:
 - a. Duty: [Light] [Medium] [Heavy] duty, [residential] [commercial/industrial].
 - b. Gate Speed: Minimum [45 feet (13.7 m) per minute] [60 feet (18.2 m) per minute] [variable speed] <Insert requirement>.
 - c. Maximum Gate Weight: [600 lb (272 kg)] [800 lb (363 kg)] <Insert value>.
 - d. Frequency of Use: [10 cycles per hour] [25 cycles per hour] [60 cycles per hour] [Continuous duty] <Insert requirement>.
 - e. Operating Type: [Crank arm] [Wheel and rail drive] [Roller chain], [with manual release].
 - f. Drive Type: Enclosed worm gear[and chain-and-sprocket] reducers, roller-chain drive.
 - g. Drive Type: V-belt and [worm gear] [chain-and-sprocket] reducers, roller-chain drive.

- F. Controls: Electric controls separated from gate and motor and drive mechanism, with [NEMA 250, Type 3R] [NEMA 250, Type 4] <Insert enclosure type> enclosure for [surface] [recessed or flush] [equipment base/pad] [pedestal] <Insert mounting> mounting and with space for additional optional equipment.

- G. Control Devices:
 1. Control Station: Keyed, [two] [three]-position switch, located remotely from gate. Provide two keys per station.
 - a. Function: Open[, stop,] and close.

2. Control Station: Momentary contact, [**single**] [**three**]-button operated; located remotely from gate.[**Key switch to lock out open and close buttons.**]
 - a. Function: Open[, **stop,**] and close.
3. Card Reader: Functions only when authorized card is presented. Programmable, magnetic [**multiple**] [**single**]-code system[, **permitting four different access time periods**] [**; face-lighted unit fully visible at night**].
 - a. Reader Type: [**Touch plate**] [**Swipe**] [**Insertion**] [**Proximity**].
 - b. Features: [**Timed anti-passback**] [**Limited-time usage**] [**Capable of monitoring and auditing gate activity**].
4. Digital Keypad Entry Unit: Multiple-**[programmable-]**code capability of not less than [**five**] [**500**] [**2500**] **<Insert number>** possible individual codes, consisting of [**one- to seven**] [**four**] [**five**]-digit codes[, **and permitting four different access time periods**].
 - a. Features: [**Timed anti-passback**] [**Limited-time usage**] [**Capable of monitoring and auditing gate activity**].
 - b. Face-lighted unit with [**metal-keyed**] [**keyless-membrane**] keypad fully visible at night.
5. Radio Control: Digital system consisting of code-compatible universal receiver for each gate, located where indicated, with remote antenna with coaxial cable and mounting brackets designed to operate gates. Provide [**one**] [**two**] **<Insert number>** programmable transmitter(s) with multiple-code capability, permitting validating or voiding of not less than [**1000**] [**10,000**] **<Insert number>** codes per channel configured for the following functions:
 - a. Transmitters: [**Single**] [**Three**]-button operated, with open [**and close**] function.
 - b. Channel Settings: [**Two**] [**Three**] [**Four**] **<Insert number>** independent channel settings controlling separate receivers for operating more than one gate from each transmitter.
6. Telephone Entry System: Hands-free voice-communication system for connection to building telephone system, with digital-entry code activation of gate operator[**and auxiliary keypad entry**].
 - a. Residential System: Designed to be wired to same line with telephone.
 - b. Multiunit System: Designed to be wired to a dedicated telephone line, with capacity to access [**20**] [**100**] **<Insert number>** telephones[**and with electronic directory**].
7. Vehicle Loop Detector: System that includes automatic closing timer with adjustable time delay before closing[, **timer cut-off switch,**] and loop detector designed to [**open and close gate**] [**hold gate open until traffic clears**] [**reverse gate**] **<Insert functions>**. Provide electronic detector with adjustable detection patterns, adjustable sensitivity and frequency settings, and panel indicator light designed to detect presence or transit of a vehicle over an embedded loop of wire and to emit a signal activating the gate operator.

Provide number of loops consisting of multiple strands of wire, number of turns, loop size, and method of placement at location shown on Drawings, and as recommended in writing by detection system manufacturer for function indicated.

- a. Loop: **[Field-assembled] [Factory-preformed]** wire, in size indicated, for **[pave-over] [saw-cut and epoxy-grouted]** installation.
8. Vehicle Presence Detector: System that includes automatic closing timer with adjustable time delay before closing[, **timer cut-off switch,**] and presence detector designed to **[open and close gate] [hold gate open until traffic clears] [reverse gate] <Insert functions>**.
 - a. Provide **[retroreflective] [emitter/receiver]** detector with adjustable detection zone pattern and sensitivity, designed to detect the presence or transit of a vehicle in gate pathway when infrared beam in zone pattern is interrupted, and to emit a signal activating the gate operator.
- H. Obstruction Detection Devices: Provide each motorized gate with automatic safety sensor(s). Activation of sensor(s) causes operator to immediately function as follows:
 1. Action: **[Reverse gate in both opening and closing cycles and hold until clear of obstruction] [Stop gate in opening cycle and reverse gate in closing cycle and hold until clear of obstruction]**.
 2. Internal Sensor: Built-in torque or current monitor senses gate is obstructed.
 3. Sensor Edge: Contact-pressure-sensitive safety edge, profile, and sensitivity designed for type of gate and component indicated, in locations as follows. Connect to control circuit using **[take-up cable reel] [self-coiling cable] [gate edge transmitter and operator receiver system]**.
 - a. Along entire gate leaf leading edge.
 - b. Along entire gate leaf trailing edge.
 - c. Across entire gate leaf bottom edge.
 - d. Along entire length of gate posts.
 - e. Along entire length of gate guide posts.
 - f. Where indicated on Drawings.
 - g. **<Insert extent and location>**.
 4. Photoelectric/Infrared Sensor: Designed to detect an obstruction in gate's path when infrared beam in the zone pattern is interrupted.
- I. Limit Switches: Adjustable switches, interlocked with motor controls and set to automatically stop gate at fully open and fully closed positions.
- J. Emergency Release Mechanism: Quick-disconnect release of operator drive system, permitting manual operation if operator fails. Control circuit power is disconnected during manual operation.

1. Type: **[Integral fail-safe release, allowing gate to be pushed open without mechanical devices, keys, cranks, or special knowledge] [Mechanical device, key, or crank-activated release].**

K. Operating Features:

1. Digital Microprocessor Control: Electronic programmable means for setting, changing, and adjusting control features[**with capability for monitoring and auditing gate activity**]. Provide unit that is isolated from voltage spikes and surges.
2. System Integration: With controlling circuit board capable of accepting any type of input from external devices.
3. Master/Slave Capability: Control stations designed and wired for gate pair operation.
4. Automatic Closing Timer: With adjustable time delay before closing[**and timer cut-off switch**].
5. Open Override Circuit: Designed to override closing commands.
6. Reversal Time Delay: Designed to protect gate system from shock load on reversal in both directions.
7. Maximum Run Timer: Designed to prevent damage to gate system by shutting down system if normal time to open gate is exceeded.
8. Clock Timer: **[24 hour] [Seven day] <Insert time period>**, programmable for regular events.

L. Accessories:

1. Warning Module: **[Audio] [Visual], [constant] [strobe]**-light alarm sounding three to five seconds in advance of gate operation and continuing until gate stops moving.
2. Battery Backup System: Battery-powered drive and access-control system, independent of primary drive system.
 - a. Fail Safe: Gate opens and remains open until power is restored.
 - b. Fail Secure: Gate cycles on battery power, then fail safe when battery is discharged.
3. External electric-powered **[solenoid] [magnetic]** lock with delay timer allowing time for lock to release before gate operates.
4. **[Fire] [Postal]** box.
5. Fire **[strobe] [siren]** alarm.
6. Intercom System: **<Insert requirements>**.
7. Instructional, Safety, and Warning Labels and Signs: **[According to UL 325] [Manufacturer's standard for components and features specified] [As indicated on Drawings] <Insert requirements>**.
8. Equipment Bases/Pads: Cast-in-place or precast concrete, **[depth not less than 12 inches (300 mm)] <Insert depth 6 to 12 inches (150 to 300 mm) below frost line or detail on Drawings>**, dimensioned and reinforced according to gate-operator component manufacturer's written instructions and as indicated on Drawings.

2.12 GROUT AND ANCHORING CEMENT

- A. Nonshrink, Nonmetallic Grout: Factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C 1107/C 1107M. Provide grout, recommended in writing by manufacturer, for exterior applications.
- B. Anchoring Cement: Factory-packaged, nonshrink, nonstaining, hydraulic-controlled expansion cement formulation for mixing with water at Project site to create pourable anchoring, patching, and grouting compound. Provide formulation that is resistant to erosion from water exposure without needing protection by a sealer or waterproof coating, and that is recommended in writing by manufacturer for exterior applications.

2.13 GROUNDING MATERIALS

- A. Comply with requirements in Section 260526 "Grounding and Bonding for Electrical Systems."
- B. Connectors and Grounding Rods: Listed and labeled for complying with UL 467.
 - 1. Connectors for Below-Grade Use: Exothermic welded type.
 - 2. Grounding Rods: Copper-clad steel, 5/8 by 96 inches (16 by 2440 mm).

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas and conditions, with Installer present, for compliance with requirements for[**a certified survey of property lines and legal boundaries,**] site clearing, earthwork, pavement work, and other conditions affecting performance of the Work.
 - 1. Do not begin installation before final grading is completed unless otherwise permitted by Architect.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Stake locations of fence lines, gates, and terminal posts. Do not exceed intervals of 500 feet (152 m) or line of sight between stakes. Indicate locations of utilities, lawn sprinkler system, underground structures, benchmarks, and property monuments.

3.3 CHAIN-LINK FENCE INSTALLATION

- A. Install chain-link fencing according to ASTM F 567 and more stringent requirements specified.

1. Install fencing on established boundary lines inside property line.
- B. Post Excavation: Drill or hand-excavate holes for posts to diameters and spacings indicated, in firm, undisturbed soil.
- C. Post Setting: Set posts **[in concrete] [with mechanical anchors] [by mechanically driving into soil]** at indicated spacing into firm, undisturbed soil.
1. Verify that posts are set plumb, aligned, and at correct height and spacing, and hold in position during setting with concrete or mechanical devices.
 2. Concrete Fill: Place concrete around posts to dimensions indicated and vibrate or tamp for consolidation. Protect aboveground portion of posts from concrete splatter.
 - a. Exposed Concrete: Extend 2 inches (50 mm) above grade; shape and smooth to shed water.
 - b. Concealed Concrete: Place top of concrete **[2 inches (50 mm)] <Insert dimension>** below grade **[as indicated on Drawings]** to allow covering with surface material.
 - c. Posts Set into Sleeves in Concrete: Use steel pipe sleeves preset and anchored into concrete for installing posts. After posts are inserted into sleeves, fill annular space between post and sleeve with **[nonshrink, nonmetallic grout] [or] [anchoring cement]**, mixed and placed according to anchoring material manufacturer's written instructions. Finish anchorage joint to slope away from post to drain water.
 - d. Posts Set into Holes in Concrete: Form or core drill holes not less than 5 inches (127 mm) deep and 3/4 inch (20 mm) larger than OD of post. Clean holes of loose material, insert posts, and fill annular space between post and concrete with **[nonshrink, nonmetallic grout] [or] [anchoring cement]**, mixed and placed according to anchoring material manufacturer's written instructions. Finish anchorage joint to slope away from post to drain water.
 3. Mechanically Driven Posts: Drive into soil to depth of **[30 inches (762 mm)] [36 inches (914 mm)] <Insert dimension>**. Protect post top to prevent distortion.
- D. Terminal Posts: Install terminal end, corner, and gate posts according to ASTM F 567 and terminal pull posts at changes in horizontal or vertical alignment of **[15 degrees or more] [30 degrees or more] [as indicated on Drawings] <Insert requirement>**. For runs exceeding 500 feet (152 m), space pull posts an equal distance between corner or end posts.
- E. Line Posts: Space line posts uniformly at **[96 inches (2440 mm)] [10 feet (3 m)] <Insert dimension>** o.c.
- F. Post Bracing and Intermediate Rails: Install according to ASTM F 567, maintaining plumb position and alignment of fence posts. Diagonally brace terminal posts to adjacent line posts with truss rods and turnbuckles. Install braces at end and gate posts and at both sides of corner and pull posts.
1. Locate horizontal braces at midheight of fabric 72 inches (1830 mm) or higher, on fences with top rail, and at two-third fabric height on fences without top rail. Install so posts are plumb when diagonal rod is under proper tension.

- G. Tension Wire: Install according to ASTM F 567, maintaining plumb position and alignment of fence posts. Pull wire taut, without sags. Fasten fabric to tension wire with 0.120-inch- (3.05-mm-) diameter hog rings of same material and finish as fabric wire, spaced a maximum of 24 inches (610 mm) o.c. Install tension wire in locations indicated before stretching fabric. Provide horizontal tension wire at the following locations:
1. Extended along **[top]** **[and]** **[bottom]** of fence fabric. Install top tension wire through post cap loops. Install bottom tension wire within 6 inches (152 mm) of bottom of fabric and tie to each post with not less than same diameter and type of wire.
 2. Extended along top of **[barbed wire arms]** **[extended posts]** and top of fence fabric to support barbed tape.
 3. **[As indicated on Drawings]** **<Insert requirements>**.
- H. Top Rail: Install according to ASTM F 567, maintaining plumb position and alignment of fence posts. Run rail continuously through line post caps, bending to radius for curved runs and terminating into rail end attached to posts or post caps fabricated to receive rail at terminal posts. Provide expansion couplings as recommended in writing by fencing manufacturer.
- I. Intermediate and Bottom Rails: Secure to posts with fittings.
- J. Chain-Link Fabric: Apply fabric to **[outside]** **[inside]** of enclosing framework. Leave **[1-inch (25-mm)]** **[2-inch (50-mm)]** bottom clearance between finish grade or surface and bottom selvage unless otherwise indicated. Pull fabric taut and tie to posts, rails, and tension wires. Anchor to framework so fabric remains under tension after pulling force is released.
- K. Tension or Stretcher Bars: Thread through fabric and secure to end, corner, pull, and gate posts, with tension bands spaced not more than 15 inches (380 mm) o.c.
- L. Tie Wires: Use wire of proper length to firmly secure fabric to line posts and rails. Attach wire at one end to chain-link fabric, wrap wire around post a minimum of 180 degrees, and attach other end to chain-link fabric according to ASTM F 626. Bend ends of wire to minimize hazard to individuals and clothing.
1. Maximum Spacing: Tie fabric to line posts at 12 inches (300 mm) o.c. and to braces at 24 inches (610 mm) o.c.
- M. Fasteners: Install nuts for tension bands and carriage bolts on the side of fence opposite the fabric side. **[Peen ends of bolts or score threads to prevent removal of nuts.]**
- N. Privacy Slats: Install slats in direction indicated, securely locked in place.
1. **[Vertically]** **[Horizontally]**, **[for privacy factor of 70 to 75]** **<Insert privacy factor range>**.
 2. Diagonally **[for privacy factor of 80 to 85]** **<Insert privacy factor range>**.
 3. Direction **[and privacy factor]** as indicated on Drawings.
- O. Barbed Wire: Install barbed wire uniformly spaced **[, angled toward security side of fence]** **[as indicated on Drawings]**. Pull wire taut, install securely to extension arms, and secure to end post or terminal arms.

- P. Barbed Tape: Install according to ASTM F 1911. Install barbed tape uniformly in configurations indicated and fasten securely to prevent movement or displacement.

3.4 GATE INSTALLATION

- A. Install gates according to manufacturer's written instructions, level, plumb, and secure for full opening without interference. Attach fabric as for fencing. Attach hardware using tamper-resistant or concealed means. Install ground-set items in concrete for anchorage. Adjust hardware for smooth operation.

3.5 GATE-OPERATOR INSTALLATION

- A. Install gate operators according to manufacturer's written instructions, aligned and true to fence line and grade.
- B. Excavation: Hand-excavate holes for posts, pedestals, and equipment bases/pads, in firm, undisturbed soil to dimensions and depths and at locations according to gate-operator component manufacturer's written instructions and as indicated.
- C. Vehicle Loop Detector System: [**Cut grooves in pavement, bury, and seal**] [**Bury**] wire loop according to manufacturer's written instructions. Connect to equipment operated by detector.
- D. Ground electric-powered motors, controls, and other devices according to NFPA 70 and manufacturer's written instructions.

3.6 GROUNDING AND BONDING

- A. Comply with requirements in Section 260526 "Grounding and Bonding for Electrical Systems."
- B. Fence and Gate Grounding:
 - 1. Ground for fence and fence posts shall be a separate system from ground for gate and gate posts.
 - 2. Install ground rods and connections at maximum intervals of [**1500 feet (450 m)**] <Insert dimension>.
 - 3. Fences within 100 Feet (30 m) of Buildings, Structures, Walkways, and Roadways: Ground at maximum intervals of [**750 feet (225 m)**] <Insert dimension>.
 - 4. Ground fence on each side of gates and other fence openings.
 - a. Bond metal gates to gate posts.
 - b. Bond across openings, with and without gates, except openings indicated as intentional fence discontinuities. Use No. 2 AWG wire and bury it at least 18 inches (457 mm) below finished grade.

- C. Protection at Crossings of Overhead Electrical Power Lines: Ground fence at location of crossing and at a ground rod located a maximum distance of 150 feet (45 m) on each side of crossing.
- D. Fences Enclosing Electrical Power Distribution Equipment: Ground according to IEEE C2 unless otherwise indicated.
- E. Grounding Method: At each grounding location, drive a grounding rod vertically until the top is 6 inches (152 mm) below finished grade. Connect rod to fence with No. 6 AWG conductor. Connect conductor to each fence component at grounding location.
 - 1. Make grounding connections to each barbed wire strand with wire-to-wire connectors designed for this purpose.
 - 2. Make grounding connections to each barbed tape coil with connectors designed for this purpose.
- F. Connections:
 - 1. Make connections with clean, bare metal at points of contact.
 - 2. Make aluminum-to-steel connections with stainless-steel separators and mechanical clamps.
 - 3. Make aluminum-to-galvanized-steel connections with tin-plated copper jumpers and mechanical clamps.
 - 4. Make above-grade ground connections with mechanical fasteners.
 - 5. Make below-grade ground connections with exothermic welds.
 - 6. Coat and seal connections having dissimilar metals with inert material to prevent future penetration of moisture to contact surfaces.
- G. Bonding to Lightning Protection System: Ground fence and bond fence grounding conductor to lightning protection down conductor or lightning protection grounding conductor according to NFPA 780.
- H. Comply with requirements in Section 264113 "Lightning Protection for Structures."

3.7 FIELD QUALITY CONTROL

- A. Testing Agency: **[Owner will engage]** **[Engage]** a qualified testing agency to perform tests.
- B. Grounding Tests: Comply with requirements in Section 264113 "Lightning Protection for Structures."
- C. Prepare test reports.

3.8 ADJUSTING

- A. Gates: Adjust gates to operate smoothly, easily, and quietly, free of binding, warp, excessive deflection, distortion, nonalignment, misplacement, disruption, or malfunction, throughout

entire operational range. Confirm that latches and locks engage accurately and securely without forcing or binding.

B. Automatic Gate Operator: Energize circuits to electrical equipment and devices, start units, and verify proper motor rotation and unit operation.

1. Hydraulic Operator: Purge operating system, adjust pressure and fluid levels, and check for leaks.
2. Test and adjust operators, controls[, **alarms,**] and safety devices. Replace damaged and malfunctioning controls and equipment.
3. Lubricate operator and related components.

C. Lubricate hardware and other moving parts.

3.9 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain chain-link fences and gates.

END OF SECTION 323113

SECTION 329200 - TURF AND GRASSES

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. Seeding.
2. Hydroseeding.
3. Sodding.
4. Plugging.
5. Sprigging.
6. Meadow grasses and wildflowers.
7. Turf renovation.
8. Erosion-control material(s).
9. Grass paving.

- B. Related Requirements:

1. Section 329300 "Plants" for trees, shrubs, ground covers, and other plants as well as border edgings and mow strips.
2. Section 334600 "Subdrainage" for below-grade drainage of landscaped areas.

1.3 DEFINITIONS

- A. Finish Grade: Elevation of finished surface of planting soil.
- B. 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.
- C. 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.
- D. Planting Soil: Existing, on-site soil; imported soil; or manufactured soil that has been modified with soil amendments and perhaps fertilizers to produce a soil mixture best for plant growth.

- E. 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.

1.4 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at location selected by owner.

1.5 INFORMATIONAL 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.
- C. Product Certificates: For fertilizers, from manufacturer.
- D. Pesticides and Herbicides: Product label and manufacturer's application instructions specific to Project.

1.6 CLOSEOUT SUBMITTALS

- A. Maintenance Data: Recommended procedures to be established by Owner for maintenance of turf during a calendar year. Submit before expiration of required maintenance periods.

1.7 QUALITY ASSURANCE

- A. Installer Qualifications: A qualified landscape installer whose work has resulted in successful turf establishment.
 - 1. Professional Membership: Installer shall be a member in good standing of either the Professional Landcare Network or the American Nursery and Landscape Association.
 - 2. Experience: Three years' experience in turf installation. Installer's Field Supervision: Require Installer to maintain an experienced full-time supervisor on Project site when work is in progress.
 - 3. Personnel Certifications: Installer's field supervisor shall have certification in one of the following categories from the Professional Landcare Network:
 - a. Landscape Industry Certified Technician - Exterior.
 - b. Landscape Industry Certified Lawncare Manager.
 - c. Landscape Industry Certified Lawncare Technician.

4. Pesticide Applicator: State licensed, commercial.

1.8 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. Sod: Harvest, deliver, store, and handle sod according to requirements in "Specifications for Turfgrass Sod Materials" and "Specifications for Turfgrass Sod Transplanting and Installation" sections in TPI's "Guideline Specifications to Turfgrass Sodding." Deliver sod within 24 hours of harvesting and in time for planting promptly. Protect sod from breakage and drying.
- C. 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.

1.9 FIELD CONDITIONS

- 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.
- 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.

PART 2 - PRODUCTS

2.1 SEED

- A. Grass Seed: Fresh, clean, dry, new-crop seed complying with AOSA's "Rules for Testing Seeds" for purity and germination tolerances.
- B. Seed Species:
 1. Quality: State-certified seed of grass species as listed below for solar exposure.

2. Quality: Seed of grass species as listed below for solar exposure, with not less than 85 percent germination, not less than 95 percent pure seed, and not more than 0.5 percent weed seed:
 3. Full Sun: Bermudagrass (*Cynodon dactylon*).
 4. Full Sun: Kentucky bluegrass (*Poa pratensis*), a minimum of three cultivars.
 5. Sun and Partial Shade: Proportioned by weight as follows:
 - a. 50 percent Kentucky bluegrass (*Poa pratensis*).
 - b. 30 percent chewings red fescue (*Festuca rubra* variety).
 - c. 10 percent perennial ryegrass (*Lolium perenne*).
 - d. 10 percent redtop (*Agrostis alba*).
 6. Shade: Proportioned by weight as follows:
 - a. 50 percent chewings red fescue (*Festuca rubra* variety).
 - b. 35 percent rough bluegrass (*Poa trivialis*).
 - c. 15 percent redtop (*Agrostis alba*).
- C. Grass-Seed Mix: Proprietary seed mix as follows:
1. Products: Subject to compliance with requirements, **[provide the following] [provide one of the following] [available products that may be incorporated into the Work include, but are not limited to, the following]:**
 - a. **<Insert manufacturer's name; product name or designation>.**

2.2 TURFGRASS SOD

- A. Turfgrass Sod: **[Certified] [Approved] [Number 1 Quality/Premium, including limitations on thatch, weeds, diseases, nematodes, and insects]**, complying with "Specifications for Turfgrass Sod Materials" in TPI's "Guideline Specifications to Turfgrass Sodding." Furnish viable sod of uniform density, color, and texture that is strongly rooted and capable of vigorous growth and development when planted.
- B. Turfgrass Species: **[Bermudagrass (*Cynodon dactylon*)] [Carpetgrass (*Axonopus affinis*)] [Centipedegrass (*Eremochloa ophiuroides*)] [St. Augustinegrass (*Stenotaphrum secundatum*)] [Zoysiagrass (*Zoysia japonica*)] [Zoysiagrass (*Zoysia matrella*)] <Insert species>.**
- C. Turfgrass Species: Sod of grass species as follows, with not less than **[85] <Insert number>** percent germination, not less than **[95] <Insert number>** percent pure seed, and not more than **[0.5] <Insert number>** percent weed seed:
 1. Full Sun: Kentucky bluegrass (*Poa pratensis*), a minimum of three cultivars.
 2. Sun and Partial Shade: Proportioned by weight as follows:
 - a. 50 percent Kentucky bluegrass (*Poa pratensis*).
 - b. 30 percent chewings red fescue (*Festuca rubra* variety).

- c. 10 percent perennial ryegrass (*Lolium perenne*).
 - d. 10 percent redtop (*Agrostis alba*).
3. Shade: Proportioned by weight as follows:
- a. 50 percent chewings red fescue (*Festuca rubra* variety).
 - b. 35 percent rough bluegrass (*Poa trivialis*).
 - c. 15 percent redtop (*Agrostis alba*).

2.3 PLUGS

- A. Plugs: Turfgrass sod, [**Certified**] [**Approved**] [**Number 1 Quality/Premium, including limitations on thatch, weeds, diseases, nematodes, and insects**], complying with "Specifications for Turfgrass Sod Materials" in TPI's "Guideline Specifications to Turfgrass Sodding." Furnish viable sod of uniform density, color, and texture that is cut into square or round plugs, strongly rooted, and capable of vigorous growth and development when planted; of the following turfgrass species and plug size:
- 1. Turfgrass Species: [**Bermudagrass (*Cynodon dactylon*)**] [**Carpetgrass (*Axonopus affinis*)**] [**Centipedegrass (*Eremochloa ophiuroides*)**] [**St. Augustinegrass (*Stenotaphrum secundatum*)**] [**Zoysiagrass (*Zoysia japonica*)**] [**Zoysiagrass (*Zoysia matrella*)**] <Insert species>.
 - 2. Plug Size: [**2 inches (50 mm)**] [**3 inches (75 mm)**] [**4 inches (100 mm)**] <Insert dimension>.

2.4 SPRIGS

- A. Sod Sprigs: Healthy living stems, rhizomes, or stolons with a minimum of two nodes and attached roots free of soil, of the following turfgrass species:
- 1. Turfgrass Species: [**Bermudagrass (*Cynodon dactylon*)**] [**Carpetgrass (*Axonopus affinis*)**] [**Centipedegrass (*Eremochloa ophiuroides*)**] [**St. Augustinegrass (*Stenotaphrum secundatum*)**] [**Zoysiagrass (*Zoysia japonica*)**] [**Zoysiagrass (*Zoysia matrella*)**] <Insert species>.
 - 2. Turfgrass Species: Creeping bentgrass (*Agrostis palustris*).

2.5 MEADOW GRASSES AND WILDFLOWERS

- A. Wildflower Seed: Fresh, clean, and dry new seed, of mixed species as follows:
- 1. <Insert mix of wildflower species>.
- B. Native-Grass Seed: Fresh, clean, and dry new seed, of mixed species as follows:
- 1. <Insert mix of native-grass species>.

- C. Wildflower and Native-Grass Seed: Fresh, clean, and dry new seed, of mixed species as follows:
 - 1. **<Insert mix of wildflower and native-grass species>.**
- D. Seed Carrier: Inert material, sharp clean sand or perlite.

2.6 FERTILIZERS

- 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: **[1 lb/1000 sq. ft. (0.45 kg/92.9 sq. m)] <Insert value>** of actual nitrogen, 4 percent phosphorous, and 2 percent potassium, by weight.
 - 2. 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: 20 percent nitrogen, 10 percent phosphorous, and 10 percent potassium, by weight.
 - 2. Composition: Nitrogen, phosphorous, and potassium in amounts recommended in soil reports from a qualified soil-testing laboratory.

2.7 MULCHES

- A. Straw Mulch: Provide air-dry, clean, mildew- and seed-free, salt hay or threshed straw of wheat, rye, oats, or barley.
- B. Sphagnum Peat Mulch: Partially decomposed sphagnum peat moss, finely divided or of granular texture, and with a pH range of 3.4 to 4.8.
- C. Muck Peat Mulch: Partially decomposed moss peat, native peat, or reed-sedge peat, finely divided or of granular texture, with a pH range of 6 to 7.5, and having a water-absorbing capacity of 1100 to 2000 percent, and containing no sand.
- D. Compost Mulch: 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 (25-mm) sieve; soluble salt content of **[2 to 5] <Insert range or value>** 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] <Insert number range>** percent of dry weight.
 - 2. Feedstock: Agricultural, food, or industrial residuals; biosolids; yard trimmings; or source-separated or compostable mixed solid waste.

- E. Fiber Mulch: Biodegradable, dyed-wood, cellulose-fiber mulch; nontoxic and free of plant-growth or germination inhibitors; with a maximum moisture content of 15 percent and a pH range of 4.5 to 6.5.
- F. Nonasphaltic Tackifier: Colloidal tackifier recommended by fiber-mulch manufacturer for slurry application; nontoxic and free of plant-growth or germination inhibitors.
- G. Asphalt Emulsion: ASTM D 977, Grade SS-1; nontoxic and free of plant-growth or germination inhibitors.

2.8 PESTICIDES

- A. General: Pesticide, registered and approved by the EPA, acceptable to authorities having jurisdiction, and of type recommended by manufacturer for each specific problem and as required for Project conditions and application. Do not use restricted pesticides unless authorized in writing by authorities having jurisdiction.
- B. Pre-Emergent Herbicide (Selective and Nonselective): Effective for controlling the germination or growth of weeds within planted areas at the soil level directly below the mulch layer.
- C. Post-Emergent Herbicide (Selective and Nonselective): Effective for controlling weed growth that has already germinated.

2.9 EROSION-CONTROL MATERIALS

- A. Erosion-Control Blankets: Biodegradable wood excelsior, straw, or coconut-fiber mat enclosed in a photodegradable plastic mesh. Include manufacturer's recommended steel wire staples, 6 inches (150 mm) long.
- B. Erosion-Control Fiber Mesh: Biodegradable burlap or spun-coir mesh, a minimum of 0.92 lb/sq. yd. (0.5 kg/sq. m), with 50 to 65 percent open area. Include manufacturer's recommended steel wire staples, 6 inches (150 mm) long.
- C. Erosion-Control Mats: Cellular, nonbiodegradable slope-stabilization mats designed to isolate and contain small areas of soil over steeply sloped surface, of **[3-inch (75-mm)] [4-inch (100-mm)] [6-inch (150-mm)]** <Insert dimension> nominal mat thickness. Include manufacturer's recommended anchorage system for slope conditions.

1. <Double click here to find, evaluate, and insert list of manufacturers and products.>

2.10 GRASS-PAVING MATERIALS

- A. Grass Paving: Cellular, nonbiodegradable plastic mats, designed to contain small areas of soil and enhance the ability of turf to support vehicular and pedestrian traffic, of **[1-inch (25-mm)] [1-3/4-inch (45-mm)] [2-inch (50-mm)] [manufacturer's standard]** <Insert dimension>

nominal mat thickness. Include manufacturer's recommended anchorage system for slope conditions.

1. <Double click here to find, evaluate, and insert list of manufacturers and products.>
- B. Base Course: Sound crushed stone or gravel complying with [ASTM D 448 for Size No. 8] [Section 312000 "Earth Moving" for base-course material] <Insert requirements>.
- C. Sand: Sound, sharp, washed, natural sand or crushed stone complying with gradation requirements in ASTM C 33/C 33M for fine aggregate.
- D. Proprietary Growing Mix: As submitted and acceptable to Architect.
- E. Sandy Loam Soil Mix: Sound, sharp, washed, natural sand or crushed stone complying with gradation requirements in ASTM C 33/C 33M for fine aggregate blended with planting soil <Insert drawing designation>. Use blend consisting of [1/2 sand and 1/2 planting soil] [2/3 sand and 1/3 planting soil] <Insert proportions>.
- F. Soil for Paving Fill: Planting soil <Insert drawing designation>.

PART 3 - EXECUTION

3.1 EXAMINATION

- 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 Architect 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. General: Prepare planting area for soil placement and mix planting soil according to [Section 329113 "Soil Preparation."] [Section 329115 "Soil Preparation (Performance Specification)."]
- B. Placing Planting Soil: **[Place and mix planting soil in place over exposed subgrade] [Place manufactured planting soil over exposed subgrade] [Blend planting soil in place] <Insert requirement>.**
1. Reduce elevation of planting soil to allow for soil thickness of sod.
- C. Moisten prepared area before planting if soil is dry. Water thoroughly and allow surface to dry before planting. Do not create muddy soil.
- D. Before planting, obtain Architect's acceptance of finish grading; restore planting areas if eroded or otherwise disturbed after finish grading.

3.4 PREPARATION FOR EROSION-CONTROL MATERIALS

- A. Prepare area as specified in "Turf Area Preparation" Article.
- B. For erosion-control mats, install planting soil in two lifts, with second lift equal to thickness of erosion-control mats. Install erosion-control mat and fasten as recommended by material manufacturer.
- C. Fill cells of erosion-control mat with planting soil and compact before planting.
- D. For erosion-control blanket or mesh, install from top of slope, working downward, and as recommended by material manufacturer for site conditions. Fasten as recommended by material manufacturer.
- E. Moisten prepared area before planting if surface is dry. Water thoroughly and allow surface to dry before planting. Do not create muddy soil.

3.5 PREPARATION FOR GRASS-PAVING MATERIALS

- A. Reduce subgrade elevation soil to allow for thickness of grass-paving system. Grade planting areas to a smooth, uniform surface plane with loose, uniformly fine texture. Grade so that

installed paving is within plus or minus 1/2 inch (13 mm) of finish elevation. Roll and rake, remove ridges, and fill depressions.

- B. Install **[base course]** **[and]** **[sand course]** and **[sandy loam soil mix]** **[proprietary growing mix]** **[soil for paving fill]** as recommended by paving-material manufacturer for site conditions and according to details indicated on Drawings. Compact according to paving-material manufacturer's written instructions.
- C. Install paving mat and fasten according to paving-material manufacturer's written instructions.
- D. Before planting, fill cells of paving mat with **[planting soil]** **[sandy loam soil mix]** **[proprietary growing mix]** **[sand half full]** and compact according to manufacturer's written instructions.
- E. Moisten prepared area before planting if surface is dry. Water thoroughly and allow surface to dry before planting. Do not create muddy soil.

3.6 SEEDING

- A. Sow seed with spreader or seeding machine. Do not broadcast or drop seed when wind velocity exceeds 5 mph (8 km/h).
 - 1. Evenly distribute seed by sowing equal quantities in two directions at right angles 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 total rate of **[2 lb/1000 sq. ft. (0.9 kg/92.9 sq. m)]** **[3 to 4 lb/1000 sq. ft. (1.4 to 1.8 kg/92.9 sq. m)]** **[5 to 8 lb/1000 sq. ft. (2.3 to 3.6 kg/92.9 sq. m)]** **<Insert values>**.
- 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 **[1:4 with erosion-control blankets]** **[and]** **[1:6 with erosion-control fiber mesh]** installed and stapled according to manufacturer's written instructions.
- E. Protect seeded areas with erosion-control mats where indicated on Drawings; install and anchor according to manufacturer's written instructions.
- F. 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)]** **<Insert values>** to form a continuous blanket **[1-1/2 inches (38 mm)]** **<Insert dimension>** 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.
 - 2. Bond straw mulch by spraying with asphalt emulsion at a rate of **[10 to 13 gal./1000 sq. ft. (38 to 49 L/92.9 sq. m)]** **<Insert values>**. Take precautions to prevent damage or

staining of structures or other plantings adjacent to mulched areas. Immediately clean damaged or stained areas.

- G. Protect seeded areas from hot, dry weather or drying winds by applying [**compost mulch**] [**peat mulch**] [**planting soil**] within 24 hours after completing seeding operations. Soak areas, scatter mulch uniformly to a thickness of [**3/16 inch (4.8 mm)**] <Insert dimension>, and roll surface smooth.

3.7 HYDROSEEDING

- A. Hydroseeding: Mix specified seed, [**commercial fertilizer**] [**slow-release fertilizer**] <Insert type>, 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**] [**asphalt-emulsion**] [**fiber-mulch manufacturer's recommended**] 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)**] <Insert values> dry weight, and seed component is deposited at not less than the specified seed-sowing rate.
 - 3. Spray-apply slurry uniformly to all areas to be seeded in a two-step process. Apply first slurry coat at a rate so that mulch component is deposited at not less than [**500-lb/acre (5.2-kg/92.9 sq. m)**] <Insert values> dry weight, and seed component is deposited at not less than the specified seed-sowing rate. Apply slurry cover coat of fiber mulch (hydromulching) at a rate of [**1000 lb/acre (10.4 kg/92.9 sq. m)**] <Insert values>.

3.8 SODDING

- A. Lay sod within 24 hours of harvesting[**unless a suitable preservation method is accepted by Architect prior to delivery time**]. Do not lay sod if dormant or if ground is frozen or muddy.
- B. Lay sod to form a solid mass with tightly fitted joints. Butt ends and sides of sod; do not stretch or overlap. Stagger sod strips or pads to offset joints in adjacent courses. Avoid damage to soil or sod during installation. Tamp and roll lightly to ensure contact with soil, eliminate air pockets, and form a smooth surface. Work sifted soil or fine sand into minor cracks between pieces of sod; remove excess to avoid smothering sod and adjacent grass.
 - 1. Lay sod across slopes exceeding 1:3.
 - 2. Anchor sod on slopes exceeding 1:6 with wood pegs[**or steel staples**] spaced as recommended by sod manufacturer but not less than two anchors per sod strip to prevent slippage.
- C. Saturate sod with fine water spray within two hours of planting. During first week after planting, water daily or more frequently as necessary to maintain moist soil to a minimum depth of 1-1/2 inches (38 mm) below sod.

3.9 PLUGGING

- A. Plant plugs in holes or furrows, spaced [**12 inches (300 mm)**] [**18 inches (450 mm)**] **<Insert dimension>** apart in [**both directions**] [**triangular pattern**]. On slopes, contour furrows to near level.

3.10 SPRIGGING

- A. Plant freshly shredded sod sprigs in furrows [**1 to 1-1/2 inches (25 to 38 mm)**] [**1-1/2 to 2 inches (38 to 50 mm)**] [**2-1/2 to 3 inches (64 to 75 mm)**] deep. Place individual sprigs with roots and portions of stem in moistened soil, [**6 inches (150 mm)**] [**12 inches (300 mm)**] **<Insert dimension>** apart in rows [**10 inches (250 mm)**] [**18 inches (450 mm)**] **<Insert dimension>** apart, and fill furrows without covering growing tips. Lightly roll and firm soil around sprigs after planting.
- B. Broadcast sprigs uniformly over prepared surface at a rate of [**10 cu. ft./1000 sq. ft. (0.28 cu. m/92.9 sq. m)**] **<Insert values>** and mechanically force sprigs into lightly moistened soil.
 - 1. Spread a 1/4-inch- (6-mm-) thick layer of [**compost mulch**] [**peat mulch**] [**planting soil**] on sprigs.
 - 2. Lightly roll and firm soil around sprigs after planting.
 - 3. Water sprigs immediately after planting and keep moist by frequent watering until well rooted.

3.11 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.
 - 1. Soil Amendment(s): <Insert required soil amendment(s)> according to requirements of [Section 329113 "Soil Preparation."] [Section 329115 "Soil Preparation (Performance Specification)."] Apply <Insert soil amendment> at the rate of <Insert application rate>.
 - 2. Initial Fertilizer: [Commercial fertilizer] [Slow-release fertilizer] <Insert type> applied according to manufacturer's recommendations.
- J. Apply [seed and protect with straw mulch] [sod] [plugs] [sprigs] as required for new turf.
- K. Water newly planted areas and keep moist until new turf is established.

3.12 TURF MAINTENANCE

- A. General: Maintain and establish turf by watering, fertilizing, weeding, mowing, trimming, replanting, and performing other operations as required to establish healthy, viable turf. Roll, regrade, and replant bare or eroded areas and remulch to produce a uniformly smooth turf. Provide materials and installation the same as those used in the original installation.
 - 1. Fill in as necessary soil subsidence that may occur because of settling or other processes. Replace materials and turf damaged or lost in areas of subsidence.
 - 2. In areas where mulch has been disturbed by wind or maintenance operations, add new mulch and anchor as required to prevent displacement.
 - 3. Apply treatments as required to keep turf and soil free of pests and pathogens or disease. Use integrated pest management practices whenever possible to minimize the use of pesticides and reduce hazards.
- B. Watering: Install and maintain temporary piping, hoses, and turf-watering equipment to convey water from sources and to keep turf uniformly moist to a depth of 4 inches (100 mm).
 - 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 turf with fine spray at a minimum rate of 1 inch (25 mm) per week unless rainfall precipitation is adequate.
- C. Mow turf as soon as top growth is tall enough to cut. Repeat mowing to maintain specified height without cutting more than one-third of grass height. Remove no more than one-third of grass-leaf growth in initial or subsequent mowings. Do not delay mowing until grass blades

bend over and become matted. Do not mow when grass is wet. Schedule initial and subsequent mowings to maintain the following grass height:

1. Mow [bentgrass] <Insert grass species> to a height of 1/2 inch (13 mm) or less.
2. Mow [bermudagrass] <Insert grass species> to a height of 1/2 to 1 inch (13 to 25 mm).
3. Mow [carpetgrass] [centipedegrass] [perennial ryegrass] [zoysiagrass] <Insert grass species> to a height of 1 to 2 inches (25 to 50 mm).
4. Mow [Kentucky bluegrass] [buffalograss] [annual ryegrass] [chewings red fescue] <Insert grass species> to a height of 1-1/2 to 2 inches (38 to 50 mm).
5. Mow [bahiagrass] [turf-type tall fescue] [St. Augustinegrass] <Insert grass species> to a height of 2 to 3 inches (50 to 75 mm).

D. Turf Postfertilization: Apply [commercial fertilizer] [slow-release fertilizer] <Insert type> after initial mowing and when grass is dry.

1. Use fertilizer that provides actual nitrogen of at least [1 lb/1000 sq. ft. (0.45 kg/92.9 sq. m)] <Insert value> to turf area.

3.13 SATISFACTORY TURF

A. Turf installations shall meet the following criteria as determined by Architect:

1. Satisfactory Seeded Turf: 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. (0.92 sq. m) and bare spots not exceeding 5 by 5 inches (125 by 125 mm)] <Insert coverage>.
2. Satisfactory Sodded Turf: At end of maintenance period, a healthy, well-rooted, even-colored, viable turf has been established, free of weeds, open joints, bare areas, and surface irregularities.
3. Satisfactory Plugged Turf: At end of maintenance period, the required number of plugs has been established as well-rooted, viable patches of grass, and areas between plugs are free of weeds and other undesirable vegetation.
4. Satisfactory Sprigged Turf: At end of maintenance period, the required number of sprigs has been established as well-rooted, viable plants, and areas between sprigs are free of weeds and other undesirable vegetation.

B. Use specified materials to reestablish turf that does not comply with requirements, and continue maintenance until turf is satisfactory.

3.14 MEADOW

A. Sow seed with spreader or seeding machine. Do not broadcast or drop seed when wind velocity exceeds 5 mph (8 km/h).

1. Before sowing, mix seed with seed carrier at a ratio of not less than [two] [three] [four] <Insert number> parts seed carrier to one part seed.

2. Evenly distribute seed by sowing equal quantities in two directions at right angles to each other.
 3. Do not use wet seed or seed that is moldy or otherwise damaged.
- B. Sow seed at a total rate of [4 oz./1000 sq. ft. (113 g/92.9 sq. m)] [5 oz./1000 sq. ft. (142 g/92.9 sq. m)] [6 oz./1000 sq. ft. (170 g/92.9 sq. m)] <Insert values>.
 - C. Brush seed into top 1/16 inch (1.6 mm) of soil, roll lightly, and water with fine spray.
 - D. Protect seeded areas from hot, dry weather or drying winds by applying [peat] [or] [compost] mulch within 24 hours after completing seeding operations. Soak areas, scatter mulch uniformly to a thickness of 3/16 inch (4.8 mm), and roll surface smooth.
 - E. Water newly planted areas and keep moist until meadow is established.

3.15 MEADOW MAINTENANCE

- A. Maintain and establish meadow by watering, weeding, mowing, trimming, replanting, and performing other operations as required to establish a healthy, viable meadow. Roll, regrade, and replant bare or eroded areas and remulch. Provide materials and installation the same as those used in the original installation.
 1. Fill in as necessary soil subsidence that may occur because of settling or other processes. Replace materials and meadow damaged or lost in areas of subsidence.
 2. In areas where mulch has been disturbed by wind or maintenance operations, add new mulch and anchor as required to prevent displacement.
 3. Apply treatments as required to keep meadow and soil free of pests and pathogens or disease. Use integrated pest management practices whenever possible to minimize the use of pesticides and reduce hazards.
- B. Watering: Install and maintain temporary piping, hoses, and meadow-watering equipment to convey water from sources and to keep meadow uniformly moist.
 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 meadow with fine spray at a minimum rate of 1/2 inch (13 mm) per week for [four] [six] [eight] weeks after planting unless rainfall precipitation is adequate.

3.16 PESTICIDE APPLICATION

- A. Apply pesticides and other chemical products and biological control agents according to requirements of authorities having jurisdiction and manufacturer's written recommendations. Coordinate applications with Owner's operations and others in proximity to the Work. Notify Owner before each application is performed.

- B. Post-Emergent Herbicides (Selective and Nonselective): Apply only as necessary to treat already-germinated weeds and according to manufacturer's written recommendations.

3.17 CLEANUP 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, walks, 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 nondegradable erosion-control measures after grass establishment period.

3.18 MAINTENANCE SERVICE

- 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] <Insert number> days from date of [planting completion] [Substantial Completion] <Insert starting time>.
 - 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.
 - 2. Sodded Turf: [30] <Insert number> days from date of [planting completion] [Substantial Completion] <Insert starting time>.
 - 3. Plugged Turf: [30] <Insert number> days from date of [planting completion] [Substantial Completion] <Insert starting time>.
 - 4. Sprigged Turf: [30] <Insert number> days from date of [planting completion] [Substantial Completion] <Insert starting time>.
- B. Meadow Maintenance Service: Provide full maintenance by skilled employees of landscape Installer. Maintain as required in "Meadow Maintenance" Article. Begin maintenance immediately after each area is planted and continue until acceptable meadow is established, but for not less than maintenance period below.
 - 1. Maintenance Period: [40] <Insert number> days from date of [planting completion] [Substantial Completion] <Insert starting time>.

END OF SECTION 329200