

SECTION 015639 - TEMPORARY TREE AND PLANT PROTECTION

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 general protection and pruning of existing trees and plants that are affected by execution of the Work, whether temporary or permanent construction.
- B. Related Requirements:
 - 1. Section 015000 "Temporary Facilities and Controls" for temporary site fencing.
 - 2. Section 311000 "Site Clearing" for removing existing trees and shrubs.

1.3 DEFINITIONS

- A. Caliper: Diameter of a trunk measured by a diameter tape at a height 6 inches above the ground for trees up to and including 4-inch size at this height and as measured at a height of 12 inches above the ground for trees larger than 4-inch size.
- B. Caliper (DBH): Diameter breast height; diameter of a trunk as measured by a diameter tape at a height 54 inches above the ground line for trees with caliper of 8 inches or greater as measured at a height of 12 inches above the ground.
- C. Plant-Protection Zone: Area surrounding individual trees, groups of trees, shrubs, or other vegetation to be protected during construction and indicated on Drawings.
- D. Tree-Protection Zone: Area surrounding individual trees or groups of trees to be protected during construction and defined by a circle concentric with each tree with a radius 1.5 times the diameter of the drip line unless otherwise indicated.
- E. Vegetation: Trees, shrubs, groundcovers, grass, and other plants.

1.4 ACTION SUBMITTALS

- A. Shop Drawings:
 - 1. Include plans, elevations, sections, and locations of protection-zone fencing and signage, showing relation of equipment-movement routes and material storage locations with protection zones.

2. Detail fabrication and assembly of protection-zone fencing and signage.
3. Indicate extent of trenching by hand or with air spade within protection zones.

B. Tree Pruning Schedule: Written schedule detailing scope and extent of pruning of trees to remain that interfere with or are affected by construction.

1. Species and size of tree.
2. Location on site plan. Include unique identifier for each.
3. Reason for pruning.
4. Description of pruning to be performed.
5. Description of maintenance following pruning.

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For arborist and tree service firm.
- B. Quality-control program.

1.6 QUALITY ASSURANCE

- A. Tree Service Firm Qualifications: An experienced tree service firm that has successfully completed temporary tree and plant protection work similar to that required for this Project and that will assign an experienced, qualified arborist to Project site during execution of the Work.
- B. Quality-Control Program: Prepare a written program to systematically demonstrate the ability of personnel to properly follow procedures and handle materials and equipment during the Work without damaging trees and plantings. Include dimensioned diagrams for placement of protection zone fencing and signage, the arborist's and tree-service firm's responsibilities, instructions given to workers on the use and care of protection zones, and enforcement of requirements for protection zones.

1.7 FIELD CONDITIONS

- A. The following practices are prohibited within protection zones:
 1. Storage of construction materials, debris, or excavated material.
 2. Moving or parking vehicles or equipment.
 3. Foot traffic.
 4. Erection of sheds or structures.
 5. Impoundment of water.
 6. Excavation or other digging unless otherwise indicated.
 7. Attachment of signs to or wrapping materials around trees or plants unless otherwise indicated.
- B. Do not direct vehicle or equipment exhaust toward protection zones.

- C. Prohibit heat sources, flames, ignition sources, and smoking within or near protection zones and organic mulch.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Protection-Zone Fencing: Fencing fixed in position and meeting one of the following requirements: Previously used materials may be used when approved by Engineer.
 - 1. Plastic Protection-Zone Fencing: Plastic construction fencing constructed of high-density extruded and stretched polyethylene fabric with 2-inch maximum opening in pattern and weighing a minimum of 0.4 lb/ft.; remaining flexible from minus 60 to plus 200 deg F; inert to most chemicals and acids; minimum tensile yield strength of 2000 psi and ultimate tensile strength of 2680 psi; secured with plastic bands or galvanized-steel or stainless-steel wire ties; and supported by tubular or T-shape galvanized-steel posts spaced not more than 96 inches apart.
 - a. Height: 48 inches.
 - b. Color: High-visibility orange, nonfading.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Erosion and Sedimentation Control: Examine the site to verify that temporary erosion- and sedimentation-control measures are in place. Verify that flows of water redirected from construction areas or generated by construction activity do not enter or cross protection zones.
- B. Prepare written report, endorsed by arborist, listing conditions detrimental to tree and plant protection.

3.2 PREPARATION

- A. Locate and clearly identify trees, shrubs, and other vegetation to remain. Flag each tree trunk at 54 inches above the ground.
- B. Protect tree root systems from damage caused by runoff or spillage of noxious materials while mixing, placing, or storing construction materials. Protect root systems from ponding, eroding, or excessive wetting caused by dewatering operations.

3.3 PROTECTION ZONES

- A. Protection-Zone Fencing: Install protection-zone fencing along edges of protection zones before materials or equipment are brought on the site and construction operations begin in a manner that

will prevent people from easily entering protected areas except by entrance gates. Construct fencing so as not to obstruct safe passage or visibility at vehicle intersections where fencing is located adjacent to pedestrian walkways or in close proximity to street intersections, drives, or other vehicular circulation.

1. Posts: Set or drive posts into ground one-third the total height of the fence without concrete footings. Where a post is located on existing paving or concrete to remain, provide appropriate means of post support acceptable to Engineer.
2. Access Gates: Install; adjust 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. Maintain protection zones free of weeds and trash.

C. Maintain protection-zone fencing and signage in good condition as acceptable to Engineer and remove when construction operations are complete and equipment has been removed from the site.

1. Do not remove protection-zone fencing, even temporarily, to allow deliveries or equipment access through the protection zone.
2. Temporary access is permitted subject to preapproval in writing by arborist if a root buffer effective against soil compaction is constructed as directed by arborist. Maintain root buffer so long as access is permitted.

3.4 EXCAVATION

A. General: Excavate at edge of protection zones and for trenches indicated within protection zones according to requirements in Section 312000 "Earth Moving" unless otherwise indicated.

B. Trenching within Protection Zones: Where utility trenches are required within protection zones, excavate under or around tree roots by hand or with air spade, or tunnel under the roots by drilling, auger boring, or pipe jacking. Do not cut main lateral tree roots or taproots; cut only smaller roots that interfere with installation of utilities. Cut roots as required for root pruning. If excavating by hand, use narrow-tine spading forks to comb soil and expose roots.

C. Redirect roots in backfill areas where possible. If encountering large, main lateral roots, expose roots beyond excavation limits as required to bend and redirect them without breaking. If encountered immediately adjacent to location of new construction and redirection is not practical, cut roots approximately 3 inches back from new construction and as required for root pruning.

D. Do not allow exposed roots to dry out before placing permanent backfill. Provide temporary earth cover or pack with peat moss and wrap with burlap. Water and maintain in a moist condition. Temporarily support and protect roots from damage until they are permanently relocated and covered with soil.

3.5 ROOT PRUNING

- A. Prune tree roots that are affected by temporary and permanent construction. Prune roots as follows:
1. Cut roots manually by digging a trench and cutting exposed roots with sharp pruning instruments; do not break, tear, chop, or slant the cuts. Do not use a backhoe or other equipment that rips, tears, or pulls roots.
 2. Cut Ends: Coat cut ends of roots more than 1-1/2 inches in diameter with an emulsified asphalt or other coating formulated for use on damaged plant tissues and that is acceptable to arborist.
 3. Temporarily support and protect roots from damage until they are permanently redirected and covered with soil.
 4. Cover exposed roots with burlap and water regularly.
 5. Backfill as soon as possible according to requirements in Section 312000 "Earth Moving."
- B. Root Pruning at Edge of Protection Zone: Prune tree roots 12 inches outside of the protection zone by cleanly cutting all roots to the depth of the required excavation.
- C. Root Pruning within Protection Zone: Clear and excavate by hand or with air spade to the depth of the required excavation to minimize damage to tree root systems. If excavating by hand, use narrow-tine spading forks to comb soil to expose roots. Cleanly cut roots as close to excavation as possible.

3.6 REGRADING

- A. Raising Grade: Where new finish grade is indicated above existing grade around trees, slope grade beyond the protection zone. Maintain existing grades within the protection zone.

3.7 REPAIR AND REPLACEMENT

- A. General: Repair or replace trees, shrubs, and other vegetation indicated to remain or to be relocated that are damaged by construction operations, in a manner approved by Engineer.
1. Submit details of proposed pruning and repairs.
 2. Perform repairs of damaged trunks, branches, and roots within 24 hours according to arborist's written instructions.
 3. Replace trees and other plants that cannot be repaired and restored to full-growth status, as determined by Engineer.
- B. Trees: Remove and replace trees indicated to remain that are more than [25] 66 percent dead or in an unhealthy condition before the end of the corrections period or are damaged during construction operations that Engineer determines are incapable of restoring to normal growth pattern.
1. Small Trees: Provide new trees of same size and species as those being replaced for each tree that measures 6 inches or smaller in caliper size.

2. Large Trees: Provide two new tree(s) of 6-inch caliper size for each tree being replaced that measures more than 6 inches in caliper size.

- a. Species: As selected by Engineer that closely matches the removed tree.

3.8 DISPOSAL OF SURPLUS AND WASTE MATERIALS

- A. Disposal: Remove excess excavated material, displaced trees, trash, and debris and legally dispose of them off Owner's property.

END OF SECTION 015639

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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.
2. Removing below-grade construction.
3. Disconnecting, capping or sealing, and abandoning in-place removing site utilities.

- B. Related Requirements:

1. 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 INFORMATIONAL SUBMITTALS

- A. Proposed Protection Measures: Submit report, including Drawings, that indicates the measures proposed for protecting individuals and property, for environmental protection. Indicate proposed locations and construction of barriers.
 - 1. Adjacent Buildings: Detail special measures proposed to protect adjacent buildings to remain.
- B. 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 or re-routing of utility services.
- C. Predemolition Photographs or Video: Show existing conditions of adjoining construction and site improvements, including finish surfaces, that might be misconstrued as damage caused by salvage and demolition operations. Comply with Section 013233 "Photographic Documentation." Submit before the Work begins.

1.6 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 In subparagraph below, include list of items that will be removed by Owner.
- D. 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.

- E. On-site storage or sale of removed items or materials is not permitted.

1.7 COORDINATION

- A. Arrange demolition schedule so as not to interfere with.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Standards: Comply with ANSI/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 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. 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.

3.2 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. Arrange to shut off utilities with utility companies.

2. 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.
3. Cut off pipe or conduit a minimum of 24 inches below grade. Cap, valve, or plug and seal remaining portion of pipe or conduit after bypassing according to requirements of authorities having jurisdiction.
4. Do not start demolition work until utility disconnecting and sealing have been completed and verified in writing.

3.3 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.
- 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.

3.4 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 adequate ventilation when using cutting torches.
 - 3. 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.

3.5 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 on Drawings.
- D. Below-Grade Construction: Demolish foundation walls and other below-grade construction.
 - 1. Remove below-grade construction, including basements, foundation walls, and footings, completely.
- E. Existing Utilities: Abandon existing utilities and below-grade utility structures. Cut utilities flush with grade.
- F. Existing Utilities: Demolish and remove existing utilities and below-grade utility structures.

3.6 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.
 - 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.

3.7 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

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SECTION 221113 - FACILITY WATER DISTRIBUTION PIPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes water-distribution piping and related components outside the building for water service.
- B. Utility-furnished products include water meters that will be furnished to the site, ready for installation.

1.3 DEFINITIONS

- A. EPDM: Ethylene propylene diene terpolymer rubber.
- B. LLDPE: Linear, low-density polyethylene plastic.
- C. PA: Polyamide (nylon) plastic.
- D. PE: Polyethylene plastic.
- E. PP: Polypropylene plastic.
- F. PVC: Polyvinyl chloride plastic.
- G. RTRF: Reinforced thermosetting resin (fiberglass) fittings.
- H. RTRP: Reinforced thermosetting resin (fiberglass) pipe.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: Detail precast concrete vault assemblies and indicate dimensions, method of field assembly, and components.
 - 1. Wiring Diagrams: Power, signal, and control wiring for alarms.

1.5 INFORMATIONAL SUBMITTALS

- A. Field quality-control test reports.

1.6 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For water valves and specialties to include in emergency, operation, and maintenance manuals.

1.7 QUALITY ASSURANCE

- A. Regulatory Requirements:

1. Comply with requirements of utility company supplying water. Include tapping of water mains and backflow prevention.
2. Comply with standards of authorities having jurisdiction for potable-water-service piping, including materials, installation, testing, and disinfection.
3. Comply with standards of authorities having jurisdiction for fire-suppression water-service piping, including materials, hose threads, installation, and testing.

- B. Piping materials shall bear label, stamp, or other markings of specified testing agency.

- C. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

- D. Comply with ASTM F 645 for selection, design, and installation of thermoplastic water piping.

- E. Comply with FMG's "Approval Guide" or UL's "Fire Protection Equipment Directory" for fire-service-main products.

- F. NFPA Compliance: Comply with NFPA 24 for materials, installations, tests, flushing, and valve and hydrant supervision for fire-service-main piping for fire suppression.

1. Potable-water piping and components shall comply with NSF 14, NSF 61, and NSF 372. Include marking "NSF-pw" on piping..

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Preparation for Transport: Prepare valves, including fire hydrants, according to the following:

1. Ensure that valves are dry and internally protected against rust and corrosion.
2. Protect valves against damage to threaded ends and flange faces.
3. Set valves in best position for handling. Set valves closed to prevent rattling.

- B. During Storage: Use precautions for valves, including fire hydrants, according to the following:

1. Do not remove end protectors unless necessary for inspection; then reinstall for storage.

2. Protect from weather. Store indoors and maintain temperature higher than ambient dew-point temperature. Support off the ground or pavement in watertight enclosures when outdoor storage is necessary.
- C. Handling: Use sling to handle valves and fire hydrants if size requires handling by crane or lift. Rig valves to avoid damage to exposed parts. Do not use handwheels or stems as lifting or rigging points.
- D. Deliver piping with factory-applied end caps. Maintain end caps through shipping, storage, and handling to prevent pipe-end damage and to prevent entrance of dirt, debris, and moisture.
- E. Protect stored piping from moisture and dirt. Elevate above grade. Do not exceed structural capacity of floor when storing inside.
- F. Protect flanges, fittings, and specialties from moisture and dirt.
- G. Store plastic piping protected from direct sunlight. Support to prevent sagging and bending.

1.9 PROJECT CONDITIONS

- A. Interruption of Existing Water-Distribution Service: Do not interrupt service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary water-distribution service according to requirements indicated:
 1. Notify Engineer Owner no fewer than Insert number days in advance of proposed interruption of service.
 2. Do not proceed with interruption of water-distribution service without Engineer's written permission.

1.10 COORDINATION

- A. Coordinate connection to water main with utility company.

PART 2 - PRODUCTS

2.1 PIPING MATERIALS

- A. Comply with requirements in "Piping Application" Article for applications of pipe, tube, fitting materials, and joining methods for specific services, service locations, and pipe sizes.
- B. Potable-water piping and components shall comply with NSF 14, NSF 61, and NSF 372. Include marking "NSF-pw" on piping.

2.2 COPPER TUBE AND FITTINGS

- A. Soft Copper Tube: ASTM B 88, Type K and ASTM B 88, Type L, water tube, annealed temper.

1. Copper, Solder-Joint Fittings: ASME B16.18, cast-copper-alloy or ASME B16.22, wrought-copper, solder-joint pressure type. Furnish only wrought-copper fittings if indicated.
- B. Hard Copper Tube: ASTM B 88, Type K and ASTM B 88, Type L, water tube, drawn temper.
 1. Copper, Solder-Joint Fittings: ASME B16.18, cast-copper-alloy or ASME B16.22, wrought-copper, solder-joint pressure type. Furnish only wrought-copper fittings if indicated.
- C. Bronze Flanges: ASME B16.24, Class 150, with solder-joint end. Furnish Class 300 flanges if required to match piping.
- D. Copper Unions:
 1. MSS SP-123.
 2. Cast-copper-alloy, hexagonal-stock body.
 3. Ball-and-socket, metal-to-metal seating surfaces.
 4. Solder-joint or threaded ends.
- E. Copper, Brass or Bronze, Pressure-Seal-Joint Fittings:
 1. Fittings: Cast-brass, cast-bronze, or wrought-copper with EPDM O-ring seal in each end. Sizes NPS 2-1/2 and larger with stainless steel grip ring and EPDM O-ring seal.
 2. Minimum 200-psig working-pressure rating at 250 deg F .

2.3 PE PIPE AND FITTINGS

- A. PE, ASTM Pipe: ASTM D 2239, SDR No. 5.3, 7, or 9; with PE compound number required to give pressure rating not less than 160 psig.
 1. Insert Fittings for PE Pipe: ASTM D 2609, made of PA, PP, or PVC with serrated male insert ends matching inside of pipe. Include bands or crimp rings.
 2. Molded PE Fittings: ASTM D 3350, PE resin, socket- or butt-fusion type, made to match PE pipe dimensions and class.

2.4 JOINING MATERIALS

- A. Refer to Section 330500 "Common Work Results for Utilities" for commonly used joining materials.
- B. Brazing Filler Metals: AWS A5.8, BCuP Series.
- C. Bonding Adhesive for Fiberglass Piping: As recommended by fiberglass piping manufacturer.
- D. Plastic Pipe-Flange Gasket, Bolts, and Nuts: Type and material recommended by piping system manufacturer, unless otherwise indicated.

2.5 CURB VALVES

- A. Curb Valves: Comply with AWWA C800. Include bronze body, ground-key plug or ball, and wide tee head, with inlet and outlet matching service piping material.
- B. Service Boxes for Curb Valves: Similar to AWWA M44 requirements for cast-iron valve boxes. Include cast-iron telescoping top section of length required for depth of burial of valve, plug with lettering "WATER," and bottom section with base that fits over curb valve and with a barrel approximately 3 inches in diameter.
 - 1. Shutoff Rods: Steel, tee-handle with one pointed end, stem of length to operate deepest buried valve, and slotted end matching curb valve.

PART 3 - EXECUTION

3.1 EARTHWORK

- A. Refer to Section 312000 "Earth Moving" for excavating, trenching, and backfilling.

3.2 PIPING APPLICATIONS

- A. General: Use pipe, fittings, and joining methods for piping systems according to the following applications.
- B. Transition couplings and special fittings with pressure ratings at least equal to piping pressure rating may be used, unless otherwise indicated.
- C. Do not use flanges or unions for underground piping.
- D. Flanges, unions, grooved-end-pipe couplings, and special fittings may be used, instead of joints indicated, on aboveground piping and piping in vaults.
- E. Underground water-service piping NPS 3/4 to NPS 3 shall be any of the following:
 - 1. Soft copper tube, ASTM B 88, Type K ASTM B 88, Type L; wrought-copper, solder-joint fittings; and brazed copper, pressure-seal fittings; and pressure-sealed joints.
 - 2. PE, ASTM pipe; molded PE fittings; and heat-fusion joints.

3.3 VALVE APPLICATIONS

- A. General Application: Use mechanical-joint-end valves for NPS 3 and larger underground installation. Use threaded- or flanged-end valves for installation in vaults. Use UL/FMG, nonrising-stem gate valves for installation with indicator posts. Use corporation valves and curb valves with ends compatible with piping, for NPS 2 and smaller installation.
- B. Drawings indicate valve types to be used. Where specific valve types are not indicated, the following requirements apply:

1. Underground Valves, NPS 3 and Larger: AWWA, cast-iron, nonrising-stem, metal-seated gate valves with valve box.

3.4 PIPING INSTALLATION

- A. Water-Main Connection: Arrange with utility company for tap of size and in location indicated in water main.
- B. Water-Main Connection: Tap water main according to requirements of water utility company and of size and in location indicated.
- C. Make connections larger than NPS 2 with tapping machine according to the following:
 1. Install tapping sleeve and tapping valve according to MSS SP-60.
 2. Install tapping sleeve on pipe to be tapped. Position flanged outlet for gate valve.
 3. Use tapping machine compatible with valve and tapping sleeve; cut hole in main. Remove tapping machine and connect water-service piping.
 4. Install gate valve onto tapping sleeve. Comply with MSS SP-60. Install valve with stem pointing up and with valve box.
- D. Make connections NPS 2 and smaller with drilling machine according to the following:
 1. Install service-saddle assemblies and corporation valves in size, quantity, and arrangement required by utility company standards.
 2. Install service-saddle assemblies on water-service pipe to be tapped. Position outlets for corporation valves.
 3. Use drilling machine compatible with service-saddle assemblies and corporation valves. Drill hole in main. Remove drilling machine and connect water-service piping.
 4. Install corporation valves into service-saddle assemblies.
 5. Install manifold for multiple taps in water main.
 6. Install curb valve in water-service piping with head pointing up and with service box.
- E. Install PE pipe according to ASTM D 2774 and ASTM F 645.
- F. Install piping by tunneling or jacking, or combination of both, under streets and other obstructions that cannot be disturbed.
- G. Extend water-service piping and connect to water-supply source and building-water-piping systems at outside face of building wall in locations and pipe sizes indicated.
 1. Terminate water-service piping at building wall until building-water-piping systems are installed. Terminate piping with caps, plugs, or flanges as required for piping material. Make connections to building-water-piping systems when those systems are installed.
- H. Install underground piping with restrained joints at horizontal and vertical changes in direction. Use restrained-joint piping, thrust blocks, anchors, tie-rods and clamps, and other supports.

3.5 JOINT CONSTRUCTION

- A. See Section 330500 "Common Work Results for Utilities" for basic piping joint construction.
- B. Make pipe joints according to the following:
 - 1. Copper-Tubing, Pressure-Sealed Joints: Join copper tube and pressure-seal fittings with tools and procedures recommended by pressure-seal-fitting manufacturer. Leave insertion marks on pipe after assembly.
 - 2. PE Piping Insert-Fitting Joints: Use plastic insert fittings and fasteners according to fitting manufacturer's written instructions.
 - 3. Install dielectric fittings in piping at connections of dissimilar metal piping and tubing.
 - a. Dielectric Fittings for NPS 2 and Smaller: Use dielectric nipples unions.
 - b. Dielectric Fittings for NPS 2-1/2 to NPS 4: Use dielectric flanges flange kits nipples.

3.6 ANCHORAGE INSTALLATION

- A. Anchorage, General: Install water-distribution piping with restrained joints. Anchorages and restrained-joint types that may be used include the following:
 - 1. Concrete thrust blocks.
 - 2. Locking mechanical joints.
 - 3. Set-screw mechanical retainer glands.
 - 4. Bolted flanged joints.
 - 5. Heat-fused joints.
 - 6. Pipe clamps and tie rods.
- B. Install anchorages for tees, plugs and caps, bends, crosses, valves, and hydrant branches. Include anchorages for the following piping systems:

3.7 VALVE INSTALLATION

- A. AWWA Gate Valves: Comply with AWWA C600 and AWWA M44. Install each underground valve with stem pointing up and with valve box.
- B. AWWA Valves Other Than Gate Valves: Comply with AWWA C600 and AWWA M44.
- C. UL/FMG, Valves Other Than Gate Valves: Comply with NFPA 24.
- D. MSS Valves: Install as component of connected piping system.

3.8 WATER METER INSTALLATION

- A. Install water meters, piping, and specialties according to utility company's written instructions.

3.9 ROUGHING-IN FOR WATER METERS

- A. Rough-in piping and specialties for water meter installation according to utility company's written instructions.

3.10 CONNECTIONS

- A. Connect water-distribution piping to existing water main.
- B. Connect water-distribution piping to interior domestic water piping.
- C. Ground equipment according to Section 260526 "Grounding and Bonding for Electrical Systems."
- D. Connect wiring according to Section 260519 "Low-Voltage Electrical Power Conductors and Cables."

3.11 FIELD QUALITY CONTROL

- A. Piping Tests: Conduct piping tests before joints are covered and after concrete thrust blocks have hardened sufficiently. Fill pipeline 24 hours before testing and apply test pressure to stabilize system. Use only potable water.
- B. Hydrostatic Tests: Test at not less than one-and-one-half times working pressure for two hours.
 - 1. Increase pressure in 50-psig increments and inspect each joint between increments. Hold at test pressure for 1 hour; decrease to 0 psig . Slowly increase again to test pressure and hold for 1 more hour. Maximum allowable leakage is 2 quarts per hour per 100 joints. Remake leaking joints with new materials and repeat test until leakage is within allowed limits.
- C. Prepare reports of testing activities.

3.12 IDENTIFICATION

- A. Install continuous underground detectable warning tape during backfilling of trench for underground water-distribution piping. Locate below finished grade, directly over piping. Underground warning tapes are specified in Section 312000 "Earth Moving."

3.13 CLEANING

- A. Clean and disinfect water-distribution piping as follows:
 - 1. Purge new water-distribution piping systems and parts of existing systems that have been altered, extended, or repaired before use.
 - 2. Use purging and disinfecting procedure prescribed by authorities having jurisdiction or, if method is not prescribed by authorities having jurisdiction, use procedure described in

NFPA 24 for flushing of piping. Flush piping system with clean, potable water until dirty water does not appear at points of outlet.

3. Use purging and disinfecting procedure prescribed by authorities having jurisdiction or, if method is not prescribed by authorities having jurisdiction, use procedure described in AWWA C651 or do as follows:
 - a. Fill system or part of system with water/chlorine solution containing at least 50 ppm of chlorine; isolate and allow to stand for 24 hours.
 - b. Drain system or part of system of previous solution and refill with water/chlorine solution containing at least 200 ppm of chlorine; isolate and allow to stand for 3 hours.
 - c. After standing time, flush system with clean, potable water until no chlorine remains in water coming from system.
 - d. Submit water samples in sterile bottles to authorities having jurisdiction. Repeat procedure if biological examination shows evidence of contamination.
- B. Prepare reports of purging and disinfecting activities.

END OF SECTION 221113

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SECTION 221313 - FACILITY SANITARY SEWERS

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. PVC pipe and fittings.
2. Nonpressure-type transition couplings.
3. Cleanouts.
4. Concrete.

1.3 DEFINITIONS

- A. FRP: Fiberglass-reinforced plastic.

1.4 ACTION SUBMITTALS

- A. Product Data: For the following:

1. Pipe and fittings.
2. Non-pressure and pressure couplings
3. Cleanouts.

- B. Shop Drawings: For manholes. Include plans, elevations, sections, details, and frames and covers.

1.5 INFORMATIONAL SUBMITTALS

- A. Field quality-control reports.

1.6 DELIVERY, STORAGE, AND HANDLING

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

1.7 FIELD CONDITIONS

PART 2 - PRODUCTS

2.1 PVC PIPE AND FITTINGS

A. PVC Gravity Sewer Piping:

1. Pipe and Fittings: ASTM F 679, T-1 wall thickness, PVC gravity sewer pipe with bell-and-spigot ends and with integral ASTM F 477, elastomeric seals for gasketed joints.

2.2 NONPRESSURE-TYPE TRANSITION COUPLINGS

- #### A. Comply with ASTM C 1173, elastomeric, sleeve-type, reducing or transition coupling; for joining underground nonpressure piping. Include ends of same sizes as piping to be joined and include corrosion-resistant-metal tension band and tightening mechanism on each end.

B. Sleeve Materials:

1. For Cast-Iron Soil Pipes: ASTM C 564, rubber.
2. For Concrete Pipes: ASTM C 443, rubber.
3. For Fiberglass Pipes: ASTM F 477, elastomeric seal or ASTM D 5926, PVC.
4. For Plastic Pipes: ASTM F 477, elastomeric seal or ASTM D 5926, PVC.
5. For Dissimilar Pipes: ASTM D 5926, PVC or other material compatible with pipe materials being joined.

C. Unshielded, Flexible Couplings:

1. Description: Elastomeric sleeve with stainless-steel shear ring and corrosion-resistant-metal tension band and tightening mechanism on each end.

2.3 CLEANOUTS

A. PVC Cleanouts:

1. Description: PVC body with PVC threaded plug. Include PVC sewer pipe fitting and riser to cleanout of same material as sewer piping.

2.4 CONCRETE

A. General: Cast-in-place concrete complying with ACI 318, ACI 350, and the following:

1. Cement: ASTM C 150/C 150M, Type II.
2. Fine Aggregate: ASTM C 33/C 33M, sand.
3. Coarse Aggregate: ASTM C 33/C 33M, crushed gravel.
4. Water: Potable.

- B. Portland Cement Design Mix: 4000 psi minimum, with 0.45 maximum water/cementitious materials ratio.
 - 1. Reinforcing Fabric: ASTM A 1064/A 1064M, steel, welded wire fabric, plain.
 - 2. Reinforcing Bars: ASTM A 615/A 615M, Grade 60 deformed steel.
- C. Manhole Channels and Benches: Factory or field formed from concrete. Portland cement design mix, 4000 psi minimum, with 0.45 maximum water/cementitious materials ratio. Include channels and benches in manholes.
 - 1. Channels: Concrete invert, formed to same width as connected piping, with height of vertical sides to three-fourths of pipe diameter. Form curved channels with smooth, uniform radius and slope.
 - a. Invert Slope: 1 percent through manhole.
 - 2. Benches: Concrete, sloped to drain into channel.
- D. Ballast and Pipe Supports: Portland cement design mix, 3000 psi minimum, with 0.58 maximum water/cementitious materials ratio.
 - 1. Reinforcing Fabric: ASTM A1064/A 1064M, steel, welded wire fabric, plain.
 - 2. Reinforcing Bars: ASTM A 615/A 615M, Grade 60 deformed steel.

PART 3 - EXECUTION

3.1 EARTHWORK

- A. Excavating, trenching, and backfilling are specified in Section 312000 "Earth Moving."

3.2 PIPING INSTALLATION

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

- E. When installing pipe under streets or other obstructions that cannot be disturbed, use pipe-jacking process of microtunneling.
- F. Install gravity-flow, nonpressure, drainage piping according to the following:
 - 1. Install piping pitched down in direction of flow, at minimum slope of 1 percent unless otherwise indicated.
 - 2. Install piping NPS 6 and larger with restrained joints at tee fittings and at changes in direction. Use corrosion-resistant rods, pipe or fitting manufacturer's proprietary restraint system, or cast-in-place-concrete supports or anchors.
 - 3. Install PVC gravity sewer piping according to ASTM D 2321 and ASTM F 1668.
- G. Clear interior of piping and manholes of dirt and superfluous material as work progresses. Maintain swab or drag in piping, and pull past each joint as it is completed. Place plug in end of incomplete piping at end of day and when work stops.

3.3 PIPE JOINT CONSTRUCTION

- A. Join gravity-flow, nonpressure, drainage piping according to the following:
 - 1. Join PVC gravity sewer piping according to ASTM D 2321 and ASTM D 3034 for elastomeric-seal joints or ASTM D 3034 for elastomeric-gasket joints.
 - 2. Join dissimilar pipe materials with nonpressure-type, flexible couplings.
- B. Pipe couplings, expansion joints, and deflection fittings with pressure ratings at least equal to piping rating may be used in applications below unless otherwise indicated.
 - 1. Use nonpressure flexible couplings where required to join gravity-flow, nonpressure sewer piping unless otherwise indicated.
 - a. Unshielded flexible or rigid couplings for pipes of same or slightly different OD.
 - b. Unshielded, increaser/reducer-pattern, flexible or rigid couplings for pipes with different OD.

3.4 CONCRETE PLACEMENT

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

3.5 CLEANOUT INSTALLATION

- A. Install cleanouts and riser extensions from sewer pipes to cleanouts at grade. Use cast-iron soil pipe fittings in sewer pipes at branches for cleanouts, and use cast-iron soil pipe for riser extensions to cleanouts. Install piping so cleanouts open in direction of flow in sewer pipe.
 - 1. Use Light-Duty, top-loading classification cleanouts in earth or unpaved foot-traffic areas.
 - 2. Use Medium-Duty, top-loading classification cleanouts in paved foot-traffic areas.
 - 3. Use Heavy-Duty, top-loading classification cleanouts in vehicle-traffic service areas.

4. Use Extra-Heavy-Duty, top-loading classification cleanouts in roads.
- B. Set cleanout frames and covers in earth in cast-in-place-concrete block, 18 by 18 by 12 inches deep.
- C. Set cleanout frames and covers in concrete pavement and roads with tops flush with pavement surface.

3.6 CONNECTIONS

- A. Connect nonpressure, gravity-flow drainage piping to building's sanitary building drains specified in Section 221316 "Sanitary Waste and Vent Piping."
- B. Connect force-main piping to building's sanitary force mains specified in Section 221316 "Sanitary Waste and Vent Piping." Terminate piping where indicated.
- C. Make connections to existing piping and underground manholes.
 1. Use commercially manufactured wye fittings for piping branch connections. Remove section of existing pipe, install wye fitting into existing piping, and encase entire wye fitting plus 6-inch overlap with not less than 6 inches of concrete with 28-day compressive strength of 3000 psi.
 2. Make branch connections from side into existing piping, NPS 4 to NPS 20. Remove section of existing pipe, install wye fitting into existing piping, and encase entire wye with not less than 6 inches of concrete with 28-day compressive strength of 3000 psi.
 3. Make branch connections from side into existing piping, NPS 21 or larger, or to underground manholes by cutting opening into existing unit large enough to allow 3 inches of concrete to be packed around entering connection. Cut end of connection pipe passing through pipe or structure wall to conform to shape of, and be flush with, inside wall unless otherwise indicated. On outside of pipe or manhole wall, encase entering connection in 6 inches of concrete for minimum length of 12 inches to provide additional support of collar from connection to undisturbed ground.
 - a. Use concrete that will attain a minimum 28-day compressive strength of 3000 psi unless otherwise indicated.
 - b. Use epoxy-bonding compound as interface between new and existing concrete and piping materials.
 4. Protect existing piping and manholes to prevent concrete or debris from entering while making tap connections. Remove debris or other extraneous material that may accumulate.

3.7 CLOSING ABANDONED SANITARY SEWER SYSTEMS

- A. Abandoned Piping: Close open ends of abandoned underground piping indicated to remain in place. Include closures strong enough to withstand hydrostatic and earth pressures that may result after ends of abandoned piping have been closed. Use either procedure below:
 1. Close open ends of piping with at least 8-inch- thick, brick masonry bulkheads.

2. Close open ends of piping with threaded metal caps, plastic plugs, or other acceptable methods suitable for size and type of material being closed. Do not use wood plugs.
- B. Abandoned Manholes: Excavate around manhole as required and use either procedure below:
 1. Remove manhole and close open ends of remaining piping.
 2. Remove top of manhole down to at least 36 inches below final grade. Fill to within 12 inches of top with stone, rubble, gravel, or compacted dirt. Fill to top with concrete.
- C. Backfill to grade according to Section 312000 "Earth Moving."

3.8 IDENTIFICATION

- A. Comply with requirements in Section 312000 "Earth Moving" for underground utility identification devices. Arrange for installation of green warning tapes directly over piping and at outside edges of underground manholes.
 1. Use detectable warning tape over nonferrous piping and over edges of underground manholes.

3.9 FIELD QUALITY CONTROL

- A. Inspect interior of piping to determine whether line displacement or other damage has occurred. Inspect after approximately 24 inches of backfill is in place, and again at completion of Project.
 1. Submit separate report for each system inspection.
 2. Defects requiring correction include the following:
 - a. Alignment: Less than full diameter of inside of pipe is visible between structures.
 - b. Deflection: Flexible piping with deflection that prevents passage of ball or cylinder of size not less than 92.5 percent of piping diameter.
 - c. Damage: Crushed, broken, cracked, or otherwise damaged piping.
 - d. Infiltration: Water leakage into piping.
 - e. Exfiltration: Water leakage from or around piping.
 3. Replace defective piping using new materials, and repeat inspections until defects are within allowances specified.
 4. Reinspect and repeat procedure until results are satisfactory.
- B. Test new piping systems, and parts of existing systems that have been altered, extended, or repaired, for leaks and defects.
 1. Do not enclose, cover, or put into service before inspection and approval.
 2. Test completed piping systems according to requirements of authorities having jurisdiction.
 3. Schedule tests and inspections by authorities having jurisdiction with at least 24 hours' advance notice.
 4. Submit separate report for each test.

5. Air Tests: Test sanitary sewerage according to requirements of authorities having jurisdiction, UNI-B-6, and the following:
 - a. Test plastic gravity sewer piping according to ASTM F 1417.
 - b. Test concrete gravity sewer piping according to ASTM C 1628.
 6. Manholes: Perform hydraulic test according to ASTM C 969.
- C. Leaks and loss in test pressure constitute defects that must be repaired.
- D. Replace leaking piping using new materials, and repeat testing until leakage is within allowances specified.

3.10 CLEANING

- A. Clean dirt and superfluous material from interior of piping.

END OF SECTION 221313

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SECTION 311000 - SITE CLEARING

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. Protecting existing vegetation to remain.
2. Removing existing vegetation.
3. Clearing and grubbing.
4. Disconnecting, capping or sealing, and.

1.3 DEFINITIONS

- A. Subsoil: Soil beneath the level of subgrade; soil beneath the topsoil layers of a naturally occurring soil profile, typified by less than 1 percent organic matter and few soil organisms.
- B. Surface Soil: Soil that is present at the top layer of the existing soil profile. In undisturbed areas, surface soil is typically called "topsoil," but in disturbed areas such as urban environments, the surface soil can be subsoil.
- C. Topsoil: Top layer of the soil profile consisting of existing native surface topsoil or existing in-place surface soil; the zone where plant roots grow.
- D. Topsoil: Top layer of the soil profile consisting of existing native surface topsoil or existing in-place surface soil; the zone where plant roots grow. Its appearance is generally friable, pervious, and black or a darker shade of brown, gray, or red than underlying subsoil; reasonably free of subsoil, clay lumps, gravel, and other objects larger than 2 inches in diameter; and free of weeds, roots, toxic materials, or other nonsoil materials.
- E. Plant-Protection Zone: Area surrounding individual trees, groups of trees, shrubs, or other vegetation to be protected during construction and indicated on Drawings.
- F. Tree-Protection Zone: Area surrounding individual trees or groups of trees to be protected during construction and indicated according to requirements in Section 015639 "Temporary Tree and Plant Protection."
- G. Vegetation: Trees, shrubs, groundcovers, grass, and other plants.

1.4 MATERIAL OWNERSHIP

- A. Except for materials indicated to be stockpiled or otherwise remain Owner's property, cleared materials shall become Contractor's property and shall be removed from Project site.

1.5 INFORMATIONAL SUBMITTALS

- A. Existing Conditions: Documentation of existing trees and plantings, adjoining construction, and site improvements that establishes preconstruction conditions that might be misconstrued as damage caused by site clearing.
 - 1. Use sufficiently detailed photographs or video recordings.
 - 2. Include plans and notations to indicate specific wounds and damage conditions of each tree or other plant designated to remain.

1.6 FIELD CONDITIONS

- A. Traffic: Minimize interference with adjoining roads, streets, walks, and other adjacent occupied or used facilities during site-clearing operations.
 - 1. Do not close or obstruct streets, walks, or other adjacent occupied or used facilities without permission from Owner and authorities having jurisdiction.
 - 2. Provide alternate routes around closed or obstructed trafficways if required by Owner or authorities having jurisdiction.
- B. Utility Locator Service: Notify One Call for area where Project is located before site clearing.
- C. Tree- and Plant-Protection Zones: Protect according to requirements in Section 015639 "Temporary Tree and Plant Protection."
- D. Soil Stripping, Handling, and Stockpiling: Perform only when the soil is dry or slightly moist.

PART 2 - PRODUCTS

2.1 MATERIALS

PART 3 - EXECUTION

3.1 PREPARATION

- A. Protect and maintain benchmarks and survey control points from disturbance during construction.
- B. Verify that trees, shrubs, and other vegetation to remain or to be relocated have been flagged and that protection zones have been identified and enclosed according to requirements in Section 015639 "Temporary Tree and Plant Protection."

- C. Protect existing site improvements to remain from damage during construction.
 - 1. Restore damaged improvements to their original condition, as acceptable to Owner.

3.2 TREE AND PLANT PROTECTION

- A. Protect trees and plants remaining on-site according to requirements in Section 015639 "Temporary Tree and Plant Protection."
- B. Repair or replace trees, shrubs, and other vegetation indicated to remain or be relocated that are damaged by construction operations according to requirements in Section 015639 "Temporary Tree and Plant Protection."

3.3 EXISTING UTILITIES

- A. Locate, identify, disconnect, and seal or cap utilities indicated to be removed.
 - 1. Arrange with utility companies to shut off indicated utilities.
- B. Interrupting Existing Utilities: Do not interrupt utilities serving facilities occupied by Owner or others, unless permitted under the following conditions and then only after arranging to provide temporary utility services according to requirements indicated:
 - 1. Notify Engineer not less than two days in advance of proposed utility interruptions.
 - 2. Do not proceed with utility interruptions without Engineer's written permission.
- C. Removal of underground utilities is included in earthwork sections; in applicable fire suppression, plumbing, HVAC, electrical, communications, electronic safety and security, and utilities sections; and in Section 024116 "Structure Demolition"

3.4 CLEARING AND GRUBBING

- A. Remove obstructions, trees, shrubs, and other vegetation to permit installation of new construction.
 - 1. Do not remove trees, shrubs, and other vegetation indicated to remain or to be relocated.
 - 2. Grind down stumps and remove roots larger than 2 inches in diameter, obstructions, and debris to a depth of 18 inches below exposed subgrade.
 - 3. Use only hand methods or air spade for grubbing within protection zones.
 - 4. Chip removed tree branches and dispose of off-site.
- B. Fill depressions caused by clearing and grubbing operations with satisfactory soil material unless further excavation or earthwork is indicated.
 - 1. Place fill material in horizontal layers not exceeding a loose depth of 8 inches, and compact each layer to a density equal to adjacent original ground.

3.5 SITE IMPROVEMENTS

- A. Remove slabs, paving, curbs, gutters, and aggregate base as indicated.
 - 1. Unless existing full-depth joints coincide with line of demolition, neatly saw-cut along line of existing pavement to remain before removing adjacent existing pavement. Saw-cut faces vertically.

3.6 DISPOSAL OF SURPLUS AND WASTE MATERIALS

- A. Remove surplus soil material, unsuitable topsoil, obstructions, demolished materials, and waste materials including trash and debris, and legally dispose of them off Owner's property.
- B. Burning tree, shrub, and other vegetation waste is permitted according to burning requirements and permitting of authorities having jurisdiction. Control such burning to produce the least smoke or air pollutants and minimum annoyance to surrounding properties. Burning of other waste and debris is prohibited.

END OF SECTION 311000

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SECTION 312000 - EARTH MOVING

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. Excavating and filling for rough grading the Site.
2. Preparing subgrades for slabs-on-grade walks pavements turf and grasses.
3. Excavating and backfilling for buildings and structures.
4. Subbase course for concrete walks pavements.
5. Subbase course and base course for asphalt paving.

B. Related Requirements:

1. Section 013233 "Photographic Documentation" for recording pre excavation and earth-moving progress.
2. Section 311000 "Site Clearing" for site stripping, grubbing, stripping[and stockpiling] topsoil, and removal of above- and below-grade improvements and utilities.
3. Section 329200 "Turf and Grasses" for finish grading in turf and grass areas, including preparing and placing planting soil for turf areas.

1.3 DEFINITIONS

A. Backfill: Soil material or controlled low-strength material used to fill an excavation.

1. Initial Backfill: Backfill placed beside and over pipe in a trench, including haunches to support sides of pipe.
2. Final Backfill: Backfill placed over initial backfill to fill a trench.

B. Base Course: Aggregate layer placed between the subbase course and hot-mix asphalt paving.

C. Bedding Course: Aggregate layer placed over the excavated subgrade in a trench before laying pipe.

D. Borrow Soil: Satisfactory soil imported from off-site for use as fill or backfill.

E. Drainage Course: Aggregate layer supporting the slab-on-grade that also minimizes upward capillary flow of pore water.

- F. Excavation: Removal of material encountered above subgrade elevations and to lines and dimensions indicated.
1. Authorized Additional Excavation: Excavation below subgrade elevations or beyond indicated lines and dimensions as directed by Engineer. Authorized additional excavation and replacement material will be paid for according to Contract provisions for changes in the Work.
 2. Unauthorized Excavation: Excavation below subgrade elevations or beyond indicated lines and dimensions without direction by Engineer. Unauthorized excavation, as well as remedial work directed by Engineer, shall be without additional compensation.
- G. Fill: Soil materials used to raise existing grades.
- H. Rock: Rock material in beds, ledges, unstratified masses, conglomerate deposits, and boulders of rock material that exceed 1 cu. yd. for bulk excavation or 3/4 cu. yd. for footing, trench, and pit excavation that cannot be removed by rock-excavating equipment equivalent to the following in size and performance ratings, without systematic drilling, ram hammering, ripping, or blasting, when permitted:
1. Equipment for Footing, Trench, and Pit Excavation: Late-model, track-mounted hydraulic excavator; equipped with a 42-inch- maximum-width, short-tip-radius rock bucket; rated at not less than 138-hp flywheel power with bucket-curling force of not less than 28,700 lbf and stick-crowd force of not less than 18,400 lbf with extra-long reach boom.
 2. Equipment for Bulk Excavation: Late-model, track-mounted loader; rated at not less than 230-hp flywheel power and developing a minimum of 47,992-lbf breakout force with a general-purpose bare bucket.
- I. Structures: Buildings, footings, foundations, retaining walls, slabs, tanks, curbs, mechanical and electrical appurtenances, or other man-made stationary features constructed above or below the ground surface.
- J. Subbase Course: Aggregate layer placed between the subgrade and base course for hot-mix asphalt pavement, or aggregate layer placed between the subgrade and a cement concrete pavement or a cement concrete or hot-mix asphalt walk.
- K. Subgrade: Uppermost surface of an excavation or the top surface of a fill or backfill immediately below subbase, drainage fill, drainage course, or topsoil materials.
- L. Utilities: On-site underground pipes, conduits, ducts, and cables as well as underground services within buildings.

1.4 INFORMATIONAL SUBMITTALS

- A. Material Test Reports: For each borrow soil material proposed for fill and backfill as follows:
1. Classification according to ASTM D2487.
 2. Laboratory compaction curve according to ASTM D698.

- B. Preexcavation Photographs or Videotape: Show existing conditions of adjoining construction and site improvements, including finish surfaces that might be misconstrued as damage caused by earth-moving operations. Submit before earth moving begins.

1.5 FIELD CONDITIONS

- A. Traffic: Minimize interference with adjoining roads, streets, walks, and other adjacent occupied or used facilities during earth-moving operations.
 - 1. Do not close or obstruct streets, walks, or other adjacent occupied or used facilities without permission from Owner and authorities having jurisdiction.
 - 2. Provide alternate routes around closed or obstructed traffic ways if required by Owner or authorities having jurisdiction.
- B. Improvements on Adjoining Property: Authority for performing earth moving indicated on property adjoining Owner's property will be obtained by Owner before award of Contract.
 - 1. Do not proceed with work on adjoining property until directed by Engineer.
- C. Utility Locator Service: Notify "One Call" for area where Project is located before beginning earth-moving operations.
- D. Do not commence earth-moving operations until temporary site fencing and erosion- and sedimentation-control measures specified in Section 015000 "Temporary Facilities and Controls" and Section 311000 "Site Clearing" are in place.
- E. Do not commence earth-moving operations until plant-protection measures specified in Section 015639 "Temporary Tree and Plant Protection" are in place.
- F. The following practices are prohibited within protection zones:
 - 1. Storage of construction materials, debris, or excavated material.
 - 2. Parking vehicles or equipment.
 - 3. Foot traffic.
 - 4. Erection of sheds or structures.
 - 5. Impoundment of water.
 - 6. Excavation or other digging unless otherwise indicated.
 - 7. Attachment of signs to or wrapping materials around trees or plants unless otherwise indicated.
- G. Do not direct vehicle or equipment exhaust towards protection zones.
- H. Prohibit heat sources, flames, ignition sources, and smoking within or near protection zones.

PART 2 - PRODUCTS

2.1 SOIL MATERIALS

- A. General: Provide borrow soil materials when sufficient satisfactory soil materials are not available from excavations.
- B. Satisfactory Soils: Soil Classification Groups GW, GP, GM, SW, SP, and SM according to ASTM D2487, or a combination of these groups; free of rock or gravel larger than in any dimension, debris, waste, frozen materials, vegetation, and other deleterious matter.
- C. Unsatisfactory Soils: Soil Classification Groups GC, SC, CL, ML, OL, CH, MH, OH, and PT according to ASTM D2487, or a combination of these groups.
 - 1. Unsatisfactory soils also include satisfactory soils not maintained within 2 percent of optimum moisture content at time of compaction.
- D. Subbase Material: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D2940/D2940M; with at least 90 percent passing a 1-1/2-inch sieve and not more than 12 percent passing a No. 200 sieve.
- E. Base Course: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D2940/D2940M; with at least 95 percent passing a 1-1/2-inch sieve and not more than 8 percent passing a No. 200 sieve.
- F. Engineered Fill: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D2940/D2940M; with at least 90 percent passing a 1-1/2-inch sieve and not more than 12 percent passing a No. 200 sieve.
- G. Bedding Course: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D2940/D2940M; except with 100 percent passing a 1-inch sieve and not more than 8 percent passing a No. 200 sieve.
- H. Drainage Course: Narrowly graded mixture of [washed] crushed stone, or crushed or uncrushed gravel; ASTM D448; coarse-aggregate grading Size 57; with 100 percent passing a 1-1/2-inch sieve and zero to 5 percent passing a No. 8 sieve.
- I. Filter Material: Narrowly graded mixture of natural or crushed gravel, or crushed stone and natural sand; ASTM D448; coarse-aggregate grading Size 67; with 100 percent passing a 1-inch sieve and zero to 5 percent passing a No. 4 sieve.
- J. Sand: ASTM C33/C33M; fine aggregate.
- K. Impervious Fill: Clayey gravel and sand mixture capable of compacting to a dense state.

PART 3 - EXECUTION

3.1 PREPARATION

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

3.2 DEWATERING

- A. Provide dewatering system of sufficient scope, size, and capacity to control hydrostatic pressures and to lower, control, remove, and dispose of ground water and permit excavation and construction to proceed on dry, stable subgrades.
- B. Prevent surface water and ground water from entering excavations, from ponding on prepared subgrades, and from flooding Project site and surrounding area.
- C. Protect subgrades from softening, undermining, washout, and damage by rain or water accumulation.
 - 1. Reroute surface water runoff away from excavated areas. Do not allow water to accumulate in excavations. Do not use excavated trenches as temporary drainage ditches.
- D. Dispose of water removed by dewatering in a manner that avoids endangering public health, property, and portions of work under construction or completed. Dispose of water and sediment in a manner that avoids inconvenience to others.

3.3 EXPLOSIVES

- A. Explosives: Do not use explosives.

3.4 EXCAVATION, GENERAL

- A. Unclassified Excavation: Excavate to subgrade elevations regardless of the character of surface and subsurface conditions encountered. Unclassified excavated materials may include rock, soil materials, and obstructions. No changes in the Contract Sum or the Contract Time will be authorized for rock excavation or removal of obstructions.
 - 1. If excavated materials intended for fill and backfill include unsatisfactory soil materials and rock, replace with satisfactory soil materials.

2. Remove rock to lines and grades indicated to permit installation of permanent construction without exceeding the following dimensions:
 - a. 24 inches outside of concrete forms other than at footings.
 - b. 12 inches outside of concrete forms at footings.
 - c. 6 inches outside of minimum required dimensions of concrete cast against grade.
 - d. Outside dimensions of concrete walls indicated to be cast against rock without forms or exterior waterproofing treatments.
 - e. 6 inches beneath bottom of concrete slabs-on-grade.
 - f. 6 inches beneath pipe in trenches and the greater of wider than pipe or wide.

- B. Classified Excavation: Excavate to subgrade elevations. Material to be excavated will be classified as earth and rock. Do not excavate rock until it has been classified and cross sectioned by Engineer. The Contract Sum will be adjusted for rock excavation according to unit prices included in the Contract Documents. Changes in the Contract Time may be authorized for rock excavation.

1. Earth excavation includes excavating pavements and obstructions visible on surface; underground structures, utilities, and other items indicated to be removed; and soil, boulders, and other materials not classified as rock or unauthorized excavation.
 - a. Intermittent drilling; blasting, if permitted; ram hammering; or ripping of material not classified as rock excavation is earth excavation.

3.5 EXCAVATION FOR STRUCTURES

- A. Excavate to indicated elevations and dimensions within a tolerance of plus or minus 1 inch. If applicable, extend excavations a sufficient distance from structures for placing and removing concrete formwork, for installing services and other construction, and for inspections.
1. Excavations for Footings and Foundations: Do not disturb bottom of excavation. Excavate by hand to final grade just before placing concrete reinforcement. Trim bottoms to required lines and grades to leave solid base to receive other work.
 2. Pile Foundations: Stop excavations 6 to 12 inches above bottom of pile cap before piles are placed. After piles have been driven, remove loose and displaced material. Excavate to final grade, leaving solid base to receive concrete pile caps.
 3. Excavation for Underground Tanks, Basins, and Mechanical or Electrical Utility Structures: Excavate to elevations and dimensions indicated within a tolerance of plus or minus 1 inch. Do not disturb bottom of excavations intended as bearing surfaces.
- B. Excavations at Edges of Tree- and Plant-Protection Zones:
1. Excavate by hand or with an air spade to indicated lines, cross sections, elevations, and subgrades. If excavating by hand, use narrow-tine spading forks to comb soil and expose roots. Do not break, tear, or chop exposed roots. Do not use mechanical equipment that rips, tears, or pulls roots.
 2. Cut and protect roots according to requirements in Section 015639 "Temporary Tree and Plant Protection."

3.6 EXCAVATION FOR WALKS AND PAVEMENTS

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

3.7 SUBGRADE INSPECTION

- A. Notify Engineer when excavations have reached required subgrade.
- B. If Engineer determines that unsatisfactory soil is present, continue excavation and replace with compacted backfill or fill material as directed.
- C. Proof-roll subgrade below the building slabs and pavements with a pneumatic-tired and loaded 10-wheel, tandem-axle dump truck weighing not less than 15 tons to identify soft pockets and areas of excess yielding. Do not proof-roll wet or saturated subgrades.
 - 1. Completely proof-roll subgrade in one direction. Limit vehicle speed to 3 mph.
 - 2. Excavate soft spots, unsatisfactory soils, and areas of excessive pumping or rutting, as determined by Engineer, and replace with compacted backfill or fill as directed.
- D. Authorized additional excavation and replacement material will be paid for according to Contract provisions for changes in the Work.
- E. Reconstruct subgrades damaged by freezing temperatures, frost, rain, accumulated water, or construction activities, as directed by Engineer, without additional compensation.

3.8 UNAUTHORIZED EXCAVATION

- A. Fill unauthorized excavation under foundations or wall footings by extending bottom elevation of concrete foundation or footing to excavation bottom, without altering top elevation. Lean concrete fill, with 28-day compressive strength of 2500 psi, may be used when approved by Engineer.
 - 1. Fill unauthorized excavations under other construction, pipe, or conduit as directed by Engineer.

3.9 STORAGE OF SOIL MATERIALS

- A. Stockpile borrow soil materials and excavated satisfactory soil materials without intermixing. Place, grade, and shape stockpiles to drain surface water. Cover to prevent windblown dust.
 - 1. Stockpile soil materials away from edge of excavations. Do not store within drip line of remaining trees.

3.10 BACKFILL

- A. Place and compact backfill in excavations promptly, but not before completing the following:

1. Construction below finish grade including, where applicable, subdrainage, dampproofing, waterproofing, and perimeter insulation.
2. Surveying locations of underground utilities for Record Documents.
3. Testing and inspecting underground utilities.
4. Removing concrete formwork.
5. Removing trash and debris.
6. Removing temporary shoring, bracing, and sheeting.
7. Installing permanent or temporary horizontal bracing on horizontally supported walls.

- B. Place backfill on subgrades free of mud, frost, snow, or ice.

3.11 UTILITY TRENCH BACKFILL

- A. Place backfill on subgrades free of mud, frost, snow, or ice.
- B. Place and compact bedding course on trench bottoms and where indicated. Shape bedding course to provide continuous support for bells, joints, and barrels of pipes and for joints, fittings, and bodies of conduits.
- C. Backfill voids with satisfactory soil while removing shoring and bracing.
- D. Initial Backfill:
1. Soil Backfill: Place and compact initial backfill of, free of particles larger than 1 inch in any dimension, to a height of 12 inches over the pipe or conduit.
 - a. Carefully compact initial backfill under pipe haunches and compact evenly up on both sides and along the full length of piping or conduit to avoid damage or displacement of piping or conduit. Coordinate backfilling with utilities testing.
- E. Final Backfill:
1. Soil Backfill: Place and compact final backfill of satisfactory soil to final subgrade elevation.

3.12 SOIL FILL

- A. Plow, scarify, bench, or break up sloped surfaces steeper than 1 vertical to 4 horizontal so fill material will bond with existing material.
- B. Place and compact fill material in layers to required elevations as follows:
1. Under grass and planted areas, use satisfactory soil material.
 2. Under walks and pavements, use satisfactory soil material.
 3. Under steps and ramps, use engineered fill.
 4. Under building slabs, use engineered fill.
 5. Under footings and foundations, use engineered fill.

- C. Place soil fill on subgrades free of mud, frost, snow, or ice.

3.13 SOIL MOISTURE CONTROL

- A. Uniformly moisten or aerate subgrade and each subsequent fill or backfill soil layer before compaction to within 2 percent of optimum moisture content.
 - 1. Do not place backfill or fill soil material on surfaces that are muddy, frozen, or contain frost or ice.
 - 2. Remove and replace, or scarify and air dry, otherwise satisfactory soil material that exceeds optimum moisture content by 2 percent and is too wet to compact to specified dry unit weight.

3.14 COMPACTION OF SOIL BACKFILLS AND FILLS

- A. Place backfill and fill soil materials in layers not more than 8 inches in loose depth for material compacted by heavy compaction equipment and not more than 4 inches in loose depth for material compacted by hand-operated tampers.
- B. Place backfill and fill soil materials evenly on all sides of structures to required elevations and uniformly along the full length of each structure.
- C. Compact soil materials to not less than the following percentages of maximum dry unit weight according to ASTM D698:
 - 1. Under structures, building slabs, steps, and pavements, scarify and recompact top 12 inches of existing subgrade and each layer of backfill or fill soil material at 95 percent.
 - 2. Under walkways, scarify and recompact top 6 inches below subgrade and compact each layer of backfill or fill soil material at 92 percent.
 - 3. Under turf or unpaved areas, scarify and recompact top 6 inches below subgrade and compact each layer of backfill or fill soil material at 85 percent.

3.15 GRADING

- A. General: Uniformly grade areas to a smooth surface, free of irregular surface changes. Comply with compaction requirements and grade to cross sections, lines, and elevations indicated.
 - 1. Provide a smooth transition between adjacent existing grades and new grades.
 - 2. Cut out soft spots, fill low spots, and trim high spots to comply with required surface tolerances.
- B. Site Rough Grading: Slope grades to direct water away from buildings and to prevent ponding. Finish subgrades to elevations required to achieve indicated finish elevations, within the following subgrade tolerances:
 - 1. Turf or Unpaved Areas: Plus or minus 1 inch.
 - 2. Walks: Plus or minus 1 inch.

3. Pavements: Plus or minus 1/2 inch.

C. Grading inside Building Lines: Finish subgrade to a tolerance of 1/2 inch when tested with a 10-foot straightedge.

3.16 SUBBASE AND BASE COURSES UNDER PAVEMENTS AND WALKS

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

B. On prepared subgrade, place subbase course and base course under pavements and walks as follows:

1. Place base course material over subbase course under hot-mix asphalt pavement.
2. Shape subbase course and base course to required crown elevations and cross-slope grades.
3. Place subbase course and base course 6 inches or less in compacted thickness in a single layer.
4. Place subbase course and base course that exceeds 6 inches in compacted thickness in layers of equal thickness, with no compacted layer more than 6 inches thick or less than 3 inches thick.
5. Compact subbase course and base course at optimum moisture content to required grades, lines, cross sections, and thickness to not less than 95 percent of maximum dry unit weight according to ASTM D698.

3.17 DRAINAGE COURSE UNDER CONCRETE SLABS-ON-GRADE

A. Place drainage course on subgrades free of mud, frost, snow, or ice.

B. On prepared subgrade, place and compact drainage course under cast-in-place concrete slabs-on-grade as follows:

1. Install subdrainage geotextile on prepared subgrade according to manufacturer's written instructions, overlapping sides and ends.
2. Place drainage course 6 inches or less in compacted thickness in a single layer.
3. Place drainage course that exceeds 6 inches in compacted thickness in layers of equal thickness, with no compacted layer more than 6 inches thick or less than 3 inches thick.
4. Compact each layer of drainage course to required cross sections and thicknesses to not less than 95 percent of maximum dry unit weight according to ASTM D698.

3.18 FIELD QUALITY CONTROL

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

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

- C. Footing Subgrade: At footing subgrades, at least one test of each soil stratum will be performed to verify design bearing capacities. Subsequent verification and approval of other footing subgrades may be based on a visual comparison of subgrade with tested subgrade when approved by Engineer.
- D. Testing agency will test compaction of soils in place according to ASTM D1556, ASTM D2167, ASTM D2937, and ASTM D6938, as applicable. Tests will be performed at the following locations and frequencies:
 - 1. Paved and Building Slab Areas: At subgrade and at each compacted fill and backfill layer, at least one test for every 2000 sq. ft. or less of paved area or building slab but in no case fewer than three tests.
 - 2. Foundation Wall Backfill: At each compacted backfill layer, at least one test for every 100 feet or less of wall length but no fewer than two tests.
 - 3. Trench Backfill: At each compacted initial and final backfill layer, at least one test for every 150 feet or less of trench length but no fewer than two tests.
- E. When testing agency reports that subgrades, fills, or backfills have not achieved degree of compaction specified, scarify and moisten or aerate, or remove and replace soil materials to depth required; recompact and retest until specified compaction is obtained.

3.19 PROTECTION

- A. Protecting Graded Areas: Protect newly graded areas from traffic, freezing, and erosion. Keep free of trash and debris.
- B. Repair and reestablish grades to specified tolerances where completed or partially completed surfaces become eroded, rutted, settled, or where they lose compaction due to subsequent construction operations or weather conditions.
 - 1. Scarify or remove and replace soil material to depth as directed by Engineer; reshape and recompact.
- C. Where settling occurs before Project correction period elapses, remove finished surfacing, backfill with additional soil material, compact, and reconstruct surfacing.
 - 1. Restore appearance, quality, and condition of finished surfacing to match adjacent work, and eliminate evidence of restoration to greatest extent possible.

3.20 DISPOSAL OF SURPLUS AND WASTE MATERIALS

- A. Remove surplus satisfactory soil and waste materials, including unsatisfactory soil, trash, and debris, and legally dispose of them off Owner's property.

END OF SECTION 312000

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. Hot-mix asphalt paving.
- 2. Hot-mix asphalt patching.

B. Related Requirements:

- 1. Section 024116 "Structure Demolition" for demolition and removal of existing asphalt pavement.
- 2. Section 312000 "Earth Moving" for subgrade preparation, fill material, separation geotextiles, unbound-aggregate subbase and base courses, and aggregate pavement shoulders.
- 3. Section 321313 "Concrete Paving" for concrete pavement and for separate concrete curbs, gutters, and driveway aprons.
- 4. Section 321373 "Concrete Paving Joint Sealants" for joint sealants and fillers at pavement terminations.

1.3 ACTION SUBMITTALS

A. Hot-Mix Asphalt Designs:

- 1. Certification, by authorities having jurisdiction, of approval of each hot-mix asphalt design proposed for the Work.
- 2. For each hot-mix asphalt design proposed for the Work.

1.4 INFORMATIONAL SUBMITTALS

- A. Material Certificates: Include statement that mixes containing recycled materials will perform equal to mixes produced from all new materials.

- 1. Aggregates.
- 2. Asphalt binder.
- 3. Asphalt cement.
- 4. Cutback prime coat.

5. Emulsified asphalt prime coat.
6. Tack coat.
7. Undersealing asphalt.

1.5 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.
- B. Regulatory Requirements: Comply with materials, workmanship, and other applicable requirements of **MDOT** for asphalt paving 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: 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.
 2. Tack Coat: Minimum surface temperature of 60 deg F.
 3. Asphalt Base Course and Binder Course: Minimum surface temperature of 40 deg F and rising at time of placement.
 4. Asphalt Surface Course: Minimum surface temperature of 60 deg F 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 D692/D692M, sound; angular crushed stone, crushed gravel, or cured, crushed blast-furnace slag.
- C. Fine Aggregate: ASTM D1073, 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 D242/D242M, rock or slag dust, hydraulic cement, or other inert material.

2.2 ASPHALT MATERIALS

- A. Asphalt Binder: ASTM D6373 binder designation PG 64-22.
- B. Emulsified Asphalt Prime Coat: ASTM D977 emulsified asphalt, or ASTM D2397/D2397M cationic emulsified asphalt, slow setting, diluted in water, of suitable grade and consistency for application.
- C. Tack Coat: ASTM D977 emulsified asphalt, or ASTM D2397/D2397M cationic emulsified asphalt, slow setting, diluted in water, of suitable grade and consistency for application.
- D. Water: Potable.

2.3 AUXILIARY MATERIALS

2.4 MIXES

- A. Hot-Mix Asphalt: Dense-graded, hot-laid, hot-mix asphalt plant mixes approved by authorities having jurisdiction and complying with the following requirements:
 - 1. Provide mixes with a history of satisfactory performance in geographical area where Project is located.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify that subgrade is dry and in suitable condition to begin paving.
- B. Proceed with paving only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Protection: Provide protective materials, procedures, and worker training to prevent asphalt materials from spilling, coating, or building up on curbs, driveway aprons, manholes, and other surfaces adjacent to the Work.
- 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. Limit vehicle speed to 3 mph.
 - 2. Proof-roll with a loaded 10-wheel, tandem-axle dump truck weighing not less than 15 tons.
 - 3. Excavate soft spots, unsatisfactory soils, and areas of excessive pumping or rutting, as determined by Engineer, and replace with compacted backfill or fill as directed.

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 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. 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..
 - 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.
- C. Placing Single-Course 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.
- D. Placing Two-Course Patch Material: Partially fill excavated pavements with hot-mix asphalt base course mix and, while still hot, compact. Cover asphalt base course with compacted layer of hot-mix asphalt surface course, 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 in existing pavements.
 - 1. Install leveling wedges in compacted lifts not exceeding 3 inches thick.

3.5 SURFACE PREPARATION

- A. Ensure that prepared subgrade has been proof-rolled and is ready to receive paving. Immediately before placing asphalt materials, remove loose and deleterious material from substrate surfaces.
- B. Herbicide Treatment: Apply herbicide in accordance with 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.. 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. 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..
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 HOT-MIX ASPHALT PLACEMENT

- 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 and binder 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.
 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 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 from strip to strip to ensure proper compaction of mix along longitudinal joints.
 2. Complete a section of asphalt base course and binder 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.

3.7 JOINTS

- A. Construct joints to ensure a continuous bond between adjoining paving sections. Construct joints free of depressions, with same texture and smoothness as other sections of hot-mix asphalt course.

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

3.8 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.
- 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, Marshall Test Method: 96 percent of reference laboratory density in accordance with ASTM D6927, but not less than 94 percent or greater than 100 percent.
 2. Average Density, Rice Test Method: 92 percent of reference maximum theoretical density in accordance with ASTM D2041/D2041M, 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.

3.9 INSTALLATION TOLERANCES

- A. Pavement Thickness: Compact each course to produce thickness indicated within the following tolerances:
 - 1. Base Course and Binder Course: Plus or minus 1/2 inch.
 - 2. Surface Course: Plus 1/4 inch, no minus.
- B. Pavement Surface Smoothness: Compact each course to produce surface smoothness within the following tolerances as determined by using a 10-foot straightedge applied transversely or longitudinally to paved areas:
 - 1. Base Course and Binder Course: 1/4 inch.
 - 2. Surface Course: 1/8 inch.

3.10 FIELD QUALITY CONTROL

- A. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections.
- B. Thickness: In-place compacted thickness of hot-mix asphalt courses will be determined in accordance with ASTM D3549/D3549M.
- C. Surface Smoothness: Finished surface of each hot-mix asphalt course will be tested for compliance with smoothness tolerances.
- D. In-Place Density: Testing agency will take samples of uncompacted paving mixtures and compacted pavement in accordance with ASTM D979/D979M.
 - 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 in accordance with ASTM D2041/D2041M, and compacted in accordance with job-mix specifications.
 - 2. In-place density of compacted pavement will be determined by
 - a. Field density of in-place compacted pavement determined by nuclear method in accordance with ASTM D2950/D2950M and coordinated with ASTM D1188 or ASTM D2726/D2726M.
- E. Replace and compact hot-mix asphalt where core tests were taken.
- F. Remove and replace or install additional hot-mix asphalt where test results or measurements indicate that it does not comply with specified requirements.

END OF SECTION 321216

SECTION 321313 - CONCRETE PAVING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes Concrete Paving Including the Following:
 - 1. Curbs and gutters.
 - 2. Walks.
- B. Related Requirements:
 - 1. Section 321373 "Concrete Paving Joint Sealants" for joint sealants in expansion and contraction joints within concrete paving and in joints between concrete paving and asphalt paving or adjacent construction.
 - 2. Section 321723 "Pavement Markings."

1.3 DEFINITIONS

- A. Cementitious Materials: Portland cement alone or in combination with one or more of blended hydraulic cement, fly ash, slag cement, and other pozzolans.
- B. W/C Ratio: The ratio by weight of water to cementitious materials.

1.4 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.
 - 1. Review methods and procedures related to concrete paving, including but not limited to, the following:
 - a. Concrete mixture design.
 - b. Quality control of concrete materials and concrete paving construction practices.
 - 2. Require representatives of each entity directly concerned with concrete paving to attend, including the following:
 - a. Contractor's superintendent.
 - b. Independent testing agency responsible for concrete design mixtures.
 - c. Ready-mix concrete manufacturer.
 - d. Concrete paving Subcontractor.

- e. Manufacturer's representative of stamped concrete paving system used for stamped detectable warnings.

1.5 ACTION SUBMITTALS

- A. Design Mixtures: For each concrete paving mixture. Include alternate design mixtures when characteristics of materials, Project conditions, weather, test results, or other circumstances warrant adjustments.

1.6 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For qualified ready-mix concrete manufacturer **[and]**.
- B. Material Certificates: For the following, from manufacturer:
 - 1. Cementitious materials.
 - 2. Steel reinforcement and reinforcement accessories.
 - 3. Fiber reinforcement.
 - 4. Admixtures.
 - 5. Curing compounds.
 - 6. Applied finish materials.
 - 7. Bonding agent or epoxy adhesive.
 - 8. Joint fillers.
- C. Material Test Reports: For each of the following:
 - 1. Aggregates: Include service-record data indicating absence of deleterious expansion of concrete due to alkali-aggregate reactivity.

1.7 QUALITY ASSURANCE

- A. Ready-Mix-Concrete Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C 94/C 94M requirements for production facilities and equipment.
 - 1. Manufacturer certified according to NRMCA's "Certification of Ready Mixed Concrete Production Facilities" (Quality Control Manual - Section 3, "Plant Certification Checklist").

1.8 FIELD CONDITIONS

- A. Traffic Control: Maintain access for vehicular and pedestrian traffic as required for other construction activities.

- B. Cold-Weather Concrete Placement: Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing, or low temperatures. Comply with ACI 306.1 and the following:
1. When air temperature has fallen to or is expected to fall below 40 deg F, uniformly heat water and aggregates before mixing to obtain a concrete mixture temperature of not less than 50 deg F and not more than 80 deg F at point of placement.
 2. Do not use frozen materials or materials containing ice or snow.
 3. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators unless otherwise specified and approved in design mixtures.
- C. Hot-Weather Concrete Placement: Comply with ACI 301 and as follows when hot-weather conditions exist:
1. Cool ingredients before mixing to maintain concrete temperature below 90 deg F at time of placement. Chilled mixing water or chopped ice may be used to control temperature, provided water equivalent of ice is calculated in total amount of mixing water. Using liquid nitrogen to cool concrete is Contractor's option.
 2. Cover steel reinforcement with water-soaked burlap, so steel temperature will not exceed ambient air temperature immediately before embedding in concrete.
 3. Fog-spray forms, steel reinforcement, and subgrade just before placing concrete. Keep subgrade moisture uniform without standing water, soft spots, or dry areas.

PART 2 - PRODUCTS

2.1 CONCRETE, GENERAL

- A. ACI Publications: Comply with ACI 301 unless otherwise indicated.

2.2 FORMS

- A. Form Materials: Plywood, metal, metal-framed plywood, or other approved panel-type materials to provide full-depth, continuous, straight, and smooth exposed surfaces.
1. Use flexible or uniformly curved forms for curves with a radius of 100 feet or less. Do not use notched and bent forms.
- B. Form-Release Agent: Commercially formulated form-release agent that will not bond with, stain, or adversely affect concrete surfaces and that will not impair subsequent treatments of concrete surfaces.

2.3 STEEL REINFORCEMENT

- A. Epoxy-Coated Welded-Wire Reinforcement: ASTM A 884/A 884M, Class A, plain steel.

- B. Epoxy-Coated Reinforcing Bars: ASTM A 775/A 775M or ASTM A 934/A 934M; with ASTM A 615/A 615M, Grade 60 deformed bars.
- C. Plain-Steel Wire: ASTM A 1064/A 1064M,.
- D. Epoxy-Coated-Steel Wire: ASTM A 884/A 884M, Class A; coated,.
- E. Tie Bars: ASTM A 615/A 615M, Grade 60; deformed.
- F. Hook Bolts: ASTM A 307, Grade A, internally and externally threaded. Design hook-bolt joint assembly to hold coupling against paving form and in position during concreting operations, and to permit removal without damage to concrete or hook bolt.
- G. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars, welded-wire reinforcement, and dowels in place. Manufacture bar supports according to CRSI's "Manual of Standard Practice" from steel wire, plastic, or precast concrete of greater compressive strength than concrete specified, and as follows:
 - 1. Equip wire bar supports with sand plates or horizontal runners where base material will not support chair legs.
 - 2. For epoxy-coated reinforcement, use epoxy-coated or other dielectric-polymer-coated wire bar supports.
- H. Epoxy Repair Coating: Liquid, two-part, epoxy repair coating, compatible with epoxy coating on reinforcement.
- I. Zinc Repair Material: ASTM A 780/A 780M.

2.4 CONCRETE MATERIALS

- A. Cementitious Materials: Use the following cementitious materials, of same type, brand, and source throughout Project:
 - 1. Portland Cement: ASTM C 150/C 150M, gray portland cement Type I.
- B. Normal-Weight Aggregates: ASTM C 33/C 33M, Class 4S, uniformly graded. Provide aggregates from a single source with documented service-record data of at least 10 years' satisfactory service in similar paving applications and service conditions using similar aggregates and cementitious materials.
 - 1. Maximum Coarse-Aggregate Size: 1 inch nominal.
 - 2. Fine Aggregate: Free of materials with deleterious reactivity to alkali in cement.
- C. Air-Entraining Admixture: ASTM C 260/C 260M.
- D. Chemical Admixtures: Admixtures certified by manufacturer to be compatible with other admixtures and to contain not more than 0.1 percent water-soluble chloride ions by mass of cementitious material.

1. High-Range, Water-Reducing Admixture: ASTM C 494/C 494M, Type F.

- E. Water: Potable and complying with ASTM C 94/C 94M.

2.5 CURING MATERIALS

- A. Moisture-Retaining Cover: ASTM C 171, polyethylene film or white burlap-polyethylene sheet.
- B. Water: Potable.
- C. Evaporation Retarder: Waterborne, monomolecular, film forming, manufactured for application to fresh concrete.
- D. White, Waterborne, Membrane-Forming Curing Compound: ASTM C 309, Type 2, Class B, dissipating.

2.6 RELATED MATERIALS

- A. Joint Fillers: ASTM D 1752, cork or self-expanding cork in preformed strips.

2.7 CONCRETE MIXTURES

- A. Prepare design mixtures, proportioned according to ACI 301, for each type and strength of normal-weight concrete, and as determined by either laboratory trial mixtures or field experience.
 1. Use a qualified independent testing agency for preparing and reporting proposed concrete design mixtures for the trial batch method.
 2. When automatic machine placement is used, determine design mixtures and obtain laboratory test results that comply with or exceed requirements.
- B. Cementitious Materials: Use fly ash, pozzolan, slag cement, and silica fume as needed to reduce the total amount of portland cement, which would otherwise be used, by not less than 40 percent.
 1. Fly Ash or Pozzolan: 25 percent.
 2. Slag Cement: 50 percent.
 3. Combined Fly Ash or Pozzolan, and Slag Cement: 50 percent, with fly ash or pozzolan not exceeding 25 percent.
- C. Add air-entraining admixture at manufacturer's prescribed rate to result in normal-weight concrete at point of placement having an air content as follows:
 1. Air Content: 6 percent plus or minus 1-1/2 percent for 1-inch nominal maximum aggregate size.
- D. Limit water-soluble, chloride-ion content in hardened concrete to 0.15 percent by weight of cement.
- E. Chemical Admixtures: Use admixtures according to manufacturer's written instructions.

1. Use in concrete as required for placement and workability.

F. Concrete Mixtures: Normal-weight concrete.

1. Compressive Strength (28 Days): 3500 psi.
2. Maximum W/C Ratio at Point of Placement: 0.45.
3. Slump Limit: 5 inches, plus or minus 1 inch.

2.8 CONCRETE MIXING

A. Ready-Mixed Concrete: Measure, batch, and mix concrete materials and concrete according to ASTM C 94/C 94M and ASTM C 1116/C 1116M. Furnish batch certificates for each batch discharged and used in the Work.

1. When air temperature is between 85 and 90 deg F, reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air temperature is above 90 deg F, reduce mixing and delivery time to 60 minutes.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine exposed subgrades and subbase surfaces for compliance with requirements for dimensional, grading, and elevation tolerances.
- B. Proof-roll prepared subbase surface below concrete paving to identify soft pockets and areas of excess yielding.
 1. Completely proof-roll subbase in one direction. Limit vehicle speed to 3 mph.
 2. Proof-roll with a pneumatic-tired and loaded, 10-wheel, tandem-axle dump truck weighing not less than 15 tons.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Remove loose material from compacted subbase surface immediately before placing concrete.

3.3 EDGE FORMS AND SCREED CONSTRUCTION

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

3.4 STEEL REINFORCEMENT INSTALLATION

- A. General: Comply with CRSI's "Manual of Standard Practice" for fabricating, placing, and supporting reinforcement.
- B. Clean reinforcement of loose rust and mill scale, earth, ice, or other bond-reducing materials.
- C. Arrange, space, and securely tie bars and bar supports to hold reinforcement in position during concrete placement. Maintain minimum cover to reinforcement.
- D. Install welded-wire reinforcement in lengths as long as practicable. Lap adjoining pieces at least one full mesh, and lace splices with wire. Offset laps of adjoining widths to prevent continuous laps in either direction.
- E. Epoxy-Coated Reinforcement: Use epoxy-coated steel wire ties to fasten epoxy-coated reinforcement. Repair cut and damaged epoxy coatings with epoxy repair coating according to ASTM D 3963/D 3963M.
- F. Install fabricated bar mats in lengths as long as practicable. Handle units to keep them flat and free of distortions. Straighten bends, kinks, and other irregularities, or replace units as required before placement. Set mats for a minimum 2-inch overlap of adjacent mats.

3.5 JOINTS

- A. General: Form construction, isolation, and contraction joints and tool edges true to line, with faces perpendicular to surface plane of concrete. Construct transverse joints at right angles to centerline unless otherwise indicated.
 - 1. When joining existing paving, place transverse joints to align with previously placed joints unless otherwise indicated.
- B. Construction Joints: Set construction joints at side and end terminations of paving and at locations where paving operations are stopped for more than one-half hour unless paving terminates at isolation joints.
 - 1. Continue steel reinforcement across construction joints unless otherwise indicated. Do not continue reinforcement through sides of paving strips unless otherwise indicated.
 - 2. Provide tie bars at sides of paving strips where indicated.
- C. Isolation Joints: Form isolation joints of preformed joint-filler strips abutting concrete curbs, catch basins, manholes, inlets, structures, other fixed objects, and where indicated.
 - 1. Locate expansion joints at intervals of 50 feet unless otherwise indicated by the field engineer.
 - 2. Extend joint fillers full width and depth of joint.
 - 3. Terminate joint filler not less than 1/2 inch or more than 1 inch below finished surface if joint sealant is indicated.
 - 4. Place top of joint filler flush with finished concrete surface if joint sealant is not indicated.

5. Furnish joint fillers in one-piece lengths. Where more than one length is required, lace or clip joint-filler sections together.
 6. During concrete placement, protect top edge of joint filler with metal, plastic, or other temporary preformed cap. Remove protective cap after concrete has been placed on both sides of joint.
- D. Contraction Joints: Form weakened-plane contraction joints, sectioning concrete into areas as indicated. Construct contraction joints for a depth equal to at least one-fourth of the concrete thickness, as follows, to match jointing of existing adjacent concrete paving:
1. Sawed Joints: Form contraction joints with power saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut 1/8-inch- wide joints into concrete when cutting action will not tear, abrade, or otherwise damage surface and before developing random contraction cracks.
- E. Edging: After initial floating, tool edges of paving, gutters, curbs, and joints in concrete with an edging tool to a 1/4-inch radius. Repeat tooling of edges after applying surface finishes. Eliminate edging-tool marks on concrete surfaces.

3.6 CONCRETE PLACEMENT

- A. Before placing concrete, inspect and complete formwork installation, steel reinforcement, and items to be embedded or cast-in.
- B. Remove snow, ice, or frost from subbase surface and steel reinforcement before placing concrete. Do not place concrete on frozen surfaces.
- C. Moisten subbase to provide a uniform dampened condition at time concrete is placed. Do not place concrete around manholes or other structures until they are at required finish elevation and alignment.
- D. Comply with ACI 301 requirements for measuring, mixing, transporting, and placing concrete.
- E. Do not add water to concrete during delivery or at Project site. Do not add water to fresh concrete after testing.
- F. Deposit and spread concrete in a continuous operation between transverse joints. Do not push or drag concrete into place or use vibrators to move concrete into place.
- G. Consolidate concrete according to ACI 301 by mechanical vibrating equipment supplemented by hand spading, rodding, or tamping.
 1. Consolidate concrete along face of forms and adjacent to transverse joints with an internal vibrator. Keep vibrator away from joint assemblies, reinforcement, or side forms. Use only square-faced shovels for hand spreading and consolidation. Consolidate with care to prevent dislocating reinforcement joint devices.
- H. Screed paving surface with a straightedge and strike off.

- I. Commence initial floating using bull floats or darbies to impart an open-textured and uniform surface plane before excess moisture or bleedwater appears on the surface. Do not further disturb concrete surfaces before beginning finishing operations or spreading surface treatments.
- J. Curbs and Gutters: Use design mixture for automatic machine placement. Produce curbs and gutters to required cross section, lines, grades, finish, and jointing.
- K. Slip-Form Paving: Use design mixture for automatic machine placement. Produce paving to required thickness, lines, grades, finish, and jointing.
 - 1. Compact subbase and prepare subgrade of sufficient width to prevent displacement of slip-form paving machine during operations.

3.7 FLOAT FINISHING

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

3.8 CONCRETE PROTECTION AND CURING

- A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures.
- B. Comply with ACI 306.1 for cold-weather protection.
- C. Evaporation Retarder: Apply evaporation retarder to concrete surfaces if hot, dry, or windy conditions cause moisture loss approaching 0.2 lb/sq. ft. x h before and during finishing operations. Apply according to manufacturer's written instructions after placing, screeding, and bull floating or darbying concrete but before float finishing.
- D. Begin curing after finishing concrete but not before free water has disappeared from concrete surface.
- E. Curing Methods: Cure concrete by curing compound as follows:
 - 1. Curing Compound: Apply uniformly in continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Maintain continuity of coating, and repair damage during curing period.

3.9 PAVING TOLERANCES

A. Comply with tolerances in ACI 117 and as follows:

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

3.10 FIELD QUALITY CONTROL

- A. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections.
- B. Strength of each concrete mixture will be satisfactory if average of any three consecutive compressive-strength tests equals or exceeds specified compressive strength and no compressive-strength test value falls below specified compressive strength by more than 500 psi.
- C. Additional Tests: Testing and inspecting agency shall make additional tests of concrete when test results indicate that slump, air entrainment, compressive strengths, or other requirements have not been met, as directed by Engineer.
- D. Concrete paving will be considered defective if it does not pass tests and inspections.
- E. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

3.11 REPAIR AND PROTECTION

- A. Remove and replace concrete paving that is broken, damaged, or defective or that does not comply with requirements in this Section. Remove work in complete sections from joint to joint unless otherwise approved by Engineer.
- B. Drill test cores, where directed by Engineer, when necessary to determine magnitude of cracks or defective areas. Fill drilled core holes in satisfactory paving areas with portland cement concrete bonded to paving with epoxy adhesive.
- C. Protect concrete paving from damage. Exclude traffic from paving for at least 14 days after placement. When construction traffic is permitted, maintain paving as clean as possible by removing surface stains and spillage of materials as they occur.

- D. Maintain concrete paving free of stains, discoloration, dirt, and other foreign material. Sweep paving not more than two days before date scheduled for Substantial Completion inspections.

END OF SECTION 321313

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SECTION 321373 - CONCRETE PAVING JOINT SEALANTS

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 joint sealants.

1.3 ACTION SUBMITTALS

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

1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For.
- B. Product Certificates: For each type of joint sealant and accessory.

1.5 QUALITY ASSURANCE

- A. Product Testing: Test joint sealants using a qualified testing agency.

1.6 FIELD CONDITIONS

- A. Do not proceed with installation of joint sealants under the following conditions:
 - 1. When ambient and substrate temperature conditions are outside limits permitted by joint-sealant manufacturer or are below 40 deg F.
 - 2. When joint substrates are wet.
 - 3. Where joint widths are less than those allowed by joint-sealant manufacturer for applications indicated.
 - 4. Where contaminants capable of interfering with adhesion have not yet been removed from joint substrates.

PART 2 - PRODUCTS

2.1 MATERIALS, GENERAL

- A. Compatibility: Provide joint sealants, backing materials, and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by joint-sealant manufacturer, based on testing and field experience.

2.2 COLD-APPLIED JOINT SEALANTS

- A. Single-Component, Self-Leveling, Silicone Joint Sealant: ASTM D 5893/D 5893M, Type SL.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine joints to receive joint sealants, with Installer present, for compliance with requirements for joint configuration, installation tolerances, and other conditions affecting joint-sealant performance.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Surface Cleaning of Joints: Before installing joint sealants, clean out joints immediately to comply with joint-sealant manufacturer's written instructions.
 - 1. Remove all foreign material from joint substrates that could interfere with adhesion of joint sealant, including dust, old joint sealants, oil, grease, waterproofing, water repellents, water, surface dirt, and frost.
- B. Joint Priming: Prime joint substrates where indicated or where recommended in writing by joint-sealant manufacturer, based on preconstruction joint-sealant-substrate tests or prior experience. Apply primer to comply with joint-sealant manufacturer's written instructions. Confine primers to areas of joint-sealant bond; do not allow spillage or migration onto adjoining surfaces.

3.3 INSTALLATION OF JOINT SEALANTS

- A. Comply with joint-sealant manufacturer's written installation instructions for products and applications indicated unless more stringent requirements apply.
- B. Joint-Sealant Installation Standard: Comply with recommendations in ASTM C 1193 for use of joint sealants as applicable to materials, applications, and conditions.

- C. Install joint-sealant backings to support joint sealants during application and at position required to produce cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability.
 - 1. Do not leave gaps between ends of joint-sealant backings.
 - 2. Do not stretch, twist, puncture, or tear joint-sealant backings.
 - 3. Remove absorbent joint-sealant backings that have become wet before sealant application and replace them with dry materials.
- D. Install joint sealants immediately following backing installation, using proven techniques that comply with the following:
 - 1. Place joint sealants so they fully contact joint substrates.
 - 2. Completely fill recesses in each joint configuration.
 - 3. Produce uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability.
- E. Tooling of Nonsag Joint Sealants: Immediately after joint-sealant application and before skinning or curing begins, tool sealants according to the following requirements to form smooth, uniform beads of configuration indicated; to eliminate air pockets; and to ensure contact and adhesion of sealant with sides of joint:
 - 1. Remove excess joint sealant from surfaces adjacent to joints.
 - 2. Use tooling agents that are approved in writing by joint-sealant manufacturer and that do not discolor sealants or adjacent surfaces.
- F. Provide joint configuration to comply with joint-sealant manufacturer's written instructions unless otherwise indicated.

3.4 CLEANING AND PROTECTION

- A. Clean off excess joint sealant as the Work progresses, by methods and with cleaning materials approved in writing by joint-sealant manufacturers.
- B. Protect joint sealants, during and after curing period, from contact with contaminating substances and from damage resulting from construction operations or other causes so sealants are without deterioration or damage at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out and remove damaged or deteriorated joint sealants immediately and replace with joint sealant so installations in repaired areas are indistinguishable from the original work.

3.5 PAVING-JOINT-SEALANT SCHEDULE

- A. Joint-Sealant Application: Joints within concrete paving[<PJS-#>].
 - 1. Joint Location:
 - a. Expansion and isolation joints in concrete paving.

- b. Contraction joints in concrete paving.
 - c. Other joints as indicated.
- 2. Joint Sealant: Single-component, self-leveling, silicone joint sealant .
- 3. Joint-Sealant Color: Manufacturer's standard and as approved by the Engineer.

END OF SECTION 321373

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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:
 - 1. Painted markings applied to asphalt paving.

1.3 ACTION SUBMITTALS

- A. Shop Drawings:
 - 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.

1.4 FIELD CONDITIONS

- A. Environmental Limitations: Proceed with pavement marking only on clean, dry surfaces and at a minimum ambient or surface temperature of 55 deg F for water-based materials, and not exceeding 95 deg F.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Source Limitations: Obtain pavement-marking paints from single source from single manufacturer.

2.2 PERFORMANCE REQUIREMENTS

- A. Accessibility Standard: Comply with applicable provisions in the USDOJ's "2010 ADA Standards for Accessible Design".

2.3 PAVEMENT-MARKING PAINT

- A. Pavement-Marking Paint, Acrylic: Acrylic, waterborne emulsion, lead and chromate free, ready mixed, complying with FS TT-P-1952F, Type II, with drying time of less than three minutes.
 - 1. Color: Yellow and Blue (As indicated).

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify that pavement-marking substrate is dry and in suitable condition to begin pavement marking in accordance with 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 Engineer.
- B. Allow asphalt paving or concrete surfaces to age for a minimum of 30 days before starting pavement marking, unless otherwise approved by the Engineer.
- 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.
 - 1. Apply graphic symbols and lettering with paint-resistant, die-cut stencils, firmly secured to asphalt paving or concrete 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.

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 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.

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 include 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. See and drawing designations for planting soils.
- 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 INFORMATIONAL SUBMITTALS

- A. 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. Include identification of source and name and telephone number of supplier.

- B. Product Certificates: For fertilizers, from manufacturer.

1.5 DELIVERY, STORAGE, AND HANDLING

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

1.6 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. 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*).

2.2 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. 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.

2.3 MULCHES

- A. Straw Mulch: Provide air-dry, clean, mildew- and seed-free, salt hay or threshed straw of wheat, rye, oats, or barley.

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 Engineer and replace with new planting soil.

3.2 PREPARATION

- A. Protect structures; utilities; sidewalks; pavements; and other facilities, trees, shrubs, and plantings from damage caused by planting operations.
 1. Protect adjacent and adjoining areas from hydroseeding and hydromulching overspray.
 2. Protect grade stakes set by others until directed to remove them.

3.3 TURF AREA PREPARATION

- A. General: Prepare planting area for soil placement and mix planting soil according to
- B. Placing Planting Soil: Place and mix planting soil in place over exposed subgrade.

- 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 Engineer's acceptance of finish grading; restore planting areas if eroded or otherwise disturbed after finish grading.

3.4 SEEDING

- A. Sow seed with spreader or seeding machine. Do not broadcast or drop seed when wind velocity exceeds 5 mph .
 - 1. Evenly distribute seed by sowing equal quantities in two directions at right 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 3 to 4 lb/1000 sq. ft..
- C. Rake seed lightly into top 1/8 inch of soil, roll lightly, and water with fine spray.
- D. Protect seeded areas from hot, dry weather or drying winds by applying within 24 hours after completing seeding operations. Soak areas, scatter mulch uniformly to a thickness of 3/16 inch, and roll surface smooth.

3.5 HYDROSEEDING

- A. Hydroseeding: Mix specified seed, commercial fertilizer, and fiber mulch in water, using equipment specifically designed for hydroseed application. Continue mixing until uniformly blended into homogeneous slurry suitable for hydraulic application.
 - 1. Mix slurry with 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 dry weight, and seed component is deposited at not less than the specified seed-sowing rate.

3.6 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 .
 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 per week unless rainfall precipitation is adequate.

3.7 SATISFACTORY TURF

- A. Turf installations shall meet the following criteria as determined by Engineer:
 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. and bare spots not exceeding 5 by 5 inches.
- B. Use specified materials to reestablish turf that does not comply with requirements, and continue maintenance until turf is satisfactory.

3.8 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.

3.9 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.

END OF SECTION 329200

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SECTION 03 3000
CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

1.1.1 Submittals: Product Data, concrete mix designs and submittals required by ACI 301.

1.1.2 Ready-Mixed Concrete Producer Qualifications: ASTM C 94/C 94M.

1.2 PREINSTALLATION MEETINGS

1.2.1.1 Before submitting design mixtures, review concrete design mixture and examine procedures for ensuring quality of concrete materials. Require representatives of each entity directly concerned with concrete material and installation and finishing including polished for the following:

1.2.1.1.1 Contractor's superintendent.

1.2.1.1.2 Independent testing agency responsible for concrete design mixtures.

1.2.1.1.3 Ready-mix concrete manufacturer.

1.2.1.1.4 Cast-in-place concrete subcontractor.

1.2.1.1.5 Polished concrete finishing Subcontractor.

1.2.1.2 Review mix design, cold- and hot-weather concreting procedures, curing procedures, construction joints, concrete repair procedures, concrete finishing, and protection of polished concrete.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

2.1.1 Comply with ACI 301, "Specification for Structural Concrete," and with ACI 117, "Specifications for Tolerances for Concrete Construction and Materials."

2.2 MATERIALS

2.2.1 Reinforcing Bars: ASTM A 615/A 615M, Grade 60, deformed.

2.2.2 Plain Steel Wire: ASTM A 82/A 82M, as drawn.

2.2.3 Plain-Steel Welded Wire Reinforcement: ASTM A 185/A 185M, as drawn, flat sheet.

2.2.4 Portland Cement: ASTM C 150, Type I or II.

2.2.5 Retain supplementary cementing materials from "Fly Ash," "Ground Granulated Blast-Furnace Slag," and "Silica Fume" paragraphs below if permitted. Ready-mix concrete

manufacturer blends these materials with portland cement. Fly ash, slag, or pozzolanic materials may slow rate of concrete strengthening and affect color uniformity.

2.2.6 Aggregates: ASTM C 33, Class 3S coarse aggregate or better, graded, with at least 10 years' satisfactory service in similar applications.

2.2.6.1 Maximum Coarse-Aggregate Size: 3/4 inch nominal.

2.2.7 Air-Entraining Admixture: ASTM C 260.

2.2.8 Chemical Admixtures: ASTM C 494, Do not use calcium chloride or admixtures containing calcium chloride.

2.2.9 Vapor Retarder: Reinforced sheet, ASTM E 1745, Class A. Include manufacturer's recommended adhesive or pressure-sensitive tape.

2.2.10 Penetrating Liquid Floor Treatments for Polished Concrete Finish: Clear, waterborne solution of inorganic silicate or silicate materials and proprietary components; odorless; that penetrates, hardens, and is suitable for polished concrete surfaces.

2.2.10.1 Manufacturers: Subject to compliance with requirements, provide products by one of the following:

2.2.10.1.1 AWRC Corporation.

2.2.10.1.2 ChemTec Int'l.

2.2.10.1.3 L&M Construction Chemicals, Inc.

2.2.10.1.4 Metalcrete Industries.

2.2.10.1.5 PROSOCO, Inc.

2.2.11 Moisture-Retaining Cover: ASTM C 171, polyethylene film or white burlap-polyethylene sheet.

2.2.12 Clear, Waterborne, Membrane-Forming Curing and Sealing Compound: ASTM C 1315, Type 1, Class A.

2.2.12.1 Manufacturers: Subject to compliance with requirements, provide products by one of the following:

2.2.12.1.1 AWRC Corporation.

2.2.12.1.2 Euclid Chemical Company (The); an RPM company.

2.2.12.1.3 L&M Construction Chemicals, Inc.

2.2.12.1.4 Metalcrete Industries.

2.2.13 Joint-Filler Strips: ASTM D 1751, asphalt-saturated cellulosic fiber, or ASTM D 1752, cork or self-expanding cork.

2.3 CONCRETE MIXTURES

2.3.1 Prepare design mixtures, proportioned according to ACI 301.

2.3.2 Normal-Weight Concrete:

2.3.2.1 Minimum Compressive Strength: 3000 psi at 28 days.

2.3.2.2 Maximum Water-Cementitious Materials Ratio: 0.45.

2.3.2.3 Slump Limit: 8 inches for concrete with verified slump of 4 inches before adding high-range water-reducing admixture or plasticizing admixture, plus or minus 1

inch.

2.3.2.4 Air Content: Maintain within range permitted by ACI 301. Do not allow air content of floor slabs to receive troweled finishes to exceed 3 percent.

2.3.2.5 For concrete exposed to deicing chemicals, limit use of fly ash to 25 percent replacement of portland cement by weight and granulated blast-furnace slag to 40 percent of portland cement by weight; silica fume to 10 percent of portland cement by weight.

2.3.3 Measure, batch, mix, and deliver concrete according to ASTM C 94/C 94M and ASTM C 1116.

2.3.3.1 When air temperature is above 90 deg F, reduce mixing and delivery time to 60 minutes.

PART 3 - EXECUTION

3.1 CONCRETING

3.1.1 Construct formwork according to ACI 301 and maintain tolerances and surface irregularities within ACI 347R limits of Class A, 1/8 inch for concrete exposed to view and Class B, 1/4 inch for other concrete surfaces.

3.1.2 Place vapor retarder on prepared subgrade, with joints lapped 6 inches and sealed.

3.1.3 Comply with CRSI's "Manual of Standard Practice" for fabricating, placing, and supporting reinforcement.

3.1.4 Install construction, isolation, and contraction joints where indicated. Install full-depth joint-filler strips at isolation joints.

3.1.5 Place concrete in a continuous operation and consolidate using mechanical vibrating equipment.

3.1.6 Protect concrete from physical damage, premature drying, and reduced strength due to hot or cold weather during mixing, placing, and curing.

3.1.7 Formed Surface Finish: Smooth-formed finish for concrete exposed to view, coated, or covered by waterproofing or other direct-applied material; rough-formed finish elsewhere.

3.1.8 Slab Finishes: Comply with ACI 302.1R for screeding, restraightening, and finishing operations for concrete surfaces. Do not wet concrete surfaces. Provide the following finishes:

3.1.9

3.1.9.1 Troweled finish for floor surfaces and floors to receive floor coverings, paint, or other thin film-finish coatings.

3.1.10 Cure formed surfaces by moisture curing for at least seven days.

- 3.1.11 Begin curing concrete slabs after finishing. Keep concrete continuously moist for at least seven days.
- 3.1.12 Owner will engage a testing agency to perform field tests and to submit test reports.
- 3.1.13 Protect concrete from damage. Repair and patch defective areas.

END OF SECTION

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SECTION 033543
BONDED ABRASIVE POLISHED CONCRETE FINISHING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS.

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

1.2 SUMMARY

- 1.2.1 Section includes polished concrete finishing.

- 1.2.1.1 Products and procedures for bonded abrasive polished concrete floors using multi-step wet/dry mechanical process, and accessories indicated, specified, or required to complete polishing, including formwork, reinforcement, concrete materials, mixture design, placement procedures, initial finishing, and curing is specified in Section 033000 "Cast-in-Place Concrete."

- 1.2.2 Related Requirements:

- 1.2.2.1 Section 033000 "Cast-in-Place Concrete" for concrete not designated as polished concrete.

1.3 DEFINITIONS

- 1.3.1 Design Reference Sample: Sample designated by Architect in the Contract Documents that reflects acceptable surface quality and appearance of polished concrete.
- 1.3.2 Terminology: As defined by Concrete Polishing Council (CPC) glossary.
- 1.3.3 Polished Concrete: The act of changing a concrete floor surface, with or without surface exposure of aggregate, to achieve a specified level or appearance.
- 1.3.4 Bonded Abrasive Polished Concrete: The multi-step operation of mechanically grinding, honing and polishing a concrete floor surface with bonded abrasives to cut a concrete floor surface and to refine each cut to the maximum potential to achieve a specified level or appearance as defined by the CPC.

1.4 PREINSTALLATION MEETINGS

- 1.4.1.1 Before submitting design mixtures, review concrete design mixture and examine procedures for ensuring quality of concrete materials. Require representatives of each entity directly concerned with polished concrete to attend, including the following:
 - 1.4.1.1.1 Contractor's superintendent.
 - 1.4.1.1.2 Independent testing agency responsible for concrete design mixtures.
 - 1.4.1.1.3 Ready-mix concrete manufacturer.
 - 1.4.1.1.4 Cast-in-place concrete subcontractor.
 - 1.4.1.1.5 Polished concrete finishing Subcontractor.
 - 1.4.1.1.6 Owner
 - 1.4.1.1.7 Project Engineer
- 1.4.1.2 Minimum Agenda: Polisher shall demonstrate understanding of work required by reviewing and discussing procedures for, but not limited to the following:
 - 1.4.1.2.1 Tour field mock-up and representative areas of required work, discuss and evaluate for compliance with Contract Documents, including substrate conditions, surface preparations, sequence of procedures and other preparatory work performed by other installers.
 - 1.4.1.2.2 Review cold- and hot-weather concreting procedures, curing procedures, construction joints, concrete repair procedures, concrete finishing, and protection of polished concrete.
 - 1.4.1.2.3 Review Contract Documents requirements.
 - 1.4.1.2.4 Review procedures, including, but not limited to:
 - 1.4.1.2.4.1 Applicable Division 03 Section on cast-in-place concrete
 - 1.4.1.2.4.2 Specific mix design.
 - 1.4.1.2.4.3 Specified curing methods/procedures.
 - 1.4.1.2.4.4 Projected 3, 14- and 28-day compressive strength test for finished floor and project phasing.
 - 1.4.1.2.4.5 Protection of Concrete substrate during construction and prior to polishing process.
 - 1.4.1.2.4.6 Project phasing and scheduling for each step of grinding, honing and polishing operations included, but not limited to:
 - 1.4.1.2.4.6.1 Quality of qualified personnel committed to the project.
 - 1.4.1.2.4.6.2 Quality and size of grinders committed to the project.
 - 1.4.1.2.4.6.3 Proper disposal of concrete slurry and/or concrete dust.
 - 1.4.1.2.4.7 Details of each step of grinding, honing and polishing operations.
 - 1.4.1.3 Reports: Record discussions, including decisions and agreements reached and furnish copy of record to each party attending.

1.5 SUBMITTALS

- 1.5.1 Product Data: Manufacturer's technical literature for each product indicated, specified, or required. Include manufacturer's technical data, application instructions and recommendations.
- 1.5.2 Installer Qualifications: Data for company, principal personnel, experience and training specified in Part 1.7 "Quality Assurance" Article.
- 1.5.3 Maintenance Data: for inclusion in maintenance manual required by Division 01.
 - 1.5.3.1 Include instructions for maintenance of installed work, including methods and frequency recommended for maintain optimum condition under anticipated use.
 - 1.5.3.2 Include precautions against cleaning products and methods which may be detrimental to finishes and performance.
- 1.5.4 Polishing Schedule: Submit plan showing polished concrete surfaces and schedule of polishing operations for each area of polished concrete before start of polishing operations. Include locations of all joints, including construction joints.

1.6 QUALITY ASSURANCE

- 1.6.1 Polisher Qualifications:
 - 1.6.1.1 Experience: Company that has successfully completed five projects similar in design, projects, and extent to scope of this Project; with a record of successful in-service performance; and with sufficient production capability, facilities, and personnel to produce specified work.
 - 1.6.1.2 Supervision: Maintain a competent supervisor who is at Project during times specified work is in progress and is currently certified as Craftsman-Level 1 or higher by CPAA, CPC Craftsman, or equivalent.
 - 1.6.1.3 Manufacturer Qualification: Approved by manufacturer to apply liquid applied products.
- 1.6.2 Field Mockups: Before performing work of this Section, provide following field mock-up to verify selections made under submittals and to demonstrate aesthetic effects of polishing. Approval does not constitute approval of deviations from Contract Documents, unless Architect specially approves deviations in writing.
 - 1.6.2.1 Form, reinforce and cast concrete slab for 10-foot square field mock-up.
 - 1.6.2.2 Concrete shall be same mix design as scheduled for Project.
 - 1.6.2.3 Placement and finish work shall be performed by same personnel as will place and finish concrete for Project.
 - 1.6.2.4 Mock-up shall be representative of work to be expected.
 - 1.6.2.5 Perform grinding, honing and polishing work as scheduled for Project using same personnel as will perform work for Project.
 - 1.6.2.6 Approval is for the following aesthetic qualities:
 - 1.6.2.6.1 Compliance with approved submittals.
 - 1.6.2.6.2 Compliance with specified aggregate exposure class.

- 1.6.2.6.3 Compliance with specified appearance level.
- 1.6.2.7 Obtain Owners and Project Manager's approval before starting work on Project.
- 1.6.2.8 Protect and maintain approved field mock-ups during construction in an undisturbed condition as a standard for judging completed work.

1.7 FIELD CONDITIONS

- 1.7.1 Traffic Control: Maintain access for vehicular and pedestrian traffic as required for other construction activities.
- 1.7.2 Damage and Stain Prevention: It is the responsibility of others to prevent damage and staining of concrete surfaces to be polished.
 - 1.7.2.1 Prohibit use of markers, spray paint and soapstone.
 - 1.7.2.2 Prohibit improper application of liquid membrane film forming curing compounds.
 - 1.7.2.3 Prohibit vehicle parking over concrete surfaces.
 - 1.7.2.4 Prohibit pipe-cutting operations over concrete surfaces.
 - 1.7.2.5 Prohibit storage of any items over concrete surfaces for not less than 28 days after concrete placement.
 - 1.7.2.6 Prohibit ferrous metals storage over concrete surfaces.
 - 1.7.2.7 Protect from petroleum, oil, hydraulic fluid, or other liquid dripping from equipment working over concrete surfaces.
 - 1.7.2.8 Protect from acids and acidic detergents contacting concrete surfaces.
 - 1.7.2.9 Protect from painting activities over concrete surfaces.
- 1.7.3 Environmental Limitations: Comply with manufacture's written instructions for substrate temperature, ambient temperature, moisture, ventilation and other conditions affecting liquid applied product application.

PART 2 - PRODUCTS

2.1 LIQUID FLOOR TREATMENTS

- 2.1.1 Liquid Densifier: An aqueous solution of silicon dioxide dissolved in one of the following hydroxides that penetrates into the concrete surface and reacts with the calcium hydroxide to provide a permanent chemical reaction that hardens and densifies the wear surface of the cementitious portion of the concrete.
 - 2.1.1.1 Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 2.1.1.1.1 Advanced Floor Products.
 - 2.1.1.1.2 Euclid Chemical Company (The); an RPM company.
 - 2.1.1.1.3 L&M Construction Chemicals, Inc.

2.2 ACCESSORIES

- 2.2.1 Repair Material: A product that is designed to repair cracks and surface imperfections. The specified material must have sufficient bonding capabilities to adhere after the polishing to the concrete surface and provide abrasion resistance equal to or greater than the surrounding concrete substrate.
- 2.2.2 Grout material: A thin mortar used for filling spaces. Acceptable products shall be:
- 2.2.2.1 Epoxy, urethane, polyurea, or polyaspartic resins.
 - 2.2.2.2 Latex or acrylic binders mixed with cement dust from previous grinding steps.
 - 2.2.2.3 Silicate binders mixed with cement dust from previous grinding steps.

2.3 POLISHING EQUIPEMENT

- 2.3.1.1 Field Grinding and Polishing Equipment:
- 2.3.1.1.1 A multiple head, counter rotating, walk behind or ride on machine, of various size and weights, with diamond tooling affixed to the head for the purpose of grinding concrete. Excludes janitorial maintenance equipment.
 - 2.3.1.1.2 If dry grinding, honing or polishing, use dust extraction equipment with flow rate suitable for dust generated, with squeegee attachments to meet OSHA requirements.
 - 2.3.1.1.3 If wet grinding, honing, or polishing, use slurry extraction equipment suitable for slurry removal and containment prior to disposal.
- 2.3.1.2 Edge Grinding and Polishing Equipment: Hand-held or walk-behind machines which produces the same results, without noticeable differences, as field grinding and polishing equipment.
- 2.3.1.3 Burnishing Equipment: High speed walk-behind or ride-on machines capable of generating 1000 to 2000 rpm and with sufficient head pressure of not less than 200 pounds to raise floor temperature by 20 degrees F.
- 2.3.1.4 Diamond Tooling: Abrasive tools that contain industrial grade diamonds within a bonded matrix (such as metallic, resinous, ceramic, etc..) that are attached to rotating heads to refine the concrete substrate.
- 2.3.1.4.1 Bonded Abrasive: Abrasive medium that is held within a bonding that erodes away to expose new abrasive medium as it is used.
 - 2.3.1.4.2 Metal Bond Tooling: Diamond tooling that contains industrial grade diamonds with a metallic bonded matrix that is attached to rotating heads to refine the concrete substrate. These tools are available in levels of soft, medium and hard metallic matrices that are matched with contracting concrete substrates (i.e. hard matrix/soft concrete, medium matrix/medium concrete, soft matrix/hard concrete) and are typically used in the grinding and early honing stages of the polishing process.
 - 2.3.1.4.3 Resin Bond Tooling: Diamond tooling that contains industrial grade diamonds within a resinous bonded matrix (poly-phenolic, ester-phenolic and thermoplastic-phenolic) that is attached to rotating heads to refine the concrete substrate. Resin bond tooling does not have the soft/medium/hard characteristics of metal bond tooling and are typically used for the later honing and polishing stages of the polishing process.

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- 2.3.1.4.4 Hybrid Tooling: Diamond tooling that combines metal bond and resin bond that has the characteristics of both types of tooling. These types of tools are typically used as either transitional tooling from metal bond tools to resin bond tools or as a first cut tool on smooth concrete surfaces.
- 2.3.1.4.5 Transitional Tooling: Diamond tooling that is used to refine the scratch pattern of metal bond tooling prior to the application of resin bond tooling in an effort to extend the life of resin bond tooling and to create a better foundation for the polishing process.
- 2.3.1.4.6 Abrasive Pad: An abrasive pad, resembling a typical floor maintenance burnishing pad that has the capability of refining the concrete surface on a microscopic level that may or may not contain industrial grade diamonds. These pads are typically used for the maintenance and/or restoration of previously installed polished concrete flooring.

PART 3 - EXECUTION

3.1 EXAMINATION

3.1.1 Acceptance of Surfaces and Conditions

- 3.1.1.1 Examine substrates to be polished for compliance with requirements and other conditions affecting performance.
 - 3.1.1.1.1 Concrete finished floor flatness according to applicable Division 03 Section on cast-in-place concrete.
 - 3.1.1.1.2 Concrete curing methods according to applicable Division 03 Section on cast-in-place concrete.
 - 3.1.1.1.3 Concrete compressive strength according to applicable Division 03 Section on cast-in-place concrete.
- 3.1.1.2 Proceed only when unsatisfactory conditions have been corrected in a manner complying with Contract Documents.
- 3.1.1.3 Stating work within a particular area will be construed as acceptance surface conditions.
- 3.1.1.4 Provide sample area in service area as indicated on plans for approval prior with proceeding with scope of work.

3.2 PREPARATION

3.2.1 Cleaning New Concrete Surfaces:

- 3.2.1.1 Prepare and clean concrete surfaces.
- 3.2.1.2 Provide sound concrete surface free of laitance, glaze, efflorescence, curing compounds, form-release agents, dust, dirt, grease, oil, paint splatter, and other contaminants incompatible with liquid applied products and polishing.

3.2.2 POLISHING CONCRETE FLOORS

- 3.2.2.1 Perform all polishing procedures to ensure a consistent visual appearance from wall to wall.
- 3.2.2.2 Initial Grinding:
 - 3.2.2.2.1 Use grinding equipment with metal or semi-metal bonded tooling.
 - 3.2.2.2.2 Begin grinding in one direction using sufficient size equipment and diamond tooling to meet specified aggregate exposure class.
 - 3.2.2.2.3 Make sequential passes with each pass perpendicular to previous pass using finer grit tool with each pass, up to 100 grit metal bonded tooling.
 - 3.2.2.2.4 Achieve maximum refinement with each pass before proceeding to finer grit tools.
 - 3.2.2.2.5 Clean floor thoroughly after each pass using dust extraction equipment properly fitted with squeegee attachment or walk behind auto scrubber suitable to remove all visible loose debris and dust.
 - 3.2.2.2.6 Continue grinding until aggregate surface exposure matches approved field mock-up.
- 3.2.2.3 Treating Surface Imperfections:
 - 3.2.2.3.1 Mix patching compound or grout material with dust created by grinding operations, manufacturer's tint, or sand to match color of adjacent concrete surfaces.
 - 3.2.2.3.2 Fill surface imperfections including, but not limited to, holes, surface damage, small a micro cracks, air holes, pop-outs and voids with grout to eliminate micro pitting in finished work.
 - 3.2.2.3.3 Work compound and treatment until color differences between concrete surface and filled surface imperfections, compared to mockup, are not reasonably noticeable when viewed from 20 feet away under lighting conditions that will be present after construction.
- 3.2.2.4 Liquid Densifier Application: Apply undiluted to point of rejection, remove excess liquid and allow curing according to manufacturer's instructions.
- 3.2.3 Grout Grinding:
 - 3.2.3.1 Use grinding equipment and appropriate grit and bond diamond tooling.
 - 3.2.3.2 Apply grout, forced into the pore structure of the concrete substrate, to fill surface imperfections.
 - 3.2.3.3 Clean floor thoroughly after each pass using dust extraction equipment properly fitted with squeegee attachment or walk behind auto scrubber suitable to remove all visible loose debris and dust.
- 3.2.4 Honing:
 - 3.2.4.1 Use grinding equipment with hybrid or resin bonded tooling.
 - 3.2.4.2 Hone concrete in one direction stating with 100 grit tooling and make as many sequential passes as required to remove scratches, each pass perpendicular to previous pass, up to 400 grit tooling reaching maximum refinement with each pass before proceeding to finer grit tooling.
 - 3.2.4.3 Clean floor thoroughly after each pass using dust extraction equipment properly fitted with squeegee attachment or walk behind auto scrubber suitable to remove all visible loose debris and dust.

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3.2.5 Polishing:

- 3.2.5.1 Use polishing equipment with resin-bonded tooling.
- 3.2.5.2 Begin polishing in one direction stating with 800 grit tooling.
- 3.2.5.3 Make sequential passes with each pass perpendicular to previous pass using finer grit tooling with each pass until the specified level of appearance has been achieved.
- 3.2.5.4 Achieve maximum refinement with each pass before proceeding to finer grit pads.
- 3.2.5.5 Clean floor thoroughly after each pass using dust extraction equipment properly fitted with squeegee attachment or walk behind auto scrubber suitable to remove all visible loose debris and dust.
- 3.2.5.6 Stain Protection: uniformly apply and remove excessive liquid according to manufacturer's instructions. Final film thickness should be less than .05 mils after cure.
- 3.2.5.7 Final Polish: Using burnishing equipment and finest grit abrasive pads, burnish to uniform reflective sheen matching approved field mock-up and sample area.

3.2.6 Final Polished Concrete Floor Finish:

- 3.2.6.1 Aggregate Exposure Class C- Course Aggregate: Surface exposure of 80% - 90% coarse aggregate and 10% - 20% cement fines and fine aggregate based on visual observation of the overall area of the polished floor.
- 3.2.6.2 Appearance Level 3 – Polished:
 - 3.2.6.2.1 Procedure: Recommended not less than 4 steps with full refinement of each diamond tool with one application of densifier.
 - 3.2.6.2.2 Measurement: Determine the image of Clarity Value, %, and the Haze Index.
 - 3.2.6.2.2.1 Image Clarity Value, %: An average of 50 to 69 measured in accordance with ASTM D5767 prior to the application of sealers.
 - 3.2.6.2.2.2 Haze Index: an average value less than 10 measured in accordance with ASTM d4039 prior to the application of sealers.
 - 3.2.6.2.2.3 The minimum number of tests distributed across the polished surface should be 3 (three), for areas up to 1000 sq. ft. and one additional 1 (one) for each 1000 sq. ft. or fraction thereof. This applies to both the image Clarify Value and Haze Index.

END OF SECTION

**SECTION 042000
UNIT MASONRY**

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes unit masonry assemblies consisting of the following:
 - 1. Concrete masonry units (CMUs).
- B. See Division 05 Section "Metal Fabrications" for furnishing steel lintels for unit masonry.
- C. See Division 07 Section "Sheet Metal Flashing and Trim" for furnishing manufactured reglets installed in masonry joints for metal flashing.

1.2 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: For reinforcing steel. Detail bending and placement of unit masonry reinforcing bars. Comply with ACI 315, "Details and Detailing of Concrete Reinforcement."
- C. Samples for each type and color of exposed masonry units and colored mortars for selection by Architect from manufactures standard colors.
- D. Material Certificates: For each type of product indicated. Include statements of material properties indicating compliance with requirements including compliance with standards and type designations within standards.
 - 1. For masonry units include material test reports substantiating compliance with requirements.
- E. Mix Designs: For each type of mortar and grout. Include description of type and proportions of ingredients.

1.3 QUALITY ASSURANCE

Preconstruction Testing Service: Contractor will engage a qualified independent testing agency to perform preconstruction testing indicated below.

- 1. Clay Masonry Unit Test: For each type of unit required, per ASTM C 67.
- 2. Concrete Masonry Unit Test: For each type of unit required, per ASTM C 140.
- 3. Mortar Test (Property Specification): For each mix required, per ASTM C 780.
- 4. Grout Test (Compressive Strength): For each mix required, per ASTM C 1019.

1.4 PROJECT CONDITIONS

- A. Cold-Weather Requirements: Do not use frozen materials or materials mixed or coated with ice or frost. Do not build on frozen substrates. Remove and replace unit masonry damaged by frost or by freezing conditions. Comply with cold-weather construction requirements contained in ACI 530.1/ASCE 6/TMS 602.
- B. Hot-Weather Requirements: Comply with hot-weather construction requirements contained in ACI 530.1/ASCE 6/TMS 602.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:

1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, products specified.
2. Products: Subject to compliance with requirements, provide one of the products specified.
3. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, manufacturers specified.
4. Manufacturers: Subject to compliance with requirements, provide products by one of the manufacturers specified.

2.2 CONCRETE MASONRY UNITS (CMUs)

- A. Shapes: Provide special shapes for lintels, corners, jambs, sashes, movement joints, headers, bonding, and other special conditions.
- B. Integral Water Repellent: Provide units made with liquid polymeric, integral water-repellent admixture that does not reduce flexural bond strength for exposed units.
 1. Products:
 - a. Addiment Incorporated; Block Plus W-10.
 - b. Grace Construction Products, a unit of W. R. Grace & Co. - Conn.; Dry- Block.
 - c. Master Builders, Inc.; Rheopel.
- C. Concrete Masonry Units: ASTM C 90.
 1. Unit Compressive Strength: Provide units with minimum average net-area compressive strength of 1500 psi.
 2. Weight Classification: Normal weight.
 3. Pattern and Texture for Decorative Units:
 - a. Standard pattern, ground finish. Color to be selected by architect from manufacturer's standard colors.
 - b. Standard pattern, split-face finish. Color to be selected by architect from manufacturer's standard colors.
 4. Pre-faced Concrete Masonry Units: Lightweight concrete units, with smooth resinous facing complying with ASTM C 744.
 - a. Size: Manufactured with pre-faced surfaces having 1/16-inch wide returns of facing to create 1/4-inch wide mortar joints.

2.3 MASONRY LINTELS

- A. General: Provide either concrete or masonry lintels, at Contractor's option, complying with requirements below.
- B. Concrete Lintels: Precast units matching concrete masonry units and with reinforcing bars indicated or required to support loads indicated.
- C. Concrete Lintels: Precast or formed-in-place concrete lintels complying with requirements in Division 03 Section "Cast-in-Place Concrete."
- D. Masonry Lintels: Made from bond beam concrete masonry units with reinforcing bars placed as indicated and filled with coarse grout.

2.4 MORTAR AND GROUT MATERIALS

- A. Portland Cement: ASTM C 150, Type I or II, except Type III may be used for cold-weather construction.
- B. Hydrated Lime: ASTM C 207, Type S.
- C. Masonry Cement: ASTM C 91.
- D. Aggregate for Mortar: ASTM C 144.
- E. Aggregate for Grout: ASTM C 404.
- F. Cold-Weather Admixture: Nonchloride, noncorrosive, accelerating admixture complying with ASTM C 494/C 494M, Type C, and recommended by manufacturer for use in masonry mortar of composition indicated.
 - 1. Products:
 - a. Addiment Incorporated; Mortar Kick.
 - b. Euclid Chemical Company (The); Accelguard 80.
 - c. Grace Construction Products, a unit of W. R. Grace & Co. - Conn.; Morset.
 - d. Sonneborn, Div. of ChemRex; Trimix-NCA.
- G. Water-Repellent Admixture: Liquid water-repellent mortar admixture intended for use with concrete masonry units, containing integral water repellent by same manufacturer.
 - 1. Products:
 - a. Addiment Incorporated; Mortar Tite.
 - b. Grace Construction Products, a unit of W. R. Grace & Co. - Conn.; Dry-Block Mortar Admixture.
 - c. Master Builders, Inc.; Color Cure Mortar Admix.
- H. Water: Potable.

2.5 REINFORCEMENT

- A. Uncoated Steel Reinforcing Bars: ASTM A 615/A 615M or ASTM A 996/A 996M, Grade 60.
- B. Masonry Joint Reinforcement: ASTM A 951; mill galvanized, carbon-steel wire for interior walls and hot-dip galvanized, carbon-steel wire for exterior walls.
 - 1. Wire Size for Side Rods: W1.7 diameter.
 - 2. Spacing of Cross Rods, Tabs, and Cross Ties: Not more than 16 inches o.c. vertically
 - 3. Single-Wythe Masonry: Horizontal ladder type with single pair of side rods.
 - 4. Multiwythe Masonry:
 - a. Ladder type with 1 side rod at each face shell of hollow masonry units more than 4 inches in width, plus 1 side rod at each wythe of masonry 4 inches or less in width.
 - b. Tab type, with 1 side rod at each face shell of backing wythe and with rectangular tabs sized to extend at least halfway through facing wythe but with at least 5/8-inch cover on outside face.

2.6 EMBEDDED FLASHING MATERIALS

- A. Flexible Flashing: For flashing not exposed to the exterior, use the following, unless otherwise indicated:
 - 1. Copper-Laminated Flashing: 5-oz./sq. ft. copper sheet bonded with asphalt between 2 layers of glass-fiber cloth.
 - 2. Rubberized-Asphalt Flashing: Composite flashing product consisting of a pliable, adhesive rubberized-asphalt compound, bonded to a high-density, cross-laminated polyethylene film to produce an overall thickness of not less than 0.040 inch.
 - 3. Elastomeric Thermoplastic Flashing: Composite flashing product consisting of a polyester-reinforced ethylene interpolymers alloy 0.025 inch thick, with a 0.015-inch thick coating of rubberized-asphalt adhesive.
- B. Solder and Sealants for Sheet Metal Flashings: As specified in Division 07 Section "Sheet Metal Flashing and Trim."
- C. Adhesives, Primers, and Seam Tapes for Flashings: Flashing manufacturer's standard products or products recommended by flashing manufacturer.

2.7 MISCELLANEOUS MASONRY ACCESSORIES

- A. Compressible Filler: Premolded filler strips complying with ASTM D 1056, Grade 2A1; compressible up to 35 percent; formulated from neoprene urethane or PVC.
- B. Bond-Breaker Strips: Asphalt-saturated, organic roofing felt complying with ASTM D 226, Type I (No. 15 asphalt felt).

2.8 MORTAR AND GROUT MIXES

- A. General: Do not use admixtures, unless otherwise indicated.
 - 1. Do not use calcium chloride in mortar or grout.
 - 2. Limit cementitious materials in mortar for exterior and reinforced masonry to portland cement and lime.
 - 3. Add cold-weather admixture (if used) at same rate for all mortar that will be exposed to view, regardless of weather conditions, to ensure that mortar color is consistent.
- B. Mortar for Unit Masonry: Comply with ASTM C 270, Proportion Specification.
 - 1. For masonry below grade or in contact with earth, use Type M.
 - 2. For reinforced masonry, use Type S.
 - 3. For exterior, above-grade, load-bearing and non-load-bearing walls and parapet walls; for interior load-bearing walls; for interior non-load-bearing partitions; and for other applications where another type is not indicated, use Type N.
 - 4. For interior non-load-bearing partitions, Type O may be used instead of Type N.
- C. Grout for Unit Masonry: Comply with ASTM C 476.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

- A. Use full-size units without cutting if possible. If cutting is required, cut units with motor-driven saws; provide clean, sharp, unchipped edges. Allow units to dry before laying

unless wetting of units is specified. Install cut units with cut surfaces and, where possible, cut edges concealed.

- B. Select and arrange units for exposed unit masonry to produce a uniform blend of colors and textures.
- C. Wetting of Brick: Wet brick before laying if initial rate of absorption exceeds 30 g/30 sq. in. per minute when tested per ASTM C 67. Allow units to absorb water so they are damp but not wet at time of laying.
- D. Comply with tolerances in ACI 530.1/ASCE 6/TMS 602 and with the following:
 - 1. For conspicuous vertical lines, such as external corners, door jambs, reveals, and expansion and control joints, do not vary from plumb by more than 1/8 inch in 10 feet, 1/4 inch in 20 feet, or 1/2 inch maximum.
 - 2. For conspicuous horizontal lines, such as lintels, sills, parapets, and reveals, do not vary from level by more than 1/8 inch in 10 feet, 1/4 inch in 20 feet, or 1/2 inch maximum.

3.2 LAYING MASONRY WALLS

- A. Lay out walls in advance for accurate spacing of surface bond patterns with uniform joint thicknesses and for accurate location of openings, movement-type joints, returns, and offsets. Avoid using less-than-half-size units, particularly at corners, jambs, and, where possible, at other locations.
- B. Bond Pattern for Exposed Masonry: Unless otherwise indicated, lay exposed masonry in running bond; do not use units with less than nominal 4-inch horizontal face dimensions at corners or jambs.
- C. Built-in Work: As construction progresses, build in items specified in this and other Sections. Fill in solidly with masonry around built-in items.
- D. Fill space between steel frames and masonry solidly with mortar, unless otherwise indicated.
- E. Fill cores in hollow concrete masonry units with grout 24 inches under bearing plates, beams, lintels, posts, and similar items, unless otherwise indicated.

3.3 MORTAR BEDDING AND JOINTING

- A. Lay hollow concrete masonry units as follows:
 - 1. With face shells fully bedded in mortar and with head joints of depth equal to bed joints.
 - 2. With webs fully bedded in mortar in all courses of piers, columns, and pilasters.
 - 3. With webs fully bedded in mortar in grouted masonry, including starting course on footings.
 - 4. With entire units, including areas under cells, fully bedded in mortar at starting course on footings where cells are not grouted.
- B. Lay solid masonry units with completely filled bed and head joints; butter ends with sufficient mortar to fill head joints and shove into place. Do not deeply furrow bed joints or slush head joints.
- C. Lay structural-clay tile as follows:
 - 1. Lay vertical-cell units with full head joints, unless otherwise indicated. Provide bed joints with full mortar coverage on face shells and webs.
 - 2. Lay horizontal-cell units with full bed joints, unless otherwise indicated. Keep drainage channels, if any, free of mortar. Form head joints with sufficient mortar so excess will be squeezed out as units are placed in position.
 - 3. Maintain joint thicknesses indicated except for minor variations required to maintain bond alignment. If not indicated, lay walls with 1/4- to 3/8-inch

thick joints.

- D. Tool exposed joints slightly concave when thumbprint hard, using a jointer larger than joint thickness, unless otherwise indicated.
- E. Cut joints flush for masonry walls to receive plaster or other direct-applied finishes (other than paint), unless otherwise indicated.

3.4 MASONRY JOINT REINFORCEMENT

- A. General: Install in mortar with a minimum cover of 5/8 inch on exterior side of walls, 1/2 inch elsewhere. Lap reinforcement a minimum of 6 inches.
- B. Interrupt joint reinforcement at control and expansion joints, unless otherwise indicated.
- C. Provide continuity at wall intersections by using prefabricated T-shaped units.
- D. Provide continuity at corners by using prefabricated L-shaped units.

3.5 ANCHORING MASONRY TO STRUCTURAL MEMBERS

- A. Anchor masonry to structural members where masonry abuts or faces structural members to comply with the following:
 - 1. Provide an open space not less than 1/2 inch in width between masonry and structural member, unless otherwise indicated.
 - 2. Anchor masonry to structural members with anchors embedded in masonry joints and attached to structure.
 - 3. Space anchors as indicated, but not more than 24 inches o.c. vertically and 36 inches o.c. horizontally.

3.6 FLASHING, WEEP HOLES, CAVITY DRAINAGE, AND VENTS

- A. General: Install embedded flashing and weep holes in masonry at shelf angles, lintels, ledges, other obstructions to downward flow of water in wall, and where indicated
- B. Install flashing as follows, unless otherwise indicated:
 - 1. Prepare masonry surfaces so they are smooth and free from projections that could puncture flashing. Where flashing is within mortar joint, place through-wall flashing on sloping bed of mortar and cover with mortar. Before covering with mortar, seal penetrations in flashing as recommended by flashing manufacturer.
 - 2. At lintels and shelf angles, extend flashing a minimum of 6 inches into masonry at each end. At heads and sills, extend flashing 6 inches at ends and turn up not less than 2 inches to form end dams.
 - 3. Install metal drip edges beneath flexible flashing at exterior face of wall. Stop flexible flashing 1/2 inch back from outside face of wall and adhere flexible flashing to top of metal drip edge.
 - 4. Install metal flashing termination beneath flexible flashing at exterior face of wall. Stop flexible flashing 1/2 inch back from outside face of wall and adhere flexible flashing to top of metal flashing termination.

3.7 REINFORCED UNIT MASONRY INSTALLATION

- A. Temporary Formwork and Shores: Construct formwork and shores as needed to support reinforced masonry elements during construction.
 - 1. Construct formwork to provide shape, line, and dimensions of completed masonry as indicated. Make forms sufficiently tight to prevent leakage of mortar and grout. Brace, tie, and support forms to maintain position and shape during

- construction and curing of reinforced masonry.
 2. Do not remove forms and shores until reinforced masonry members have hardened sufficiently to carry their own weight and other temporary loads that may be placed on them during construction.
- B. Placing Reinforcement: Comply with requirements in ACI 530.1.
- C. Grouting: Do not place grout until entire height of masonry to be grouted has attained enough strength to resist grout pressure.
1. Comply with requirements in ACI 530.1 for cleanouts and for grout placement, including minimum grout space and maximum pour height.
 2. Limit height of vertical grout pours to not more than 60 inches.

3.8 FIELD QUALITY CONTROL

- A. Inspectors: Contractor will engage qualified independent inspectors to perform inspections and prepare reports. Allow inspectors access to scaffolding and work areas, as needed to perform inspections.
1. Place grout only after inspectors have verified compliance of grout spaces and grades, sizes, and locations of reinforcement.
- B. Testing Agency: Owner will engage a qualified independent testing and inspecting agency to perform field tests and inspections indicated below and prepare test reports:
1. Payment for these services will be made from Testing and Inspecting Allowance, as authorized by Change Orders.
- C. Testing Frequency: One set of tests for each 5000 sq. ft. of wall area or portion thereof.
- D. Clay Masonry Unit Test: For each type of unit provided, per ASTM C 67.
- E. Concrete Masonry Unit Test: For each type of unit provided, per ASTM C 140.
- F. Mortar Test (Property Specification): For each mix provided, per [ASTM C 780] [UBC Standard 21-16]. Test mortar for [mortar air content] [and] [compressive strength].
- G. Grout Test (Compressive Strength): For each mix provided, per [ASTM C 1019] [UBC Standard 21-18].

3.9 CLEANING

- A. In-Progress Cleaning: Clean unit masonry as work progresses by dry brushing to remove mortar fins and smears before tooling joints.
- B. Final Cleaning: After mortar is thoroughly set and cured, clean exposed masonry as follows:
1. Test cleaning methods on sample wall panel; leave one-half of panel uncleaned for comparison purposes.
 2. Protect adjacent surfaces from contact with cleaner.
 3. Wet wall surfaces with water before applying cleaners; remove cleaners promptly by rinsing surfaces thoroughly with clear water.
 4. Clean brick by bucket-and-brush hand-cleaning method described in BIA Technical Notes 20.
 5. Clean masonry with a proprietary acidic cleaner applied according to manufacturer's written instructions.
 6. Clean concrete masonry by cleaning method indicated in NCMA TEK 8-2A applicable to type of stain on exposed surfaces.

3.10 MASONRY WASTE DISPOSAL

- A.** Waste Disposal as Fill Material: Dispose of clean masonry waste, including excess or soil-contaminated sand, waste mortar, and broken masonry units, by crushing and mixing with fill material as fill is placed.
1. Do not dispose of masonry waste as fill within 18 inches of finished grade.
 2. Remove excess clean masonry waste that cannot be used as fill, as described above, and other masonry waste, and legally dispose of off Owner's property.

END OF SECTION

50% Design Review
1/26/20

SECTION 044313.16
ADHERED STONE MASONRY VENEER

PART 1 - TIPS:

To view non-printing **Editor's Notes** that provide guidance for editing, click on Masterworks/Single File Formatting/Toggle/Editor's Notes.

To read **detailed research, technical information about products and materials, and coordination checklists**, click on Masterworks/Supporting Information.

GENERAL

1.1 SECTION REQUIREMENTS

- 1.1.1 Submittals: Samples for stone and colored mortar.
- 1.1.2 Submit qualification data for masonry contractor, including a list of completed projects.
- 1.1.3 Do not use frozen materials or materials mixed or coated with ice or frost. Do not build on frozen subgrade or setting beds. Comply with cold-weather construction requirements contained in TMS 602/ACI 530.1/ASCE 6.
- 1.1.4 Comply with hot-weather construction requirements contained in TMS 602/ACI 530.1/ASCE 6.

PART 2 - PRODUCTS

2.1 STONE

- 2.1.1 Match stone on existing Comfort Station on property.

2.2 MORTAR

- 2.2.1 Mortar for Stone Masonry Veneer: ASTM C 270, Proportion Specification, ~~[Type S]~~ ~~[Type N]~~ for setting stone, Type N ~~[Type O]~~ for pointing.
 - 2.2.1.1 Use- portland cement-lime ~~[or masonry cement]~~ mortar.
 - 2.2.1.2 Low-Alkali Cement: Use portland cement with not more than 0.60 percent total alkali according to ASTM C 114.
 - 2.2.1.3 Colored Pointing Mortar: Use colored cement product of color selected.

2.2.2 Latex-Modified Portland Cement Setting Mortar: Proportion and mix portland cement, aggregate, and latex additive to comply with latex-additive manufacturer's written instructions.

2.2.2.1 Latex Additive: Manufacturer's standard water emulsion.

2.2.2.1.1 Manufacturers: Subject to compliance with requirements, provide products by one of the following:

2.2.2.1.1.1 Custom Building Products.

2.2.2.1.1.2 Laticrete International, Inc.

2.2.2.1.1.3 Southern Grouts & Mortars, Inc.

——Mortar for Scratch Coat over Metal Lath: 1 part portland cement, 1/2 part lime, and

2.2.42.2.3 Mortar for Scratch Coat over Unit Masonry: 1 part portland cement, 1 part lime, and 7 parts sand.

2.3 EMBEDDED FLASHING MATERIALS

2.3.1 Metal Flashing: Stainless steel, 0.016 inch thick, 10-oz./sq. ft. weight or 0.0135 inch thick for fully concealed flashing, 16-oz./sq. ft. weight or 0.0216 inch thick elsewhere.

2.3.2 Laminated Flashing: Copper sheet 5 oz./sq. ft., bonded with asphalt between two layers of glass-fiber cloth. Use only where flashing is fully concealed.

2.3.3 Rubberized-Asphalt Flashing: Adhesive rubberized-asphalt compound, bonded to polyethylene film, with an overall thickness of 0.030 inch. Use only where flashing is fully concealed.

2.3.4 Butyl Rubber Flashing: Pliable, butyl rubber compound, bonded to a polyethylene film, aluminum foil, or spunbonded polyolefin to produce an overall thickness of not less than 0.040 inch. Use only where flashing is fully concealed.

2.3.5 Elastomeric Thermoplastic Flashing: Composite flashing product consisting of a polyester-reinforced ethylene interpolymer alloy, 0.025 inch thick, with a thick coating of adhesive. Use only where flashing is fully concealed.

2.4 MISCELLANEOUS MATERIALS

2.4.1 Dampproofing for Limestone: Cementitious dampproofing recommended by ILI.

2.4.2 Weeps: Round polyethylene tubing, 3/8-inch OD.

2.4.3 Expanded Metal Lath: ASTM C 847, 3.4-lb/sq. yd.,
galvanized, self-furring, diamond-mesh lath.

2.4.4 Welded-Wire Lath: ASTM C 933, 2-by-2-inch mesh, 0.0625-
inch- diameter, galvanized-steel wire.

STONE FABRICATION
STONE FABRICATION
STONE FABRICATION

2.5.12.4.5 Gage backs of stones more than 81 sq. in. in area.

2.5.22.4.6 Thickness of Stone Masonry Veneer: 1 inch plus or minus 1/4 inch

2.5.32.4.7 Type of Masonry (Pattern): Split-bed, broken-range ashlar with random course heights
and random lengths (interrupted coursed).

2.5.42.4.8 Finish: Split face.

PART 3 - EXECUTION

3.1 SETTING STONE MASONRY VENEER, GENERAL

3.1.1 Execute stone masonry by skilled masons experienced with the kind and form of stone
and installation method indicated. Arrange stones for good fit, in pattern indicated.

3.1.2 Maintain uniform joint widths except for variations due to different stone sizes and minor
variations required to maintain bond alignment. Lay walls with joints not less than
3/8 inch] at narrowest points or more than 1 inch]
at widest points.

3.1.3 Install embedded flashing at shelf angles, lintels, ledges, other obstructions to downward
flow of water in wall, and where indicated.

3.1.3.1 Extend flashing 4 inches into masonry at each end and turn
up 2 inches (50 mm) to form a pan.

3.1.4 Coat limestone with dampproofing on beds, joints, and back surfaces to at least 12
inches above finish-grade elevations, and on face surfaces up to
finish-grade elevations.

3.2 INSTALLING ADHERED STONE MASONRY VENEER

- 3.2.1 Install lath over weather-resistive barrier by fastening through sheathing into framing to comply with ASTM C 1063.
- 3.2.2 Install lath over unit masonry and concrete to comply with ASTM C 1063.
- 3.2.3 Install 3/8-inch- thick scratch coat over metal lath. Coat backs of stone units and face of scratch coat with cement-paste bond coat, then butter both surfaces with setting mortar. Tap units into place, completely filling space between units and scratch coat.
- 3.2.4 Rake out joints for pointing 1/2 inch] deep.

3.3 POINTING

- 3.3.1 Point stone joints by placing and compacting pointing mortar in layers not more than 3/8 inch deep. Compact each layer thoroughly and allow it to become thumbprint hard before applying next layer.
- 3.3.2 Tool joints, when pointing mortar is thumbprint hard, with a smooth jointing tool to produce joint profile indicated.

3.4 CLEANING

- 3.4.1 In-Progress Cleaning: Clean masonry as work progresses. Remove mortar fins and smears before tooling joints.
- 3.4.2 Final Cleaning: After mortar is thoroughly cured, remove large mortar particles, scrub, and rinse stone masonry veneer.

A. If residual mortar is on face of stone, allow to dry partially and brush mortar off surface and sponge off residue.

B. When work is completed and mortar has set for 2 to 3 days, clean surface from top to bottom using mild masonry detergent acceptable to natural stone manufacturer.

C. Do not use harsh cleaning materials or methods that could damage stone.

D. Do not use metal brushes or acids for cleaning.

END OF SECTION

**SECTION 055000
METAL FABRICATIONS**

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Shop fabricated ferrous metal items, galvanized and prime painted.

1.2 PRODUCTS FURNISHED BUT NOT INSTALLED UNDER THIS SECTION

- A. Section 033000-Concrete: Placement of metal fabrications in concrete.
- B. Section 042000-Masonry: Placement of metal fabrications in masonry.

1.3 REFERENCES

- A. ASTM A36-Structural Steel.
- B. ASTM A53-Hot-Dipped, Zinc-Coated Welded and Seamless Steel Pipe.
- C. ASTM A123-Zinc (Hot-Galvanized) Coatings on Products Fabricated from Rolled, Pressed and Forged Steel Shapes, Plates, Bars, and Strip.
- D. ASTM A153-Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
- E. ASTM A307-Carbon Steel Externally Threaded Standard Fasteners.
- F. ASTM A325-High Strength Bolts for Structural Steel Joints.
- G. ASTM A386-Zinc-Coating (Hot-Dip) on Assembled Steel Products.
- H. ASTM A500-Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Round and Shapes.
- I. ASTM A992 - Standard Specification for Structural Steel Shapes.
- J. AWS A2.0-Standard Welding Code.
- K. AWS D1.1-Structural Welding Code.
- L. SSPC-Steel Structures Painting Council.

1.4 SUBMITTALS

- A. Submit under provisions of Division 1.
- B. Shop Drawings: Indicate profiles, sizes, connection attachments, reinforcing, anchorage, size and type of fasteners, and accessories. Include erection drawings, elevations, and details where applicable.
- C. Indicate welded connections using standard AWS A2.0 welding symbols. Indicate net weld lengths.

1.5 QUALIFICATIONS

- A. Welder's Certificates: Submit under provisions of Division 1, certifying welders employed on the Work, verifying AWS qualification within the previous 12 months.

1.6 FIELD MEASUREMENTS

- A. Verify that field measurements are as indicated on the Drawings.

PART 2 PRODUCTS

2.1 MATERIALS

- A. Structural Steel Wide Flange("W") Shapes: ASTM A992.
- B. Hollow Structural Sections("HSS"):

1. All square and rectangular sections, and round sections with a wall thickness of 5/8" or less: ASTM A500, Grade B.
 2. Round sections with a wall thickness greater than 5/8": ASTM A53, Grade B.
- C. All other structural steel shapes, plates and rods: ASTM A36.
 - D. Steel Tubing: ASTM A500, Grade B.
 - E. Plates: ASTM A36.
 - F. Pipe: ASTM A53, Grade B, Schedule 40.
 - G. Bolts, Nuts, and Washers: ASTM A325 or A307 galvanized to ASTM A153 for galvanized components.
 - H. Welding Materials: AWS D1.1; type required for materials being welded.
 - I. Shop and Touch-Up Primer: SSPC 15, Type 1, red oxide
 - J. Touch-Up Primer for Galvanized Surfaces: Zinc rich type.
 - K. Hog Wire Fencing: 4x4 1/4 gauge galvanized metal fence, welded at each wire crossing. Secure to studs at with heavy gauge staples, embed wire ends in adjacent wood 1" deep.

2.2 FABRICATION

- A. Fit and assemble in largest practical sections, for delivery to site.
- B. Fabricate items with joints tightly fitted and secured.
- C. Continuously seal joined members by intermittent welds and plastic filler.
- D. Grind exposed joints flush and smooth with adjacent finish surface. Make exposed joints butt tight, flush and hairline. Grind exposed edges to small uniform radius.
- E. Exposed Mechanical Fastenings: Flush countersunk screws or bolts; unobtrusively located; consistent with design of component, except where specifically noted otherwise.
- F. Supply components required for anchorage of fabrications. Fabricate anchors and related components of same material and finish as fabrication, except where specifically noted otherwise.

2.3 FINISHES

- A. Clean surfaces of rust, scale, grease, and foreign matter prior to finishing.
- B. Do not prime surfaces in direct contact with concrete or where field welding is required.
- C. Prime paint items with one coat.
- D. Galvanize in accordance with ASTM A123, structural steel members. Provide minimum 1.25 oz/sq. foot galvanized coating.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify that field conditions are acceptable and are ready to receive work.
- B. Beginning of installation means erector accepts existing conditions.

3.2 PREPARATION

- A. Clean and strip primed steel items to bare metal where site welding is required.
- B. Supply items required to be cast into concrete or embedded in masonry with setting templates.

3.3 INSTALLATION

- A. Install items plumb and level, accurately fitted, free from distortion or defects.
- B. Allow for erection loads, and for sufficient temporary bracing to maintain true alignment until completion of erection and installation of permanent attachments.
- C. Field weld components indicated on Drawings.
- D. Perform field welding in accordance with AWS D1.1.

- E. Obtain Architect/Engineer approval prior to site cutting or making adjustments not scheduled.
- F. After erection, prime welds, abrasions, and surfaces not shop primed or galvanized, except surfaces to be in contact with concrete.

3.4 ERECTION TOLERANCES

- A. Maximum variation from Plumb: 1/4" per story, non-cumulative.
- B. Maximum Offset from true Alignment: 1/4".

3.5 SCHEDULE

- A. The Schedule is a list of principal items only. Refer to Drawing details for items not specifically scheduled.
- B. Ladder: Steel, of 3/8" x 2" side rails spaced at 20"; rungs of 3/4" diameter solid rod spaced 12" on center; space rungs 7" from wall surface; with steel mounting brackets and attachments; prime paint finish.
- C. Guard rails: As detailed, prime paint finish.
- D. Bollards: Steel pipe, concrete filled, crowned cap, as detailed; prime paint finish.
- E. Ledge and Shelf Angles, Channels and Plates not attached to Structural Framing: for support of masonry; prime paint finish.
- F. Lintels: As detailed; prime paint finish.
- G. Door Frames for Overhead Door Openings and Wall Openings: Channel and Angle sections, galvanized finish.
- H. Mud and Foot Grilles including pans; as detailed; galvanized finish.
- I. Grating and Floor Plates: Size and type designated on the plans, plain finish, unless noted otherwise on plans.

END OF SECTION

**SECTION 061000
ROUGH CARPENTRY**

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:

1. Framing with dimensionlumber.
2. Framing with engineered wood products.
3. Wood blocking and nailers.
4. Wood furring.
5. Wood sleepers.
6. Plywood backing panels.

1.2 SUBMITTALS

A. Product Data: For each type of process and factory-fabricated product.

1. Include data for wood-preservative treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements.

B. Material Certificates: For dimension lumber specified to comply with minimum allowable unit stresses. Indicate species and grade selected for each use and design values approved by the American Lumber Standards Committee Board of Review.

1.3 QUALITY ASSURANCE

A. Forest Certification: For the following wood products, provide materials produced from wood obtained from forests certified by an FSC-accredited certification body to comply with FSC 1.2, "Principles and Criteria":

1. Dimension lumber framing.
2. Laminated veneer lumber.
3. Prefabricated wood I-joists.
4. Rim boards.
5. Miscellaneous lumber.

PART 2 - PRODUCTS

2.1 WOOD PRODUCTS, GENERAL

A. Lumber: DOC PS 20 and applicable rules of grading agencies indicated. If no grading agency is indicated, provide lumber that complies with the applicable rules of any rules-writing agency certified by the ALSC Board of Review. Provide lumber graded by an agency certified by the ALSC Board of Review to inspect and grade lumber under the rules indicated.

1. Factory mark each piece of lumber with grade stamp of grading agency.

2. For exposed lumber indicated to receive a stained or natural finish, mark grade stamp on end or back of each piece or omit grade stamp and provide certificates of grade compliance issued by grading agency.
 3. Provide dressed lumber, S4S, unless otherwise indicated.
- B. Engineered Wood Products: Provide engineered wood products acceptable to authorities having jurisdiction and for which current model code research or evaluation reports exist that show compliance with building code in effect for Project.
1. Allowable Design Stresses: Provide engineered wood products with allowable design stresses, as published by manufacturer, that meet or exceed those indicated. Manufacturer's published values shall be determined from empirical data or by rational engineering analysis and demonstrated by comprehensive testing performed by a qualified independent testing agency.

2.2 WOOD-PRESERVATIVE-TREATED LUMBER

- A. Preservative Treatment by Pressure Process: AWPAC C2.
- B. Kiln-dry lumber after treatment to a maximum moisture content of 19 percent.
- C. Mark lumber with treatment quality mark of an inspection agency approved by the ALSC Board of Review.
- D. Application: Treat all rough carpentry, unless otherwise indicated.
1. Wood cants, nailers, curbs, equipment support bases, blocking, stripping, and similar members in connection with roofing, flashing, vapor barriers, and waterproofing.
 2. Wood sills, sleepers, blocking, furring and similar concealed members in contact with masonry or concrete.
 3. Wood framing and furring attached directly to the interior of below-grade exterior masonry or concrete walls.
 4. Wood framing members that are less than 18 inches above the ground in crawlspaces or unexcavated areas.
 5. Wood floor plates that are installed over concrete slabs-on-grade.

2.3 DIMENSION LUMBER FRAMING

- A. Maximum Moisture Content: 19 percent.
- B. Non-Load-Bearing Interior Partitions: Construction, Stud, or No. 3 grade of any species.
- C. Framing Other Than Non-Load-Bearing Interior Partitions: No. 2 grade and the following species:
1. Hem-fir (north); NLGA.
 2. Southern pine; SPIB.
 3. Douglas fir-larch; WCLIB or WWPA.
 4. Mixed southern pine; SPIB.
 5. Spruce-pine-fir; NLGA.
 6. Douglas fir-south; WWPA.
 7. Hem-fir; WCLIB or WWPA.
 8. Douglas fir-larch (north); NLGA.

9. Spruce-pine-fir (south); NeLMA, WCLIB, or WWPA.

D. Exposed Exterior Framing: Provide material hand-selected for uniformity of appearance and freedom from characteristics, on exposed surfaces and edges, that would impair finish appearance, including decay, honeycomb, knot-holes, shake, splits, torn grain, and wane.

1. Species and Grade: As indicated above for load-bearing construction of same
2. Species and Grade: type. Hem-fir (north), Select Structural grade; NLGA.
3. Species and Grade: Southern pine, Select Structural grade; SPIB.
4. Species and Grade: Douglas fir-larch; Select Structural grade; WCLIB, or WWPA.

2.4 MISCELLANEOUS LUMBER

A. General: Provide miscellaneous lumber indicated and lumber for support or attachment of other construction, including the following:

1. Blocking.
2. Nailers.
3. Cants.
4. Furring.
5. Grounds

B. For items of dimension lumber size, provide Construction or No. 2 grade lumber with 19 percent maximum moisture content of any species.

2.5 PLYWOOD BACKING PANELS

A. Telephone and Electrical Equipment Backing Panels: DOC PS 1, Exposure 1, C-D Plugged in thickness indicated or, if not indicated, not less than 1/2-inch nominal thickness.

2.6 FASTENERS

A. General: Provide fasteners of size and type indicated that comply with requirements specified.

1. Where rough carpentry is exposed to weather, in ground contact, pressure-preservative treated, or in area of high relative humidity, provide fasteners of Type 304 stainless steel.

B. Power-Driven Fasteners: NES NER-272.

C. Bolts: Steel bolts complying with (ASTM A 307, Grade A; with ASTM A 563 hex nuts and, where indicated, flat washers.

2.7 METAL FRAMING ANCHORS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Alpine Engineered Products, Inc.
2. Cleveland Steel Specialty Co.
3. Harlen Metal Products, Inc.
4. KC Metals Products, Inc.

5. Simpson Strong-Tie Co., Inc.
6. Southeastern Metals Manufacturing Co., Inc.
7. USP Structural Connectors.

- B. Galvanized Steel Sheet: Hot-dip, zinc-coated steel sheet complying with ASTM A 653/A 653M, G60 coating designation.

2.8 MISCELLANEOUS MATERIALS

- A. Sill-Sealer Gaskets: Glass-fiber-resilient insulation, fabricated in strip form, for use as a sill sealer; 1-inch nominal thickness, compressible to 1/32 inch; selected from manufacturer's standard widths to suit width of sill members indicated.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Set rough carpentry to required levels and lines, with members plumb, true to line, cut, and fitted. Fit rough carpentry to other construction; scribe and cope as needed for accurate fit. Locate nailers, blocking, and similar supports to comply with requirements for attaching other construction.
- B. Framing Standard: Comply with AF&PA's "Details for Conventional Wood Frame Construction," unless otherwise indicated.
- C. Framing with Engineered Wood Products: Install engineered wood products to comply with manufacturer's written instructions.
- D. Metal Framing Anchors: Install metal framing to comply with manufacturer's written instructions.
- E. Do not splice structural members between supports, unless otherwise indicated.
- F. Comply with AWPA M4 for applying field treatment to cut surfaces of preservative-treated lumber.
- G. Securely attach rough carpentry work to substrate by anchoring and fastening as indicated, complying with the following:
1. NES NER-272 for power-driven fasteners.
 2. Table 2304.9.1, "Fastening Schedule," in ICC's International Building Code.
 3. Table 23-II-B-1, "Nailing Schedule," and Table 23-II-B-2, "Wood Structural Panel Roof Sheathing Nailing Schedule," in ICBO's Uniform Building Code.
 4. Table 2305.2, "Fastening Schedule," in BOCA's BOCA National Building Code.
 5. Table 2306.1, "Fastening Schedule," in SBCCI's Standard Building Code.
 6. Table R602.3(1), "Fastener Schedule for Structural Members," and Table R602.3(2), "Alternate Attachments," in ICC's International Residential Code for One- and Two-Family Dwellings.
 7. Table 602.3(1), "Fastener Schedule for Structural Members," and Table 602.3(2), "Alternate Attachments," in ICC's International One- and Two-Family Dwelling Code.

3.2 PROTECTION

- A. Protect wood that has been treated with inorganic boron (SBX) from weather. If, despite protection, inorganic boron-treated wood becomes wet, apply EPA-registered borate treatment. Apply borate solution by spraying to comply with EPA-registered label.

END OF SECTION

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**SECTION 061323
HEAVY TIMBER CONSTRUCTION**

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes framing using timbers and round wood poles.

1.2 DEFINITIONS

A. Timbers: Lumber of 5 inches nominal or greater in least dimension.
B. Inspection agencies, and the abbreviations used to reference them, include the following:

1. NELMA - Northeastern Lumber Manufacturers Association.
2. NLGA - National Lumber Grades Authority.
3. SPIB - Southern Pine Inspection Bureau.
4. WCLIB - West Coast Lumber Inspection Bureau.
5. WWPA - Western Wood Products Association.

1.3 SUBMITTALS

A. Certificates of Inspection: Issued by lumber grading agency for exposed timber not marked with grade stamp.
B. Shop drawings

1.4 QUALITY ASSURANCE

A. Timber Standard: Comply with AITC 108, "Standard for Heavy Timber Construction."

1.5 DELIVERY, STORAGE, AND HANDLING

A. Schedule delivery of heavy timber construction to avoid extended on-site storage and to avoid delaying the Work.

PART 2 - PRODUCTS

2.1 HEAVY TIMBER, GENERAL

A. General: Comply with DOC PS 20 and grading rules of lumber grading agencies certified by American Lumber Standards Committee Board of Review, as applicable.
1. Factory mark each item of timber with grade stamp of grading agency.
2. For exposed timber indicated to receive a stained or natural finish, apply grade stamps to surfaces that will not be exposed to view or omit grade stamps and provide certificates of grade compliance issued by grading agency.

2.2 TIMBER

A. Timber Species and Grade: Douglas fir-larch (North); Select Structural, NELMA, NLGA, SPIB, WCLIB, or WWPA.
B. Moisture Content: Provide timber with 19 percent maximum moisture content at time of dressing.
C. Dressing: Provide dressed timber (S4S).
D. End Sealer: Manufacturer's standard, transparent, colorless wood sealer that is effective in retarding the transmission of moisture at cross-grain cuts.
E. Penetrating Sealer: Manufacturer's standard, transparent, penetrating wood sealer that is compatible with indicated finish.

2.3 ROUND WOOD POLES

- A. Round Wood Poles: Clean-peeled wood poles complying with ASTM D 3200; with at least 80 percent of inner bark removed and with knots and limbs cut flush with the surface and hand honed.

2.4 TIMBER CONNECTORS

- A. General: Unless otherwise indicated, fabricate from the following materials:
 - 1. Structural-steel shapes, plates, and flat bars complying with ASTM A 36/A 36M.
 - 2. Round steel bars complying with ASTM A 575, Grade M 1020.
 - 3. Hot-rolled steel sheet complying with ASTM A 1011, Structural Steel, Type SS, Grade 33.
- B. Provide bolts, 3/4 inch, unless otherwise indicated, complying with ASTM A 307, Grade A; nuts complying with ASTM A 563; and, where indicated, flat washers.
- C. Provide shear plates, 2-5/8 inches in diameter, complying with ASTM D 5933.
- D. Finish steel assemblies and fasteners with rust-inhibitive primer, 2-mil dry film thickness.
- E. Hot-dip galvanize steel assemblies and fasteners after fabrication to comply with ASTM A 123/A 123M or ASTM A 153/A 153M.

2.5 FABRICATION

- A. Shop fabricate members by cutting and restoring exposed surfaces to match specified surfacing. Predrill for fasteners and assembly of units.
 - 1. Finish exposed surfaces to remove planing or surfacing marks and to provide a finish equivalent to that produced by machine sanding with No. 120 grit sandpaper.
- B. Seal Coat: After fabricating and surfacing each unit, apply a saturation coat of penetrating sealer on surfaces of each unit.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. General: Erect heavy timber construction true and plumb. Provide temporary bracing to maintain lines and levels until permanent supporting members are in place.
- B. Fit members by cutting and restoring exposed surfaces to match specified surfacing. Predrill for fasteners and assembly of units.
 - 1. Finish exposed surfaces to remove planing or surfacing marks and to provide a finish equivalent to that produced by machine sanding with No. 120 grit sandpaper.
 - 2. Coat crosscuts with end sealer.
- C. Install timber connectors as indicated.
 - 1. Install bolts with orientation as indicated or, if not indicated, as directed by Architect.
- D. Repair damaged surfaces and finishes after completing erection. Replace damaged heavy timber construction if repairs are not approved by Architect.

END OF SECTION

SECTION 061600 SHEATHING

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:

1. Wall sheathing.
2. Roof sheathing.
3. Subflooring.
4. Underlayment.
5. Building paper.
6. Building wrap.
7. Sheathing joint-and-penetration treatment.
8. Flexible flashing at openings in sheathing.

1.2 SUBMITTALS

A. Product Data: For each type of process and factory-fabricated product. Indicate component materials and dimensions and include construction and application details.

1. Include data for wood-preservative treatment from chemical treatment manufacturer and certification by treating plant that treated plywood complies with requirements.

B. Research/Evaluation Reports: For the following:

1. Preservative-treated plywood.
2. Building wrap.

1.3 QUALITY ASSURANCE

A. Fire-Test-Response Characteristics: For assemblies with fire-resistance ratings, provide materials and construction identical to those of assemblies tested for fire resistance per ASTM E 119 by a testing and inspecting agency acceptable to authorities having jurisdiction.

1. Plywood.
2. Oriented strand board.
3. Hardboard underlayment.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Stack plywood and other panels flat with spacers between each bundle to provide air circulation. Provide for air circulation around stacks and under coverings.

PART 2 - PRODUCTS

2.1 WOOD PANEL PRODUCTS, GENERAL

- A. Plywood: DOC PS 1.
- B. Oriented Strand Board: DOC PS 2.

2.2 PRESERVATIVE-TREATED PLYWOOD

- A. Preservative Treatment by Pressure Process: AWPAC9.
- B. Mark plywood with appropriate classification marking of an inspection agency acceptable to authorities having jurisdiction.
- C. Application: Treat items indicated on Drawings and plywood in contact with masonry or

concrete or used with roofing, flashing, vapor barriers, and waterproofing.

2.3 WALL SHEATHING

- A. Plywood Wall Sheathing: Exposure 1 sheathing or as indicated on drawings.
- B. Oriented-Strand-Board Wall Sheathing: Exposure 1 sheathing or as indicated on drawings.

2.4 ROOF SHEATHING

- A. Plywood Roof Sheathing: Exposure 1, Structural I sheathing or as indicated on drawings.
- B. Oriented-Strand-Board Roof Sheathing: Exposure 1, Structural I sheathing or as indicated on drawings.

2.5 SUBFLOORING AND UNDERLAYMENT

- A. Plywood Subflooring: Exposure 1, Structural I single-floor panels or sheathing or as indicated on drawings.

2.6 FASTENERS

- A. General: Provide fasteners of size and type indicated.
 - 1. For wall and roof sheathing panels, provide fasteners with corrosion-protective coating having a salt-spray resistance of more than 800 hours according to ASTM B 117.

2.7 WEATHER-RESISTANT SHEATHING PAPER

- A. Building Paper: ASTM D 226, Type 1 (No. 15 asphalt-saturated organic felt), unperforated.
- B. Building Wrap: ASTM E 1677, Type I air retarder; with flame-spread and smoke-developed indexes of less than 25 and 450, respectively, when tested according to ASTM E 84; UV stabilized; and acceptable to authorities having jurisdiction.
 - 1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:
 - 2. Products: Subject to compliance with requirements, provide one of the following:
 - a. Dow Chemical Company (The); Styrofoam Weathermate Plus Brand Housewrap.
 - b. DuPont (E. I. du Pont de Nemours and Company); Tyvek
 - c. Ludlow Coated Products;
 - d. Pactiv, Inc.; GreenGuard
 - e. Raven Industries Inc.; Rufco-Wrap.
 - f. Reemay, Inc.; Tytar HouseWrap.
 - g. Substitutions per Division 1
 - 3. Water-Vapor Permeance: Not less than 58 perms through 1 sq. m of surface in 24 hours per ASTM E 96, Desiccant Method (Procedure A).
- C. Building-Wrap Tape: Tape recommended by building-wrap manufacturer.

2.8 MISCELLANEOUS MATERIALS

- A. Adhesives for Field Gluing Panels to Framing: Formulation complying with ASTM D 3498 that is approved for use indicated by manufacturers of both adhesives and panels.
 - 1. Use adhesives that have a VOC content of 70 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
- B. Flexible Flashing: Self-adhesive, rubberized-asphalt compound, bonded to a high-density, polyethylene film to produce an overall thickness of not less than 0.025 inch (0.6 mm).

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

- A. Securely attach to substrate by fastening as indicated, complying with the following:
 - 1. NES NER-272 for power-driven fasteners.
 - 2. "Fastening Schedule," in 2015 Michigan Building Code as required."
- B. Coordinate sheathing installation with flashing and joint-sealant installation so these materials are installed in sequence and manner that exclude exterior moisture.
- C. Do not bridge building expansion joints; cut and space edges of panels to match spacing of structural support elements.

3.2 WOOD STRUCTURAL PANEL INSTALLATION

- A. General: Comply with applicable recommendations in APA Form No. E30K, "APA Design/Construction Guide: Residential & Commercial."
- B. Fastening Methods: Fasten panels as indicated below:
 - 1. Combination Subfloor-Underlayment:
 - a. Glue and nail to wood framing.
 - b. Screw to cold-formed metal framing.
 - 2. Subflooring:
 - a. Glue and nail to wood framing.
 - b. Screw to cold-formed metal framing.
 - 3. Wall and Roof Sheathing:
 - a. Nail to wood framing. Apply a continuous bead of glue to framing members at edges of wall sheathing panels.
 - b. Screw to cold-formed metal framing.
 - 4. Underlayment:
 - a. Nail to subflooring.

3.3 WEATHER-RESISTANT SHEATHING-PAPER INSTALLATION

- A. General: Cover sheathing with weather-resistant sheathing paper as follows:
 - 1. Cut back barrier 1/2 inch (13 mm) on each side of the break in supporting members at expansion- or control-joint locations.
 - 2. Apply barrier to cover vertical flashing with a minimum 4-inch (100-mm) overlap, unless otherwise indicated.
- B. Building Paper: Apply horizontally with a 2-inch (50-mm) overlap and a 6-inch (150-mm) end lap; fasten to sheathing with galvanized staples or roofing nails.
- C. Building Wrap: Comply with manufacturer's written instructions.
 - 1. Seal seams, edges, fasteners, and penetrations with tape.
 - 2. Extend into jambs of openings and seal corners with tape.

3.4 SHEATHING JOINT-AND-PENETRATION TREATMENT

- A. Seal sheathing joints according to sheathing manufacturer's written instructions.
 - 1. Apply elastomeric sealant to joints and fasteners and trowel flat. Seal other penetrations and openings.

3.5 FLEXIBLE FLASHING INSTALLATION

A. Apply flexible flashing where indicated to comply with manufacturers written instructions.

1. Lap seams and junctures with other materials at least 4 inches (100 mm), except that at flashing flanges of other construction, laps need not exceed flange width.
2. Lap flashing over weather-resistant building paper at bottom and sides of openings.
3. Lap weather-resistant building paper over flashing at heads of openings.
4. After flashing has been applied, roll surfaces with a hard rubber or metal roller.

END OF SECTION

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**SECTION 062000
FINISH CARPENTRY**

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Finish carpentry items.
- B. Hardware and attachment accessories.
- C. Wood trim, rails and exposed wood.
- D. Interior Tongue and Groove
- E. Exterior Trim
- F. Exterior Plywood Soffit

1.2 REFERENCES

- A. ANSI/HPHA HP - American Standard for Hardwood and Decorative Plywood.
- B. ANSI A135.4 - Basic Hardboard.
- C. AWI - Quality Standards.
- D. FS MM-L-736 - Lumber; Hardwood.
- E. FS MMM-A-130 - Adhesive, Contact.
- F. PS 1 - Construction and Industrial Hardwood.
- G. PS 20 - American Softwood Lumber Standard.

1.3 SUBMITTALS.

- A. Submit Shop Drawings indicating materials, component profiles, fastening methods, jointing details, finishes, and accessories to a minimum scale of 1-1/2 inch to one foot.
- B. Submit Product Data of each product used.
- C. Submit two samples 6 inches long of all wood products listed under Materials illustrating wood grain and specified finish.
- D. Submit fabricator's installation instructions for each product.
- E. Submit instructions for use of adhesives, attachment hardware, and finish hardware.

1.4 QUALITY ASSURANCE

- A. Forest Certification: For the following wood products, provide materials produced from wood obtained from forests certified by an FSC-accredited certification body to comply with FSC 1.2, "Principles and Criteria"
- B. Provide AWI Quality Certification Program labels and certificates for woodwork and installation.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Store materials in ventilated, interior locations under constant minimum temperatures of 60 degrees F and maximum relative humidity of 55 percent.

PART 2 PRODUCTS

2.1 MATERIALS

- A. Lumber: DOC PS 20 and applicable grading rules of inspection agencies certified by ALSC's Board of Review. Softwood Plywood: DOC PS 1.; maximum moisture content of 15 percent; Flame spread index of 75 or less per ASTM E 84; Cedar species for interior and exterior spaces; with flat grain, of quality capable and acceptable of transparent finish.

- B. Kiln Dried Cedar Quarter Log: 8" or 10" exterior log siding, smooth finish.
- C. Cedar Trim: All exterior trim to match, size to be 2x at corners, windows and doors.
- D. Cedar Tongue and Groove: Michigan White Cedar 1x tongue and groove siding on walls, ceilings, and floors. Prefinished, stain color per code to room finishes. All interior trim to match.
- E. Plywood Soffits: Exterior Grade A/B, %" or as indicated on drawings. Species: Douglas Fir, Surface: Smooth

2.2 WOOD-PRESERVATIVE-TREATED MATERIALS

A. Preservative Treatment by Pressure Process:

- 1. Lumber: AWPAC C2. Kiln dry after treatment to a maximum moisture content of 19 percent.
- 2. Plywood: AWPAC C9. Kiln dry after treatment to a maximum moisture content of 18 percent.
- 3. Preservative Chemicals: Acceptable to authorities having jurisdiction and containing no arsenic or chromium.
- 4. Application: All exterior lumber and plywood

2.3 ADHESIVE

- A. Contact Adhesives (interior): FS MMM-A-130; solvent release type.
- B. Wall and Ceiling Adhesive (interior): Solvent release, cartridge type, compatible with wall substrate, capable of achieving durable bond.

2.4 ACCESSORIES

- A. Nails: Size and type to suit application, coated finish.
- B. Bolts, Nuts, Washers, Blind Fasteners, Lags, and Screws: Size and type to suit application; galvanized finish.
- C. Lumber for Shimming and Blocking: Softwood lumber, Southern Pine.
- D. Primer: primer sealer as specified in Section 09900.
- E. Wood Filler: Solvent or Oil base, tinted to match surface finish color.

2.5 MISCELLANEOUS MATERIALS

- A. Fasteners for Exterior Finish Carpentry: Provide nails or screws, in sufficient length to penetrate not less than 1-1/2 inches (38 mm) into wood substrate.
 - 1. For prefinished items, provide matching prefinished aluminum fasteners where face fastening is required.
 - 2. For applications not otherwise indicated, provide hot-dip galvanized steel fasteners.
- B. Insect Screening for Soffit Vents: Aluminum, 18-by-16 (1.4-by-1.6-mm) mesh.
- C. Sealants: Latex, complying with ASTM C 834, Type P, Grade NF and with applicable requirements in Division 07 Section "Joint Sealants," recommended by sealant manufacturer and manufacturer of substrates for intended application.

2.6 FABRICATION

- A. Fabricate to AWI Premium standards using Grade A materials.
- B. Shop prepare and identify components for book match grain matching during site erection.

2.7 SHOP FINISHING

- A. Shop finish work in accordance with AWI 'Factory Finishing' Section 1500.
- B. Transparent Finish: AWI System Number 5; Premium.
- C. Opaque Finish: AWI System Number 400B, Premium.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify that surfaces are ready to receive work and field measurements are as shown on Shop Drawings.
- B. Verify mechanical, electrical, and building items affecting work of this Section are placed and ready to receive this work.
- C. Beginning of installation means acceptance of existing conditions.

3.2 PREPARATION

- A. Back prime all exterior trim and siding work.

3.3 PROJECT CONDITIONS

- A. Environmental Limitations: Do not deliver or install woodwork until building is enclosed, wet work is complete, and HVAC system is operating and maintaining temperature and relative humidity at occupancy levels during the remainder of the construction period.

3.4 INSTALLATION

- A. Install work in accordance with AWI Premium quality standard.
- B. Set and secure materials and components in place, plumb and level.
- C. Install components and trim with coated nails at approximately 12 inches on center.
- D. Cover exposed edges of plywood with trim.
- E. Install trim with minimum number of joints practical, using full-length pieces from maximum lengths of lumber available. Do not use pieces less than 24 inches (610 mm) long except where necessary.
- F. Fit exterior joints to exclude water. Cope at returns and miter at corners.
- G. Siding installation: Install siding to comply with manufacturer's written instructions.
- H. Tongue and Groove installation: Install per manufacturer's written instructions. Select and arrange on each surface to minimize noticeable variations in grain character and color between adjacent panels. Leave a $\frac{1}{8}$ " gap to be covered with trim at top, bottom, and openings. Install with uniform tight joints between planks. Attached to supports with manufacturer's recommended adhesive and fasteners, spaced as recommended. Conceal fasteners to greatest practical extent.

3.5 TOLERANCES

- A. Maximum Variation from True Position: 1/16 inch.
- B. Maximum Offset from True Alignment with Abutting Materials: 1/32 inch.

3.6 PREPARATION FOR SITE FINISHING

- A. Set exposed fasteners. Apply wood filler to match finish color in exposed fastener indentations.

Sand work smooth.

- B. Site Finishing: Refer to Section 099000.

3.7 PROTECTION

- A. Protect finished installation under provisions of Section 015000.
- B. Correct all defects per Architect-Engineer approval.

END OF SECTION

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SECTION 066116
SOLID SURFACE FABRICATIONS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the contract, including general and supplementary conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes the following horizontal and trim solid surface product types:

1. Lavatory tops with under-mount bowls

- B. Related Sections include the following:

1. Division 6 Section "Rough Carpentry" for Blocking.
2. Division 9 Section "Wall Cladding."
3. Division 10 Section "Toilet Partitions."
4. Division 15 Section "Plumbing Fixtures."
5. Division 16 Section "Wiring Devices."

1.3 DEFINITION

- A. Solid surface is defined as nonporous, homogeneous material maintaining the same composition throughout the part with a composition of acrylic polymer, aluminum trihydrate filler and pigment.

1.4 SUBMITTALS

- A. Product data:

1. For each type of product indicated.
2. Product data for the Chemical-resistant tops

- B. Shop drawings:

1. Show location of each item, dimensioned plans and elevations, large-scale details, attachment devices and other components.
 - a. Show full-size details, edge details, thermoforming requirements, attachments, etc.
 - b. Show locations and sizes of furring, blocking, including concealed blocking and reinforcement specified in other Sections.
 - c. Show locations and sizes of cutouts and holes for plumbing fixtures, faucets, and other items installed in solid surface.

- C. Samples:

1. Samples for Initial Selection: For each exposed product specified including sealants. Provide representative color charts of manufacturer's full range of colors.
2. Samples for Verification: Provide sample panel verifying color selection.
3. Submit (2) two minimum 6-inch by 6-inch samples.
 - a. Cut sample and seam together for representation of inconspicuous seam if required to have for a 10'-0" length of countertop.
Approved samples will be retained as a standard for work.

D. Product data:

1. Indicate product description, fabrication information and compliance with specified performance requirements.

E. Maintenance data:

1. Submit manufacturer's care and maintenance data, including repair and cleaning instructions.
 - a. Maintenance kit for finishes shall be submitted.
2. Include in project closeout documents.

1.5 QUALITY ASSURANCE

A. Qualifications:

1. Shop that employs skilled workers who custom fabricate products similar to those required for this project and whose products have a record of successful in-service performance.

B. Fabricator/installer qualifications:

Work of this section shall be by a certified fabricator/installer, certified in writing by the manufacturer.

C. Applicable standards:

1. Standards of the following, as referenced herein:
 - a. American National Standards Institute (ANSI)
 - b. American Society for Testing and Materials (ASTM)
 - c. National Electrical Manufacturers Association (NEMA)
 - d. NSF International
2. Fire test response characteristics:
 - a. Provide with the following Class A (Class I) surface burning characteristics as determined by testing identical products per UL 723 (ASTM E84) or another testing and inspecting agency acceptable to authorities having jurisdiction:
 - b. Flame Spread Index: 25 or less.
 - c. Smoke Developed Index: 450 or less.

D. Coordination drawings:

1. Shall be prepared indicating:
 - a. Plumbing work.
 - b. Electrical work.
 - c. Indicate location of all walls and blocking locations.
2. Content:
 - a. Project-specific information, drawn accurately to scale.
 - b. Do not base coordination drawings on reproductions of the contract documents or standard printed data.
 - c. Indicate dimensions shown on the contract drawings and make specific note of dimensions that appear to be in conflict with submitted equipment and minimum clearance requirements.
 - d. Provide alternate sketches to designer for resolution of such conflicts.
3. Minor dimension changes and difficult installations will not be considered changes to the contract.

4. Drawings shall be produced in 1/2-inch scale for all fabricated items.
5. Drawings must be complete and submitted to the architect within 60 days after award of contract.
6. Coordination drawings are required for the benefit of contractor's fabricators/installers as an aid to coordination of their work so as to eliminate or reduce conflicts that may arise during the installation of their work.

1.6 DELIVERY, STORAGE AND HANDLING

- A. Deliver no components to project site until areas are ready for installation.
- B. Store components indoors prior to installation.
- C. Handle materials to prevent damage to finished surfaces.
 1. Provide protective coverings to prevent physical damage or staining following installation for duration of project.

1.7 WARRANTY

- A. Provide manufacturer's warranty against defects in materials.
 1. Warranty shall provide material and labor to repair or replace defective materials.
 2. Damage caused by physical or chemical abuse or damage from excessive heat will not be warranted.
- B. Manufacturer's warranty period of ten years from date of substantial completion.

1.8 MAINTENANCE

- A. Provide maintenance requirements as specified by the manufacturer.

PART 2- PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers:
 1. Subject to compliance with requirements, provide products by one of the following:
 - a. Wilsonart (basis of design/color).
 - b. Corian
 - c. Hanex
 - d. Requests for substitutions will be considered in accordance with provisions of Section 01 60 00 - Product Requirements.

2.2 MATERIALS

- A. Solid polymer components
 1. Cast, nonporous, filled polymer, not coated, laminated or of composite construction with through body colors meeting ANSI Z124.3 or ANSI Z124.6, having minimum physical and performance properties specified.
 2. Superficial damage to a depth of 0.010 inch (.25 mm) shall be repairable by sanding and/or polishing.
- B. Thickness:
 1. 1/2 inch
- C. Edge treatment: Eased
- D. Backsplash: Applied.
- E. Sidesplash: Applied.

F. Performance characteristics:

Property	Typical Result	Test
Tensile Strength	6,000 psi	ASTM D 638
Tensile Modulus	1.5×10^{-6} psi	ASTM D 638
Tensile Elongation	0.4% min.	ASTM D 638
Flexural Strength	10,000 psi	ASTM D 790
Flexural Modulus	1.2×10^{-6} psi	ASTM D 790
Hardness	>85	Rockwell "M" Scale ASTM D 785
	56	Barcol Impressor ASTM D 2583
Thermal Expansion	3.02×10^{-5} in./in./°C (1.80×10^{-5} in./in./°F)	ASTM D 696
Gloss (60° Gardner)	5-75 (matte—highly polished)	ANSI Z124
Light Resistance	(Xenon Arc) No effect	NEMA LD 3-2000 Method 3.3
Wear and Cleanability	Passes	ANSI Z124.3 & Z124.6
Stain Resistance: Sheets	Passes	ANSI Z124.3 & Z124.6
Fungus and Bacteria Resistance	Does not support microbial growth	ASTM G21&G22
Boiling Water Resistance	No visible change	NEMA LD 3-2000 Method 3.5
High Temperature Resistance	No change	NEMA LD 3-2000 Method 3.6
Izod Impact (Notched Specimen)	0.28 ft.-lbs./in. of notch	ASTM D 256 (Method A)
Ball Impact Resistance: Sheets	No fracture—12 lb. ball: 1/4" slab—36" drop 1/2" slab—144" drop	NEMA LD 3-2000 Method 3.8
Weatherability	AE* ₉₄ <5 in 1,000 hrs.	ASTM G155
Specific Gravity t	1.7	
Water Absorption	Long-term 0.4% (3/4") 0.6% (12") 0.8% (14")	ASTM D 570
Toxicity	99 (solid colors) 66 (patterned colors)	Pittsburgh Test ("LC50" Test)
Flammability	All colors (Class I and Class A)	ASTM E 84, NFPA 255 & UL 723
Flame Spread Index	<25	
Smoke Developed Index	<25	

Approximate weight per square foot: 1/4" (6 mm) 2.2 lbs., 1/2" (12.3 mm) 4.4 lbs.

NEMA results based on the NEMA LD 3-2000

2.3 ACCESSORIES

- A. Joint adhesive: Manufacturer's standard one- or two-part adhesive kit to create inconspicuous, nonporous joints.
- B. Sealant: Manufacturer's standard mildew-resistant, FDA-compliant, NSF 51-compliant (food zone — any type), UL-listed silicone sealant in colors matching components.
- C. Sink/lavatory mounting hardware: Manufacturer's standard bowl clips, panel inserts and

fasteners for attachment of under-mount sinks/lavatories.

- D. Conductive tape: Manufacturer's standard aluminum foil tape, with required thickness, for use with cutouts near heat sources.
- E. Insulating felt tape: Manufacturer's standard for use with conductive tape in insulating solid surface material from adjacent heat source.

2.4 FACTORY FABRICATION

A. Shop assembly

- 1. Fabricate components to greatest extent practical to sizes and shapes indicated, in accordance with approved shop drawings and manufacturer's printed instructions and technical bulletins.
- 2. Form joints between components using manufacturer's standard joint adhesive without conspicuous joints.
 - a. Reinforce with strip of solid polymer material, 2" wide.
- 3. Provide factory cutouts for plumbing fittings and bath accessories as indicated on the drawings.
- 4. Rout and finish component edges with clean, sharp returns.
 - a. Rout cutouts, radii and contours to template.
 - b. Smooth edges.
 - c. Repair or reject defective and inaccurate work.

2.5 FINISHES

- A. Select from the manufacturer's standard color chart.
 - 1. Color: Wilsonart Sea Stone 9202CS (basis of design)
 - 2. Provide samples for color selection similar to above color if other manufacturer used.
- B. Finish:
 - 1. Provide surfaces with a uniform finish. a. Matte; gloss range of 5-20.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates and conditions, with fabricator present for compliance with requirements for installation tolerances and other conditions affecting performance of work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Install components plumb, level and rigid, scribed to adjacent finishes, in accordance with approved shop drawings and product data.
 - 1. Provide product in the largest pieces available.
 - 2. Form field joints using manufacturer's recommended adhesive, with joints inconspicuous in finished work.
 - a. Exposed joints/seams shall not be allowed.
 - 3. Reinforce field joints with solid surface strips extending a minimum of 1 inch on either side of the seam with the strip being the same thickness as the top.
 - 4. Cut and finish component edges with clean, sharp returns.
 - 5. Rout radii and contours to template.
 - 6. Anchor securely to base cabinets or other supports.
 - 7. Align adjacent countertops and form seams to comply with manufacturer's written

recommendations using adhesive in color to match countertop.

8. Carefully dress joints smooth, remove surface scratches and clean entire surface.
9. Install countertops with no more than 1/8-inch (3 mm) sag, bow or other variation from a straight line.

- B. Applied sidesplashes: Adhere applied sidesplashes to countertops using manufacturer's standard color-matched silicone sealant.

3.3 REPAIR

- A. Repair or replace damaged work which cannot be repaired to architect's satisfaction.

3.4 CLEANING AND PROTECTION

- A. Keep components clean during installation.
- B. Remove adhesives, sealants and other stains.

END OF SECTION

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SECTION 073113
ASPHALT SHINGLES

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

- A. Submittals: Product Data, Samples, and ICC-ES evaluation reports.
- B. Warranties: Manufacturer's standard written warranty, signed by manufacturer agreeing to promptly repair or replace asphalt shingles that fail in materials for a period of 40 Years, prorated, with first 15 years non-prorated.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Exterior Fire-Test Exposure: ASTM E 108 or UL 790, Class A. Identify products with appropriate markings of testing and inspecting agency acceptable to authorities having jurisdiction.

2.2 GLASS-FIBER-REINFORCED ASPHALT SHINGLES

- A. Laminated-Strip Asphalt Shingles: ASTM D 3462/D 3462M, laminated, multi-ply overlay construction, mineral-granule surfaced, and self-sealing. Straight cut butt edge.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by the following:
 - a. Match existing on Contact Station.
- B. Three-Tab-Strip Asphalt Shingles: ASTM D 3462/D 3462M, glass-fiber reinforced, mineral-granule surfaced, and self-sealing; with tabs regularly spaced.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by the following:
 - a. Match existing on contact station.

2.3 ACCESSORIES

- A. Felts: ASTM D 4869/D 4869M, Type II, asphalt-saturated organic felts.
- B. Synthetic Underlayment: UV-resistant polypropylene, polyolefin, or polyethylene polymer fabric with surface coatings or treatments to improve traction underfoot and abrasion resistance;

evaluated and documented to be suitable for use as a roof underlayment under applicable codes by a testing and inspecting agency acceptable to authorities having jurisdiction.

1. Manufacturers: Subject to compliance with requirements, provide products by the following:
 - a. IKO Industries Inc.
- C. Self-Adhering Sheet Underlayment: ASTM D 1970/D 1970M, SBS-modified asphalt; mineral-granule or slip-resisting-polyethylene surfaced; with release paper backing; cold applied.
 1. Manufacturers: Subject to compliance with requirements, provide products by the following:
 - a. IKO Industries Inc.
- D. Asphalt Roofing Cement: ASTM D 4586/D 4586M, Type II, asbestos free.
- E. Roofing Nails: Aluminum, stainless-steel, or hot-dip galvanized-steel shingle nails, minimum 0.120-inch (3-mm) diameter, of sufficient length to penetrate 3/4 inch (19 mm) into solid wood decking or extend at least 1/8 inch (3 mm) through OSB or plywood sheathing.
 1. Where nails are in contact with metal flashing, use nails made from same metal as flashing.
- F. Felt-Underlayment Nails: Aluminum, stainless-steel, or hot-dip galvanized-steel wire with low-profile capped heads or disc caps, 1-inch minimum diameter.
- G. Sheet Metal Flashing and Trim: Comply with requirements in Section 076200 "Sheet Metal Flashing and Trim."
 1. Sheet Metal: Aluminum.
 2. Drip Edge: Formed sheet metal with at least a 2-inch roof deck flange and a 1-1/2-inch fascia flange with a 3/8-inch drip at lower edge.
 3. Open-Valley Flashing: Fabricate with 1-inch-high, inverted-V profile at center of valley and equal flange widths of 10 inches.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Comply with recommendations in ARMA's "Residential Asphalt Roofing Manual" and with asphalt shingle recommendations in NRCA's "The NRCA Roofing Manual: Steep-Slope Roof Systems."
- B. Apply self-adhering sheet underlayment at eaves and rakes from edges of roof to at least 36 inches inside exterior wall line.
- C. Apply self-adhering sheet underlayment at valleys extending 18 inches on each side.

- D. Install felt underlayment on roof deck not covered by self-adhering sheet underlayment.
- E. Install valleys complying with NRCA instructions. Construct woven or closed-cut valleys.
- F. Install metal flashings to comply with requirements in Section 076200 "Sheet Metal Flashing and Trim."
- G. Install first and remaining courses of asphalt shingles, stair-stepping diagonally across roof deck with manufacturer's recommended offset pattern at succeeding courses and maintaining uniform exposure.
- H. Install first and remaining courses of asphalt shingles, stair-stepping diagonally across roof deck with manufacturer's recommended offset pattern at succeeding courses and maintaining uniform exposure.

END OF SECTION 073113

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**SECTION 076100
SHEET METAL ROOFING**

PART 1- GENERAL

1.1 SECTION INCLUDES

- A. Mechanically-seamed, standing seam metal roof panels, with related metal trim and accessories.

1.2 RELATED REQUIREMENTS

- A. Division 07 Section "Air Barriers" for air barriers within roof assembly and adjacent to roof assembly.
- B. Division 07 Section "Sheet Metal Flashing and Trim" for formed sheet metal copings, flashings, reglets, and roof drainage items in addition to items specified in this Section.
- C. Division 07 Section for field-applied Joint Sealants.

1.3 REFERENCES

- A. American Architectural Manufacturer's Association (AAMA):
 - 1. AAMA 621 - Voluntary Specifications for High Performance Organic Coatings on Coil Coated Architectural Hot Dipped Galvanized (HDG) & Zinc-Aluminum Coated Steel Substrates.
 - 2. AAMA 809.2 - Voluntary Specification Non-Drying Sealants.
- B. American Society of Civil Engineers (ASCE):
 - 1. ASCE 7 - Minimum Design Loads for Buildings and Other Structures.
- C. ASTM International (ASTM):
 - 1. ASTM A 653 - Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
 - 2. ASTM A 755 - Specification for Steel Sheet, Metallic Coated by the Hot-Dip Process and Prepainted by the Coil-Coating Process for Exterior Exposed Building Products.
 - 3. ASTM A 792/A 792M - Standard Specification for Steel Sheet, 55 % Aluminum-Zinc Alloy-Coated by the Hot-Dip Process.
 - 4. ASTM A 980 - Standard Specification for Steel, Sheet, Carbon, Ultra High Strength Cold Rolled.
 - 5. ASTM C 645 - Specification for Nonstructural Steel Framing Members.
 - 6. ASTM D 226 - Standard Specification for Asphalt-Saturated Organic Felt Used in Roofing and Waterproofing.
 - 7. ASTM D 1003 - Standard Test Method for Haze and Luminous Transmittance of Transparent Plastics.
 - 8. ASTM D 2244 - Test Method for Calculation of Color Differences from Instrumentally Measured Color Coordinates.
 - 9. ASTM D 4214 - Test Methods for Evaluating Degree of Chalking of Exterior Paint Films.
 - 10. ASTM E 1592 - Standard Test Method for Structural Performance of Sheet Metal Roof and Siding Systems by Uniform Static Air Pressure Difference.
 - 11. ASTM E 1646 - Standard Test Method for Water Penetration of Exterior Metal Roof Panel Systems by Uniform Static Air Pressure Difference.
 - 12. ASTM E 1680 - Standard Test Method for Rate of Air Leakage Through Exterior Metal Roof Panel Systems.
 - 13. ASTM E 1980 - Practice for Calculating Solar Reflectance Index of Horizontal and Low-Sloped Opaque Surfaces.
- D. Underwriters Laboratories, Inc. (UL):
 - 1. UL 580 - Tests for Uplift Resistance of Roof Assemblies

1.4 ADMINISTRATIVE REQUIREMENTS

- A. Pre- installation Meeting: Prior to erection of framing, conduct preinstallation meeting at site attended by Owner, Architect, manufacturer's technical representative, inspection agency and related trade contractors.
 - 1. Coordinate building framing in relation to metal panel system.
 - 2. Coordinate openings and penetrations of metal panel system.
 - 3. Coordinate work of Division 07 Sections "Roof Specialties" and "Roof Accessories" and openings and penetrations and manufacturer's accessories with installation of metal panels.

1.5 QUALITY ASSURANCE

- A. Manufacturer/Source: Provide metal roof panel assembly and accessories from a single manufacturer providing fixed-base roll forming.
- B. Manufacturer Qualifications: Approved manufacturer listed in this Section with minimum five years experience in manufacture of similar products in successful use in similar applications.
- C. Installer Qualifications: Experienced Installer with minimum of five years experience with successfully completed projects of a similar nature and scope.

1.6 ACTION SUBMITTALS

- A. Product Data: Manufacturer's data sheets for specified products.
- B. Shop Drawings: Show layouts of metal panels. Include details of each condition of installation, panel profiles, and attachment to building. Provide details at a minimum scale 1-1/2-inch per foot of edge conditions, joints, fastener and sealant placement, flashings, openings, penetrations, roof accessories, lightning arresting equipment, and special details. Make distinctions between factory and field assembled work.
 - 1. Indicate points of supporting structure that must coordinate with metal panel system installation.
 - 2. Include data indicating compliance with performance requirements.
 - 3. Include structural data indicating compliance with requirements of authorities having jurisdiction.
- C. Samples for Initial Selection: For each exposed product specified including sealants. Provide representative color charts of manufacturer's full range of colors.
- D. Samples for Verification: Provide 12-inch long section of each metal panel profile. Provide color chip verifying color selection.

1.7 INFORMATIONAL SUBMITTALS

- A. Product Test Reports: Indicating compliance of products with requirements, witnessed by a professional engineer.
- B. Qualification Information: For Installer firm and Installer's field supervisor.
- C. Manufacturer's Warranty: Sample copy of manufacturer's standard warranty.

1.8 CLOSEOUT SUBMITTALS

- A. Maintenance data.
- B. Manufacturer's Warranty: Executed copy of manufacturer's standard warranty.

1.9 DELIVERY, STORAGE, AND HANDLING

- A. Protect products of metal panel system during shipping, handling, and storage to prevent staining, denting, deterioration of components or other damage. Protect panels and trim bundles during shipping.
 - 1. Deliver, unload, store, and erect metal panel system and accessory items without misshaping panels or exposing panels to surface damage from weather or construction

operations.

2. Store in accordance with Manufacturer's written instructions. Provide wood collars for stacking and handling in the field.

1.10 COORDINATION

- A. Coordinate sizes, profiles, and locations of roof curbs and other roof-mounted equipment and roof penetrations, based upon sizes of actual selected equipment.

1.11 WARRANTY

- A. Special Manufacturer's Warranty: On manufacturer's standard form, in which manufacturer agrees to repair or replace metal panel assemblies that fail in materials and workmanship within one year from date of Substantial Completion.
- B. Special Weathertightness Warranty: On manufacturer's standard form, in which manufacturer agrees to repair or replace metal panel assemblies that fail to remain weathertight, including leaks of covered area within 20 years from date of Substantial Completion.
- C. Special Panel Finish Warranty: On Manufacturer's standard form, in which Manufacturer agrees to repair or replace metal panels that evidence deterioration of factory-applied finish within 30 years from date of Substantial Completion, including:
 1. Fluoropolymer Two- Coat System:
 - a. Color fading in excess of 5 Hunter units per ASTM D 2244.
 - b. Chalking in excess of No. 8 rating per ASTM D 4214.
 - c. Failure of adhesion, peeling, checking, or cracking.

PART 2- PRODUCTS

2.1 MANUFACTURER

- A. Metal Sales Manufacturing Corporation 545 South 3rd Street Suite 200 Louisville, KY 40202

2.2 PERFORMANCE REQUIREMENTS

- A. General: Provide metal roof panel system meeting performance requirements as determined by application of specified tests by a qualified testing facility on manufacturer's standard assemblies.
- B. Structural Performance: Provide metal panel assemblies capable of withstanding the effects of indicated loads and stresses within limits and under conditions indicated:
 1. Wind Loads: Determine loads based on uniform pressure, importance factor, exposure category, and basic wind speed indicated on drawings.
 - a. Wind Uplift Testing: Certify capacity of metal panels by actual testing of proposed assembly per ASTM E 1592.
 2. Snow Loads: 70 lbf/sq. ft.
 3. Deflection Limits: Withstand inward and outward wind-load design pressures in accordance with applicable building code with maximum deflection of 1/180 of the span with no evidence of failure.
 4. Seismic Performance: Comply with ASCE 7, Section 9, "Earthquake Loads."
- C. Wind Uplift Resistance: Comply with UL 580 for wind-uplift class UL-90.
- D. Air Infiltration, ASTM E 1680: Maximum 0.25 cfm/sq. ft. at static-air-pressure difference of 6.24 lbf/sq. ft..
- E. Water Penetration Static Pressure, ASTM E 1646: No uncontrolled water penetration at a static pressure of 12 lbf/sq. ft..
- F. Thermal Movements: Allow for thermal movements from variations in both ambient and internal temperatures. Accommodate movement of support structure caused by thermal expansion and contraction. Allow for deflection and design for thermal stresses caused by

temperature differences from one side of the panel to the other.

2.3 METAL ROOF PANELS

- A. Mechanically-seamed, Concealed Fastener, Metal Roof Panels: Structural metal roof panel consisting of formed metal sheet with shake look.
- B. Basis of Design: Metal Sales Terrabella Shake Znap
- C. Nominal Coated Thickness: 26 gage.
- D. Joint Type: Mechanically seamed.
- E. Color: TBD

2.4 METAL ROOF PANEL ACCESSORIES

- A. General: Provide complete metal roof panel assembly incorporating trim, copings, fasciae, and miscellaneous flashings, in manufacturer's standard profiles. Provide required fasteners, closure strips, thermal spacers, splice plates, support plates, and sealants as indicated in manufacturer's written instructions.
- B. Flashing and Trim: Match material, thickness, and finish of metal panel face sheet.
- C. Panel Clips: Provide panel clip of type specified, at spacing indicated on approved shop drawings.
 - 1. Single-Piece Fixed: ASTM A 653/A 653M, G90 (Z180) hot-dip galvanized zinc coating, configured for concealment in panel joints, and identical to clips utilized in tests demonstrating compliance with performance requirements.
- D. Panel Fasteners: Self-tapping screws and other acceptable corrosion-resistant fasteners recommended by roof panel manufacturer. Where exposed fasteners cannot be avoided, supply fasteners with EPDM or neoprene gaskets, with heads matching color of metal panels by means of factory-applied coating.
- E. Joint Sealers: Manufacturer's standard or recommended liquid and preformed sealers and tapes, and as follows:
 - 1. Tape Sealers: Manufacturer's standard non-curing butyl tape, AAMA 809.2.
- F. Steel Sheet Miscellaneous Framing Components: ASTM C 645, with ASTM A 653/A 653M, G60 (Z180) hot-dip galvanized zinc coating.

2.5 FABRICATION

- A. General: Provide factory fabricated and finished metal panels and accessories meeting performance requirements, indicated profiles, and structural requirements.
- B. Fabricate metal panel joints configured to accept factory-applied sealant providing weathertight seal and preventing metal-to-metal contact and minimizing noise resulting from thermal movement.
- C. Form panels in continuous lengths for full length of detailed runs, except where otherwise indicated on approved shop drawings.
- D. Sheet Metal Flashing and Trim: Fabricate flashing and trim to comply with manufacturer's written instructions, approved shop drawings, and project drawings. Form from materials matching metal panel substrate and finish.

2.6 FINISHES

- A. Finishes, General: Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
- B. Fluoropolymer Two-Coat System: 0.2 - 0.3 mil primer with 0.7 - 0.8 mil 70 percent PVDF fluoropolymer color coat, AAMA 621, meeting solar reflectance index requirements.
 - 1. Basis of Design: MBCI, Signature 300.
- C. Interior Finish: 0.5 mil (0.013 mm) total dry film thickness consisting of primer coat and wash coat of manufacturer's standard light-colored acrylic or polyester backer finish.

PART 3- EXECUTION

3.1 EXAMINATION

- A. Examine metal panel system substrate and supports with Installer present. Inspect for erection tolerances and other conditions that would adversely affect installation of metal panel installation.
 - 1. Inspect metal panel support substrate to determine if support components are installed as indicated on approved shop drawings. Confirm presence of acceptable supports at recommended spacing to match installation requirements of metal panels.
 - 2. Panel Support Tolerances: Confirm that panel supports are within tolerances acceptable to metal panel system manufacturer but not greater than the following:
 - a. 1/4 inch (6 mm) in 20 foot (6.1 m) in any direction.
 - b. 3/8 inch (9 mm) over any single roof plane.
- B. Correct out-of-tolerance work and other deficient conditions prior to proceeding with insulated metal roof panel system installation.

3.2 PREPARATION

- A. Miscellaneous Supports: Install subframing, girts, furring, and other miscellaneous panel support members according to ASTM C 754 and manufacturer's written instructions.
- B. Flashings: Provide flashings as required to complete metal roof panel system. Install in accordance with Section 07620 "Sheet Metal Flashing and Trim" and approved shop drawings.

3.3 METAL PANEL INSTALLATION

- A. Mechanically-Seamed, Standing Seam Metal Roof Panels: Install weathertight metal panel system in accordance with manufacturer's written instructions, approved shop drawings, and project drawings. Install metal roof panels in orientation, sizes, and locations indicated, free of waves, warps, buckles, fastening stresses, and distortions. Anchor panels and other components securely in place. Provide for thermal and structural movement.
- B. Attach panels to supports using clips, screws, fasteners, and sealants recommended by manufacturer and indicated on approved shop drawings.
 - 1. Fasten metal panels to supports with concealed clips at each location indicated on approved shop drawings, with spacing and fasteners recommended by manufacturer.
 - 2. Seamed Joint: Crimp standing seams with manufacturer-approved, motorized seamer tool so clip, metal roof panel, and factory-applied sealant are completely engaged.
 - 3. Provide weatherproof jacks for pipe and conduit penetrating metal panels of types recommended by manufacturer.
 - 4. Dissimilar Materials: Where elements of metal panel system will come into contact with dissimilar materials, treat faces and edges in contact with dissimilar materials as recommended by manufacturer.

3.4 ACCESSORY INSTALLATION

- A. General: Install metal panel trim, flashing, and accessories using recommended fasteners and joint sealers, with positive anchorage to building, and with weather tight mounting. Provide for thermal expansion. Coordinate installation with flashings and other components.
 - 1. Install components required for a complete metal panel assembly, including trim, metal fascia, copings, flashings, sealants, closure strips, and similar items.
 - 2. Comply with details of assemblies utilized to establish compliance with performance requirements and manufacturer's written installation instructions.
 - 3. Provide concealed fasteners except where noted on approved shop drawings.
 - 4. Set units true to line and level as indicated. Install work with laps, joints, and seams that will be permanently weather resistant.
- B. Joint Sealers: Install joint sealers where indicated and where required for weathertight

performance of metal panel assemblies, in accordance with manufacturer's written instructions.

1. Seal panels in accordance with insulated panel manufacturer's instructions, and project design drawings.
2. Prepare joints and apply sealants per requirements of Division 07.

3.5 CLEANING AND PROTECTION

- A. Remove temporary protective films immediately in accordance with metal roof panel manufacturer's instructions. Clean finished surfaces as recommended by metal roof panel manufacturer.
- B. Replace damaged panels and accessories that cannot be repaired to the satisfaction of the Architect.

END OF SECTION

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SECTION 076200
SHEET METAL FLASHING AND TRIM

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:

1. Formed roof flashing and trim.
2. Formed wall flashing and trim.
3. Window, Door, and Louver flashing and trim
4. Miscellaneous flashing and trim

1.2 SUBMITTALS

- A. Product Data: For each product indicated.
- B. Shop Drawings: Show layouts, profiles, shapes, seams, dimensions, and details for fastening, joining, supporting, and anchoring sheet metal flashing and trim.
- C. Samples: For each type of sheet metal flashing and trim.

1.3 QUALITY ASSURANCE

- A. Sheet Metal Flashing and Trim Standard: Comply with SMACNA's "Architectural Sheet Metal Manual." Conform to dimensions and profiles shown unless more stringent requirements are indicated.
- B. Preinstallation Conference

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:
 1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, manufacturers specified.
 2. Manufacturers: Subject to compliance with requirements, provide products by one of the manufacturers specified.

2.2 SHEET METALS

- A. Aluminum Sheet: ASTM B 209 (ASTM B 209M), Alloy 3003, 3004, 3105, or 5005, Temper suitable for forming and structural performance required, but not less than H14, finished as follows:
 1. Clear Anodic Finish: Class II, AA-M12C22A31, complying with AAMA 611.

2. Color Anodic Finish: Class II, AA-M12C22A34, complying with AAMA 611.

a. Color: Dark bronze at windows, doors, and louvers

B. Stainless-Steel Sheet: ASTM A 240/A 240M, Type 304,

2.3 MISCELLANEOUS MATERIALS

A. General: Provide materials and types of fasteners, solder, welding rods, protective coatings, separators, sealants, and other miscellaneous items as required for complete sheet metal flashing and trim installation.

B. Felt Underlayment: ASTM D 226, Type II (No. 30), asphalt-saturated organic felt, nonperforated.

1. Slip Sheet: Rosin-sized paper, minimum 3 lb/100 sq. ft. (0.16 kg/sq. m).

C. Fasteners: Wood screws, annular threaded nails, self-tapping screws, self-locking rivets and bolts, and other suitable fasteners designed to withstand design loads.

1. Fasteners for Flashing and Trim: Blind fasteners or self-drilling screws, gasketed, with hex washer head.

2. Blind Fasteners: High-strength aluminum or stainless-steel rivets.

D. Sealing Tape: Pressure-sensitive, 100 percent solids, polyisobutylene compound sealing tape with release-paper backing. Provide permanently elastic, non-sag, nontoxic, non-staining tape.

2.4 FABRICATION, GENERAL

A. General: Custom fabricate sheet metal flashing and trim to comply with recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to design, dimensions, metal, and other characteristics of item indicated. Shop fabricate items where practicable. Obtain field measurements for accurate fit before shop fabrication.

B. Fabricate sheet metal flashing and trim without excessive oil canning, buckling, and tool marks and true to line and levels indicated, with exposed edges folded back to form hems.

1. Seams for Aluminum: Fabricate nonmoving seams with flat-lock seams. Form seams and seal with epoxy seam sealer. Rivet joints for additional strength.

2. Seams for Other Than Aluminum: Fabricate nonmoving seams in accessories with flat-lock seams. Tin edges to be seamed, form seams, and solder.

C. Sealed Joints: Form non-expansion but movable joints in metal to accommodate elastomeric sealant to comply with SMACNA recommendations.

D. Expansion Provisions: Where lapped or bayonet-type expansion provisions in the Work cannot be used, form expansion joints of intermeshing hooked flanges, not less than 1 inch (25 mm) deep, filled with sealant concealed within joints.

E. Conceal fasteners and expansion provisions where possible on exposed-to-view sheet metal flashing and trim, unless otherwise indicated.

F. Fabricate cleats and attachment devices from same material as accessory being anchored or from compatible, noncorrosive metal, and in thickness not less than that of metal being secured.

2.5 ROOF SHEET METAL FABRICATIONS

- A. Roof Edge Flashing and Fascia: Fabricate in minimum 96-inch- (2400-mm-) long, but not exceeding 10-foot- (3-m-) long, sections. Furnish with 6-inch- (150-mm-) wide joint cover plates.
- B. Copings: Fabricate in minimum 96-inch- (2400-mm-) long, but not exceeding 10-foot- (3-m-) long, sections. Fabricate joint plates of same thickness as copings. Furnish with continuous cleats to support edge of external leg and drill elongated holes for fasteners on interior leg. Miter corners, seal, and solder or weld watertight.
- C. Base Flashing: Fabricate from the following material:
 - 1. Aluminum: 0.040 inch (1.0 mm)
- D. Counterflashing: Fabricate from the following material:
 - 1. Aluminum: [0.0320 inch (0.8 mm)] thick.
- E. Drip Edges: Fabricate from the following material:
 - 1. Aluminum: [0.0320 inch (0.8 mm)] thick.

2.6 WALL SHEET METAL FABRICATIONS

- A. Openings Flashing in Frame Construction: Fabricate head, sill, jamb, and similar flashings to extend beyond wall openings. Form head and sill flashing with 2-inch- (50-mm-) high end dams. Fabricate from the following material:
 - 1. Aluminum: [0.0320 inch (0.8 mm)] thick.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

- A. General: Anchor sheet metal flashing and trim and other components of the Work securely in place, with provisions for thermal and structural movement. Use fasteners, solder, welding rods, protective coatings, separators, sealants, and other miscellaneous items as required to complete sheet metal flashing and trim system.
 - 1. Torch cutting of sheet metal flashing and trim is not permitted.
- B. Metal Protection: Where dissimilar metals will contact each other or corrosive substrates, protect against galvanic action by painting contact surfaces with bituminous coating or by other permanent separation as recommended by fabricator or manufacturers of dissimilar metals.
- C. Install exposed sheet metal flashing and trim without excessive oil canning, buckling, and tool marks.
- D. Install sheet metal flashing and trim true to line and levels indicated. Provide uniform, neat seams with minimum exposure of solder, welds, and sealant.
- E. Install sheet metal flashing and trim to fit substrates and to result in watertight performance. Verify shapes and dimensions of surfaces to be covered before fabricating sheet metal.
 - 1. Space cleats not more than 12 inches (300 mm) apart. Anchor each cleat with two fasteners. Bend tabs over fasteners.
- F. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim. Space movement

joints at a maximum of 10 feet (3 m) with no joints allowed within 24 inches (600 mm) of corner or intersection. Where lapped or bayonet-type expansion provisions cannot be used or would not be sufficiently watertight, form expansion joints of intermeshing hooked flanges, not less than 1 inch (25 mm) deep, filled with sealant concealed within joints.

- G. Fasteners: Use fasteners of sizes that will penetrate substrate not less than 1-1/4 inches (32 mm) for nails and not less than 3/4 inch (19 mm) for wood screws.
 - 1. Galvanized or Pre-painted, Metallic-Coated Steel: Use stainless-steel fasteners.
 - 2. Aluminum: Use aluminum or stainless-steel fasteners.
 - 3. Copper: Use copper, hardware bronze, or stainless-steel fasteners.
 - 4. Stainless Steel: Use stainless-steel fasteners.
- H. Seal joints with [elastomeric] [butyl] sealant as required for watertight construction.
- I. Soldered Joints: Clean surfaces to be soldered, removing oils and foreign matter. Prein edges of sheets to be soldered to a width of 1-1/2 inches (38 mm) except where pretinned surface would show in finished Work.

3.2 ROOF FLASHING INSTALLATION

- A. General: Install sheet metal roof flashing and trim to comply with performance requirements and SMACNA's "Architectural Sheet Metal Manual." Provide concealed fasteners where possible, set units true to line, and level as indicated. Install work with laps, joints, and seams that will be permanently watertight.
- B. Roof Edge Flashing: Anchor to resist uplift and outward forces according to recommendations in FMG Loss Prevention Data Sheet 1-49.
 - 1. Interlock bottom edge of roof edge flashing with continuous cleats anchored to substrate at 16-inch (400-mm) centers.
- C. Copings: Anchor to resist uplift and outward forces according to recommendations in FMG Loss Prevention Data Sheet 1-49.
 - 1. Interlock exterior bottom edge of coping with continuous cleats anchored to substrate at 16-inch (400-mm) centers.
 - 2. Anchor interior leg of coping with screw fasteners and washers at 18-inch (450-mm) centers.
- D. Counterflashing: Coordinate installation of counterflashing with installation of base flashing. Insert counterflashing in reglets or receivers and fit tightly to base flashing. Secure in a waterproof manner. Extend counterflashing 4 inches (100 mm) over base flashing. Lap counterflashing joints a minimum of 4 inches (100 mm) and bed with sealant.
- E. Roof-Penetration Flashing: Coordinate installation of roof-penetration flashing with installation of roofing and other items penetrating roof. Install flashing as follows:

1. Turn lead flashing down inside vent piping, being careful not to block vent piping with flashing.
2. Seal with sealant and clamp flashing to pipes penetrating roof except for lead flashing on vent piping.

3.3 WALL FLASHING INSTALLATION

- A. General: Install sheet metal wall flashing to intercept and exclude penetrating moisture according to SMACNA recommendations and as indicated. Coordinate installation of wall flashing with installation of wall-opening components such as windows, doors, and louvers.
- B. Openings Flashing in Frame Construction: Install continuous head, sill, jamb, and similar flashings to extend beyond wall openings.

END OF SECTION

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SECTION 077200
ROOFING UNDERLAYMENT

PART 1 - GENERAL

1.1 SUMMARY

- A. Section provides for a flexible rubberized asphalt membrane at:
 - 1. Pre-finished metal roofing underlayment.
 - 2. Pre-finished metal siding at corners, vertical joints and base flashing between bottom of metal siding and top of masonry wall.

1.2 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.
- B. Section 042000 - Unit Masonry.
- C. Section 076100 - Metal Roof Panels
- D. Section 073113 - Asphalt Shingle Roofing

1.3 REFERENCES

- A. American Society for Testing and Materials
 - 1. ASTM E 96 - Test Methods for Water Vapor Transmission of Materials
 - 2. ASTM D 570 - Test Method for Water Absorption of Plastics
 - 3. ASTM E 154 - Test Method for Water Vapor Retarders used in contact with Earth Under Concrete Slabs, on Walls or as Ground Cover
 - 4. ASTM D 1004 - Test Method for Initial Tear Resistance of Plastic Film and Sheeting
 - 5. ASTM D 1938 - Test Method for Tear Propagation Resistance of Plastic Film and Thin Sheeting by a Single-Tear Method
 - 6. ASTM D 1876 - Test Method for Peel Resistance of Adhesives
 - 7. ASTM D 1970 - Standard Specifications for Self-Adhering Polymer Modified Bituminous Sheet Materials Used as Steep Roofing Underlayment for Ice Dam Protection
 - 8. ASTM D 412 - Test Methods for Vulcanized Rubber & Thermoplastic Rubbers and Thermoplastic Elastomers - Tension

1.4 SUBMITTALS

- A. Product Data and Shop Drawings: Submit Spec-Data , details and installation procedures.
- B. Test Reports: Indicating compliance with the performance requirements of this section.
- C. Samples of rubberized asphalt membrane.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Comply with manufacturer's recommendations for storage and handling of each product.

1.6 WARRANTY

- A. Standard Product Warranty:
 - 1. Submit manufacturer's warranty that rubberized asphalt membrane and accessories are free of defects at time of delivery, and are manufactured to meet manufacturer's published physical properties and material specifications.
 - 2. Installer to warrant that rubberized asphalt membrane and accessories have been

installed in accordance with manufacturer's recommendations.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Grace Ice and Water Shield produced by W. R. Grace 62 Whittemore Ave., Cambridge, MA 02140, Phone 866-333-3726
- B. WinterGuard HT Waterproofing underlayment produced by CertainTeed Corporation, P.O. Box 860, Valley Forge, PA 19482, Phone 800-233-8990
- C. Weatherlock Self Sealing Ice and Water Barrier, produced by Owens Corning, Phone 800-438-7465

2.2 MATERIALS

- A. Description: .9 mm (36 mils) of self-adhesive rubberized asphalt integrally bonded to .1 mm (4 mils) of cross-laminated, high-density polyethylene film to provide a min. 1 mm (40 mil) thick membrane. Membrane shall be interleaved with disposable silicone-coated release paper until installed.
- B. Performance Requirements:
 - 1. Water Vapor Transmission: ASTM E 96, Method B - 2.9 ng/m²sPa (0.05 perms) maximum
 - 2. Water Absorption: ASTM D 570 - Max. 0.1% by weight
 - 3. Puncture Resistance: ASTM E 154 - 178 N (40 lbs.)
 - 4. Tear Resistance:
 - a. Initiation - ASTM D 1004 - min. 58 N (7.0 lbs.) M.D.
 - b. Propagation - ASTM D 1938 - min. 40 N (4.0 lbs.) M.D.
 - 5. Lap Adhesion at -4°C (25°F): ASTM D 1876 - 880 N/m (5.0 lbs./in.) of width
 - 6. Low Temperature Flexibility - ASTM D 1970 - Unaffected to -43°C (-45°F)
 - 7. Tensile Strength: ASTM D 412, Die C Modified - Min. 2.7 MPa (400 psi)
 - 8. Elongation, Ultimate Failure of Rubberized Asphalt: ASTM D 412 - Die C - Min. 200%
- C. Air & Vapor Barrier Accessories:
 - 1. Surface Conditioner:
 - a. Description: Water-based latex liquid for substrate preparation.
 - b. Flash Point: No flash to boiling point
 - c. Solvent Type: Water
 - d. VOC Content: Not to exceed 125 g/l
 - e. Application Temperature: -4°C (25°F) and above
 - f. Freeze/Thaw Stability: 5 cycles min.
 - g. Freezing point (as packaged): -10°C (14°F)
 - 2. Termination Mastic:
 - a. Description: Rubberized asphalt-based mastic with 200 g/l max. VOC Content.
 - 3. Primer:
 - a. Description: Rubber-based primer in solvent with 440 g/l max. VOC content.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine conditions, with installer present, for compliance with requirements for installation, tolerances and other specific conditions affecting performance of air & vapor barrier.

3.2 SUBSTRATE PREPARATION

- A. Substrate to be smooth and free of voids, spalled areas, loose aggregate and sharp protrusions that would hinder the adhesion or regularity of the air & vapor barrier membrane.
- B. Remove all deleterious materials from surfaces to be covered.

3.3 INSTALLATION

- A. General: Install air & vapor barrier to dry surfaces at air and surface temperatures of -4°C (25°F) and above in accordance with manufacturer's recommendations, at locations indicated on Construction Documents.
- B. Air & Vapor Barrier Membrane:
 - 1. Precut pieces of air & vapor barrier into easily-handled lengths.
 - 2. Remove silicone-coated release paper and position membrane carefully before placing length horizontally against the surface.
 - 3. Begin installation at the base of the wall placing top edge of membrane immediately below any masonry reinforcement or ties protruding from substrate.
 - 4. When properly positioned, place against surface by pressing firmly into place. Roll membrane with extension-handled countertop roller immediately after placement.
 - 5. Overlap horizontally-adjacent pieces 50 mm (2 in.) and roll seams.
 - 6. Subsequent sheets of membrane applied above shall be positioned immediately below masonry reinforcement or ties. Bottom edge shall be slit to fit around reinforcing wires or ties, and membrane shall overlap the membrane sheet below by 50 mm (2 in.). Roll firmly into place.
 - 7. Seal around masonry reinforcing or ties and all penetrations with termination mastic.
 - 8. Continue the membrane into all openings in the wall, such as doors, windows, etc., and terminate at points that will prevent visibility from interior.
 - 9. Coordinate the installation of air & vapor barrier with roof installer to ensure continuity of membrane with rooftop air & vapor membrane.
 - 10. At end of each working day seal top edge of air & vapor barrier to substrate with termination mastic.
 - 11. Do not allow the rubberized asphalt surface of the air & vapor barrier membrane to come in contact with polysulfide sealants, creosote, uncured coal tar products or EPDM.
 - 12. Do not expose air & vapor barrier membrane to sunlight for more than thirty days prior to enclosure.
 - 13. Inspect installation prior to enclosing and repair punctures, damaged areas and inadequately lapped seams with a patch of the membrane sized to extend 150 mm (6 in.) in all directions from the perimeter of the affected area.
- C. Accessories:
 - 1. When required by dirty or dusty site conditions or by surfaces having irregular or rough texture or if it becomes difficult to adhere the air & vapor barrier to the substrate, apply surface conditioner by spray, brush, or roller at the rate recommended by manufacturer,

prior to membrane installation. Allow surface conditioner to dry completely before membrane application.

2. Apply a bead or trowel coat of mastic along membrane edges, seams, cuts, and penetrations.
3. Apply primer by brush or heavy nap, natural-material roller at rate recommended by manufacturer prior to membrane installation. Allow primer to dry completely before membrane application.

END OF SECTION

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SECTION 079200 JOINT SEALERS

PART 1- GENERAL

1.1 SUMMARY

A. Section Includes:

1. The sealing of joints indicated drawings and locations indicated in this section.
2. The sealing of exterior joints, including:
 - a. Wall joints, including expansion and control joints.
 - b. Coping joints.
 - c. Joints around perimeter of frames.
 - d. Louvers.
3. The sealing of interior joints, including:
 - a. Wall joints, including expansion and control joints.
 - b. Joints around perimeter of any frame.
 - c. Joints between countertops and walls.
 - d. Openings where items pass through interior walls exposed.
 - e. Hard ceilings to masonry.
 - f. Floor joints at perimeter.

- B. Joints of a nature similar to that of joints indicated on this summary shall be sealed with same sealer, whether indicated on drawings to be sealed or not.

1.2 REFERENCES

- A. ASTM C 834 - Standard Specification for Latex Sealants.
- B. ASTM C 719-93 -- Standard Test Method for Adhesion and Cohesion of Elastomeric Joint Sealants Under Cyclic Movement (Hockman Cycle); 1993.
- C. ASTM C 919 Standard Practice for Use of Sealants in Acoustical Applications.
- D. ASTM C 920 - Standard Specification for Elastomeric Joint Sealants.
- E. ASTM C 1193 - Standard Guide for Use of Joint Sealants.
- F. FS TT-S-00227E - Interim Federal Specification for Sealing Compound: Elastomeric Type, Multi-Component
- G. FS TT-S-00230C - Interim Federal Specification for Sealing Compound: Elastomeric Type, Single Component
- H. FS TT-S-001543 - Interim Federal Specification for Sealing Compound; Silicone Rubber Base.

1.3 DEFINITIONS

A. Substrates:

1. M-type substrates: Concrete, concrete masonry units, brick, mortar, natural stone. The term "masonry" means brick, stone, and concrete masonry work.
2. G-type substrates: Glass and transparent plastic glazing sheets.
3. A-type substrates: Metals, porcelain, glazed tile, and smooth plastics.
4. O-type substrates: Wood, unglazed tile; substrates not included under other categories.

1.4 SUBMITTALS

- A. Product Data: Manufacturer's data on each joint sealer, with instructions for substrate preparation

- and installation. Indicate in submittal where or in what application the product will be used.
- B. Samples for Color Selection: Cured samples of actual products showing manufacturer's full range of colors. (Products exposed to view only.) Indicate location of sealer on all submittals.
 - C. Substrate Test Report for Each Sealer.
 - D. Field Installation Test Reports.
 - E. Certificates: For each sealer, provide manufacturer's certificate stating that the product complies with the specifications and is appropriate for the use it is being put to.
 - F. Installer's Pre-construction Inspection Report: List all conditions detrimental to performance of joint sealer work.

1.5 QUALITY ASSURANCE

- A. Installer Qualifications:
 - 1. Similar installations completed within 5 years before start of this project.
 - 2. Lead mechanic assigned from among those experienced on previous similar projects.
- B. Substrate Tests: Have samples of actual substrate materials tested by manufacturer(s) of sealer products.
 - 1. Test to determine what preparation procedures (if any) is necessary to make sealers adhere properly under environmental conditions that may occur during installation.
 - 2. Test to determine compatibility with substrates, backers, and secondary seals, if any.
 - 3. Use manufacturer's standard test methods.
 - 4. Report the sealer manufacturer's recommendations for substrate preparation and sealer installation and identify specific primer(s) required.
 - 5. The requirement for testing for this project will be waived if test reports based on previous testing of the products and substrates to be used are acceptable to the Architect.
- C. Mock-ups: Before beginning installation, install sealers in joints in actual construction as directed by the Architect, to show color, materials, and installation. Keep mock-ups intact as the standard for evaluating the completed work.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials in original containers or bundles with labels showing manufacturer, product name or designation, color, shelf life, and installation instructions.

1.7 PROJECT CONDITIONS

- A. Environmental Limitations: Do not install sealers if any of the following conditions exist:
 - 1. Air or substrate temperature exceeds the range recommended by sealer manufacturer or is below 60 degrees F.
 - 2. Substrate is wet, damp, or covered with snow, ice, or frost.
- B. Dimensional Limitations: Do not install sealers if joint dimensions are less than or greater than that recommended by sealer manufacturer; notify the Architect and get sealer manufacturer's recommendations for alternative procedures.

1.8 WARRANTY

- A. Submit written warranty signed by contractor and installer guaranteeing to correct failures in sealer work that occur within 5 years after substantial completion, without reducing or otherwise limiting any other rights to correction which the owner may have under the contract documents. Failure is defined as failure to remain weather-tight due to faulty materials or workmanship. Correction is limited to replacement and installation of sealers.

PART 2- PRODUCTS

2.1 MATERIALS - GENERAL

- A. General: Provide only products which are recommended and approved by their manufacturer for the specific use to which they are put and which comply with all requirements of the contract documents.
 - 1. For each generic product, use only materials from one manufacturer.
 - 2. Provide only materials, which are compatible with each other and with joint substrates.
 - 3. Colors of exposed sealers: As selected by the Architect from manufacturer's standard colors.
- B. Manufacturers: Products of the manufacturers listed, provided they comply with requirements of the contract documents will be among those considered acceptable.
 - 1. Sealants:
 - a. Sonneborn Building Products
 - b. Dow Corning Corporation.
 - c. Bostik
 - d. Pecora Corporation.
 - e. GE Silicones.
 - f. Tremco, Inc.
 - 2. Compressible foam sealer:
 - a. Emseal Joint Systems Ltd.
 - b. Illbruck Will-Seal Division/Illbruck, Inc.
 - c. Polytite Manufacturing Corporation.

2.2 ELASTOMERIC SEALANTS

- A. Elastomeric Sealants - General: Chemically curing elastomeric sealants of types indicated, complying with ASTM C 920, including specific Type, Grade, Class, and Uses indicated, as well as all other requirements specified.
 - 1. Where movement capability exceeding that measured by ASTM C 920 is specified, sealant shall withstand the total movement indicated while remaining in compliance with the other requirements specified, when tested in accord with ASTM C 719, with base joint width measured at the time of application.
 - 2. For M-type substrates: Comply with requirements for UseM.
 - 3. For G-type substrates: Comply with requirements for UseG.
 - 4. For A-type substrates: Comply with requirements for UseA.
 - 5. For O-type substrates: Comply with requirements for UseM (minimum) and Use O for the particular substrate.
- B. High Strength Silicone Sealant: One-part, acid- or non-acid-curing, Type S, Grade NS, Class 25, Use NT; with not over plus or minus 30 percent movement capability.
- C. Mildew-Resistant Silicone Sealant: One-part, Type S, Grade NS, Class 25, Use NT, formulated with fungicide, for interior use on nonporous substrates.
- D. Silicone Sealant for Use T: One-part, non-acid curing, Type S, Grade NS, Class 25, Use T, Use M, plus movement capability of 50 percent in both extension and compression.
- E. Two-Part Nonsag Low-Modulus Urethane Sealant: Type M, Grade NS, Class 25, Use NT, plus movement capability of 50 percent in both extension and compression.
- F. Multipart Pourable Urethane Sealant: Type M, Grade P, Class 25, Use T.
- G. Nonsag Urethane Sealant for Use T: Type S or M, Grade NS, Class 25, Use T.

- H. One-Part Nonsag Low-Modulus Urethane Sealant: Type S, Grade NS, Class 25, Use NT, plus movement capability of 50 percent in both extension and compression.
- I. One-Part Pourable Urethane Sealant: Type S, Grade P, and Class 25, Use T.

2.3 SOLVENT-RELEASE-CURING SEALANTS

- A. Butyl Sealant: Nonsag, one part, solvent-release-curing; complying with FS A-A-272, Type III; nonstaining; paintable.

2.4 NONCURING SEALERS

- A. Noncuring Butyl Sealant: Nondrying, nonhardening, nonskinning, nonstaining, gunnable, synthetic rubber sealant.

2.5 COMPRESSION SEALS

- A. Compressible Foam Sealer: High-density closed-cell urethane foam saturated with nondrying water-repellent; precompressed in rolls or sticks; permanently flexible, mildew-resistant, nonstaining.

- 1. For vertical above grade applications:
 - a. Select sizes so that installed sealer is compressed as recommended by manufacturer to provide a weather tight seal.

2.6 SEALANT BACKERS

- A. Backers - General: Non-staining; recommended or approved by sealant manufacturer for specific use.
- B. Backer Rods: Flexible, nonabsorbent, compressible polyurethane foam, either open-cell or non-gassing closed-cell, unless otherwise restricted by sealant manufacturer; preformed to appropriate size and shape.
- C. Bond-Breaker Tape: Self-adhesive, polyethylene or other plastic tape, unless otherwise restricted by sealant manufacturer; suitable for preventing sealant adhesion.

2.7 MISCELLANEOUS MATERIALS

- A. Primers: Use primers determined to be required by substrate tests.
- B. Cleaners: As recommended by sealer manufacturer and not damaging to substrates.
- C. Masking Tape: Nonabsorbent, non-staining.
- D. Tooling Agents: Approved by sealant manufacturer; non-staining to sealant and substrate.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine joints for characteristics that may affect sealer performance, including configuration and dimensions.
- B. Do not begin joint sealer work until unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Cleaning: Just before starting sealer installation, clean out joints in accord with recommendations of sealer manufacturers and as follows:
 - 1. Remove all material that could impair adhesion, including dust, dirt, coatings, paint, oil, and grease. Exception: Materials tested to show acceptable adhesion and compatibility.
 - 2. Dry out damp and wet substrates thoroughly.
 - 3. Clean M-type and O-type substrates by suitable mechanical or chemical methods.

4. Remove loose particles by vacuuming or by blowing with oil-free compressed air.
 5. Concrete: Remove laitance and form-release coatings.
 6. Clean A-type and G-type substrates by chemical or other methods, which will not damage the substrate.
 7. Use methods, which will not leave residues that will impair adhesion.
- B. Priming prime substrates as recommended by sealer manufacturer.
- C. Masking Tape: Use masking tape to keep primers and sealers off of adjacent surfaces which would be damaged by contact or by cleanup. Remove tape as soon as practical.
- D. Install fillers where needed to provide proper joint depth or support for sealant backers.

3.3 INSTALLATION

- A. Comply with sealer manufacturers' installation instructions and recommendations, except where more restrictive requirements are specified.
- B. Gunnable and Pourable Sealants: Comply with recommendations of ASTM C 1193.
- C. Sealants in Acoustical Assemblies: Comply with recommendations of ASTM C 919.
- D. Backers:
1. Install backers at depth required resulting in shape and depth of installed sealant, which allows the most joint movement without failure.
 - a. Make backers continuous, without gaps, tears, or punctures.
 - b. Do not stretch or twist backers.
 2. Use bond-breaker tape where indicated and wherever it is necessary to keep sealant from adhering to back or third side of joint.
 3. If backers become wet or damp before installation of sealant, dry out thoroughly before proceeding.
- E. Sealants: Use methods recommended by manufacturer; completely fill the joint; make full contact with bond surfaces; tool nonsag sealants to smooth surface eliminating air pockets.
1. Use concave joint shape shown in Figure 5A in ASTM C 1193, where not otherwise indicated.
 2. Use flush joints shape shown in Figure 5B in ASTM C 1193, where indicated.
- F. Compressible Foam Sealers: Use methods recommended by manufacturer; do not stretch; use as few end joints as possible; make tight, sealed joints at corners and intersections; in cold weather, accelerate expansion using heat.

3.4 PROTECTION AND CLEANING

- A. Clean surfaces adjacent to joints as work progresses and before sealants set using methods and materials approved by manufacturers of sealers and of surfaces to be cleaned.
- B. Protect joint sealers from contamination and damage.
- C. Remove and replace damaged sealers.

3.5 SCHEDULE OF JOINT SEALERS

- A. General: Unless otherwise indicated, joints around perimeter of frames, where indicated to be sealed, are to be sealed using sealer specified for the substrate adjacent to the frame.
- B. General-Purpose Interior and Exterior Applications:
1. Sealant:
 - a. Single component polyurethane.
 - b. Two component polyurethane.
 - c. Polysulfide.
 - d. Silicone.
 2. Applications:

- a. Joints and recesses between adjacent constructions and frames, sills, and subsills of windows, doors, curtainwall, storefront, and louvers.
- b. Coping joints and wash joints in precast concrete, cast stone, or natural stone.
- c. Masonry joints beneath shelf angles.
- d. Around penetrations in exterior walls.
- e. Under door thresholds and at bottom of door frames.
- f. Where necessary to prevent infiltration of water or air into or through exterior building envelope.

C. Other Exterior Applications:

1. Sealant:

- a. Single component polyurethane.
- b. Two component polyurethane.
- c. Silicone.

2. Applications:

- a. Between adjacent construction and gravel stops, copings, fascias, and miscellaneous flashings.
- b. Metal flashings inserted into reglet.
- c. Top edges of surface mounted counterflashing.
- d. Expansion and control joints in masonry where expansion joint covers are not indicated.
- e. Joints between new and existing exterior construction.

D. Interior Wetted Areas:

1. Sealant: Silicone.
2. Applications: Between adjacent construction and vanities, shower stalls, bathtub and shower enclosures, sinks, counter tops, plumbing cut-outs, and plumbing fixtures.

E. Interior High-Movement Joints:

1. Sealant:

- a. Single component polyurethane.
- b. Two component polyurethane.
- c. Polysulfide.
- d. Silicone.

2. Applications:

- a. At resilient joint between interior partitions and floor framing above.

F. Other Interior Applications:

1. Sealant:

- a. Single component polyurethane.
- b. Two component polyurethane.
- c. Polysulfide.
- d. Silicone.

2. Applications:

- a. Between adjacent construction and equipment, shelving, casework, and furniture.

- b. Perimeters of door and window frames, access panels.
- c. Between interior partitions and adjoining concrete or steel columns, walls, or other construction.
- d. Other exposed locations within partitions to seal against passage of air.
- e. Other interior joints of small dimension which require painting.
- f. Gypsum board partitions:
 - 1) Between gypsum panels and metal track at floors and dissimilar walls; install sealant just prior to installation of gypsum panel.
 - 2) Seal control joints prior to installing control joint trim.

- 3. Allow sealant to cure before painting over joint.

G. Exterior Traffic Surfaces:

- 1. Sealant:
 - a. Two component self-leveling polyurethane.
 - b. Single component self-leveling polyurethane.
- 2. Applications:
 - a. Control and expansion joints in sidewalks and pavements.

H. Interior Traffic Surfaces:

- 1. Sealant:
 - a. Two component self-leveling polyurethane.
 - b. Single component self-leveling polyurethane.
- 2. Applications:
- 3.
 - a. Control and expansion joints in floors.

I. Interior Surface at Ceramic Tile Installation:

- 1. Sealant
 - a. Two component non-sag urethane sealant.
- 2. Applications:
 - a. Control joints in ceramic tile.

J. Glazing:

- 1. Primer: None.
 - a. Glass (non-coated).
 - b. Ceramic tile, quarry tile.
- 2. Primer:
 - a. Aluminum (anodized and mill finish).
 - b. Iron and steel (carbon, stainless, galvanized).
 - c. Plastic (ABS, PVDF, polyurethane, PVC).

- d. Wood.
 - e. Marble, slate.
 - f. Concrete.
- 3. Sealant:
 - a. Silicone.
- 4. Applications:
 - a. Glazing, including butt and lap sheer joints, stopless glazing, and cap, head and toe bead in conventional glazing.
 - b. Storefront.

END OF SECTION

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**SECTION 084113
ALUMINUM FRAMED ENTRANCES**

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Aluminum Flush Doors
2. Aluminum Door Frames

1.2 REFERENCES

- A. ASTM B 209 - Aluminum and Aluminum-Alloy Sheet and Plate.
- B. ASTM B 221 - Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.
- C. ASTM B 308 - Aluminum-Alloy 6061-T6 Standard Structural Profiles.
- D. ASTM E 283 - Determining the Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen.
- E. ASTM E 330 - Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference.
- F. ASTM E 331 - Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference.

1.3 SYSTEM DESCRIPTION

A. System Performance Requirements:

1. Air infiltration: When tested in accordance with ASTM E 283, the air infiltration should not exceed .04 cfm per square foot of fixed area.
2. Uniform Load Deflection: Entry system shall be tested in accordance with ASTM E 330: 3840 Pa or 80.0 psf positive and negative pressure for a minimum of 60 seconds.
3. Uniform Load Structural: Entry system shall be tested in accordance with ASTM E 330: 5760 Pa or 120.0 psf positive and negative pressure for a minimum of 10 seconds.
4. Missile Impact: Entry system will pass double impact from large missile; ASTM E 1886.
5. Air Pressure Cycling: Entry system will pass cyclic pressure tests with a design pressure of negative 80.0 psf and positive 80.0 psf.

1.4 SUBMITTALS

- A. General: Refer to Submittal Procedures - Section 013300
- B. Product Data: Include manufacturer's product information, including material, elemental construction, fabrication, and finishes.
- C. Shop Drawings: Include shop drawings relating to fabrication, finish and installation.

1. Drawings should include the following:

- a. Elevations with necessary detail keys
- b. Entry system reinforcements (if applicable)
- c. Fabrication and Finish

D. Samples:

1. Color: Provide manufacturer's samples of standard and non-standard finishes.

2. Door: Supply manufacturer's door sample presenting finish, interior insulation, and standard reinforcement components.

- E. Test Results: Offer any required test results for particular jobs. Accredited test reports will be available upon request.

1.5 QUALITY ASSURANCE

A. Manufacturer's Qualifications:

1. Manufacturing process with contemporary inspection using neoteric checklist for optimum field performance.
2. Manufacturing same product specified for over 25 years.

- B. Pre-Installation Meetings: Plan initial pre-installation meetings for job details.

1.6 DELIVERY, STORAGE, HANDLING

- A. Packing: Finished products shall be packaged securely with appropriate labeling for protection and product identification visible on packaging.
- B. Shipping and Handling: Deliver materials to site in original condition and packaging without any damage to packaging or materials.
- C. Unloading: Individually packaged products to be unloaded by hand truck or 2-person team lift (or more if needed) to avoid unnecessary damage.
- D. Storage and Protection:
 1. Store items indoors away from excessive amounts of moisture.
 2. Protect entry doors against damage from outdoor hazards and during the entire installation
- E. Waste Management: Refer to contact information apparent on packaging for appropriate recycling opportunities.

1.7 WARRANTY

- A. Warrant doors and frames to be free from defects which include factory applied hardware, and premature degradation of finish and door structure.
- B. Warranty period will be ten years from the date of manufacture.

PART 2- PRODUCTS

2.1 MANUFACTURER

A. Aluminum Doors:

1. Provide products complying with requirements of the contract documents and made by one of the following:
 - a. Cross Aluminum Products, Inc., basis of design.
 - b. Kawneer Company, Inc.
 - c. Tubelite

- B. Components: Door and frame components from same manufacturer.

2.2 THERMAL ALUMINUM FLUSH DOORS - THERMALPLANK

- A. Product: FL-400 Series with required aluminum frames.
- B. Door Opening Size: refer to drawings.
- C. Door Assembly:

1. Door Stile: To be aluminum alloy 6063; temper to be T5 with a minimum 1/8" wall thickness.
2. Stile Thickness: To be 1 3/4" thick tubular extrusion.
3. Door Joinery: Joinery shall be 3/8" diameter cadmium tie rods bolted through interlocking stiles. Minimum of 3 tie rods per door (where applicable).
4. Top of Door: To receive added 1/8" reinforcement closer plate adhered to interior wall for door closer hardware.
5. Top/Bottom of Door: To receive 1/8" thick cap for further seal and to trim the top and bottom of door.

D. Pattern:

1. Inside Door Face Fluted
2. Outside Door Face Fluted

E. Insulation: Polyisocyanurate Rigid Foam

2.3 MATERIALS & ACCESSORIES

A. Aluminum:

1. ASTM B 221, alloy and temper to be 6063 T-5 or similar alloy and temper recommended by manufacturer for optimum finish results and consistency. Color to match window and door material.

B. Internal Reinforcement

1. ASTM B 308, for structural aluminum.

C. Fasteners

1. Material: Aluminum, 18-8 Stainless Steel, or other non-corrosive materials compatible with items being screw applied.
2. Exposed:
 - a. Type: Fasteners exposed will be Philips flathead fasteners unless provided by other supplier.
 - b. Finish: Fasteners to match appropriate finish on standard doors and frames.
3. Concealed: To be standard according to manufacturer's standards.

D. Weather stripping:

1. Wool pile:
 - a. Material: Solid Propylene Base with resilient fibers.
 - b. Color: Manufacturer's standard black color.

2.4 HARDWARE

- A. Hardware Preparation: To be fabricated at factory according to hardware templates provided.
- B. Hardware Installation: To factory install all applicable and supplied hardware to doors and frames.
- C. Hardware Reinforcement: To provide necessary reinforcement for proper longevity and hardware function; ASTM B 209 and/or ASTM 308.
- D. Refer to Section 087100 for Door Hardware.

2.5 FABRICATION

A. Processes:

1. Job Preparation:
 - a. Preliminary Analysis: Job drawings to indicate door types, sizes, vision lite configuration(s),

and finishes.

- b. Fulfill Custom Requirements: Follow through on any specific deviations from standard requirements.

2. Assembly:

- a. Product Operation: Measure, cut, and fabricate required materials for job.
- b. Product Refinement: Smooth rough cut edges.
- c. Arrangement: Place prepared structural fasteners inside door to conceal from view.
- d. Reinforcement Preparation: To apply necessary structural and hardware reinforcement in beneficial areas of doors and frames where needed.

3. Fitting:

- a. Placement: Product materials to fit accurately in appropriate locations.
- b. Alignment: Doors to be in proper alignment with intended elevations.

B. Tolerances: Doors and/or frame elevations will not deviate from last revised and approved drawings.

2.6 FRAMING SYSTEMS

A. Framing Members: Manufacturer's standard aluminum extruded profiles with required thickness for load support.

- 1. Vertical Jamb Sizes: 2" x 4 1/2"
- 2. Header Sizes: 4" x 4 1/2"

B. Clips and Reinforcements: Manufacturer's standard high strength aluminum: ASTM B 221 and/or ASTM B 308.

C. Fasteners and Accessories: Manufacturer's standard non-bleeding and non-corrosive material congruent to adjacent material.

- 1. Exposed Fasteners: To be stainless steel Philips flathead screws with appropriate finish: ASME B 18.6.4
- 2. Concealed Fasteners: To be manufacturer's standard.

D. Assembly:

- 1. Framing members are separate aluminum pieces cut to length and mechanically fastened from either spline or clip systems.
- 2. Joinery to be hairline.
- 3. Sommer and Maca Silicone 88R or Dow Corning® 795 Sealants applied on applicable areas.
- 4. Framing elevations to be identified according to final approved drawings.

E. Anchoring:

- 1. Appropriate anchoring fasteners to be secured no more than 18" apart on entire frame opening.
- 2. Frame headers to receive no less than 2 anchoring fasteners.
- 3. Add extra fasteners where hardware and hinge may require more.

F. Doorstop:

- 1. To be #CDM-32.
 - a. Wall Thickness: To be 3/16" thick for receiving applicable hardware.
 - b. Profile Height: To be no less than 5/8" high.
- 2. Snap-in: Fits standard manufacturer's door jamb profiles.
- 3. To receive weather strip around acting door leafs.

- a. Wool pile: Solid Propylene Base with resilient fibers in a standard black color.

G. Hardware Preparation:

1. Intramural Work: Hardware preparation according to hardware suppliers' templates.
2. Field Work: Refer to manufacturers' installation instructions.

2.7 LOUVERS

- A. Style: Extruded Aluminum, mitered corners secured with reinforcing clips, inverted-Y design
- B. Dimension: Refer to plans
- C. Finish: To match door
- D. Installation: Louvers to be factory installed and removable from interior only.

2.8 FINISHES

A. Standard Anodic Finishes (door, frame, and trim):

1. Dark Bronze: Architectural Class 1, AA-M12C22A44, 0.7 mils.

PART 3- EXECUTION

3.1 EXAMINATION

- A. Examine conditions for compliance with requirements for installation tolerances and other conditions affecting proper installation.

3.2 INSTALLATION

- A. Comply with manufacturer's instructions.
- B. Do not install damaged components.
- C. Install doors plumb, level, and square, with no warp or rack in frame.
- D. Hang doors with the following required clearances:
 1. Lock Stiles: 0.125"
 2. Between Meeting Stiles: 0.187" - 0.25"
 3. At Top Rails: 0.125"
 4. Between Bottom Rail and Threshold: 0.125" - 0.187"
- E. Fit joints to produce hairline joints free of burrs and distortion.
- F. Apply bituminous coatings to keep Aluminum free from contacting other metals.
- G. Rigidly secure non movement joints.
- H. Install recommended anchors with separators to prevent metal corrosion and electrolytic deterioration.
- I. Seal joints watertight, unless otherwise indicated.
- J. Glaziers to provide necessary glazing shims for proper glass installation on vision lites and side lites. Reference section Glazing Accessories 08800.
- K. Place thresholds in bed of proper weather sealant.

3.3 ADJUSTING

- A. Fine-tune doors and hinges to operate properly without bind or sag.
- B. Adjust pressure settings on closers.
 1. For doors accessible to people with disabilities, adjust closers to provide a 3-second closer sweep period for doors to move from a 70-degree open position to 3 inches from the latch measured to the leading door edge.

3.4 CLEANING

- A. Immediately clean doors after installation.
- B. Avoid any harsh cleaners not specified on manufacturer's cleaning and care guide.

3.5 PROTECTION

- A. Follow Manufacturer's guide to cleaning and care for proper treatment on entrances for optimum longevity, function, and performance.

END OF SECTION

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**SECTION 085113
ALUMINUM WINDOWS**

PART 1 - GENERAL

1.1 WORK INCLUDED

- A. The conditions of the contract and applicable sections of Division 1 are hereby made a part of this section.
- B. Material, labor, tools and equipment necessary to furnish and install aluminum windows as shown on drawings and specified herein, shall be provided. Details indicate the required depth and profile.
- C. Glass and Glazing.
- D. Existing sash, stops, and other items indicated on the drawings and required by the proposal replacement system shall be removed and properly discarded.
- E. Perimeter Sealing.

1.2 RELATED WORK

- A. Division 8...Glass & Glazing
- B. Division 4...Masonry
- C. Section 079200...Joint Sealant

1.3 SYSTEM DESCRIPTION, BASIS OF DESIGN

- A. Units shall be Litex, Inc. L500T Horizontally Sliding Aluminum Windows conforming to HS-AW100 specifications in AAMA/WDMA/CSA 101/I.S.2 A440-08 and ANSI/AAMA Publication GS-001.
- B. Kawneer Company, Inc.
- C. Efcow Window
- D. Tubelite
- E. Cross Aluminum
- F. Requests for substitutions will be considered in accordance with provisions of Section 16000

1.1 PERFORMANCE REQUIREMENTS

- A. Air Infiltration: When tested in accordance with ASTM E 283-04 on a test size of 5'0"x 3'0", the air infiltration rate shall not exceed .02 cfm/ft of sash perimeter under a static pressure difference of 1.57 PSF. Additionally, at 6.24 PSF the air infiltration shall not exceed .04 cfm/ft.
- B. Water Resistance: When tested in accordance with ASTM E 331-00 on a test size of 5'0"x 3'0", there shall be no leakage under a static pressure of 15.00 PSF.
- C. Uniform Load Structural Test:
 - 1. With window sash closed and locked, the unit shall be tested in accordance with ASTM E 330-02 on a test size of 5'0"x 3'0", at a static pressure difference of 225.00 PSF with first the exterior [positive] pressure applied, and then the interior [negative] pressure applied.
 - 2. At conclusion of test, there shall be no glass breakage, permanent damage to fasteners, hardware parts, or actuating mechanisms, nor any other damage that would cause the window to be inoperable. Permanent deformation of any frame or sash member shall not exceed 0.4% of its span.
- D. Condensation Resistance Factor (CRF): When tested in accordance with AAMA 1503-98 on a test size of 5'0"x 3'0", the CRF shall not be less than 55.
- E. Thermal Transmittance [U Value]: When tested in accordance with NFRC 100 Standards on a sample size of 59" X 24", the thermal transmittance due to conduction [Uc] shall be between 0.30 to 0.50 BTU/HR.FT².F based on the type of glass specified for the project. The whole window U-Value with the project specific glass will be verified by NFRC Computer Modeling from an independent NFRC Accredited Simulator.
- F. Life Cycle Test: The movable panel and locking hardware will be cycled 2500 total cycles without failure. After the Life Cycle Test the window will be retested for air infiltration, water penetration

and
uniform structural load deflection without failure. D. Forced Entry Resistance: The window shall have a Level 10 Forced Entry Resistance Rating as per ASTM F588.

1.4 QUALITY ASSURANCE

A. Pre-Bid Qualifications:

1. All projected and fixed windows shall be L-500T Offset fixed and L-500T Fixed as manufactured by Litex Incorporated, 2774 Product Dr., Rochester Hills, MI 48309, phone 248-852-0661, fax 248-852-0095, online www.Litex.com, or approved equal.
2. Other approved manufacturers;
 - a. Kawneer Company
 - b. Efco Window
 - c. Cross Aluminum
 - d. Tubelite
3. Other manufacturers desiring approval shall furnish a full size sample and valid test reports indicating full compliance with all requirements of this specification at least ten days prior to bid.
4. Other manufacturers shall have been engaged in fabrication of aluminum windows for five years, and shall submit for review a list of completed projects.
5. Approval of "equal" product shall be in the form of a written addendum.

1.5 SUBMITTAL

- A. Product Data: Manufacturers specifications, test reports, and standard aluminum window details shall be submitted.
- B. Shop Drawings: Location plans showing window openings, unit elevations, full size sections of typical members, anchors and glazing details shall be shown.
- C. Samples:
 1. Specified aluminum finish shall be submitted on 6" sections of aluminum as required.
 2. Additional samples shall be submitted as directed by the architect, to show fabrication techniques, workmanship of component parts, and design of hardware
- D. Written approval by the architect shall be required prior to shop fabrication

1.6 WRITTEN PROJECT WARRANTIES

- A. Windows shall be warranted against defects in material or workmanship under normal use for a period of 10 years from the date of installation.
- B. Insulating glass shall be warranted against visual obstruction resulting from film formation or moisture collection between the interior glass surfaces [excluding glass breakage] for a period of 10 years from date of manufacture.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Aluminum Extrusions:
 1. All frame and sash sections shall be extruded shapes produced from commercial quality 6063-T5 or 6063-T6 alloy and shall be free from defects impairing strength and/or durability.
 2. The frame depth shall be a nominal 3 1/2"
 3. All frame, sash and sill members shall have a nominal wall thickness of .125".
 4. No extruded plastics shall be allowed in the frame or sash members.
- B. Weatherstrip:
 1. All sashes shall be double weaterstripped using silicone-treated pile with a polypropylene center fin conforming to AAMA 701.2
 2. All weathersrtipping shall be held in extruded ports and secured to prevent loss when operating sash.

- C. Glazing:
 - 1. All windows to be factory glazed with either 1" sealed insulated glass. Refer to Section 08800 for glazing type.
 - 2. Glass shall be set in glazing tape 1/8" thick at the exterior glazing leg and held in place with interior snap-in stops.
 - 3. All glass to be set on %" setting blocks.
 - 4. Gasket type glazing requiring sash disassembly to reglaze is not acceptable.
 - 5. All glass or panels glazed into fixed framing to receive a perimeter cap bead of silicone sealant between the glazing leg and the glass surface.
 - 6. All glass glazed into sliding windows to receive a perimeter cap bead of silicone sealant between the glazing leg and glass surface.
 - 7. All glazing for toilet/shower building shall be frosted, refer to 088000 Glazing
- D. Trim:
 - 1. Aluminum: ASTM B 221, alloy and temper to be 6063 T-5 or similar alloy and temper recommended by manufacturer for optimum finish results and consistency. Color to match window and door material.

2.2 FABRICATION

- A. Construction
 - 1. Frame and sash members to be extruded as a single section. The frame members and the sash members will have a channel that is filled with polyurethane which becomes a rigid structural element. A connecting aluminum "bridge" of at least .250 inches wide is removed to establish interior and exterior sections separated by the polyurethane to prevent thermal transmittance.
 - 2. The thermal barrier shall be a structural and integral part of the aluminum extrusion, having strength exceeding the basic shapes. The thermal barrier shall be permanently bonded to the aluminum extrusion and there shall be no bridging of the thermal barrier at any corner or connection or by anchorage.
 - 3. All frame and sash members to be continuous extrusions. The window frame corners are to be butt jointed, sealed with small joint sealant as manufactured by the H.B. Fuller Co. and fastened with 2 [two] stainless steel or cadmium plated screws. The sash corners are to be mitre cut, tightly joined with solid aluminum corner keys, sealed with small joint sealant as manufactured by the H.B. Fuller Co. and hydraulically crimped.
 - 4. Each operating vent shall open 50 degrees for ventilation and cleaning. Also each vent will have one or more handle locks [depending on window dimension] to provide a secure weathertight "locked" position.
 - 5. The frame sill shall contain integral baffled weep holes that allow gravity water drainage and resistance to wind driven water and/or air.
 - 6. All joints shall be hairline and be factory sealed with a sealant conforming to AAMA 803.3-85.
- B. Mullions or other Structural Members: When units occur that are joined by independent mullions, the resulting member shall be capable of withstanding the design pressure. Evidence of compliance may be by mathematical calculations.
- C. Finish: The exposed surfaces of all aluminum members shall be clean and free from surface blemishes, scratches or tool marks. The finish for frames and tri shall be the following:
 - 1. Dark Bronze: Architectural Class 1, AA-M12C22A44, 0.7 mils.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Openings shall be verified by contractor and/or general contractor to be within allowable tolerances, plumb, level, clean, providing a solid anchoring surface and in accordance with approved shop drawings. Unsatisfactory conditions shall be corrected prior to installation.

- B. Openings shall not be left uncovered at the end of the working day, during wind driven precipitation, or very cold weather.

3.2 WINDOW INSTALLATION

- A. Windows shall be erected by skilled craftsman in prepared openings in accordance with manufacturers recommendations and approved shop drawings. Frames shall be securely supported, fastened and set plumb, square, and level without twist or bow.
- B. All sashes shall be glazed using manufacturer glazing instructions in the factory or if conditions dictate in the field, depending upon job scope and field conditions.
- C. Fiberglass insulation shall be compressed between new window frame and existing construction, or between frame and new blocking as applicable.
- D. Aluminum shall be insulated from direct contact with steel, masonry, concrete or non-compatible materials by bituminous paint, zinc chromate primer or other suitable insulating material.
- E. Exterior joints between windows and surrounding construction shall be sealed per specifications and approved drawings.
- F. Joints and surfaces to receive sealants shall be dry, clean, and free from loose material, efflorescence or mortar leaching. Sealants shall not be applied when temperature is below sealant manufacturer recommendations.

3.3 ADJUSTING AND CLEANING

- A. Frames and sash shall be adjusted, if necessary, after installation to insure smooth and weather tight operation.
- B. The general contractor shall be responsible for protection of the work from damage by other trades and for final cleaning.

END SECTION

SECTION 087100 DOOR HARDWARE

PART 1- GENERAL

1.1 Refer to Division 1 of Specifications. Requirements of these Sections and the project drawings shall govern work in this section.

1.2 WORK INCLUDED

- A. Furnish all items of Finish Hardware specified, scheduled, shown or required herein except those items specifically excluded from this section of the specification.
- B. Related work:
 - 1. Division 00 00 00 - Procurement and Contracting Requirements
 - 2. Division 01 00 00 - General Requirements
 - 3. Division 06 00 00 - Wood, Plastics, and Composites
 - 4. Division 08 00 00 - Openings

1.3 QUALITY ASSURANCE

- A. Requirements of Regulatory Agencies:
 - 1. Furnish finish hardware to comply with the requirements of laws, codes, ordinances, and regulations of the governmental authorities having jurisdiction where such requirements exceed the requirements of the Specifications.
 - 2. Furnish finish hardware to comply with the requirements of the regulations for public building accommodations for physically handicapped persons of the governmental authority having jurisdiction and to comply with Americans with Disabilities Act.
 - 3. Provide hardware for fire-rated openings in compliance with NFPA 80 and state and local building code requirements. Provide only hardware that has been tested and listed by UL for types and sizes of doors required and complies with requirements of door and door frame labels.
 - 4. All hardware to be commercial grade-heavy duty.
- B. Hardware Supplier:
 - 1. Shall be an established firm dealing in contract builders' hardware. He must have adequate inventory and qualified personnel on staff. The distributor must be a factory-authorized dealer for all materials required. The supplier shall be or have in employment an Architectural Hardware Consultant (AHC).
- C. Manufacturer:
 - 1. Obtain each type of hardware (latch and locksets, hinges, closers, etc.) from a single manufacturer, although several may be indicated as offering products complying with requirements.
- D. References:
 - 1. American National Standards Institute:
 - a. ANSI A156.1 - Butts and Hinges.
 - b. ANSI A156.2 - Bored and Preamsembled Locks and Latches.
 - c. ANSI A156.3 - Exit Devices.
 - d. ANSI A156.4 - Door Controls - Closures.
 - e. ANSI A156.5 - Auxiliary Locks and Associated Products.
 - f. ANSI A156.6 - Architectural Door Trim.
 - g. ANSI A156.7 - Template Hinge Dimensions.
 - h. ANSI A156.8 - Door Controls - Overhead Holders.
 - i. ANSI A156.12 - Interconnected Locks and Latches.
 - j. ANSI A156.13 - Mortise Locks and Latches.
 - k. ANSI A156.14 - Sliding and Folding Door Hardware.
 - l. ANSI A156.15 - Closer Holder Release Devices.
 - m. ANSI A156.16 - Auxiliary Hardware.

- n. ANSI A156.18 - Materials and Finishes
- o. ANSI A156.19 - Power Assist and Low Energy Power Operated Doors.
- p. ANSI A156.23 - Electromagnetic Locks.
- q. ANSI A156.24 - Delayed Egress Locks.
- r. ANSI A156 - Complete Set of 24 BHMA Standards (A156 Series) with Binder.

- 2. Builders Hardware Manufacturers Association:
 - a. BHMA Directory of Certified Products.

1.4 SUBMITTALS

A. Hardware Schedule

- 1. Submit number of Hardware Schedules as directed in Division 1.
- 2. Follow guidelines established in Door & Hardware Institute Handbook (DHI) Sequence and Format for the Hardware Schedule unless noted otherwise.
- 3. Schedule will include the following:
 - a. Door Index including opening numbers and the assigned Finish Hardware set.
 - b. Preface sheet listing category only and manufacturer's names of items being furnished as follows:

CATEGORY	SPECIFIED	SCHEDULED
Hinges	Manufacturer A	Manufacturer B
Lock sets	Manufacturer X	Manufacturer X
Kick Plates	Open	Manufacturer Z

- c. Hardware Locations: Refer to Article 3.1 B.2 Locations.
- d. Opening Description: Single or pair, number, room locations, hand, active leaf, degree of swing, size, door material, frame material, and UL listing.
- e. Hardware Description: Quantity, category, product number, fasteners, and finish.
- f. Headings that refer to the specified Hardware Set Numbers.
- g. Scheduling Sequence shown in Hardware Sets.
- h. Product data of each hardware item, and shop drawings where required, for special conditions and specialty hardware.
- i. "Vertical" scheduling format only. "Horizontal" schedules will be returned "Not Approved."
- j. Typed Copy.
- k. Double-Spacing.
- l. 8-1/2 x 11 inch sheets
- m. U.S. Standard Finish symbols or BHMA Finish symbols.

B. Closeout

- 1. Project Record Documents: Record actual locations of installed cylinders and their master key code.
- 2. Operation and Maintenance Data: Submit data on operating hardware, lubrication requirements, and inspection procedures related to preventative maintenance.
- 3. Keys: Deliver with identifying tags to Owner.

1.5 PRODUCT DATA

- A. Submit, in booklet form Manufacturers Catalog cut sheets of scheduled hardware.
- B. Submit product data with hardware schedule.

1.6 KEY SCHEDULE

- A. Submit detailed schedule indicating clearly how the Owner's final keying instructions have been followed.
- B. Submit as a separate schedule.

1.7 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Product Delivery, Storage, and Handling:

1. Label each item of hardware with the appropriate door number and Hardware Schedule heading number, and deliver to the installer so designated by the contractor.

1.8 WARRANTIES

A. Special Warranty: During the warranty period, replace defective work, including labor, materials and other costs incidental to the work. Failures include, but not limited to the following;

1. Structural failures including excessive deflection, cracking or breakage.
2. Faulty operation of operators and door hardware.
3. Deterioration of metals, metal finishes and other materials beyond normal weathering and use.

B. Warranty Period: Two years from Substantial Completion.

PART 2-PRODUCT

2.1 Furnish each category with the products of only one manufacturer unless specified otherwise; this requirement is mandatory whether various manufacturers are listed or not.

- A. Provide the products of manufacturer designated or if more than one manufacturer is listed, the comparable product of one of the other manufacturers listed. Where only one manufacturer or product is listed, it is understood that this is the owner's Building Standard and "no substitution" is allowed.

2.2 HINGES

- A. Furnish hinges of class and size as listed in sets.
B. Numbers used are Ives (IVE).
C. Products of a BHMA member are acceptable.

2.3 CONTINUOUS GEAR HINGE

- A. 6063-T6 aluminum alloy, anodized finish (cap on entire hinge painted if specified). Manufacture to template, uncut hinges non-handed, pinless assembly, three interlocking extrusions, full height of door and frame, lubricated polyacetal thrust bearing, fasteners 410 stainless steel plated and hardened. All hinge profiles to be manufactured to template bearing locations, with standard duty bearing configurations at 5-1/8" spacing with a minimum of 16 bearings; and heavy duty at 2-9/16" spacing with a minimum of 32 bearings. Anodizing of material shall be done after fabrication of components so that all bearing slots are anodized.
- B. Length: 1" less than door opening height. Fastener 12-24 x 1/2" #3 Phillips kept from stainless steel self-tapping at aluminum and hollow metal doors, 12- 1/2" #3 Philips, flathead full thread at wood doors.
- C. Numbers used are Ives.
a. Equal products by Hager & Select will also be accepted.

2.4 CLOSERS

- A. Door closers shall have fully hydraulic, full rack and pinion action with a high strength cast iron cylinder. Cylinder body shall be 1 1/2" in diameter, and double heat treated pinion shall be 1 1/16" in diameter with double D slab drive arm connection.
- B. Hydraulic fluid shall be of a type requiring no seasonal closer adjustment for temperatures ranging from 120 degrees F to -30 degrees F.
- C. Spring power shall be continuously adjustable over the full range of closer sizes, and allow for reduced opening force for the physically handicapped. Hydraulic regulation shall be by tamper-proof, non-critical valves. Closers shall have separate adjustment for latch speed, general speed, and backcheck.
- D. All closers shall have solid forged steel main arms (and forged forearms for parallel arm closers).
- E. All surface mounted mechanical closers shall be certified to exceed ten million (10,000,000)

full load cycles by a recognized independent testing laboratory.

- F. Closers will have Powder coating finish certified to exceed 100 hours salt spray testing by ETL, an independent testing laboratory used by BHMA for ANSI certification.
- G. Refer to door and frame details and furnish accessories such as drop plates, panel adapters, spacers and supports as required to correctly install door closers. State degree of door swing in the hardware schedule.

2.5 KICK PLATES

- A. Furnish .050 inches thick, beveled three sides, 10" high x door width less 2" at single doors and less 1" at pairs. Where glass or louvers prevent this height, supply with height equal to height of bottom rail less 2".
- B. Any BHMA manufacturing product meeting above is acceptable.

2.6 WALL STOPS

- A. Length to exceed projection of all other hardware. Provide with threaded studs and expansion shields for masonry wall construction. Install with slope at top.
 - 1. IR-Ives WS33x
 - 2. BHMA L12011 or L12021

2.7 THRESHOLDS

- A. 1/2" high - 5" wide. Cope at jambs.
- B. Furnish full wall opening width when frames are recessed.
- C. Cope in front of mullions if thresholds project beyond door faces.
- D. Furnish with non-ferrous Stainless Steel Screws and Lead Anchors.
 - 1. National Guard as listed in sets
 - 2. Equal of Zero or Reese

2.8 DOOR SWEEPS

- A. Surface Sweeps:
 - 1. National Guard as listed in sets
 - 2. Equal by Zero or Reese

2.9 WEATHER-STRIPPING

- A. Apply to head and jamb stops.
- B. Solid Bar stock all sides
 - 1. National Guard as listed in sets
 - 2. Equal by Zero or Reese

2.10 MISCELLANEOUS

- A. Furnish items not categorized in the above descriptions but specified by manufacturer's names in Hardware Sets.

2.11 FASTENERS

- A. Furnish fasteners of the proper type, size, quantity and finish. Use machine screws and expansion shields for attaching hardware to concrete or masonry, and wall grip inserts at hollow wall construction. Furnish machine screws for attachment to reinforced hollow metal doors and frames and reinforced aluminum doors and frames. Furnish full thread wood screws for attachment to solid wood doors and frames. "TEK" type screws are not acceptable.
- B. Sex bolts will not be permitted on reinforced metal doors or wood doors where blocking is specified.

2.12 FINISHES

- A. Generally, Dark Bronze to match door and frame. Provide finish for each item as indicated in sets, verify with Architect if a color is in question.

2.13 TEMPLATES AND HARDWARE LOCATION

- A. Furnish hardware made to template. Supply required templates and hardware locations to the door and frame manufacturers.
- B. Furnish metal template to frame/door supplier for continuous hinge.
- C. Refer to Article 3.1 B.2, Locations, and coordinate with templates.

2.14 CYLINDERS AND KEYING

- A. All cylinders for this project will be supplied by one supplier regardless of door type and location.
- B. Provide a cylinder for all hardware components capable of being locked.
- C. Provide cylinders master and grand master keyed to existing system according to Owner's instructions. Provide two change keys for each cylinder, master and grand master keys as required by Owner.
- D. Provide cylinders with construction cores or keying for use during the construction period. When so directed, and in the presence of the Owner's security department or representative, convert construction cores or keying to the final system.
 - 1. Supplier shall include the cost of this service in his proposal.

PART 3- EXECUTION

3.1 INSTALLATION

- A. General:
 - 1. Install hardware according to manufacturer's installations and template dimensions. Attach all items of finish hardware to doors, frames, walls, etc. with fasteners furnished and required by the manufacture of the item.
 - 2. Provide blocking/reinforcement for all wall mounted Hardware.
 - 3. Reinforced hollow metal doors and frames and reinforced aluminum door and frames will be drilled and tapped for machine screws.
 - 4. Solid wood doors and frames: full thread wood screws. Drill pilot holes before inserting screws.
 - 5. Continuous gear hinges attached to hollow metal doors and frames and aluminum doors and frames: 12-24 x 1/2" #3 Phillips Keenform self-tapping. Use #13 or 3/16 drill for pilot.
 - 6. Continuous Gear Hinges require continuous mortar guards of foam or cardboard 1/2" thick x frame height, applied with construction adhesive.
 - 7. Install weather-strip gasket prior to parallel arm closer bracket, rim exit device or any stop mounted hardware. Gasket to provide a continuous seal around perimeter of door opening. Allow for gasket when installing finish hardware. Door closers will require special templating. Exit devices will require adjustment in backset.
- B. Locations:
 - 1. Dimensions are from finish floor to center line of items.
 - 2. Include this list in Hardware Schedule.

<u>CATEGORY</u>	<u>DIMENSION</u>
Hinges	Door Manufacturer's Standard 72"
Flush Bolt Levers	and 12"
Levers	Door Manufacturer's Standard Per
Exit Device Touchbar	Template
Deadlatch Cylinder	43" unless conflicting with push-pull.
Deadlock MS Cylinder	43" unless conflicting with push-pull.
Hospital Push-Pull	Manufacturer's Template At Head
Roller Latch Push-Pull	42" to centerline of Pull Suitable for
Units Offset Pulls Pulls	Exit Devices 46"
- Flush Cup Pulls	46"
(BTB)	46"
Push-Pulls Push	52"
Plates Pull Plates Wire	42"
Pulls Wall	42"
Stops/holders	At Head
Astragals	Pull side of active leaf
Trim Protector Bars	Push side of door below lever handle
Lock Protectors	Pull side of door

3.2 FIELD QUALITY INSPECTION:

- A. Provide the services of a representative to inspect material furnished and its installation and is adjustment, and to instruct the Owner's personnel in adjustment, care and maintenance of hardware.
- B. Locksets and exit devices shall be inspected by the factory representative after installation and after the HVAC system is in operation and balanced, to insure correct installation and proper operation.
- C. Closers shall be inspected by the factory representative after installation and after the HVAC system is in operation and balanced, to insure correct installation and proper operation.
- D. The manufacturer's representative shall prepare a written report stating compliance, and also recording locations and kinds of noncompliance. The original report shall be forwarded to the Owner with copies to the Contractor, hardware distributor, and hardware installer.
 - a. Technical and Warranty Information:
 - 1) At the completion of the project, the technical and warranty information coalesced and kept on file by the General Contractor/Construction Manager shall be given to the Owner or Owner's Agent. In addition to both the technical and warranty information, all factory order acknowledgement numbers supplied to the General Contractor/Construction Manager during the construction period shall be given to the Owner or Owner's Agent. The warranty information and factory order acknowledgement numbers shall serve to both expedite and properly execute any warranty work that may be required on the various hardware items supplied on the project.
 - 2) Submit to General Contractor/Construction Manager, two copies each of parts and service manuals and two each of any special installation or adjustment tools. Include for locksets, exit devices, door closers and any electrical products.

3.3 HARDWARE SETS:

HARDWARE GROUP NO. 1 TOILET ROOM DOORS (MEN'S AND WOMEN'S)

3' 0" X 7' 0" X 1 3/4" X ALUM DOOR X ALUM FRAME

For use on mark/door #(s):

104 105

Provide each door(s) with the following:

Qty	Description	Catalog Number	Finish	Mfr
1EA	CONT. HINGE	112HD	DB	IVE
1EA	DEAD BOLT LATCH	L9463	619	SC
1EA	CYLINDER	DEADLOCK	619	SAR
1EA	SURFACE CLOSER	4040XP-3077 EDA	72ME	LCN
2EA	KICK PLATE	8400 10" X 36" LDW	619	IVE
1EA	PULL PLATE	8302 4X16	619	IVE
1EA	PUSH	8200 4X16	619	IVE
1EA	WEATHERSEAL	700NA	DB	NG
1EA	THRESHOLD	425HD	DB	NG
1EA	DOOR STOP	WS33X	619	IVE

HARDWARE GROUP NO. 2 TOILET ROOM DOORS (SHOWERS AND FAMILY LAVATORY)

3' 0" X 7' 0" X 1 3/4" X ALUM DOOR X ALUM FRAME

For use on mark/door #(s):

107 108 109 110 111

Qty	Description	Catalog Number	Finish	Mfr
1EA	CONT. HINGE	112HD	DB	IVE
1EA	DEAD BOLT LATCH	L496	619	SC
1EA	CYLINDER	DEADLOCK	619	SAR
1EA	SURFACE CLOSER	4040XP-3077 EDA	72ME	LCN
2EA	KICK PLATE	8400 10" X 36" LDW	619	IVE
2EA	PULL PLATE	PR 8302 10" 4X16 J	619	IVE
1EA	WEATHERSEAL	700NA	DB	NG
1EA	THRESHOLD	425HD	DB	NG
1EA	DOOR STOP	WS33X	619	IVE

HARDWARE GROUP NO. 2 TOILET ROOM DOORS (UTILITY AND STORAGE ROOM)

3' 0" X 7' 0" X 1 3/4" X ALUM DOOR X ALUM FRAME

For use on mark/door #(s):

106A 106B

Provide each door(s) with the following:

Qty	Description	Catalog Number	Finish	Mfr
1EA	CONT. HINGE	112HD	DB	IVE
1EA	STOREROOM	LV9080	619	SC
1EA	SURFACE CLOSER	4040XP-3077 EDA	72ME	LCN
2EA	KICK PLATE	8400 10" X 36" LDW	619	IVE
1EA	WEATHERSEAL	700NA	DB	NG
1EA	THRESHOLD	425HD	DB	NG
1EA	DOOR STOP	WS33X	619	IVE

END OF SECTION END OF SECTION

50% Design Review
1/26/20

SECTION 092900 - GYPSUM BOARD

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

- A. Submittals: Product data.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Fire-Resistance-Rated Assemblies: Provide materials and construction identical to those tested in assemblies per ASTM E 119 by an independent testing and inspecting agency acceptable to authorities having jurisdiction.
- B. STC-Rated Assemblies: Provide materials and construction identical to those tested in assemblies per ASTM E 90 and classified per ASTM E 413 by a qualified independent testing and inspecting agency.

2.2 PANEL PRODUCTS

- A. Provide in maximum lengths available to minimize end-to-end butt joints.
- B. Interior Gypsum Board: ASTM C 1396/C 1396M, in thickness indicated, with manufacturer's standard edges. **Regular type unless otherwise indicated.**
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. National Gypsum Company.
 - b. USG Corporation.

2.3 ACCESSORIES

- A. Trim Accessories: ASTM C 1047, formed from galvanized or aluminum-coated steel sheet, rolled zinc, plastic, or paper-faced galvanized-steel sheet. For exterior trim, use accessories formed from hot-dip galvanized-steel sheet, plastic, or rolled zinc.
 - 1. Provide cornerbead at outside corners unless otherwise indicated.
 - 2. Provide LC-bead (J-bead) at exposed panel edges.
 - 3. Provide control joints where indicated.

B. Joint-Treatment Materials: ASTM C 475/C 475M.

1. Joint Tape: Paper unless otherwise recommended by panel manufacturer.
2. Joint Compounds: **Drying-type, ready-mixed, all-purpose compounds.**

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install gypsum board to comply with ASTM C 840.

1. Isolate gypsum board assemblies from abutting structural and masonry work. Provide edge trim and acoustical sealant.
2. Single-Layer Fastening Methods: Fasten gypsum panels to supports with screws.
3. Multilayer Fastening Methods: Fasten base layers.

B. Install cementitious backer units to comply with ANSI A108.11.

C. Fire-Resistance-Rated Assemblies: Comply with requirements of listed assemblies.

D. Finishing Gypsum Board: ASTM C 840.

1. At concealed areas, unless a higher level of finish is required for fire-resistance-rated assemblies, provide Level 1 finish: Embed tape at joints.
2. At substrates for tile, provide Level 2 finish: Embed tape and apply separate first coat of joint compound to tape, fasteners, and trim flanges.
3. Unless otherwise indicated, provide Level 4 finish: Embed tape and apply separate first, fill, and finish coats of joint compound to tape, fasteners, and trim flanges.
4. Where indicated, provide Level 5 finish: Embed tape and apply separate first, fill, and finish coats of joint compound to tape, fasteners, and trim flanges. Apply skim coat to entire surface.

E. Glass-Mat, Water-Resistant Backing Panels: Finish according to manufacturer's written instructions.

F. Cementitious Backer Units: Finish according to manufacturer's written instructions.

G. Texture Finish Application: Mix and apply finish using powered spray equipment, to produce a uniform texture free of starved spots or other evidence of thin application or of application patterns.

END OF SECTION

**SECTION 099100
PAINTING**

PART 1- GENERAL

1.1 SECTION INCLUDES

- A. Surface preparation.
- B. Surface finish schedule.
- C. Paint all surfaces to remain exposed in the finished work whether specifically indicated or not, except shop-and-factory finished items and those specifically indicated not to be painted.
- D. No surface shall have less than one prime coat and two finish coats.
- E. Miscellaneous Painting

1.2 REFERENCES

- A. ANSI/ASTM D16 - Definitions of Terms Relating to Paint, Varnish, Lacquer, and Related Products.
- B. ASTM D2016 - Test Method for Moisture Content of Wood.
- C. Conform to ANSI/ASTM D16 for interpretation of terms used in this Section.

1.3 QUALITY ASSURANCE

- A. Product Manufacturer: Company specializing in manufacturing quality paint and finish products with five years experience.
- B. Applicator: Company specializing in commercial painting and finishing with five years documented experience and approved by product manufacturer.
- C. Conform to applicable code for flame/fuel/smoke rating requirements for finishes.

1.4 SUBMITTALS

- A. Provide Product Data on all finishing products.
- B. Submit three samples 6 x 6 inches in size illustrating range of colors and textures available for each surface finishing product scheduled, for selection.
- C. Submit manufacturer's application instructions.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store and protect products on site under provisions of Division I.
- B. Deliver products to site in sealed and labeled containers; inspect to verify acceptance.
- C. Container labeling to include manufacturer's name, type of paint, brand name, brand code, coverage, surface preparation, drying time, cleanup, color designation, and instructions for mixing and reducing.
- D. Store paint materials at minimum ambient temperature of 45 degrees F and a maximum of 90 degrees F, in well ventilated area, unless required otherwise by manufacturer's instructions.
- E. Take precautionary measures to prevent fire hazards and spontaneous combustion.

1.6 ENVIRONMENTAL REQUIREMENTS

- A. Provide continuous ventilation and heating facilities to maintain surface and ambient temperatures above 45 degrees F for 24 hours before, during, and 48 hours after application of finishes, unless required otherwise by manufacturer's instructions.
- B. Do not apply exterior coatings during rain or snow, or when relative humidity is above 50 percent,

unless required otherwise by manufacturer's instructions.

- C. Minimum Application Temperatures for Latex Paints: 45 degrees F for interiors; 50 degrees F for exterior; unless required otherwise by manufacturer's instructions.
- D. Minimum Application Temperature for Varnish and stain Finishes: 65 degrees F for interior or exterior, unless required otherwise by manufacturer's instructions.
- E. Provide lighting level of 80-ft candles measured mid-height at substrate surface.

1.7 EXTRA STOCK

- A. Provide a one-gallon container of each color and surface texture to Owner.
- B. Label each container with color, texture, and room locations, in addition to the manufacturer's label.

PART 2- PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS (LATEX PAINT) ARE:

- A. Pratt and Lambert's, "Pro-Hide Plus."
- B. Sherwin-William's, "Pro-Mar 200 Latex Flat Wall Paint."
- C. Glidden's, equivalent.
- D. Tnemec's, equivalent.
- E. Benjamin Moore's, equivalent.
- F. DeVoe, equivalent.
- G. PPG, equivalent.
- H. Behr.
- I. Substitutions: Under provisions of Division I.

2.2 ACCEPTABLE MANUFACTURERS (ALKYD PAINT) ARE:

- A. Pratt and Lambert's, "Pro-Hide Plus."
- B. Sherwin-William's, "Pro-Mar 200 Alkyd Flat Wall Paint."
- C. Fuller O'Brien's, "Liquid Velvet."
- D. Glidden's, "Glid-Guard."
- E. Tnemec's, equivalent.
- F. Benjamin Moore's, equivalent.
- G. DeVoe, equivalent.
- H. PPG, equivalent.
- I. Behr.
- J. Substitutions: Under provisions of Division I.

2.3 ACCEPTABLE MANUFACTURERS (VARNISH-URETHANE) ARE:

- A. Pratt and Lambert's, "Varmor."
- B. DeVoe's, "Mirrothane."
- C. Glidden's, "Woodmaster No. 81 and 82."
- D. Sherwin-William's, "Polyurethane Varnish."
- E. Benjamin Moore's, "Benwood Polyurethane Varnish."
- F. PPG, equivalent.
- G. Substitutions: Under provisions of Division I.

2.4 ACCEPTABLE MANUFACTURERS (STAIN) ARE:

- A. Pratt and Lambert's, "Solid Hide Rustic Stain."
- B. Cabot's, "0300 Stain."
- C. DeVoe's, "Wonder Wood Stain."

- D. Olympic's, "Oil Stain."
- E. Glidden's, Woodmaster or Stain No. 1600 Series."
- F. Benjamin Moore's, "Penetrating Stain."
- G. Sherwin-William's, "Semi-Transparent Wood Preservative Stain."
- H. PPG, equivalent.
- I. Substitutions: Under provisions of Division I.

2.5 ACCEPTABLE MANUFACTURERS (PRIMER-SEALERS) ARE:

- A. Pratt and Lambert's, "Pro-Hide Plus."
- B. Sherwin-William's, "Pro-Mar 200 Latex Wall Primer."
- C. DeVoe's, "Wonder-Tones Latex Primer."
- D. Glidden's, "Spred Ultra Latex Primer-Sealer No. 5111."
- E. Benjamin Moore's, "Moore's Latex Exterior Primer."
- F. PPG, equivalent.
- G. Behr.
- H. Substitutions: Under provisions of Division I.

2.6 ACCEPTABLE MANUFACTURERS (LATEX TRAFFIC PAINT) ARE:

- A. Sherwin-William's, "Setfast Acrylic Waterborne Traffic Marking Paint."
- B. DeVoe's, "Traffic Line No. 416XX."
- C. Graham's, "Latex Street and Zone Marking Paint No. 702-00/13."
- D. Coronado's, "No. 66 Series Traffic and Zone Marking Finish."
- E. PPG, equivalent.
- F. Behr.
- G. Substitutions: Under provisions of Division I.

2.7 ACCEPTABLE MANUFACTURERS (BLOCK FILLER) ARE:

- A. Pratt and Lambert's, "Pro-Hide Plus Latex Block Filler."
- B. Sherwin-William's, "Pro-Mar Interior Exterior Latex Block Filler."
- C. DeVoe's, "Bloxfil."
- D. Glidden's, "Ultra-Ride Acrylic Latex Block Filler No. 5317."
- E. Benjamin Moore's, "Moorcraft Block Filler."
- F. PPG, equivalent.
- G. Substitutions: Under provisions of Division I.

2.8 ACCEPTABLE MANUFACTURERS (FIELD CATALYSED COATINGS) ARE:

- A. Pratt and Lambert's, "Tech-Gard" waterborn epoxy.
- B. Sherwin-William's, "Water-based Catalyzed Epoxy."
- C. Tnemec's, "Series 112-Tneme Tufcoat."
- D. Benjamin Moore's, "Two Part Acrylic Epoxy."
- E. PPG, equivalent.
- F. Substitutions: Under provisions of Division I.

2.9 MATERIALS

- A. Coatings: Ready mixed, except field catalysed coatings. Process pigments to a soft paste consistency, capable of being readily and uniformly dispersed to a homogeneous coating.
- B. Coatings: Good flow and brushing properties; capable of drying or curing free of streaks or sags.
- C. Accessory Materials: Linseed oil, shellac, turpentine, paint thinners and other materials not specifically indicated but required to achieve the finishes specified, of commercial quality.

2.10 FINISHES

A. Refer to schedule at end of Section for surface finish schedule.

PART 3- EXECUTION

3.1 INSPECTION

- A. Verify that surfaces are ready to receive work as instructed by the product manufacturer.
- B. Examine surfaces scheduled to be finished prior to commencement of work. Report any condition that may potentially affect proper application.
- C. Measure moisture content of surfaces using electronic moisture meter. Do not apply finishes unless moisture content of surfaces is below the following maximums:
 - 1. Gypsum Wallboard: 12 percent.
 - 2. Masonry, Concrete, and Concrete Unit Masonry: 12 percent.
 - 3. Interior Located Wood: 15 percent, measured in accordance with ASTM D2016.
 - 4. Exterior Located Wood: 15 percent, measured in accordance with ASTM D2016.
- D. Beginning of installation means acceptance of existing surfaces.

3.2 PREPARATION

- A. Remove electrical plates, hardware, light fixture trim, and fittings prior to preparing surfaces or finishing.
- B. Correct minor defects and clean surfaces which affect work of this Section.
- C. Shellac and seal marks which may bleed through surface finishes.
- D. Impervious Surfaces: Remove mildew by scrubbing with solution of tri-sodium phosphate and bleach. Rinse with clean water and allow surface to dry.
- E. Aluminum Surfaces Scheduled for Paint Finish: Remove surface contamination by steam or high pressure water. Remove oxidation with acid etch and solvent washing. Apply etching primer immediately following cleaning.
- F. Asphalt, Creosote, or Bituminous Surfaces Scheduled for Paint Finish: Remove foreign particles to permit adhesion of finishing materials. Apply latex-based compatible sealer or primer.
- G. Concrete Floors: Remove contamination, acid etch, and rinse floors with clear water. Verify required acid-alkali balance is achieved. Allow to dry.
- H. Galvanized Surfaces: Remove surface contamination and oils and wash with solvent. Apply coat of etching primer.
- I. Concrete and Unit Masonry Surfaces Scheduled to Receive Paint Finish: Remove dirt, loose mortar, scale, salt or alkali powder, and other foreign matter. Remove oil and grease with a solution of tri-sodium phosphate; rinse well and allow to dry. Remove stains caused by weathering of corroding metals with a solution of sodium metasilicate after thoroughly wetting with water. Allow to dry.
- J. Uncoated Steel and Iron Surfaces: Remove grease, scale, dirt, and rust. Where heavy coatings of scale are evident, remove by wire brushing or sandblasting; clean by washing with solvent. Apply a treatment of phosphoric acid solution, ensuring weld joints, bolts, and nuts are similarly cleaned. Spot prime paint after repairs.
- K. Shop Primed Steel Surfaces: Sand and scrape to remove loose primer and rust. Feather edges to make touch-up patches inconspicuous. Clean surfaces with solvent. Prime bare steel surfaces. Prime metal items including shop primed items.
- L. Interior Wood Items Scheduled to Receive Finish: Wipe off dust and grit prior to priming. Seal knots, pitch streaks, and sappy sections with sealer. Fill nail holes and cracks after primer has dried; sand between coats.
- M. Wood and Metal Doors Scheduled for Painting: Seal top and bottom edges with primer.

3.3 PROTECTION

- A. Protect elements surrounding the work of this Section from damage or disfiguration.
- B. Repair damage to other surfaces caused by work of this Section.
- C. Furnish drop cloths, shields, and protective methods to prevent spray or droppings from disfiguring other surfaces.
- D. Remove empty paint containers from site.

3.4 APPLICATION

- A. Apply products in accordance with manufacturer's instructions.
- B. Do not apply finishes to surfaces that are not dry.
- C. Apply each coat to uniform finish.
- D. Apply each coat of paint slightly darker than preceding coat unless otherwise approved.
- E. Sand lightly between coats to achieve required finish.
- F. Allow applied coat to dry before next coat is applied.
- G. Where clear finishes are required, tint fillers to match wood. Work fillers into the grain before set. Wipe excess from surface.
- H. Prime back surfaces of interior and exterior woodwork with primer paint.
- I. Prime back surfaces of interior woodwork scheduled to receive stain or varnish finish with gloss varnish reduced 25 percent with mineral spirits.

3.5 FINISHING MECHANICAL AND ELECTRICAL EQUIPMENT - EXCLUDING DESIGNATED MECHANICAL EQUIPMENT ROOMS

- A. Paint shop primed equipment.
- B. Remove unfinished louvers, grilles, covers, and access panels on mechanical and electrical components and paint separately.
- C. Prime and paint insulated and exposed pipes, conduit, boxes, insulated and exposed ducts, hangers, brackets, collars and supports, except where items are pre-finished.
- D. Replace identification markings on mechanical or electrical equipment when painted accidentally.
- E. Paint interior surfaces of air ducts, and convector and baseboard heating cabinets that are visible through grilles and louvers with one coat of flat black paint, to limit of sight line. Paint dampers exposed behind louvers, grilles, and convector and baseboard cabinets to match face panels.
- F. Paint exposed conduit and electrical equipment occurring in finished areas.
- G. Paint both sides and edges of plywood backboards for electrical and telephone equipment before installing equipment.
- H. Replace electrical plates, hardware, light fixture trim, and fittings removed prior to finishing.
- I. Paint all air handling unit support steel.

3.6 CLEANING

- A. As Work proceeds, promptly remove paint where spilled, splashed, or spattered.
- B. During progress of Work maintain premises free of unnecessary accumulation of tools, equipment, surplus materials, and debris.
- C. Collect cotton waste, cloths, and material which may constitute a fire hazard, place in closed metal containers and remove daily from site.

3.7 SCHEDULE - EXTERIOR SURFACES

- A. Steel - Unprimed
 - 1. One coat zinc rich primer.
 - 2. Two coats alkyd enamel, semi-gloss.
- B. Steel - Shop Primed
 - 1. Touch-up with zinc rich primer.

2. Two coats alkyd enamel, semi-gloss.
- C. Steel - Galvanized
 1. One coat zinc rich primer.
 2. Two coats alkyd enamel, semi-gloss.
- D. Aluminum - Mill Finish
 1. One coat etching primer.
 2. Two coats alkyd enamel, semi-gloss.
- E. Wood - Transparent (19% or less water content)
 1. Filler coat (for open grained wood only).
 2. Two coats stain.
 3. Two coats sealer.
 4. Two coats varnish, gloss.
 5. Two coats varnish, satin.

3.8 SCHEDULE - INTERIOR SURFACES

- A. Wood - Painted
 1. One coat prime/sealer.
 2. Two coats epoxy, semi-gloss.
- B. Wood - Transparent
 1. Filler coat (for open grained wood only).
 2. One coat stain.
 3. One coat sealer.
 4. One coat varnish, gloss.
 5. One coat varnish, satin.
- C. Concrete and Concrete Block (epoxy finish):
 1. One coat block filler
 2. Two coats epoxy, eggshell.
- D. Steel - Unprimed
 1. One coat zinc rich primer.
 2. Two coats alkyd enamel, semi-gloss.
- E. Steel - Primed
 1. Touch-up with original primer.
 2. Two coats alkyd enamel, semi-gloss.
- F. Steel - Galvanized
 1. One coat zinc rich primer.
 2. Two coats alkyd enamel, semi-gloss.

3.9 SCHEDULE -PAINT COLORS

- A. Refer to finish schedule on drawings.

END OF SECTION

SECTION 101400
SIGNAGE

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:

1. Plaques.
2. Dimensional characters.
3. Panel signs.

1.2 DEFINITIONS

A. ADA-ABA Accessibility Guidelines: U.S. Architectural & Transportation Barriers Compliance Board's "Americans with Disabilities Act (ADA) Accessibility Guidelines for Buildings and Facilities; Architectural Barriers Act (ABA) Accessibility Guidelines."

1.3 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: Show fabrication and installation details for signs.
1. Show sign mounting heights, locations of supplementary supports to be provided by others, and accessories.
 2. Provide message list, typestyles, graphic elements, including tactile characters and Braille, and layout for each sign.
- C. Samples: Provide 1 sample of signage for each color/material selected.

1.4 QUALITY ASSURANCE

A. Regulatory Requirements: Comply with applicable provisions in ADA-ABA Accessibility Guidelines and ICC/ANSI A117.1.

PART 2 - PRODUCTS

2.1 SIGNAGE

- A. Material: Aluminum, of alloy and temper recommended by sign manufacturer for casting process used and for use and finish indicated. Indoor/Outdoor use. Corrosion Resistant, Durable, Heavy Duty, Rigid, Weather-Resistant.
- B. Size: As shown on drawings
- C. Color: Silver and Black, Option Blue and White non-glare finish
- D. Language: English and Braille
- E. Code Requirement: All signs to conform to Chapter 11 of the 2015 Michigan Building Code and the 2010 ADA Standards of Accessible Design. Characters, letters, mounting height, spacing and location, etc. all to conform.
- F. Location: Latch side of door adjacent to each separate sex toilet room, shower room, mechanical room entrance, and family toilet/shower room. Provide one (1) directional sign at non-ADA shower rooms (south side of building) directing to ADA shower/toilet room.

2.2 ACCESSORIES

A. Anchors and Inserts: Provide nonferrous-metal or hot-dip galvanized anchors and inserts

for exterior installations and elsewhere as required for corrosion resistance. Use toothed steel or lead expansion-bolt devices for drilled-in-place anchors. Furnish inserts, as required, to be set into concrete or masonry work.

2.3 FABRICATION

- A. General: Provide manufacturer's standard signs of configurations indicated.
 - 1. Welded Connections: Comply with AWS standards for recommended practices in shop welding. Provide welds behind finished surfaces without distortion or discoloration of exposed side. Clean exposed welded surfaces of welding flux and dress exposed and contact surfaces.
 - 2. Mill joints to tight, hairline fit. Form joints exposed to weather to exclude water penetration.
 - 3. Conceal fasteners if possible; otherwise, locate fasteners where they will be inconspicuous.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Locate signs and accessories where indicated, using mounting methods of types described and complying with manufacturer's written instructions.
 - 1. Install signs level, plumb, and at heights indicated, with sign surfaces free of distortion and other defects in appearance.
- B. Wall-Mounted Signs: Comply with sign manufacturer's written instructions except where more stringent requirements apply.
 - 1. Shim Plate Mounting: Provide 1/8-inch thick, concealed aluminum shim plates with predrilled and countersunk holes, at locations indicated, and where other mounting methods are not practicable. Attach plate with fasteners and anchors suitable for secure attachment to substrate. Attach panel signs to plate using method specified above.
 - 2. Mechanical Fasteners: Use non-removable mechanical fasteners placed through predrilled holes. Attach signs with fasteners and anchors suitable for secure attachment to substrate as recommended in writing by sign manufacturer.

END OF SECTION

SECTION 10155
HIGH DENSITY POLYETHYLENE (HDPE) TOILET COMPARTMENTS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Solid plastic toilet compartments including the following: (Hiny Hiders)
 - 1. Floor mounted overhead-braced toilet compartments.
 - 2. Privacy screens.

1.2 RELATED SECTIONS

- A. Section 05500 - Metal Fabrications: Structural support ceiling beam for ceiling hung partitions provided as Work of Section 05500; Unistrut channels not acceptable.
- B. Section 06100 - Rough Carpentry: Anchorage/blocking for attachment of partitions.

1.3 REFERENCES

- A. ASTM A 666 - Standard Specification for Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip.
- B. ASTM B 221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.
- C. National Fire Protection Association (NFPA) 286 - Standard Methods of Fire Tests for Evaluating Contribution of Wall and Ceiling Interior Finish to Room Fire Growth.
- D. ASTM E 84 - Standard Test Method for Surface Burning Characteristics of Building Materials.

1.4 SUBMITTALS

- A. Submit under provisions of Section 01300.
- B. Product Data: Manufacturer's data sheets on each product to be used, including:
 - 3. Preparation instructions and recommendations.
 - 4. Storage and handling requirements and recommendations.
 - 5. Installation methods.
- C. Shop Drawings: Provide layout drawings and installation details with location and type of hardware required.
- D. Selection Samples: For each finish product specified, two complete sets of color chips representing manufacturer's full range of available colors and patterns.
- E. Verification Samples: For each finish product specified, two samples representing actual

product, color, and patterns.

1.5 QUALITY ASSURANCE

- A. Manufacturer Qualifications: A company regularly engaged in manufacture of products specified in this section, and whose products have been in satisfactory use under similar service conditions for not less than 5 years.
- B. Installer Qualifications: A company regularly engaged in installation of products specified in this Section, with a minimum of 5 years experience.
- C. Materials: Doors, panels and pilasters shall be constructed from High Density Polyethylene (HDPE) resins. Partitions shall be fabricated from polymer resins compounded under high pressure, forming a single component which is waterproof, nonabsorbent and has a self-lubricating surface that resists marks from pens, pencils, markers and other writing instruments. All plastic components shall be covered with a protective plastic masking.
- D. Performance Requirements:
 - 1. Fire Resistance: Partition materials shall comply with the following requirements, when tested in accordance with the ASTM E 84: Standard Test Method for Surface Burning Characteristics of Building Materials:
 - a. Class A flame spread/smoke developed rating, tested to ASTM E84.
 - 2. Material Fire Ratings:
 - a. National Fire Protection Association (NFPA) 286: Pass.
 - b. International Code Council (ICC): Class B.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Store products in manufacturer's unopened packaging until ready for installation.

1.7 PROJECT CONDITIONS

- A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.

1.8 WARRANTY

- A. Manufacturer guarantees its plastic against breakage, corrosion, and delamination under normal conditions for 25 years from the date of receipt by the customer. If materials are found to be defective during that period for reasons listed above, the materials will be replaced free of charge. (Labor not included in warranty.)

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Acceptable Manufacturer: Scranton Products, which is located at: 801 E. Corey St. ; Scranton, PA 18507; Toll Free Tel: 800-445-5148; Email: request info@scrantonproducts.com; Web: www.scrantonproducts.com
 - 1. Fabricator: Santana Toilet Partitions.
 - 2. Fabricator: Comtec Toilet Partitions.

3. Fabricator: Capitol Toilet Partitions.

A. Substitutions:

B. Requests for substitutions will be considered for similar products.

2.2 MATERIAL

A. Plastic Panels: High density polyethylene (HDPE) suitable for exposed applications, waterproof, non-absorbent, and graffiti-resistant textured surface;

1. Fire-resistance Rating: Class A.
2. Fire-resistance Rating: NFPA 286.

B. Zinc Aluminum Magnesium and Copper Alloy (Zamac): ASTM B 86.

C. Stainless Steel Castings: ASTM A167, Type 304.

D. Aluminum: ASTM 6463-T5 alloy.

2.3 SOLID PLASTIC TOILET COMPARTMENTS

A. Basis of Design: Hiny Hiders Toilet Partitions as manufactured by and supplied by Scranton Products.

1. Style: Floor mounted overhead-braced toilet compartments.

B. Doors, panels, and pilasters shall be 1 inch (25 mm) thick with all edges rounded to a radius. Doors and dividing panels shall be mounted based on height of specified system.

1. Door and Panel Height: 55 inches standard (1397 mm) (standard).
2. Door & Pilaster Edge: Standard.

C. Panel Color: Traditional Series:

1. Black - Orange Peel.
2. Black - Grip Ex.
3. Paisley - Orange Peel.
4. Shale - Orange Peel.
5. Charcoal Grey - Orange Peel.
6. Grey - Orange Peel.
7. Glacier Grey - Orange Peel.
8. White - Orange Peel.

D.

1. Pilaster shoes shall be 3 inches (76 mm) high stainless steel (type 304, 20 gauge) secured to the pilaster with a stainless steel tamper resistant Torx head sex bolt.
2. Headrail shall be made of heavy-duty extruded aluminum (6463-T5 alloy) with anti-grip design. The headrail shall have a clear anodized finish and shall be fastened to the headrail bracket by a stainless steel tamper resistant Torx head sex bolt, and fastened at the top of the pilaster with stainless steel tamper resistant Torx head screws.

Headrail brackets shall be 20 gauge stainless steel with a satin finish and secured to the wall with a stainless steel tamper resistant Torx head screws.

E. Wall Brackets:

1. Stainless Steel Brackets: Wall brackets shall be made of stainless steel type 304.
2. The brackets are fastened to the pilaster with stainless steel tamper resistant Torx head screws and fastened to the panels with stainless steel tamper resistant Torx head sex bolts.
7. Bracket Type: Stirrup stainless steel double ear.
8. Bracket Type: Stirrup stainless steel single ear.

F. Door Hardware:

1. Wrap-Around Hinges: Hinges shall be 8 inches (203 mm) and fabricated from heavy-duty extruded aluminum wrap-around hinges through-bolted to pilasters and doors with stainless steel tamper resistant Torx head sex bolts. Hinges operate with field adjustable nylon cams. Cams can be field set in 30, 60 or 90-degree increments.
2. Door strike/keeper shall be made of heavy-duty extruded aluminum (6436-T5 alloy) with a bright dip anodized finish and secured to the pilasters with stainless steel tamper resistant Torx head sex bolts. Bumper shall be made of extruded black vinyl.
 - a. Style: 6 inches (152 mm) aluminum
3. Stainless Steel Paddle Latch and housing shall be made of heavy-duty stainless steel type 304. The latch housing and paddle shall have a bright finish.

2.4 SOLID PLASTIC PRIVACY SCREENS

- A. Provide plastic privacy screens in urinal and entry toilet room applications as indicated or scheduled.
- B. Panels, and pilasters, if required, shall be 1 inch (25 mm) thick with all edges rounded to a radius. Screens shall be mounted at 14 inches (356 mm) above the finished floor. Color as selected by Architect from manufacturer's full line of current colors.
- C. Type: Wall mounted screen.
 1. Screen: Urinal screens shall be 24 inches (610 mm) wide by 55 inches (1397 mm) high.
- C. Type: Pilaster supported screen.
 1. Configuration: Floor pilaster and wall hung supported screen.
 2. Screen: Urinal screens shall be 24 inches (610 mm) wide by 55 inches (1397 mm) high.
 3. Headrail brackets shall be 20 gauge stainless steel with a satin finish and secured to the wall with a stainless steel tamper resistant Torx head screws.

PART 3 GENERAL

3.1 EXAMINATION

- A. Do not begin installation until substrates have been properly prepared.
- B. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.2 PREPARATION

- A. Clean surfaces thoroughly prior to installation.
- B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.
- C. Examine areas to receive toilet partitions, screens, and shower compartments for correct height and spacing of anchorage/blocking and plumbing fixtures that affect installation of partitions. Report discrepancies to the architect.

3.3 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Install partitions rigid, straight, plumb, and level major, with plastic laid out as shown on shop drawings.
- C. Clearance at vertical edges of doors shall be uniform top to bottom and shall not exceed 3/8 inch (9.5 mm).
- D. No evidence of cutting, drilling, and/or patching shall be visible on the finished work.
- E. Finished surfaces shall be cleaned after installation and be left free of imperfections.

3.4 PROTECTION

- A. Protect installed products until completion of project.
- B. Touch-up, repair or replace damaged products before Substantial Completion.

END OF SECTION

**SECTION 102113
HIGH DENSITY POLYMER TOILET COMPARTMENTS**

PART 1- GENERAL

1.1 SUMMARY

- A. Section includes: Solid color phenolic toilet floor supported with headrail toilet compartments, and urinal screens including required fittings, hardware, and accessories.
- B. Related sections:
 - 1. Section 055000 - Metal Fabrications: Structural support system for ceiling attached toilet compartments.
 - 2. Section 102800 - Toilet Accessories: Accessories mounted on toilet compartments.
 - 3. Section 224700 - Plumbing Fixtures and Equipment

1.2 REFERENCES

- A. Americans with Disabilities (ADA) Standards for Accessible Design.
- B. ANSI A117.1 - American National Standard for Buildings and Facilities - Providing Accessibility and Usability for Physically Handicapped People.
- C. ASTM A167 - Stainless and Heat Resisting Chromium-Nickel Steel Plate, Sheet, and Strip.
- D. ASTM E84 - Surface Burning Characteristics of Building Materials.
- E. UFAS - Uniform Federal Accessibility Standards.

1.3 SUBMITTALS

- A. Provide in accordance with Section 013300 - Submittal Procedures:
 - 1. Product data for compartments, panels, finishes, hardware, and accessories.
 - 2. Shop drawings showing partition plans, elevations, dimensions, door swings, details for supports, and method of anchorage.
 - 3. Samples of manufacturer's finishes for selection by Architect.
 - 4. Installation instructions.
 - 5. Maintenance instructions.
 - 6. Copy of warranty required by Paragraph 1.5 for review by Architect.

1.4 QUALITY ASSURANCE

- A. Products and installation shall comply with ADA Standards and ANSI A117.1.

1.5 WARRANTY

- A. In accordance with Section 017700 - Closeout Procedures provide 15 years warranty to cover panels, doors, and pilasters against breakage, delamination, and corrosion.

PART 2- PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

- A. General Partitions Manufacturing Corporation, P. O. Box 8370, Erie, Pennsylvania; 814-8331154 (Basis of Design)
- B. Bradley Corporation, approved equivalent.
- C. Global Partitions, approved equivalent.
- D. Manufacturers of equivalent products submitted and approved in accordance with Section 016000 - Product Requirements.

2.2 TYPE

- A. Standard Size Toilet compartments: Panels supported by pilasters anchored to floor and braced overhead with headrail; Series 40 - Floor Supported with Headrail as manufactured by General Partitions Manufacturing Corporation.
- B. Urinal screens: Screens hung from wall with continuous aluminum channel; Model WHF-7 as manufactured by General Partitions Manufacturing Corporation.

2.3 PANELS

- A. Material: Solid phenolic core made of multiple layers of phenolic resin impregnated kraft paper compressed under heat and pressure. Face with high pressure melamine sheet fusion welded to surface of core. Phenolic core color shall be the same as the decorative surface sheets with uniform color throughout.
 - 1. Resistant to delamination, water, steam, corrosion, soaps, detergents, and mildew. Does not absorb odors.
 - 2. Edges: Phenolic core edge color shall be the same as the decorative surface sheets, radiused and polished.
 - 3. Fire hazard: Class A in accordance with ASTM E84. 20 max flame spread, 45 max smoke development.
- B. Minimum thickness:
 - 1. Panels: 3/4 inch.
 - 2. Doors: 3/4 inch.
 - 3. Pilasters: 3/4 inch.
- C. Sizes:
 - 1. Toilet partitions and doors: As indicated on Drawings.
 - 2. Urinal screens: 18 wide by 42 inches high.
 - 3. Pilaster: Width to suit compartment size by height indicated on drawings.

2.4 FITTINGS

- A. Headrail: Extruded aluminum channel with anti-grip shape, designed to fit over top of pilasters, 1-7/8 by 1-1/32 inches [48 by 26 mm].
- B. Attachment hardware: Chrome plated, one-way vandal proof sex bolts and No. 14 stainless steel metal screws of length recommended by manufacturer.
- C. Connection brackets: Non-ferrous cast alloy, chrome plated.
- D. Pilaster trim: Minimum 3 inches high 0.031 inch thick stainless steel shoe.

2.5 HARDWARE

- A. Hinges: Stainless steel full length hinges.
- B. Combination coat hook and rubber bumper: Cast alloy, chrome plated.
- C. Latch: Surface mounted, extruded aluminum slide latch that does not require twisting or turning of wrist to operate.
- D. Combination latch keeper and door stop with rubber bumper: Extruded aluminum.
- E. Door pull: Cast alloy, chrome plated, straight loop design.

2.6 FACTORY FINISHING

- A. Color: General Partition: Linen

PART 3 - EXECUTION

3.1 PREPARATION

- A. Coordinate requirements for blocking in stud walls to ensure proper support is provided for wall attachments.

- B. Verify that site conditions are ready to receive work and opening dimensions are as indicated on shop drawings.
- C. Verify correct spacing of plumbing fixtures.

3.2 INSTALLATION

- A. Install partitions secure, plumb, and level in accordance with manufacturer's instructions.
- B. Maintain 3/8 to 1 inch uniform space between wall and panels and between wall and end pilasters.
- C. Attach panel brackets securely to walls using anchor devices recommended by manufacturer.
- D. Attach panels and pilasters to brackets with sheet metal screws.
- E. Brace pilasters with overhead rail. Locate headrail joints at pilaster center lines.
- F. Anchor pilaster to floor with heavy duty galvanized stainless steel angle plate, sheet metal screws, and anchors. Conceal floor fastenings with pilaster shoes.
- G. Door installation: Hang doors from pilasters. Equip each door with two pivot hinges, door latch, door strike and

1.1 ERECTION TOLERANCES

- A. Maximum variation from true position: 1/4 inch [6 mm].
- B. Maximum variation from plumb: 1/8 inch [3 mm].

1.2 ADJUSTING

- A. Replace significantly damaged, deeply scratched, or broken panels.
- B. Adjust hinges to locate in-swinging doors in partial open position and out-swinging doors in closed position when unlatched.
- C. Adjust and align hardware to uniform clearance at vertical edge of doors.

1.3 CLEANING

- A. Clean surfaces with liquid spray furniture or counter top polish. Do not use abrasives.

END OF SECTION

SECTION 102113.17 - PHENOLIC-CORE TOILET COMPARTMENTS

TIPS:

To view non-printing **Editor's Notes** that provide guidance for editing, click on MasterWorks/Single-File Formatting/Toggle/Editor's Notes.

To read **detailed research, technical information about products and materials, and coordination checklists**, click on MasterWorks/Supporting Information.

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

- A. Submittals: Product Data, Shop Drawings, and Samples.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Flame-Spread Index: **[25] [75] [200]** or less.
- B. Smoke-Developed Index: 450 or less.
- C. Regulatory Requirements: Comply with applicable provisions in **[the U.S. Architectural & Transportation Barriers Compliance Board's ADA-ABA Accessibility Guidelines for Buildings and Facilities] [and] [ICC A117.1]** for toilet compartments designated as accessible.

2.2 PHENOLIC-CORE TOILET COMPARTMENTS

- A. Manufacturers: Subject to compliance with requirements, provide products by the following:
1. Scranton Products.
- B. Toilet-Enclosure Style: **Overhead braced** and **Floor anchored**.
- C. Entrance-Screen Style: **Floor anchored** and Wall Hung.
- D. Urinal-Screen Style: **Wall hung** and Floor anchored.
- E. Door, Panel, **Screen**, and Pilaster Construction: Solid phenolic-core panel material with melamine facing on both sides fused to substrate during panel manufacture (not separately laminated), and with eased and polished edges. Provide minimum 3/4-inch- (19-mm-) thick doors and pilasters and minimum 1/2-inch- (13-mm-) thick panels.

- F. Pilaster [**Shoes**] [**and**] [**Sleeves (Caps)**]: Manufacturer's standard design; stainless steel.
- G. Brackets:
1. Stirrup Type: [**Chrome-plated zamac**] [**Clear-anodized aluminum**] [**Stainless steel**] [**Chrome-plated brass**].
 2. Full-Height (Continuous) Type: [**Extruded aluminum**] [**Stainless steel**].
- H. Doors: Unless otherwise indicated, 24-inch- (610-mm-) wide in-swinging doors for standard toilet compartments and 36-inch- (914-mm-) wide out-swinging doors with a minimum 32-inch- (813-mm-) wide clear opening for compartments indicated to be accessible to people with disabilities.
- I. Door Hardware: [**Chrome-plated zamac**] [**Clear-anodized aluminum**] [**Stainless steel**] [**Chrome-plated brass**].
1. Hinges: Self-closing type.
 2. Latches and Keepers: Surface-mounted unit designed for emergency access and with combination rubber-faced door strike and keeper.
 3. Coat Hook: Combination hook and rubber-tipped bumper, sized to prevent door from hitting compartment-mounted accessories.
 4. Door Bumper: Rubber-tipped bumpers at out-swinging doors or entrance screen doors.
 5. Door Pull: Provide at out-swinging doors. Provide units on both sides of doors at compartments indicated to be accessible to people with disabilities.
- J. Anchorages and Fasteners: Manufacturer's standard exposed fasteners of stainless steel, finished to match the items they are securing, with theft-resistant-type heads. Provide sex-type bolts for through-bolt applications. For concealed anchors, use rust-resistant materials compatible with related materials.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install units rigid, straight, level, and plumb, with not more than 1/2 inch (13 mm) between pilasters and panels and not more than 1 inch (25 mm) between panels and walls.
1. Stirrup Brackets: Align brackets at pilasters with brackets at walls.[**Locate wall brackets so holes for wall anchors occur in masonry or tile joints.**]
 2. Set hinges on in-swinging doors to hold open approximately 30 degrees from closed position when unlatched. Set hinges on out-swinging doors and swing doors in entrance screens to return to fully closed position.

END OF SECTION 102113.17

SECTION 10155
HIGH DENSITY POLYETHYLENE (HDPE) TOILET COMPARTMENTS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Solid plastic toilet compartments including the following: (Hiny Hiders)
 - 1. Floor mounted overhead-braced toilet compartments.
 - 2. Privacy screens.

1.2 RELATED SECTIONS

- A. Section 05500 - Metal Fabrications: Structural support ceiling beam for ceiling hung partitions provided as Work of Section 05500; Unistrut channels not acceptable.
- B. Section 06100 - Rough Carpentry: Anchorage/blocking for attachment of partitions.

1.3 REFERENCES

- A. ASTM A 666 - Standard Specification for Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip.
- B. ASTM B 221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.
- C. National Fire Protection Association (NFPA) 286 - Standard Methods of Fire Tests for Evaluating Contribution of Wall and Ceiling Interior Finish to Room Fire Growth.
- D. ASTM E 84 - Standard Test Method for Surface Burning Characteristics of Building Materials.

1.4 SUBMITTALS

- A. Submit under provisions of Section 01300.
- B. Product Data: Manufacturer's data sheets on each product to be used, including:
 - 3. Preparation instructions and recommendations.
 - 4. Storage and handling requirements and recommendations.
 - 5. Installation methods.
- C. Shop Drawings: Provide layout drawings and installation details with location and type of hardware required.
- D. Selection Samples: For each finish product specified, two complete sets of color chips representing manufacturer's full range of available colors and patterns.
- E. Verification Samples: For each finish product specified, two samples representing actual

product, color, and patterns.

1.5 QUALITY ASSURANCE

- A. Manufacturer Qualifications: A company regularly engaged in manufacture of products specified in this section, and whose products have been in satisfactory use under similar service conditions for not less than 5 years.
- B. Installer Qualifications: A company regularly engaged in installation of products specified in this Section, with a minimum of 5 years experience.
- C. Materials: Doors, panels and pilasters shall be constructed from High Density Polyethylene (HDPE) resins. Partitions shall be fabricated from polymer resins compounded under high pressure, forming a single component which is waterproof, nonabsorbent and has a self-lubricating surface that resists marks from pens, pencils, markers and other writing instruments. All plastic components shall be covered with a protective plastic masking.
- D. Performance Requirements:
 - 1. Fire Resistance: Partition materials shall comply with the following requirements, when tested in accordance with the ASTM E 84: Standard Test Method for Surface Burning Characteristics of Building Materials:
 - a. Class A flame spread/smoke developed rating, tested to ASTM E84.
 - 2. Material Fire Ratings:
 - a. National Fire Protection Association (NFPA) 286: Pass.
 - b. International Code Council (ICC): Class B.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Store products in manufacturer's unopened packaging until ready for installation.

1.7 PROJECT CONDITIONS

- A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.

1.8 WARRANTY

- A. Manufacturer guarantees its plastic against breakage, corrosion, and delamination under normal conditions for 25 years from the date of receipt by the customer. If materials are found to be defective during that period for reasons listed above, the materials will be replaced free of charge. (Labor not included in warranty.)

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Acceptable Manufacturer: Scranton Products, which is located at: 801 E. Corey St. ; Scranton, PA 18507; Toll Free Tel: 800-445-5148; Email: requestinfo@scrantonproducts.com; Web: www.scrantonproducts.com
 - 1. Fabricator: Santana Toilet Partitions.
 - 2. Fabricator: Comtec Toilet Partitions.

3. Fabricator: Capitol Toilet Partitions.

A. Substitutions:

B. Requests for substitutions will be considered for similar products.

2.2 MATERIAL

A. Plastic Panels: High density polyethylene (HDPE) suitable for exposed applications, waterproof, non-absorbent, and graffiti-resistant textured surface;

1. Fire-resistance Rating: Class A.
2. Fire-resistance Rating: NFPA 286.

B. Zinc Aluminum Magnesium and Copper Alloy (Zamac): ASTM B 86.

C. Stainless Steel Castings: ASTM A167, Type 304.

D. Aluminum: ASTM 6463-T5 alloy.

2.3 SOLID PLASTIC TOILET COMPARTMENTS

A. Basis of Design: Hiny Hiders Toilet Partitions as manufactured by and supplied by Scranton Products.

1. Style: Floor mounted overhead-braced toilet compartments.

B. Doors, panels, and pilasters shall be 1 inch (25 mm) thick with all edges rounded to a radius. Doors and dividing panels shall be mounted based on height of specified system.

1. Door and Panel Height: 55 inches standard (1397 mm) (standard).
2. Door & Pilaster Edge: Standard.

C. Panel Color: Traditional Series:

1. Black - Orange Peel.
2. Black - Grip Ex.
3. Paisley - Orange Peel.
4. Shale - Orange Peel.
5. Charcoal Grey - Orange Peel.
6. Grey - Orange Peel.
7. Glacier Grey - Orange Peel.
8. White - Orange Peel.

D.

1. Pilaster shoes shall be 3 inches (76 mm) high stainless steel (type 304, 20 gauge) secured to the pilaster with a stainless steel tamper resistant Torx head sex bolt.
2. Headrail shall be made of heavy-duty extruded aluminum (6463-T5 alloy) with anti-grip design. The headrail shall have a clear anodized finish and shall be fastened to the headrail bracket by a stainless steel tamper resistant Torx head sex bolt, and fastened at the top of the pilaster with stainless steel tamper resistant Torx head screws.

Headrail brackets shall be 20 gauge stainless steel with a satin finish and secured to the wall with a stainless steel tamper resistant Torx head screws.

E. Wall Brackets:

1. Stainless Steel Brackets: Wall brackets shall be made of stainless steel type 304.
2. The brackets are fastened to the pilaster with stainless steel tamper resistant Torx head screws and fastened to the panels with stainless steel tamper resistant Torx head sex bolts.
7. Bracket Type: Stirrup stainless steel double ear.
8. Bracket Type: Stirrup stainless steel single ear.

F. Door Hardware:

1. Wrap-Around Hinges: Hinges shall be 8 inches (203 mm) and fabricated from heavy-duty extruded aluminum wrap-around hinges through-bolted to pilasters and doors with stainless steel tamper resistant Torx head sex bolts. Hinges operate with field adjustable nylon cams. Cams can be field set in 30, 60 or 90-degree increments.
2. Door strike/keeper shall be made of heavy-duty extruded aluminum (6436-T5 alloy) with a bright dip anodized finish and secured to the pilasters with stainless steel tamper resistant Torx head sex bolts. Bumper shall be made of extruded black vinyl.
 - a. Style: 6 inches (152 mm) aluminum
3. Stainless Steel Paddle Latch and housing shall be made of heavy-duty stainless steel type 304. The latch housing and paddle shall have a bright finish.

2.4 SOLID PLASTIC PRIVACY SCREENS

- A. Provide plastic privacy screens in urinal and entry toilet room applications as indicated or scheduled.
- B. Panels, and pilasters, if required, shall be 1 inch (25 mm) thick with all edges rounded to a radius. Screens shall be mounted at 14 inches (356 mm) above the finished floor. Color as selected by Architect from manufacturer's full line of current colors.
- C. Type: Wall mounted screen.
 1. Screen: Urinal screens shall be 24 inches (610 mm) wide by 55 inches (1397 mm) high.
- C. Type: Pilaster supported screen.
 1. Configuration: Floor pilaster and wall hung supported screen.
 2. Screen: Urinal screens shall be 24 inches (610 mm) wide by 55 inches (1397 mm) high.
 3. Headrail brackets shall be 20 gauge stainless steel with a satin finish and secured to the wall with a stainless steel tamper resistant Torx head screws.

PART 3 GENERAL

3.1 EXAMINATION

- A. Do not begin installation until substrates have been properly prepared.
- B. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.2 PREPARATION

- A. Clean surfaces thoroughly prior to installation.
- B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.
- C. Examine areas to receive toilet partitions, screens, and shower compartments for correct height and spacing of anchorage/blocking and plumbing fixtures that affect installation of partitions. Report discrepancies to the architect.

3.3 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Install partitions rigid, straight, plumb, and level major, with plastic laid out as shown on shop drawings.
- C. Clearance at vertical edges of doors shall be uniform top to bottom and shall not exceed 3/8 inch (9.5 mm).
- D. No evidence of cutting, drilling, and/or patching shall be visible on the finished work.
- E. Finished surfaces shall be cleaned after installation and be left free of imperfections.

3.4 PROTECTION

- A. Protect installed products until completion of project.
- B. Touch-up, repair or replace damaged products before Substantial Completion.

END OF SECTION

SECTION 102800 TOILET ACCESSORIES

PART 1- GENERAL

1.1 SECTION INCLUDES

- A. Toilet, shower and utility room accessories.
- B. Attachment hardware.
- C. Coordinate the work of this Section with the placement of internal wall reinforcement to receive anchor attachments.

1.2 REFERENCES

- A. ANSI A117.1 - Specifications for Making Buildings and Facilities Accessible To and Usable by Physically Handicapped People.
- B. ANSI/ASTM A123 - Zinc (Hot-Dip Galvanized) Coatings on Products Fabricated from Rolled, Pressed, and Forged Steel Shapes, Plates, Bars and Strips.
- C. ANSI/ASTM A366 - Steel, Carbon, Cold-Rolled Sheet, Commercial Quality.
- D. ANSI/ASTM A386 - Zinc Coating (Hot-Dip) on Assembled Steel Products.
- E. ANSI/ASTM B456 - Electrodeposited Coatings of Copper Plus Nickel Plus Chromium and Nickel Plus Chromium.
- F. ASTM A167 - Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet and Strip.
- G. ASTM A269 - Seamless and Welded Austenitic Stainless Steel Tubing for General Service.
- H. NEMA LD-3 - High Pressure Decorative Laminates.
- I. ADA - Americans with Disabilities Act
- J. ANSI A117.1 - Specifications for Making Buildings and Facilities Accessible to and Usable by Physical Handicapped People.

1.3 SUBMITTALS

- A. Provide Product Data on accessories describing size, finish, details of function, attachment methods.
- B. Submit two samples chips of each specified color and finish.
- C. Submit manufacturer's installation instructions for each product.

1.4 REGULATORY REQUIREMENTS

- A. Conform to applicable code for installing work in conformance with ANSI A117.1 and ADA.

PART 2- PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS - TOILET ROOM ACCESSORIES

- A. Bobrick
- B. American Specialties Inc.
- C. Bradley
- D. Dyson
- E. Manufacturers of equivalent products submitted and approved in accordance with Section 016000 - Product Requirements.

2.2 MATERIALS

- A. Keys: Furnish keys for each accessory to Owner; master key locks as required to match Owner's current system.
- B. Sheet Steel: ANSI/ASTM A366.

- C. Stainless Steel Sheet: ASTM A167, Type 304.
- D. Tubing: ASTM A269, stainless steel.
- E. Adhesive: Two component epoxy type, waterproof.
- F. Fasteners, Screws, and Bolts: Hot dip galvanized, but stainless steel in all exposed locations, tamperproof, security type.
- G. Expansion Shields: Fiber, lead, or rubber as recommended by accessory manufacturer for component and substrate.

2.3 FABRICATION

- A. Weld and grind smooth joints of fabricated components.
- B. Form exposed surfaces from single sheet of stock, free of joints.
- C. Form surfaces flat without distortion. Maintain flat surfaces without scratches or dents.
- D. Back paint components where contact is made with building finishes to prevent electrolysis.
- E. Shop assemble components and package complete with anchors and fittings.
- F. Provide steel anchor plates, adapters, and anchor components for installation.
- G. Hot dip galvanized exposed and painted ferrous metal and fastening devices.

2.4 FACTORY FINISHING

- A. Galvanizing: ANSI/ASTM A123 and A386 to 1.25 oz/sq. yd.
- B. Shop Primed Ferrous Metals: Pre-treat and clean, spray apply one coat primer and bake.
- C. Enamel: Pre-treat to clean conditions, apply one coat primer and a minimum of two coats electrostatic baked enamel.
- D. Chrome/Nickel Plating: ANSI/ASTM B456, Type SC 2 satin finish.
- E. Stainless Steel: No. 4 satin luster finish.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Verify that site conditions are ready to receive work.
- B. Beginning of installation means acceptance of existing conditions.
- C. Deliver inserts and rough-in frames to site at appropriate time for building-in.
- D. Provide templates and rough-in measurements as required.
- E. Verify field measurements are as indicated.
- F. Verify exact location of accessories for installation.

3.2 INSTALLATION

- A. Install fixtures, accessories and items in accordance with manufacturers' instructions.
- B. Install plumb and level, securely and rigidly anchored to substrate.
- C. Protect products from damage caused by subsequent construction activities.
- D. Field repair of damaged product finishes is prohibited; replace products having damaged finishes caused by subsequent construction activities.
- E. Locate toilet accessories at heights and locations required for compliance with local accessibility regulations and the Americans with Disabilities Act.

3.3 SCHEDULE

- A. Bobrick and American Specialties Inc. is used as a quality standard set to be expected on all items of this Section.
- B. The following accessories are:
 - 1. Mirrors:
 - a. Mirrors shall be No. 1 quality, 1/4" polished tempered glass, electrolytically copper plated, or 1/4" polycarbonate or Lexan sheet. Mirrors shall be fabricated of

minimum 4 layer coating consisting of silver, copper, and 2 heat-cured protective coats, tested in Accordance with FS-DD-M-411.

- b. Mirrors shall be warranted against silver spoilage for a minimum of 10 years. Back of mirrors protected with 1/4" shock absorbing polystyrene padding and 20 gage galvanized steel back.
2. Grab Bars:
 - a. Grab bars shall be constructed of type 304 stainless steel with satin and peened non-slip finish. Wall thickness shall be 18-gage and outside diameter of 1-1/2". Stainless steel flanges shall be 11 gage, 3" minimum diameter snap on mounting cover with minimum of 3 concealed stainless steel vandal-proof set screws. Concealed anchor plates shall be 11 gage, minimum, stainless steel.
 - b. Length and configuration: As indicated on Drawings.
 - c. Similar to Bradley Model 817.
3. Hand Dryer:
 - a. Dyson Airblade V
 - b. Stainless Steel wall guard below dryer.
4. Surface Mounted Horizontal Baby Changing Stations
 - a. Surface mounted polyethylene interior and stainless steel exterior rated to support minimum 250lbs. Mechanism designed to ensure smooth, safe opening and closing motions. Seat belt with cam buckle, adjustable with one hand.
 - b. Meets or exceeds ASTM F2285 Safety Specifications for commercial changing stations.
 - c. Similar to Bradley Model 962-11.
5. Hooks
 - a. Heavy-Duty Stainless Steel, single-prong, rectangular-shaped bracket for concealed attachment, satin stainless steel finish.
 - b. Similar to Bradley Model 917.
6. Custodial Accessories
 - a. Combination utility Shelf/Mop and Broom Holder: Minimum 18 gage thick stainless steel, Type 304, with 1/2 inch returned edges, 16 gage stainless wall brackets.
 - b. Hooks: 3 minimum 1 gage stainless steel rag hooks at shelf front.
 - c. Mop/Broom holders: 4 spring-loaded rubber cam holders at shelf front.
 - d. Length 36 inches.
 - e. Similar to Bradley Model 9984.
7. Shower Curtain Rods
 - a. Extra Heavy-Duty Shower Curtain Rod: Flanges 3 in (75 mm) dia, 20 ga type 304 satin stainless. 1-1/4 in (32 mm) dia rod, 18 ga type 304 satin stainless tubing. Available in lengths up to 96 in (2440 mm).
 - b. Similar to Bradley Model 9531.
8. Shower Curtain
 - a. Nylon reinforced vinyl, 0.008 inch thick, matte finish, with antibacterial treatment, flame resistant and stain-resistant fabric.
 - b. Size: 56 or 68 x 72 inches, hemmed edges.
 - c. Grommets: Stainless Steel; pierced through top hem on 6 inch centers.
 - d. Color: White
 - e. Shower curtain hooks: Chrome-plated or stainless steel spring wire designed for snap closure.

9. Towel Bars
 - a. Stainless steel tube, 1- 1/4 in outside diameter, 0.05 inch wall thickness, satin finished, exposed flange mounting, 1-1/2 inch clearance between wall and inside of towel bar.
 - b. Lengthens 24 inches long.
 - c. Similar to Bradley Model 837.
10. Stainless Steel Wall Mounted Bench
 - a. Heavy Duty Stainless Steel Seat to be 16 ga, type 304 or higher stainless steel with polished brushed finish. No bolts or protrusions at top of seat. Corners to be TIG welded and cleaned, no burs to be present.
 - b. Heavy Duty Stainless Steel Wall Brackets to be 11 ga, type 304 or higher stainless steel with polished brushed finish. Seat and brackets to be rated at 1,000 lbs minimum.
 - c. Include all bench mounting hardware.
11. Folding ADA Shower Seat
 - a. Wall-mounted surface; welded tubular seat frame, structural support members, hinges and mechanical fasteners of Type 304 stainless steel, L-shaped right-hand, L-shaped left-hand, and rectangular seat.
 - b. Seat: Phenolic or polymeric composite one-piece seat or seat slats, of white color.
12. Owner Supplied Items – G.C. installed.
 - a. Toilet Paper Dispenser
 - b. Feminine Hygiene Disposal
 - c. Soap Dispenser
 - d. Sharp Object Disposal.

END OF SECTION

END OF SECTION 00800

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APPENDIX I

SPECIAL WORKING CONDITIONS

DEPARTMENT OF NATURAL RESOURCES

The Work comprising this Project will be performed at a site of the Department of Natural Resources. The Contractor must comply with all rules and regulations pertaining to such sites and must conform to the following rules:

1. The Contractor must provide a competent Superintendent satisfactory to the Department of Natural Resources on the work site at all times during working hours with full authority to act for him. It must be the Contractor's responsibility to furnish the Department of Natural Resources with the name, address and telephone number of the responsible person to contact for Emergency during after hour, weekend and holiday periods.
2. Access to and egress from the site must be via routes specifically designated by the Department of Natural Resources authorized representative.
3. All work will be coordinated so as to minimally interfere with the normal function of the boating access site which will be open and operational between the spring opening and fall closing. Specifically,
 - 3.1 No Work must be performed at the site on Saturdays, Sundays, holidays or during night hours without the written permission from the Department of Natural Resources; and
4. Areas on the site for employee parking, tool boxes, material lay down, etc., must be assigned by the Department of Natural Resources. All firearms, weapons, alcoholic beverages, or explosives must be removed from vehicles before entering the site.
5. Heavy equipment such as bulldozers and power shovels must be locked or immobilized in an acceptable manner when not in use. No tools, small pipe, copper or wire must remain on the site overnight, unless acceptably locked inside shanties or tool chests. There will be no exchange, loaning or borrowing of tools, equipment or manpower between the Department of Natural Resources and the Contractor.
6. The Contractor must comply with the special condition requirements of the Department of Natural Resources and the United States Army Corps of Engineers Permit Sections appended to these specifications.
7. Work Schedule: 7.1

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APPENDIX II
SPECIAL PROJECT PROCEDURES

SOIL EROSION AND SEDIMENTATION CONTROL PROJECT PROCEDURES FOR CONTRACTORS ON DTMB OWNED AND MANAGED PROPERTIES

1. Comply with Part 91, Soil Erosion and Sedimentation Control of the Natural Resources and Environmental Protection Act 1994 PA 451, as amended.
2. Contact the DTMB, SFA, Design and Construction Division to discuss the implementation of soil erosion and sedimentation control (SESC) on the Project with DTMB SESC Officer. Phone (517) 388-3045 or Email mcgarryc@michigan.gov.
3. Following the award of a contract, the Contractor will be required to prepare and issue for approval an SESC Implementation Plan, which indicates the Contractor's intended implementation of SESC on the project including a schedule and sequence. The Environmental Health and Safety Section, upon approval of the implementation plan, will issue to the Contractor an "Authorization to Proceed with Earth Change" document, which is to be posted at the job site. This document is issued in lieu of a permit from the county. Earthwork shall not begin prior to the issuance of this Authorization. Upon receipt of the Authorization document, the Contractor may begin earth change activities.
4. See below the "Checklist for Contractor's SESC Implementation Plan" for details of the required information necessary for the Contractor to create the SESC Implementation Plan. The intent of this plan is to ensure that the Contractor has reviewed and understands the SESC provisions within the plans and specifications.
5. CHECKLIST FOR CONTRACTOR'S SOIL EROSION AND SEDIMENTATION CONTROL IMPLEMENTATION PLAN (For projects that include earth changes or disturb existing vegetation):

DEPARTMENT OF TECHNOLOGY, MANAGEMENT AND BUDGET
STATE FACILITIES ADMINISTRATION, DESIGN AND CONSTRUCTION DIVISION
SOIL EROSION AND SEDIMENTATION CONTROL PROGRAM
P.O. Box 30026, Lansing, Michigan 48909

PROJECT TITLE:
PROJECT LOCATION:
PROJECT FILE NUMBER:
INDEX NUMBER:

Prior to the start of earthwork, the Contractor must submit a Soil Erosion and Sedimentation Control (SESC) Implementation Plan to the Michigan Department of Technology, Management and Budget, Soil Erosion and Sedimentation Control Program. The intent of this plan is to ensure that the Contractor has reviewed and understands the SESC provisions within the plans and specifications. The following checklist will provide Contractors with assistance in creating the SESC Implementation Plan.

The SESC Implementation Plan must include:

1. ☐ A written plan or letter demonstrating:
 - ☐ The Contractor's means and methods for the implementation of SESC provisions included within the plans and specifications and compliance with the provisions of Part 91 of PA 451 of 1994, as amended.
 - ☐ The Contractor's plan for dust control.
 - ☐ The Contractor's plan for inspection and maintenance of temporary SESC's.
2. ☐ A map, location plan, drawing, or amended copy of the Project SESC or grading plan showing:
 - ☐ The locations of any stockpiles of soil associated with the Project
 - ☐ The temporary SESC controls associated with stockpiles of soil
 - ☐ The Contractor's suggested or proposed additions or relocations of any temporary or permanent SESC's. associated with the Project plans and specifications (subject to approval by Engineer and DTMB)
 - ☐ Location of site entrances, exits and vehicle routes
 - ☐ Location of site superintendent's/project manager's site trailer or office (for SESC Inspector check-in)
3. ☐ A schedule for the installation and removal of temporary controls and the installation of permanent soil erosion and sedimentation controls in relation to the overall construction schedule.

Submit the above items to the above address.

Upon approval of the Contractor's plan, an "Authorization to Proceed with Earth Change" will be issued by DTMB, Design and Construction Division

DEMOLITION/REMODELING PROJECT PROCEDURES

Furnish all equipment, materials, labor and services necessary to complete all building demolition required in connection with the existing building, in order to permit the installation of new Work. The goal of the Owner is to generate the least amount of waste or debris possible. However, inevitable waste and debris that are generated shall be reused, salvaged, or recycled, and disposal in landfills shall be minimized to the extent economically feasible. The Contractor will be required to prepare waste management plan for the collection, handling, storage, transportation and disposal of the waste generated at the construction site for the Owner's review and approval. The Contractor will be required to produce waste management progress reports.

1. Locations: Notations are made in various places on the Drawings to call attention to building demolition which is required; however, these Drawings are not intended to show each and every item to be removed. The Contractor and the Subcontractors for the various trades must remove the materials related to their respective trades as required to permit the construction of the new Work as shown.
2. Permits: The Contractor must secure from the appropriate agencies all required permits necessary for proper execution of the work before starting work on the project site. All fees for securing the permits must be paid by the Contractor, including all inspection costs which may be legally assessed by the Bureau of Construction Codes in accordance with the authority granted under the Public Act 1980 PA 371, as amended.
3. Enclosures: Where it is necessary to make alterations to walls, floors or roof of the existing building, the Contractor must provide and maintain dustproof partitions to separate the parts where Work is being done from the adjoining parts occupied by the State Agency. Where any parts are opened and exposed to the elements, the Contractor must provide weather tight enclosures to fully protect the structure and its contents.
4. Waste Management Plan: The management plan must address waste source identification and separation, returns, reuse and salvage, recycling, landfill options, alternatives to landfilling, materials handling procedures and transportation.
5. Preparation: Protect all existing Work that is to remain and restore in an approved manner any such Work that becomes damaged.
 - 5.1 Rubbish and debris resulting from the Work must be removed immediately from the site by the Contractor. However, any recyclable materials must be recycled; the Contractor will be required to use alternatives to landfills for waste disposal such as reuse or recycle of asphalt, bricks, concrete, masonry, plastics, paint, glass, carpet, metals, wood, drywall, insulation and any other waste materials to the extent practical.
 - 5.2 Unless otherwise specified, the Agency will remove existing furniture, drapery tracks, draperies, window blinds, and other equipment items, which might interfere with the new construction.
6. Coordination: Demolition work, in connection with any new unit of Work, must not be commenced until all new materials required for completion of that new item of Work are at hand.
7. Waste Management Plan Progress Reports: Submit an updated report with the payment requests. The progress reports shall include:
 - a. The amount of waste sent to a landfill, tipping fees paid and the total disposal cost. Include supporting documents such as manifests, weight tickets, receipts and/or invoices.
 - b. Records for each material recycled/reused/salvaged from the project including the amount, date removed from the job site, final destination, transportation cost, recycled materials and the net cost/ savings.
 - c. Breakdown of waste by type generated to date.
 - d. Recycling/salvage/landfill rates.
 - e. Percent of waste recycled/salvaged to date.

HAZARDOUS MATERIALS PROJECT PROCEDURES

1. The Contractor must use, handle, store, dispose of, process, transport and transfer any material considered a Hazardous Material in accordance with all Federal, State and local Laws. If the Contractor encounters material reasonably believed to be a Hazardous Material and which may present a substantial danger, the Contractor must immediately stop all affected work, give written notice to the Owner of the conditions encountered, and take appropriate health and safety precautions.
2. This project has been identified by the DTMB-SFA as having a possibility of containing Hazardous Waste materials to be legally removed from the Project job site in order to complete the Work as described in the Proposal And Contract. If removal of friable asbestos material is required, the Contractor must contact the Air Quality Division, Department of Environment, Great Lakes, and Energy, at (517) 284-6773, for a permit and furnish all training, labor, materials, services, insurance, and equipment necessary to carry out the removal operations of all Hazardous Materials from the Project job site, as identified by the Scope of Work, or encountered on the Project job site, in accordance with State and Federal Hazardous Waste Codes. A Contract Change Order will be written to modify the existing Contract to pay for the additional cost.
3. Environmental Hazards (air, water, land and liquid industrial) are handled by the Waste and Hazardous Materials Division, Michigan Department of Environment, Great Lakes, and Energy (EGLE) in carrying out the requirements of the Federal Environmental Protection Agency (EPA). For general information and/or a copy of the latest regulations and publications call (517) 335-2690.
4. The Michigan Occupational Safety and Health Administration (MIOSHA) provides protection and regulations for the safety and health of workers. The Department of Licensing and Regulatory Affairs provides for the safety of workers. The Department of Health & Human Services provides for the health of workers (517/373-3740) (TDD 517/373-3573).
 - 4.1 Contractor must post any applicable State and/or Federal government regulations at the job site in a prominent location.
 - 4.2 Contractor must be responsible for training their workers in safe work practices and in proper removal methods when coming in contact with hazardous chemicals.
5. Applicable Regulations:
 - 5.1 Natural Resources and Environmental Protection Act – PA 451 of 1994, as amended, including Part 111 – Hazardous Waste Management, Part 121 – Liquid Industrial Waste and Part 147 – PCB compounds.
 - 5.2 RCRA, 1976 - Resource Conservation and Recovery Act: This federal statute regulates generation, transportation, treatment, storage or disposal of hazardous wastes nationally.
 - 5.3 TSCA, 1979 – Toxic Substances Control Act: This statute regulates the generation, transportation, storage and disposal of industrial chemicals such as PCBs.
6. Definitions: Hazardous substances are ignitable, corrosive, reactive, and/or toxic, based on their chemical characteristics.
 - 6.1 Under Federal and Michigan Law, a Small Quantity Generator of hazardous waste provides from 220 to less than 2,000 lbs./month or never accumulates 2,200 lbs. or more.
 - 6.2 A Generator size provider of hazardous waste provides 2,200 lbs. or more/month or accumulates above 2,200 lbs.
7. Disposals: To use an off-site hazardous waste disposal facility, the Contractor must use the Uniform Hazardous Waste Manifest (shipping paper). Small quantities of hazardous waste may not be disposed of in sanitary landfills used for solid waste.
8. Federal, State and local Laws and regulations may apply to the storage, handling and disposal of Hazardous Materials and wastes at each State Agency. Contact the **Environmental Assistance Center** of the Michigan Department of Environment, Great Lakes, and Energy (EGLE) at **1-800-662-9278**, Fax to: 517-241-0673 or e-mail to: DEQ-EAD-env-assist@michigan.gov for general EGLE information including direct and referral assistance on air, water and wetlands permits; contaminated site clean-ups; underground storage tank removals and remediation; hazardous and solid waste disposal; pollution prevention and recycling; and compliance-related assistance. The Center provides businesses, municipalities, and the general public with a single point of access to EGLE's environmental programs.

ASBESTOS ABATEMENT PROJECT PROCEDURES

Should this Work require the renovation or demolition of a building or structure initially constructed on or prior to 1980, the Contractor will use the attached copy of a Comprehensive Asbestos Building Survey for those portions of the building or structure being impacted and must plan his or her work to minimize disturbance of any known or assumed asbestos containing materials (ACM). In addition, if this building or structure was constructed on or prior to 1980, the Contractor's On-Site Superintendent and all Subcontractor On-Site Superintendents for trades that could potentially disturb known or assumed ACM, must, as a minimum, have and provide documentation of current Asbestos Awareness Training.

If the Comprehensive Asbestos Building Survey identifies known or assumed ACM that will potentially be disturbed as a part of the Contractor's renovation or demolition activities, the Contractor must remove, transport and dispose of these materials at no additional cost to the Owner and prior to any other work taking place within the immediate vicinity of said material. If required, the Contractor must provide the Owner a minimum of 10 working day notification prior to the start of any asbestos abatement activities with abatement in occupied buildings being completed even if they will be conducted during off hours (nights, weekends and state holidays).

If the Contractor encounters a suspected ACM that was not previously identified within the Comprehensive Asbestos Building Survey, the Contractor must immediately stop all affected work, give written notice to the Owner of the conditions encountered, and take appropriate health and safety precautions. If, after providing Owner notification, the Contractor is directed to sample and/or remove the suspected ACM in question, a Contract Change Order will be written to modify the existing Contract to pay for the additional cost. Any abatement shall be completed in accordance with the requirements of this Section.

If removal of ACM is required, removal must be completed by a contractor currently licensed to remove asbestos by the State of Michigan, Department of Licensing and Regulatory Affairs (DLARA) Asbestos Program and abatement must be performed in accordance with all Federal, State and local Laws and Regulations. Prior to commencing any asbestos abatement activities, the licensed abatement contractor must submit, as required by Federal, State and Local Laws and Regulations, a "Notification of Intent to Renovate/Demolish" to both the State of Michigan, Department of Environment, Great Lakes, and Energy (EGLE), Air Quality Division and to the DLARA, Asbestos Program, to comply with National Emission Standards for Hazardous Air Pollutants (NESHAP), and the Clean Air Act (CAA). All regulated ACM must be disposed of at an approved Type II (general refuse) landfill and must be in leak-tight wrapping or containers. ACM that is non friable and is not in poor condition or will not become regulated ACM at any time can be disposed of in a Type III (construction debris) landfill.

At the completion of each abatement activity, the Contractor must perform clearance testing in accordance with National Institute for Occupational Safety and Health (NIOSH) 582 "Sampling and Evaluating Airborne Asbestos Dust". All air samples shall indicate concentrations of less than 0.01 fibers/cc for clearance to be met. Clearance testing shall be performed by a third party Asbestos Consultant. The Asbestos Consultant selected by the Contractor shall be experienced and knowledgeable about the methods for asbestos air sampling and be able to select representative numbers and locations of samples. It is mandatory that the Asbestos Consultant's on-site hygienist performing sampling and analysis have certification that he/she has passed a NIOSH 582 or equivalent course.

The NESHAP asbestos regulations, notification form, guidelines and fact sheets are available on EGLE's web site www.michigan.gov/egle under heading Air; then click on Compliance; then click on Asbestos NESHAP Program. For guidelines on submitting notifications pursuant to the Asbestos Contractors Licensing Act, contact the DLARA, Occupational Health Division, Asbestos Program at (517) 322-1320 or visit DLARA's web site www.michigan.gov/asbestos.

SECTION 01310 PROGRESS SCHEDULE

PART 1 - GENERAL

1.01 SUMMARY

A. The **Contractor** will submit CPM Progress Schedules to the **Owner** depicting its approach to prosecution of the Work. This includes, but is not limited to the **Contractor's** approach to recovering schedule and managing the effect of changes, substitutions and Delays on Work sequencing.

B. The Progress Schedule will include the Rev. 0 Submittal (par. 3.02), Update Submittals (par. 3.03) and Revision Submittals (par. 3.04). Each Submittal will be assigned a unique number. For a resubmission, the initial number will be modified by the letter A, B, C, etc., as appropriate.

C. Through the Progress Schedule, the **Owner** will seek to stay current on progress, updated Activity and Milestone Dates, and the **Contractor's** approach to Work remaining.

D. References to the Critical Path Method (CPM) are to CPM construction industry standards that are consistent with the requirements of this Section 01310.

1.02 RELATED SECTIONS

A. Section 00440 Schedule of Materials and Equipment; Section 00500 Agreement; Section 00700 General Conditions; and Section 00800 Supplementary Conditions.

1.03 GLOSSARY OF TERMS

A. Capitalized terms not already defined in any Division 0 Specification have the following intent and meanings:

1. Milestone—A key point of progress, designating interim targets toward the Contract Times. They may pinpoint critical path foundations, key deliveries, building framing, start of MEP rough-in, building enclosure, partitions, interior finishes, conditioned space, commissioning stages, Substantial Completion and other events of like import.
2. Official Schedule—The most recent Revision Submittal returned to the **Contractor** as Resubmittal Not Required. The Rev. 0 Official Schedule is the *As-Planned* Schedule.
3. Revision 0 Submittal—Progress Schedule submitted by the **Contractor** depicting the entire Work as awarded.
4. Update Submittal—A monthly Progress Schedule update reflecting progress and minor adjustments on the Activities, sequencing and restraints for Work remaining.

1.04 QUALITY ASSURANCE

A. The **Contractor** will obtain a written interpretation from the **Professional**, if the **Contractor** believes the selection of Activities, logic ties or restraints requires an interpretation of the Contract Documents. With each submission, the **Contractor** will point out by specific, written notation, any Progress Schedule feature that may reflect variations from any requirements of the Contract Documents.

B. The **Contractor** is responsible to obtain information from each Subcontractor and Supplier when scoping their respective Activities, Values, logic ties and restraints

C. No review of any Progress Schedule by or on behalf of the **Owner** will relieve the **Contractor** from complying with the Contract Times and any required sequence of Work or from completing Work omitted from the Progress Schedule. No review will imply approval of any variation from or interpretation of the Contract Documents, unless approved by the **Professional** through a written interpretation or by means of a separate, written notation.

1.05 ALLOWANCES

A. Work covered by Cash Allowances will be completed within the Contract Times. To the extent reasonable and consistent with the **Contractor's** plan, Work authorized by contingency allowances will be completed within the Contract Times. The Progress Schedule will incorporate the **Contractor's** best estimate of the Activities, logic and restraints required, using the information in the Contract Documents or as indicated by the **Professional** in writing.

1.06 "OR EQUALS" AND SUBSTITUTIONS

A. Activities in the Rev. 0 Progress Schedule will be based on materials and equipment required by the Contract Documents, and will not reflect any "or equal" or substitute materials or equipment, even if the **Contractor** intends to pursue "or equal" and substitution proposals. This limitation also applies to any Means and Methods indicated in or required by the Contract Documents.

1.07 MEASUREMENT AND PAYMENT

A. The Schedule of Values will include a Progress Schedule *pay item*. Fifteen percent (15%) of this *pay item* will be eligible for payment upon delivery of the *complete* Rev. 0 Submittal. The balance of this *pay item* will be eligible for payment, on a prorated basis, with each Request for Payment attaching an Update Submittal.

PART 2 - WORK PRODUCTS

2.01 PROGRESS SCHEDULE SUBMITTALS

A. Each Progress Schedule Submittal will consist of an electronic disk with the **Contractor's** files, a narrative and three (3) copies of the required reports and plots.

B. The CPM scheduling software will be Primavera Project Planner®, SureTrak® or Microsoft Project®.

2.02 PRINTOUTS

A. Schedule Reports will include Activity (ID) code and description, duration, calendar, Early Dates, Late Dates and Total Float, all of which will comport with the requirements of paragraph 8.3.4 of Section 00700 General Conditions.

1. Late Finish Date for an Activity pinpointing a Contract Time will equal that Contract Time. Early Start Date for an Activity designating a Contract restraint will equal the proper Notice to Proceed date. Schedule Reports may or may not append CPM Plots (time-scaled Activity/logic).

2. For Precedence Diagram Method, separate Schedule Reports will tabulate, for each Activity, all preceding and succeeding logic types and lead times, whether CPM Plots displaying vertical logic ties are appended or not.

B. CPM Schedule Plots will be plotted on a suitable time scale and identify the Contract Times, Critical Paths and sub-Critical Paths. Activities will be shown on the Early Dates with Total Floats noted by Late Date flags.

C. Line of Balance Plots will reflect industry practice for repetitive construction, and will segregate the production lines for all trades within the hammock Activities.

2.03 NARRATIVE REQUIREMENTS

A. In general, a narrative will describe the **Contractor's** approach to prosecution of the Work, subject to the requirements of the Contract Documents. Further, each narrative will list the Critical Path Activities and compare Early and Late Dates with Contract Times and Milestone Dates. The basis for restraint dates will be explained.

B. For each Update Submittal, the narrative will compare current Dates to the respective Milestone Dates, describe changes in crewing and construction equipment and identify new Delays. For each Revision Submittal, the narrative also will itemize changes in Activities, logic ties and restraint dates made necessary by each change, Delay, schedule recovery, substitution and **Contractor**-initiated revision occurring since the previous Submittal.

2.04 ACTIVITY REQUIREMENTS

A. The Progress Schedule will detail Work sequencing only to the extent necessary to allow the **Owner** to correlate percent complete, compare actual dates with Milestones and Contract Times and the data in Requests for Payment.

B. Separate Activities will designate permits, construction, Submittal preparation/review (and resubmission and re-review, for same); MEP coordination drawings; deliveries; commissioning; and Punch List. Separate Activities will designate **Owner**-furnished items, interface with other work and the **Owner** and **Professional's** responsibilities.

PART 3 – EXECUTION

3.01 FLOAT TOLERANCES

A. Any Progress Schedule with Early Dates after a Contract Time will yield negative Total and Contract Floats, whether shown/calculated or not. Any Revision Submittal with less than negative twenty (20) Days of Float will be returned as "Revise and Resubmit," unless a time extension is requested or the **Owner** withholds liquidated damages or asserts intent to do so in the event schedule is not recovered.

B. Floats calculated from the definitions given in Section 00020 Glossary supersede any conflicting Float values calculated within any early completion Progress Schedule.

3.02 REVISION 0 (Rev. 0) SUBMITTAL

A. The complete Revision 0 Submittal will be due with the first Request for Payment. The Rev. 0 Submittal will show the Work as awarded, without Delays, "or equal" or substitutions, Change Orders or Change Authorizations.

1. The Rev. 0 narrative will detail the **Contractor's** management of the site (lay down, parking, etc.). Further, the Rev. 0 narrative will identify shifts, weekend Work, Activity calendars, Delays since award and all pending and anticipated "or equal" and substitution proposals.

B. Activities will be detailed only to the extent required to show the transition of trade Work. Activities will detail the progression through site/excavation, foundations, building framing, start/completion of interior partitions, MEP rough-in, building enclosure, interior finishes, conditioned space and commissioning.

1. Submittal Activities will segregate long-lead items, any item requiring structural access and other procurements that, in the **Contractor's** judgment, may bear on the rate of progress. Separate MEP coordination drawing Activities will be used for each floor. Beyond these requirements, it is not necessary to burden the Progress Schedule with Activities for less significant Submittals and deliveries.

2. For multiunit Work (e.g., rough-in overhead MEP for each floor, etc.), detailed Activities will be shown for a typical (often, the first) unit). Other or follow-on units may be replicated, as appropriate, or modeled with a hammock Activity combining the sum total of the typical detailed Activities. Separate Activities, as may be suitable to the Divisions of Work involved, will be identified for single-unit Work. This requirement applies to such scope as Work in mechanical rooms, building framing, commissioning, etc.

3. Activities will not combine separate or non-concurrent items of Unit Price or lump sum Work, Work in separate structures and Work in distinct areas, locations or floors within an area or structure; or rough-in and finish Work.

C. Activity durations will equal the Business Days required to sufficiently complete the Work designated by the Activity (i.e., when finish-to-start successors may start, even if the Activity is not quite 100% complete). Installation Activities will last from twenty (20) to forty (40) Days.

D. Activities will be assigned consistent descriptions and identification codes. Sort codes will group Activities by building or structure, floor or area, Change Order and Change Authorization and other meaningful scheme

E. Once endorsed by the **Owner** and returned as "Resubmittal Not Required," the Rev. 0 Progress Schedule (or Rev. 0A, etc.) will be the As-Planned Schedule and the basis for Update Submittals until the Rev. 1 Official Schedule is established. Once the As-Planned Schedule is established, the **Owner** will select Milestones and note Milestone Early and Late Dates. As the Official Schedule evolves, Milestone Dates will be revised accordingly.

F. If the **Owner** refuses to endorse the Rev. 0 Submittal (or Rev. 0A, for a resubmission) as "Resubmittal Not Required," the As-Planned Schedule will not be established. In that event, the **Contractor** will continue to submit Update and Revision Submittals reflecting progress and the **Contractor's** approach to remaining Work. The **Owner** will rely on the available Update and Revision Submittals, subject to whatever adjustments it determines appropriate.

3.03 UPDATE SUBMITTALS

A. Update Submittals with progress up to the closing date and updated Early and Late Dates for progress and remaining Activities will be due with each Request for Payment. As-built data will consist of actual start dates, percent complete, actual finish dates, changes, Delays and other significant events occurring before the closing date.

3.04 REVISION SUBMITTALS

A. Progress Schedule Revisions will be submitted with the third Request for Payment and every two (2) months after that, or more often, if necessary due to schedule recovery or other Progress Schedule revisions. Revisions will revise the Update Submittal attached to the prior Request for Payment.

B. Progress Schedule revisions will detail all impacts on pre-existing Activity scope, logic ties and restraint dates and reflect the Contractor's current approach to Work remaining. Revisions may be required because of changes in the Work, substitutions, schedule recovery and Delays.

C. Once endorsed by the **Owner** and returned as "Resubmittal Not Required," a Revision Submittal becomes the Rev. 1, Rev. 2, etc. Official Schedule and the basis for subsequent Update Submittals until a more current Official Schedule is established.

If the **Owner** refuses to endorse a Revision Submittal as "Resubmittal Not Required," the **Contractor** will continue to submit Update and Revision Submittals when and as required in this Section.

3.05 RETROSPECTIVE DELAY ANALYSIS

A. If the **Owner** refuses to endorse any Revision Submittal as "Resubmittal Not Required," the **Contractor** and **Owner** will use the latest Official Schedule when evaluating the effect of Delays on Contract Time and/or Contract Price. The procedure will consist of progressively revising the latest Official Schedule at key Revision Submittal closing dates. For each Progress Schedule iteration, slippage between actual Milestone Dates and Rev. 0 Milestone Dates will be correlated to Delays occurring solely in that iteration. Revisions affecting Work after any iteration will be included only to the extent consented by the **Owner** at that time and/or if actually confirmed by as-built progress.

END OF SECTION 01310

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