2) Locations of each door hardware set, cross-referenced to Drawings on floor plans and to door and frame schedule.
3) Complete designations, including name and manufacturer, type, style, function, size, quantity, function, and finish of each door hardware product.
4) Description of electrified door hardware sequences of operation and interfaces with other building control systems.

2. Keying Schedule: Prepared by or under the supervision of Installer, detailing Owner's final keying instructions for locks.

1.4 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Door Hardware: <Insert detailed descriptions and specific numbers of units>.
2. Electrical Parts: <Insert detailed descriptions and specific numbers of units>.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: Supplier of products and an employer of workers trained and approved by product manufacturers and an Architectural Hardware Consultant who is available during the course of the Work to consult with Contractor, Architect, and Owner about door hardware and keying.

B. Architectural Hardware Consultant Qualifications: A person who is experienced in providing consulting services for door hardware installations that are comparable in material, design, and extent to that indicated for this Project and who is currently certified by DHI as follows:

1. For door hardware, an Architectural Hardware Consultant (AHC)

C. Source Limitations: Provide electrified door hardware from same manufacturer as mechanical door hardware, unless otherwise indicated. Manufacturers that perform electrical modifications and that are listed by a testing and inspecting agency acceptable to authorities having jurisdiction are acceptable.

D. Fire-Rated Door Assemblies: Where fire-rated door assemblies are indicated, provide door hardware rated for use in assemblies complying with NFPA 80 that are listed and labeled by a qualified testing agency, for fire-protection ratings indicated, based on testing at positive pressure according to NFPA 252 or UL 10C, unless otherwise indicated.

E. Smoke- and Draft-Control Door Assemblies: Where smoke- and draft-control door assemblies are required, provide door hardware that meet requirements of assemblies tested according to UL 1784 and installed in compliance with NFPA 105.

1. Air Leakage Rate: Maximum air leakage of0.3 cfm/sq. ft. (3 cu. m per minute/sq. m) at the tested pressure differential of 0.3-inch wg (75 Pa) of water.

F. Electrified Door Hardware: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction.

G. Means of Egress Doors: Latches do not require more than 15 lbf (67 N) to release the latch. Locks do not require use of a key, tool, or special knowledge for operation.

H. Accessibility Requirements: For door hardware on doors in an accessible route, comply with the National Building Code of the Philippines BP 344 Disabilities Act and the U.S. Architectural & Transportation Barriers Compliance Board's ADA-ABA Accessibility Guidelines.

1. Provide operating devices that do not require tight grasping, pinching, or twisting of the wrist and that operate with a force of not more than 5 lbf (22.2 N).
2. Comply with the following maximum opening-force requirements:

   a. Interior, Non-Fire-Rated Hinged Doors: 5 lbf (22.2 N) applied perpendicular to door.
   b. Sliding or Folding Doors: 5 lbf (22.2 N) applied parallel to door at latch.
   c. Fire Doors: Minimum opening force allowable by authorities having jurisdiction.

3. Bevel raised thresholds with a slope of not more than 1:2. Provide thresholds not more than [1/2 inch (13 mm) high] [and] [3/4 inch (19 mm) high for exterior sliding doors].
4. Adjust door closer sweep periods so that, from an open position of 70 degrees, the door will take at least 3 seconds to move to a point 3 inches (75 mm) from the latch, measured to the leading edge of the door.

I. Keying Conference: Conduct conference at Project site to comply with requirements in Division 01 Section "Project Management and Coordination."

## 1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver all hardware to the building site properly wrapped with correct screws and bolts for fastening, free from flaws and defects. Properly label hardware for location with item numbers corresponding with the hardware schedule.

B. Materials should be stored in such a way as to protect and identify hardware for an expeditious installation.

C. Deliver keys to manufacturer of key control system for subsequent delivery to Owner.

D. Deliver keys and permanent cores to Owner by registered mail or overnight package service.

## 1.7 SEQUENCING AND SCHEDULING

A. Hardware supplier shall coordinate with the Contractor or other Subcontractors to select, order, and have hardware delivered so as to not impede the progress of the project.

## 1.8 COORDINATION

A. Where necessary for proper installation, furnish actual hardware to the manufacturer for his installation. Furnish samples to the manufacturer as required so that all provisions for attachment, clearance and other requirements (i.e., such as electrical wiring of magnetic switches can be made.

B. All cutouts for hardware in premachined wood, hollow metal and aluminum doors and frames shall be made to templates.

C. Furnish templates and approved hardware schedules to all interested manufacturers in sufficient quantities for fabrication and preparation of their work to receive hardware.

D. Electrical System Roughing-in: Coordinate layout and installation of electrified door hardware with connections to power supplies, fire alarm system and detection devices, and security system.

E. Coordinate cylinders for use in gates or special doors with suppliers of these items.

F. Existing Openings: Where new hardware components are scheduled for application to existing construction or where modifications to existing door hardware are required, field verify existing conditions and coordinate installation of door hardware to suit opening conditions and to provide for proper operation.

1.9 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of door hardware that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:
   a. Structural failures including excessive deflection, cracking, or breakage.
   b. Faulty operation of operators and door hardware.
   c. Deterioration of metals, metal finishes, and other materials beyond normal weathering and use.

2. Warranty Period: Finish hardware items are subject to the same guarantee and/or warranty provisions as the General Construction unless noted herein after.
   a. Lock and Latchsets: Three years from date of Substantial Completion.
   b. Electromagnetic and Delayed-Egress Locks: Five years from date of Substantial Completion.
   c. Exit Devices: Three years from date of Substantial Completion.
   d. Manual Closers: 10 years from date of Substantial Completion

1.10 MAINTENANCE SERVICE

A. Furnish manufacturer's parts list and maintenance instructions for each type of hardware provided and furnish Owner with necessary wrenches and tools required for proper maintenance of installed hardware.

B. Advise and instruct the Owner in the systems' operation. Instruct Owner's personnel on proper adjustment and maintenance of hardware and hardware finishes.

C. Maintenance Service: Beginning at Substantial Completion, provide 12 months' full maintenance by skilled employees of door hardware Installer. Include quarterly preventive maintenance, repair or replacement of worn or defective components, lubrication, leaning, and adjusting as required for proper door hardware operation. Provide parts and supplies same as those used in the manufacture and installation of original products.

PART 2 - PRODUCTS

2.1 GENERAL PROVISIONS

A. Provide items as listed in schedule at end of this section, complete to function as intended.

B. Items of same function and performance are acceptable in conformance as listed hereinafter.

C. Fastenings: Furnish appropriate screw attachments, through-bolts, and/or sex nuts and bolts.All plates (kick, push, mop, etc.) shall be fastened with Phillips oval head screws, oval head, undercut and countersunk. Fasteners of all hardware items shall be of the same material and grade as the hardware they are fastening. On other than metallic kickplates, screws to match or complement other door hardware.

D. The hardware distributor shall furnish all wiring diagrams, drawings, and advise the Electrical Contractor of proper wiring hookup of all systems. Manufacturers: Subject to compliance with requirements, provide products by the manufacturers specified

## 2.2 CYLINDERS

A. Cylinders shall be as manufactured by Schlage and have no less than 7 pins.. Allow for future expansion.

## 2.3 KEYING

A. Door Locks shall be keyed in like groups, keyed differently, master keyed, and grand masterkeyed.

B. All cylinders shall be furnished construction master keyed and shall be keyed alike, different, and cross keyed in their respective sets.

C. Keying Conference: Conduct conference at Project site to comply with requirements in Division 01 Section "Project Management and Coordination." In addition to Owner, Construction Manager, Contractor, and Architect, conference participants shall also include Installer's Architectural Hardware Consultant and Owner's security consultant. Incorporate keying conference decisions into final keying schedule after reviewing door hardware keying system including, but not limited to, the following:

1. Function of building, flow of traffic, purpose of each area, degree of security required, and plans for future expansion.
2. Preliminary key system schematic diagram
3. Requirements for key control system
4. Address for delivery of keys

D. Furnish key quantities as follows:
1. 2 keys for each lock
2. 4 keys for each keyed group
3. 3. 3 construction master keys

E. Acceptable Manufacturers are subject to compliance with requirements. Basis of Design manufacturers and model numbers are listed to establish a standard of quality. Submitting a nonequal product of an acceptable manufacturer, does not meet the intent of the established standard.

## 2.4 SCHEDULED DOOR HARDWARE

A. Provide door hardware for each door as scheduled to comply with requirements in this Section.

1. Door Hardware Sets: Provide quantity, item, size, finish or color indicated, and named manufacturers' products

2. Sequence of Operation: Provide electrified door hardware function, sequence of operation, and interface with other building control systems indicated.

B. Designations: Requirements for design, grade, function, finish, size, and other distinctive qualities of each type of door hardware are indicated in Part 3 "Door Hardware Schedule" Article. Products are identified by using door hardware designations, as follows:

1. Named Manufacturers' Products: Manufacturer and product designation are listed for each door hardware type required for the purpose of establishing minimum requirements. Manufacturers' names are abbreviated in Part 3 "Door Hardware Schedule" Article.
2. References to BHMA Designations: Provide products complying with these designations and requirements for description, quality, and function.

## 2.5 FINISHES

A. Provide finishes complying with BHMA A156.18 as indicated in door hardware schedule.

B. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

# PART 3 - EXECUTION

## 3.1 INSTALLATION

A. Steel Doors and Frames: For surface applied door hardware, drill and tap doors and frames according to ANSI/SDI A250.6.

B. Wood Doors: Comply with DHI WDHS.5 "Recommended Hardware Reinforcement Locations for Mineral Core Wood Flush Doors."

C. Mounting Heights: Mount door hardware units at heights indicated on Drawings otherwise indicated or required to comply with governing regulations.

1. Standard Steel Doors and Frames: ANSI/SDI A250.8.
2. Custom Steel Doors and Frames: HMMA 831.
3. Wood Doors: DHI WDHS.3, "Recommended Locations for Architectural Hardware for Wood Flush Doors."

D. Install each door hardware item to comply with manufacturer's written instructions. Where cutting and fitting are required to install door hardware onto or into surfaces that are later to be painted or finished in another way, coordinate removal, storage, and reinstallation of surface protective trim units with finishing work specified in Division 09 Sections. Do not install surface-mounted items until finishes have been completed on substrates involved.

1. Set units level, plumb, and true to line and location. Adjust and reinforce attachment substrates as necessary for proper installation and operation.
2. Drill and countersink units that are not factory prepared for anchorage fasteners. Space fasteners and anchors according to industry standards.

E. Door Closers and Holdopens, unless specifically noted otherwise, shall be mounted toward the room side, and not the corridor.

F. Wherever cutting and fitting is required to install hardware onto or into surfaces which are later to be painted or finished in another way, install each item completely and then remove and store in a safe place during the finish application. After completion of the finishes, reinstall each item. Do not install surface-mounted items until finishes have been completed on the surface.

G. Set units level, plumb and true to line and location. Adjust and reinforce the attachment substrate as necessary for proper installation and operation.

H. Drill and countersink units which are not factory prepared for anchorage fasteners. Space fasteners and anchors in accordance with industry standards.

I. Cut and fit thresholds and floor covers to profile of door frames, with mitered corners and hairline joints. Join units with concealed welds or concealed mechanical joints. Cut smooth openings for spindles, bolts and similar items.

J. Thresholds: Set thresholds for exterior doors and other doors indicated in full bed of sealant complying with requirements specified in Division 07 Section "Joint Sealants." Screw thresholds to substrate with No. 10 or larger screws, of the proper type for permanent anchorage and of the same or compatible type metal as the threshold.

K. At exterior doors, and elsewhere as indicated, set each edge of threshold in a seal strip of butyl rubber sealant or acrylic polymeric sealant, equivalent of Pecora BC-158 or 60+ Unicrylic and remove excess.

L. The Construction Manager shall coordinate to ensure that all necessary wiring and connections between the electrified hardware products specified herein, and the operational systems will function as they were intended. This includes the integration of such items as electric exit devices, electric strikes, electric door openers, electromagnetic floor and wall hold-open devices, magnetic switches, card readers, etc., into the fire alarm, security alarm or operating systems. House power to the specified low voltage power supplies is also included.

M. Hinges: Install types and in quantities indicated in door hardware schedule but not fewer than the number recommended by manufacturer for application indicated or one hinge for every 30 inches (750 mm) of door height, whichever is more stringent, unless other equivalent means of support for door, such as spring hinges or pivots, are provided.

N. Intermediate Offset Pivots: Where offset pivots are indicated, provide intermediate offset pivots in quantities indicated in door hardware schedule but not fewer than one intermediate offset pivot per door and one additional intermediate offset pivot for every 30 inches (750 mm) of door height greater than 90 inches (2286 mm).

O. Lock Cylinders: Install construction cores to secure building and areas during construction period.

1. Replace construction cores with permanent cores as indicated in keying schedule or directed by Owner.
2. Furnish permanent cores to Owner for installation.

P. Key Control System: Tag keys and place them on markers and hooks in key control system cabinet, as determined by final keying schedule.

Q. Boxed Power Supplies: Locate power supplies as indicated or, if not indicated, above accessible ceilings or in equipment room. Verify location with Architect.

1. Configuration: Provide one power supply for each door opening] [least number of power supplies required to adequately serve doors with electrified door hardware.

R. Stops: Provide floor stops for doors unless wall or other type stops are indicated in door hardware schedule. Do not mount floor stops where they will impede traffic.

S. Perimeter Gasketing: Apply to head and jamb, forming seal between door and frame.

T. Meeting Stile Gasketing: Fasten to meeting stiles, forming seal when doors are closed.

U. Door Bottoms: Apply to bottom of door, forming seal with threshold when door is closed.

V. Adjustment: Adjust and check each operating item of door hardware and each door to ensure proper operation or function of every unit. Replace units that cannot be adjusted to operate as intended. Adjust door control devices to compensate for final operation of heating and ventilating equipment and to comply with referenced accessibility requirements.

3.2 FIELD QUALITY CONTROL

A. Independent Architectural Hardware Consultant: Owner will engage a qualified independent Architectural Hardware Consultant to perform inspections and to prepare inspection reports.

END OF SECTION 087100

**SECTION 088000**

**GLAZING**

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes glazing for the following products and applications, including those specified in other Sections where glazing requirements are specified by reference to this Section:

1. Interior Windows: Tempered

2. Exterior Windows: Clear Low-E Glass in PVDF Coated Extruded Aluminum Frames

3. Interior Sound Insulating Glass: Double Glazed Tempered Glass (verify with manufacturer specs as selected by Architect from complete range)

1.2 PERFORMANCE REQUIREMENTS

A. Delegated Design: Design glass, including comprehensive engineering analysis according to ASTM E 1300 and ICC's 2003 International Building Code
1. Fire-rating : Minimum of 2 hours

1.3 PRECONSTRUCTION TESTING

A. Preconstruction Adhesion and Compatibility Testing: Test each glazing material type, tape sealant, gasket, glazing accessory, and glass-framing member for adhesion to and compatibility with elastomeric glazing sealants.

1. Testing will not be required if data are submitted based on previous testing of current sealant products and glazing materials matching those submitted.

1.4 ACTION SUBMITTALS

A. Product Data: For each glass product and glazing material indicated.

B. Glass Samples: For each type of glass product other than clear monolithic vision glass; 12 inches (300 mm) square.

C. Glazing Schedule: List glass types and thicknesses for each size opening and location. Use same designations indicated on Drawings.

D. Delegated-Design Submittal: For glass indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1.5 INFORMATIONAL SUBMITTALS

A. Preconstruction adhesion and compatibility test report.

1.6 QUALITY ASSURANCE

A. Safety Glazing Labeling: Where safety glazing labeling is indicated, permanently mark glazing with certification label of the manufacturer. Label shall indicate manufacturer's name, type of glass, thickness, and safety glazing standard with which glass complies.

B. Fire-Protection-Rated Glazing Labeling: Permanently mark fire-protection-rated glazing with certification label of a testing agency acceptable to authorities having jurisdiction. Label shall indicate manufacturer's name, test standard, whether glazing is for use in fire doors or other openings, whether or not glazing passes hose-stream test, whether or not glazing has a temperature rise rating of 450 deg F (250 deg C), and the fire-resistance rating in minutes.

PART 2 - PRODUCTS

2.1 GLASS PRODUCTS, GENERAL

A. Thickness: Where glass thickness is indicated, it is a minimum. Provide glass lites in thicknesses as needed to comply with requirements indicated.
   1. 10 / 12mm thick tempered glass
   2. 10 / 12mm thick fire-rated glass
   3. 8mm thick Clear Low-E glass

2.2 LOW-E GLASS

A. Luminous Factors NFRC
   1. Light Transmittance (TL) 49%
   2. Outdoor Reflectance (RLe)13%
   3. Indoor Reflectance (RLi) 11%

B. Thermal Transmission
   1. Ug Summer: 4.33 W/(sqm K) 0.76 Btu/(h/sqft F)
   2. R Summer: 0.23 (sqm K)/W 1.31 (h/sqft F)/Btu
   3. 0 degrees related to vertical position

C. Acoustics: EN 12758

D. UV Factors: TUV 20%

E. Safety Class: EN 12600

F. Shading Coefficient: 0.59 (Summer)

G. Energy Factors:
   1. Transmittance 38%
   2. Outdoor Reflectance (RLe)12%
   3. Indoor Reflectance (RLi) 19%
   4. Absoptance A1 (AE1) 50%

## 2.3 IRE-PROTECTION-RATED GLAZING

A. Fire-Protection-Rated Glazing, General: Listed and labeled by a testing agency acceptable to authorities having jurisdiction, for fire-protection ratings indicated, based on testing according to NFPA 252 for door assemblies and NFPA 257 for window assemblies.

B. Film-Faced Ceramic Glazing: Clear, ceramic flat glass; 3/16-inch (5-mm) nominal thickness; faced on one surface with a clear glazing film; complying with testing requirements in 16 CFR 1201 for Category II materials.

## 2.4 GLAZING GASKETS

A. Dense Compression Gaskets: Molded or extruded gaskets of profile and hardness required to maintain watertight seal, made from one of the following:

1. Neoprene complying with ASTM C 864.
2. EPDM complying with ASTM C 864.
3. Silicone complying with ASTM C 1115.
4. Thermoplastic polyolefin rubber complying with ASTM C 1115.

B. Soft Compression Gaskets: Extruded or molded, closed-cell, integral-skinned EPDM gaskets complying with ASTM C 509, Type II, black; of profile and hardness required to maintain watertight seal.

1. Application: Use where soft compression gaskets will be compressed by inserting dense compression gaskets on opposite side of glazing or pressure applied by means of pressure-glazing stops on opposite side of glazing.

## 2.5 GLAZING SEALANTS

A. General:

1. Compatibility: Provide glazing sealants that are compatible with one another and with other materials they will contact, including glass products, seals of insulating-glass units, and glazing channel substrates, under conditions of service and application, as demonstrated by sealant manufacturer based on testing and field experience.
2. Suitability: Comply with sealant and glass manufacturers' written instructions for selecting glazing sealants suitable for applications indicated and for conditions existing at time of installation.
3. Sealants used inside the weatherproofing system, shall have a VOC content of not more than 250 g/L when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
4. Sealants used inside the weatherproofing system shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."
5. Colors of Exposed Glazing Sealants: As selected by Architect from manufacturer's full range

B. Glazing Sealants for Fire-Rated Glazing Products: Products that are approved by testing agencies that listed and labeled fire-resistant glazing products with which they are used for applications and fire-protection ratings indicated.

## 2.6 GLAZING TAPES

A. Back-Bedding Mastic Glazing Tapes: Preformed, butyl-based, 100 percent solids elastomeric tape; nonstaining and nonmigrating in contact with nonporous surfaces; with or without spacer rod as recommended in writing by tape and glass manufacturers for application indicated; and complying with ASTM C 1281 and AAMA 800 for products indicated below:

1. AAMA 804.3 tape, where indicated.
2. AAMA 806.3 tape, for glazing applications in which tape is subject to continuous pressure.
3. AAMA 807.3 tape, for glazing applications in which tape is not subject to continuous pressure.

B. Expanded Cellular Glazing Tapes: Closed-cell, PVC foam tapes; factory coated with adhesive on both surfaces; and complying with AAMA 800 for the following types:

1. AAMA 810.1, Type 1, for glazing applications in which tape acts as the primary sealant.
2. AAMA 810.1, Type 2, for glazing applications in which tape is used in combination with a full bead of liquid sealant.

## 2.7 MISCELLANEOUS GLAZING MATERIALS

A. Cleaners, Primers, and Sealers: Types recommended by sealant or gasket manufacturer.

B. Setting Blocks: Elastomeric material with a Shore, Type A durometer hardness of 85, plus or minus 5.

C. Spacers: Elastomeric blocks or continuous extrusions of hardness required by glass manufacturer to maintain glass lites in place for installation indicated.

D. Edge Blocks: Elastomeric material of hardness needed to limit glass lateral movement (side walking).

E. Cylindrical Glazing Sealant Backing: ASTM C 1330, Type O (open-cell material), of size and density to control glazing sealant depth and otherwise produce optimum glazing sealant performance.

F. Perimeter Insulation for Fire-Resistive Glazing: Product that is approved by testing agency that listed and labeled fire-resistant glazing product with which it is used for application and fire-protection rating indicated.

## 2.8 DOUBLE-GLAZED INSULATING UNITS

A. Provide for Auditorium spaces as indicated on plans. Verify with manufacturer specifications and assemblage.
1. Clear Tempered Double Glazing units
    a. STC – minimum of 45 Unless Otherwise indicated

## 2.9 FIRE-PROTECTION-RATED GLAZING TYPES

A. Glass Type 120-minute fire-rated glazing with 450 deg F (250 deg C) temperature rise limitation; laminated glass with intumescent

1. Provide safety glazing labeling.

PART 3 - EXECUTION

## 3.1 GLAZING, GENERAL

A. Comply with combined written instructions of manufacturers of glass, sealants, gaskets, and other glazing materials, unless more stringent requirements are indicated, including those in referenced glazing publications.

B. Adjust glazing channel dimensions as required by Project conditions during installation to provide necessary bite on glass, minimum edge and face clearances, and adequate sealant thicknesses, with reasonable tolerances.

C. Protect glass edges from damage during handling and installation. Remove damaged glass from Project site and legally dispose of off Project site. Damaged glass is glass with edge damage or other imperfections that, when installed, could weaken glass and impair performance and appearance.

D. Apply primers to joint surfaces where required for adhesion of sealants, as determined by preconstruction testing.

E. Install setting blocks in sill rabbets, sized and located to comply with referenced glazing publications, unless otherwise required by glass manufacturer. Set blocks in thin course of compatible sealant suitable for heel bead.

F. Do not exceed edge pressures stipulated by glass manufacturers for installing glass lites.

G. Provide spacers for glass lites where length plus width is larger than 50 inches (1270 mm).

H. Provide edge blocking where indicated or needed to prevent glass lites from moving sideways in glazing channel, as recommended in writing by glass manufacturer and according to requirements in referenced glazing publications.

## 3.2 TAPE GLAZING

A. Position tapes on fixed stops so that, when compressed by glass, their exposed edges are flush with or protrude slightly above sightline of stops.

B. Install tapes continuously, but not necessarily in one continuous length. Do not stretch tapes to make them fit opening.

C. Cover vertical framing joints by applying tapes to heads and sills first and then to jambs. Cover horizontal framing joints by applying tapes to jambs and then to heads and sills.

D. Place joints in tapes at corners of opening with adjoining lengths butted together, not lapped. Seal joints in tapes with compatible sealant approved by tape manufacturer.

E. Apply heel bead of elastomeric sealant.

F. Center glass lites in openings on setting blocks and press firmly against tape by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centers of openings.

G. Apply cap bead of elastomeric sealant over exposed edge of tape.

3.3 GASKET GLAZING (DRY)

A. Cut compression gaskets to lengths recommended by gasket manufacturer to fit openings exactly, with allowance for stretch during installation.

B. Insert soft compression gasket between glass and frame or fixed stop so it is securely in place with joints miter cut and bonded together at corners.

C. Installation with Drive-in Wedge Gaskets: Center glass lites in openings on setting blocks and press firmly against soft compression gasket by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centers of openings. Compress gaskets to produce a weathertight seal without developing bending stresses in glass. Seal gasket joints with sealant recommended by gasket manufacturer.

D. Installation with Pressure-Glazing Stops: Center glass lites in openings on setting blocks and press firmly against soft compression gasket. Install dense compression gaskets and pressure-glazing stops, applying pressure uniformly to compression gaskets. Compress gaskets to produce a weathertight seal without developing bending stresses in glass. Seal gasket joints with sealant recommended by gasket manufacturer.

E. Install gaskets so they protrude past face of glazing stops.

3.4 SEALANT GLAZING (WET)

A. Install continuous spacers, or spacers combined with cylindrical sealant backing, between glass lites and glazing stops to maintain glass face clearances and to prevent sealant from extruding into glass channel and blocking weep systems until sealants cure. Secure spacers or spacers and backings in place and in position to control depth of installed sealant relative to edge clearance for optimum sealant performance.

B. Force sealants into glazing channels to eliminate voids and to ensure complete wetting or bond of sealant to glass and channel surfaces.

C. Tool exposed surfaces of sealants to provide a substantial wash away from glass.

3.5 CLEANING AND PROTECTION

A. Protect exterior glass from damage immediately after installation by attaching crossed streamers to framing held away from glass. Do not apply markers to glass surface. Remove nonpermanent labels and clean surfaces.

B. Protect glass from contact with contaminating substances resulting from construction operations. If, despite such protection, contaminating substances do come into contact with glass, remove substances immediately as recommended in writing by glass manufacturer.

C. Examine glass surfaces adjacent to or below exterior concrete and other masonry surfaces at frequent intervals during construction, but not less than once a month, for buildup of dirt, scum, alkaline deposits, or stains; remove as recommended in writing by glass manufacturer.

D. Remove and replace glass that is broken, chipped, cracked, or abraded or that is damaged from natural causes, accidents, and vandalism, during construction period.

END OF SECTION 088000

**SECTION 088113**

**DECORATIVE GLASS GLAZING**

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes the following decorative glass for interior applications:

1. Glass with decorative film overlay.
2. Glass with colored graphite coating.
3. Glass with finished edges.

1.2 DEFINITION

A. Glass Thickness: Indicated by thickness designations in millimeters according to ASTM C 1036.

1.3 PERFORMANCE REQUIREMENTS

A. General Performance: Installed glazing systems shall withstand normal thermal movement and impact loads (where applicable) without failure, including loss or glass breakage attributable to the following: defective manufacture, fabrication, or installation; deterioration of glazing materials; or other defects in construction.

B. Delegated Design: Design glass installed adjacent to walking surfaces, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.

1. Differential deflection of adjacent unsupported edges shall not exceed glass thickness when subjected to 50 lbf/ft. (730 N/m) applied horizontally to one panel at any point up to 42 inches (1067 mm) above the adjacent walking surface.
2. Base design on thickness at thinnest part of the glass.

1.4 PRECONSTRUCTION TESTING

A. Preconstruction Adhesion and Compatibility Testing: Test each glazing material type, tape sealant, gasket, glazing accessory, and glass-framing member for adhesion to and compatibility with elastomeric glazing sealants. Data based on previous testing of current sealant products, and glazing materials matching those specified is acceptable.

1.5 ACTION SUBMITTALS

A. Product Data: For each decorative-glass and glazing product indicated.

B. Shop Drawings: For decorative glass. Show fabrication and installation details.

C. Samples: For each exposed product and for each color and texture specified.

D. Product Schedule: For decorative glass. Use same designations indicated on Drawings.

E. Delegated-Design Submittal: For glass indicated to comply with performance requirements and design criteria, including analysis data and calculations signed and sealed by the qualified professional engineer responsible for their preparation.

1.6 INFORMATIONAL SUBMITTALS

A. Product certificates.

B. Preconstruction adhesion and compatibility test reports.

C. Warranty: Sample of special warranty.

1.7 CLOSEOUT SUBMITTALS

A. Maintenance data.

1.8 QUALITY ASSURANCE

A. Installer Qualifications: A qualified installer who employs glass installers for this Project who are certified under NGA's Certified Glass Installer Program.

B. Sealant Testing Agency Qualifications: An independent testing agency qualified according to ASTM C 1021 to conduct the testing indicated.

C. Glazing Publications: Comply with published recommendations in [GANA's "Laminated Glazing Reference Manual" and ]GANA's "Glazing Manual" unless more stringent requirements are indicated. See these publications for glazing terms not otherwise defined in this Section or in referenced standards.

D. Safety Glazing: Where safety glazing is indicated, comply with testing requirements in 16 CFR 1201 for Category II materials.

1.9 WARRANTY

A. Special Warranty on Laminated Glass: Manufacturer's standard form in which laminated-glass manufacturer agrees to replace laminated-glass units that deteriorate within specified warranty period. Deterioration of laminated glass is defined as defects developed from normal use that are not attributed to glass breakage or to maintaining and cleaning laminated glass contrary to manufacturer's written instructions. Defects include edge separation, delamination materially obstructing vision through glass, and blemishes exceeding those allowed by referenced laminated-glass standard.

1. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 GLASS PRODUCTS, GENERAL

A. Thickness: Where glass thickness is indicated, it is a minimum. Provide glass lites in thicknesses as needed to comply with requirements indicated.

B. Strength: Where float glass is indicated, provide annealed float glass, Kind HS heat-treated float glass, or Kind FT heat-treated float glass as needed to comply with requirements indicated. Where heat-strengthened glass is indicated, provide Kind HS heat-treated float glass or Kind FT heat-treated float glass as needed to comply with requirements indicated. Where fully tempered glass is indicated, provide Kind FT heat-treated float glass.

2.2 MONOLITHIC-GLASS PRODUCTS

A. Float Glass: ASTM C 1036, Type I, Quality-Q3, Class I (clear) unless otherwise indicated.

B. Heat-Treated Float Glass: ASTM C 1048; Type I; Quality-Q3; Class I (clear) unless otherwise indicated; of kind and condition indicated.

2.3 DECORATIVE GLASS TYPES

A. Decorative Glass: Glass with decorative film overlay. Use translucent, dimensionally stable, cast PVC film, 2-mil- (0.05-mm-) minimum thickness, with pressure-sensitive, clear adhesive back for adhering to glass and releasable protective backing.

1. Glass Type: Clear tempered float glass.
2. Glass Thickness: minimum 6mm or as indicated on the drawings
3. Comply with requirements for safety glazing.
4. Patterns: As selected by Architect from manufacturer's full range

B. Glass with colored graphite coating . Use graphite coated glass.

1. Glass Type: Clear tempered float glass.
2. Glass Thickness: minimum 6mm or as indicated on the drawings
3. Comply with requirements for safety glazing.
4. Patterns: As selected by Architect from manufacturer's full range

2.4 GLAZING MATERIALS

A. Glazing Gaskets, Sealants, Tapes, and Miscellaneous Glazing Materials: As specified in Division 08 Section "Glazing."

1. Elastomeric Glazing Sealants: ASTM C 920,

a. Color: As selected by Architect from manufacturer's full range.

B. Joint Sealants: As specified in Division 07 Section "Joint Sealants."

2.5 HARDWARE FOR GLASS INSTALLATION

A. Hardware: [Edge grips] [Glass panel to ceiling clamps/connectors] [Glass panel to floor clamps/connectors] [Glass panel to wall clamps/connectors] [Glass to glass panel clamp/connectors] [Panel support bars] [Stand-off display system with caps] [Swivel fittings] [Continuous top track] [Continuous floor track]

1. Dimensions: As inidicated on the Drawings
2. Material and Finish: As selected by the Architect from manufacturers full range

B. Fasteners: Fabricated of same basic metal and alloy as fastened metal and matching it in finished color and texture where fasteners are exposed.

C. Gaskets and Wedges: Manufacturer's standard, compatible with decorative glass type indicated.

D. Anchors and Inserts: Provide devices as required for hardware installation. Provide toothed or lead-shield expansion-bolt devices for drilled-in-place anchors. Provide stainless-steel anchors and inserts for applications on inside face of exterior walls and where indicated.

2.6 DECORATIVE-GLASS FABRICATION

A. Edge Finishing: Fabricate finished edges to produce smooth, polished edges without chips, scratches, or warps.

1. Finished Edge: Flat polished

B. Decorative Film Overlay: Apply squarely aligned to glass edges, uniformly smooth, and free from tears, air bubbles, wrinkles, and rough edges, in single sheet completely overlaying the back face of clean glass, according to manufacturer's written instructions, including surface preparation and application temperature limitations.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Examine decorative-glass framing members, with Installer present, for compliance with the following:

1. Manufacturing and installation tolerances, including those for size, squareness, and offsets at corners.
2. Minimum required face or edge clearances.
3. Effective sealing between joints of decorative-glass framing members.

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

C. Set decorative-glass units in each series true in line with uniform orientation, pattern, draw, bow, and similar characteristics.

D. Set glass lites with proper orientation so that each outer surface faces the direction [indicated on Drawings] <Insert orientation>.

E. Set decorative glass in locations indicated on Drawings. Install glass with hardware and accessories according to hardware manufacturer's written instructions. Attach hardware securely to mounting surfaces[ and building structure].

F. Decorative Glass: Install glazing as specified in Division 08 Section "Glazing."

G. Protect decorative glass from damage immediately after installation by attaching crossed streamers to framing and held away from glass. Do not apply markers to glass surface. Remove nonpermanent labels, and clean surfaces.

H. Protect glass from contact with contaminating substances resulting from construction operations. If, despite such protection, contaminating substances do come into contact with glass, remove substances immediately as recommended in writing by glass manufacturer.

I. Remove and replace glass that is broken, chipped, cracked, or abraded or that is damaged from natural causes, accidents, and vandalism, during construction period.

END OF SECTION 088113

**SECTION 088300**

**MIRRORS**

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 the following types of silvered flat glass mirrors:

1. Annealed monolithic glass mirrors.

1.3 ACTION SUBMITTALS

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

B. Shop Drawings: Include mirror elevations, edge details, mirror hardware, and attachments to other work.

C. Samples:

1. Mirrors: 12 inches (300 mm) square, including edge treatment on two adjoining edges.
2. Mirror Clips: Full size.
3. Mirror Trim: 12 inches (300 mm) long.

1.4 INFORMATIONAL SUBMITTALS

A. Preconstruction test reports.

B. Warranty: Sample of special warranty.

1.5 CLOSEOUT SUBMITTALS

A. Maintenance data.

1.6 QUALITY ASSURANCE

A. Preconstruction Mirror Mastic Compatibility Test: Submit mirror mastic products to mirror manufacturer for testing to determine compatibility of mastic with mirror backing and substrates on which mirrors are installed.

1.7 WARRANTY

A. Special Warranty: Manufacturer's standard form in which mirror manufacturer agrees to replace mirrors that deteriorate within specified warranty period. Deterioration of mirrors is defined as defects developed from normal use that are not attributed to mirror breakage or to maintaining and cleaning mirrors contrary to manufacturer's written instructions. Defects include discoloration, black spots, and clouding of the silver film.

1. Warranty Period: Five (5) years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 SILVERED FLAT GLASS MIRRORS

A. Glass Mirrors, General: ASTM C 1503

B. Toughened Glass: Mirror (Silver quality Twin-coated glass mirror)

1. Nominal Thickness: 6.0mm thick

2. Arrised, ground and polished on exposed edges

3. 25mm beveling on exposed perimeter

2.2 MISCELLANEOUS MATERIALS

A. Setting Blocks: Elastomeric material with a Shore, Type A durometer hardness of 85, plus or minus 5.

B. Edge Sealer: Approved by mirror manufacturer.

C. Mirror Mastic: An adhesive setting compound, asbestos-free, produced specifically for setting mirrors.

1. Adhesive shall have a VOC content of not more than [70] g/L when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
2. Adhesive shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

D. Film Backing for Safety Mirrors: Film backing and pressure-sensitive adhesive; both compatible with mirror backing paint as certified by mirror manufacturer.

2.3 MIRROR HARDWARE

A. Perimeter Clips: Stainless steel section deep enough to produce a glazing channel to accommodate mirrors of thickness indicated and in lengths required to cover bottom and top edges of each mirror in a single piece.

1. Finish: Stainless steel hairline finish.

B. Fasteners: Fabricated of same basic metal and alloy as fastened metal and matching it in finished color and texture where fasteners are exposed.

C. Anchors and Inserts: Provide devices as required for mirror hardware installation.

2.4 FABRICATION

A. Cutouts: Fabricate cutouts for notches and holes in mirrors without marring visible surfaces. Locate and size cutouts so they fit closely around penetrations in mirrors.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Examine substrates, over which mirrors are to be mounted, with Installer present, for compliance with installation tolerances, substrate preparation, and other conditions affecting performance of the Work.

1. Verify compatibility with and suitability of substrates, including compatibility of mirror mastic with existing finishes or primers.
2. Proceed with installation only after unsatisfactory conditions have been corrected and surfaces are dry.

B. Comply with mastic manufacturer's written installation instructions for preparation of substrates, including coating substrates with mastic manufacturer's special bond coating where applicable.

C. General: Install mirrors to comply with mirror manufacturer's written instructions. Mount mirrors accurately in place in a manner that avoids distorting reflected images.

D. Wall-Mounted Mirrors: Install mirrors with anchoring details as indicated in the detailed plans of Architect.

E. Protect mirrors from breakage and contaminating substances resulting from construction operations.

F. Do not permit edges of mirrors to be exposed to standing water.

G. Maintain environmental conditions that will prevent mirrors from being exposed to moisture from condensation or other sources for continuous periods of time.

H. Wash exposed surface of mirrors not more than four days before date scheduled for inspections that establish date of Substantial Completion. Wash mirrors as recommended in writing by mirror manufacturer.

END OF SECTION 088300

**SECTION 088400**

**PLASTIC GLAZING**

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Monolithic acrylic glazing.

1.2 PRECONSTRUCTION TESTING

A. Preconstruction Adhesion and Compatibility Testing: Test each plastic glazing type, tape sealant, gasket, glazing accessory, and glazing-framing member for adhesion to and compatibility with elastomeric glazing sealants.

1. Testing will not be required if data are submitted based on previous testing of current sealant products and plastic glazing matching those submitted.

1.3 ACTION SUBMITTALS

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

B. Plastic Glazing Samples: For each color and finish of plastic glazing indicated.

C. Glazing Accessory Samples: For [gaskets] [and] [sealants].

D. Plastic Glazing Schedule: Use same designations indicated on Drawings.

1.4 INFORMATIONAL SUBMITTALS

A. Preconstruction adhesion and compatibility test report.

B. Research/Evaluation Reports: For plastic glazing.

C. Warranty: Sample of special warranty.

1.5 CLOSEOUT SUBMITTALS

A. Maintenance Data: For plastic glazing to include in maintenance manuals.

1.6 QUALITY ASSURANCE

A. Glazing Publication: Comply with published recommendations of plastic glazing manufacturers and with GANA's "Glazing Manual" unless more stringent requirements are indicated.

B. Plastic Glazing Labeling: Identify plastic sheets with appropriate markings of applicable testing and inspecting agency, indicating compliance with required fire-test-response characteristics.

C. Safety Glazing Labeling: Where safety glazing labeling is indicated, permanently mark glazing with certification label of manufacturer. Label shall indicate manufacturer's name, type of plastic glazing, thickness, and safety glazing standard with which glass complies.

## 1.7 WARRANTY

A. Manufacturer's Special Warranty for Abrasion- and UV-Resistant, Monolithic Polycarbonate: Manufacturer's standard form, made out to Owner and signed by polycarbonate manufacturer, in which manufacturer agrees to replace polycarbonate products that break or develop defects from normal use that are attributable to manufacturing process and not to practices for maintaining and cleaning plastic glazing contrary to manufacturer's written instructions. Defects include coating delamination, haze, excessive yellowing, and loss of light transmission beyond the limits stated in plastic glazing manufacturer's standard form.

1. Warranty Period: 5 years from date of Substantial Completion.

# PART 2 - PRODUCTS

## 2.1 PLASTIC GLAZING, GENERAL

A. Sizes: Fabricate plastic glazing to sizes required for openings indicated. Allow for thermal expansion and contraction of plastic glazing without restraint and without withdrawal of edges from frames, with edge clearances and tolerances complying with plastic glazing manufacturer's written instructions.

B. Fire-Test-Response Characteristics of Plastic Glazing: As determined by testing plastic glazing by a qualified testing agency acceptable to authorities having jurisdiction.

1. Self-ignition temperature of 650 deg F (343 deg C) or higher when tested according to ASTM D 1929 on plastic sheets in thicknesses indicated for the Work.
2. Smoke-developed index of 450 or less when tested according to ASTM E 84, or smoke density of 75 or less when tested according to ASTM D 2843 on plastic sheets in thicknesses indicated for the Work.
3. Burning extent of 1 inch (25 mm) or less when tested according to ASTM D 635 at a nominal thickness of 0.060 inch (1.52 mm) or thickness indicated for the Work.
4. Burning rate of 2.5 in./min. (1.06 mm/s) or less when tested according to ASTM D 635 at a nominal thickness of 0.060 inch (1.52 mm) or thickness indicated for the Work.
5. Flame-spread index not less than that indicated when tested according to ASTM E 84.

## 2.2 MONOLITHIC ACRYLIC GLAZING

A. Plastic Glazing: Translucent acrylic sheet; ASTM D 4802, Category A-1 (cell cast) or Category B-1 (continuously manufactured), Finish 1 (smooth or polished), Type UVF (UV filtering).

1. Nominal Thickness: 0.236 inch (6 mm)
2. Color: As selected by Architect from manufacturer's full range
3. Combustibility Class: CC2.
4. Provide safety glazing labeling.

2.3 GLAZING GASKETS

A. Dense Compression Gaskets: Molded or extruded gaskets, EPDM, ASTM C 864 or silicone, ASTM C 1115; and of profile and hardness required to maintain watertight seal.

B. Soft Compression Gaskets: Extruded or molded, closed-cell, integral-skinned EPDM or silicone gaskets complying with ASTM C 509, Type II, black; and of profile and hardness required to maintain watertight seal.

2.4 GLAZING SEALANTS

A. General:

1. Compatibility: Provide glazing sealants that are compatible with one another and with other materials they will contact, including plastic glazing products and glazing channel substrates, under conditions of service and application, as demonstrated by sealant manufacturer based on testing and field experience.
2. Suitability: Comply with sealant and glass manufacturers' written instructions for selecting glazing sealants suitable for applications indicated and for conditions existing at time of installation.
3. Sealants used inside the weatherproofing system shall have a VOC content of not more than 250 g/L when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
4. Sealants used inside the weatherproofing system shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."
5. Colors of Exposed Glazing Sealants: As selected by Architect from manufacturer's full range.

2.5 GLAZING TAPES

A. Back-Bedding Mastic Glazing Tapes: Preformed, butyl-based, 100 percent solids elastomeric tape; nonstaining and nonmigrating in contact with nonporous surfaces; with or without spacer rod as recommended in writing by tape and glass manufacturers for application indicated; and complying with ASTM C 1281 and AAMA 800 for products indicated below:

1. AAMA 804.3 tape, where indicated.
2. AAMA 806.3 tape, for glazing applications in which tape is subject to continuous pressure.
3. AAMA 807.3 tape, for glazing applications in which tape is not subject to continuous pressure.

B. Expanded Cellular Glazing Tapes: Closed-cell, PVC foam tapes; factory coated with adhesive on both surfaces; and complying with AAMA 800 for the following types:

1. AAMA 810.1, Type 1, for glazing applications in which tape acts as the primary sealant.
2. AAMA 810.1, Type 2, for glazing applications in which tape is used in combination with a full bead of liquid sealant.

2.6 MISCELLANEOUS GLAZING MATERIALS

A. Cleaners, Primers, and Sealers: Types recommended by sealant or gasket manufacturer.

B. Setting Blocks: EPDM or silicone as required for compatibility with glazing sealant and plastic glazing, and of hardness recommended by plastic glazing manufacturer for application indicated.

C. Compressible Filler Rods: Closed cell of waterproof-jacketed rod stock of synthetic rubber or plastic foam, flexible and resilient, with 5- to 10-psi (35- to 70-kPa) compression strength for 25 percent deflection.

## PART 3 - EXECUTION

### 3.1 GLAZING, GENERAL

A. Comply with combined written instructions of manufacturers of plastic glazing materials, sealants, gaskets, and other glazing materials unless more stringent requirements are indicated, including those in referenced glazing publication.

B. Glazing channel dimensions indicated on Drawings are designed to provide the necessary bite on plastic glazing, minimum edge and face clearances, and adequate sealant thicknesses, with reasonable tolerances. Adjust plastic glazing lites during installation to ensure that bite is equal on all sides.

C. Sand or scrape cut edges of plastic glazing to provide smooth edges, free of chips and hairline cracks.

D. Remove burrs and other projections from glazing channel surfaces.

E. Protect plastic glazing surfaces from abrasion and other damage during handling and installation, according to the following requirements:

1. Retain plastic glazing manufacturer's protective covering or protect by other methods according to plastic glazing manufacturer's written instructions.
2. Remove covering at border of each piece before glazing; remove remainder of covering immediately after installation where plastic glazing will be exposed to sunlight or where other conditions make later removal difficult.
3. Remove damaged plastic glazing sheets from Project site and legally dispose of off-site. Damaged plastic glazing sheets are those containing imperfections that, when installed, result in weakened glazing and impaired performance and appearance.

F. Apply primers to joint surfaces where required for adhesion of sealants, as determined by preconstruction sealant-substrate testing.

G. Install elastomeric setting blocks in sill channels, sized and located to comply with referenced glazing publication, unless otherwise instructed by plastic glazing manufacturer. Set blocks in thin course of compatible sealant suitable for heel bead.

H. Provide edge blocking to comply with referenced glazing publication unless otherwise instructed by plastic glazing manufacturer.

### 3.2 TAPE GLAZING

A. Install tapes continuously, but not in one continuous length. Do not stretch tapes to make them fit opening.

B. Cover vertical framing joints by applying tapes to heads and sills first and then to jambs. Cover horizontal framing joints by applying tapes to jambs and then to heads and sills.

C. Place joints in tapes at corners of opening with adjoining lengths butted together, not lapped. Seal joints in tapes with compatible sealant recommended by tape manufacturer.

D. Apply heel bead of glazing sealant.

E. Center plastic glazing lites in openings on setting blocks and press firmly against tape by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centers of openings.

F. Apply cap bead of glazing sealant over exposed edge of tape.

3.3 GASKET GLAZING (DRY)

A. Fabricate compression gaskets in lengths recommended in writing by gasket manufacturer to fit openings exactly, with allowance for stretch during installation.

B. Insert soft compression gasket between plastic glazing and frame or fixed stop so it is securely in place with joints miter cut and bonded together at corners.

C. Center plastic glazing lites in openings on setting blocks and press firmly against soft compression gasket by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centers of openings. Compress gaskets to produce a weathertight seal without developing bending stresses in plastic glazing. Seal gasket joints with sealant recommended by gasket manufacturer.

D. Install gaskets so they protrude past face of glazing stops.

3.4 SEALANT GLAZING (WET)

A. Install continuous spacers between plastic glazing lites and glazing stops to maintain plastic glazing face clearances and to prevent sealant from extruding into glazing channel weep systems until sealants cure. Secure spacers in place and in position to control depth of installed sealant relative to edge clearance for optimum sealant performance.

B. Force sealants into glazing channels to eliminate voids and to ensure complete wetting or bond of sealant to plastic glazing and channel surfaces.

C. Tool exposed surfaces of sealants to provide a substantial wash away from plastic glazing.

3.5 PROTECTING AND CLEANING

A. Protect plastic glazing from contact with contaminating substances from construction operations. If, despite such protection, contaminating substances do come into contact with plastic glazing, remove immediately and wash plastic glazing according to plastic glazing manufacturer's written instructions.

B. Remove and replace plastic glazing that is broken, chipped, cracked, abraded, or damaged in other ways during construction period, including natural causes, accidents, and vandalism.

END OF SECTION 088400

**SECTION 089000**

**LOUVERS AND VENTS**

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. Fixed, extruded-aluminum and formed-metal louvers

1.3 PERFORMANCE REQUIREMENTS

A. Delegated Design: Design louvers, including comprehensive engineering analysis by a qualified professional engineer, using structural and seismic performance requirements and design criteria indicated.

B. Structural Performance: Louvers shall withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated without permanent deformation of louver components, noise or metal fatigue caused by louver blade rattle or flutter, or permanent damage to fasteners and anchors.

1. Wind Loads: Determine loads based on pressures as indicated on Drawings.
2. Wind Loads: Determine loads based on a Wind Pressure Zone II, acting inward or outward.

C. Seismic Performance: Louvers, including attachments to other construction, shall withstand the effects of earthquake motions determined according to the NSCP.

1. Design earthquake spectral response acceleration, short period (Sds) for Project is <Insert value>.
2. Component Importance Factor is 1.0.

D. Louver Performance Ratings: Provide louvers complying with requirements specified, as demonstrated by testing manufacturer's stock units identical to those provided, except for length and width according to AMCA 500-L.

1.4 ACTION SUBMITTALS

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

1. For louvers specified to bear AMCA seal, include printed catalog pages showing specified models with appropriate AMCA Certified Ratings Seals.

B. Shop Drawings: For louvers and accessories. Include plans, elevations, sections, details, and attachments to other work. Show frame profiles and blade profiles, angles, and spacing.

C. Samples: For each type of metal finish required.

D. Delegated-Design Submittal: For louvers indicated to comply with structural and seismic performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1.5 INFORMATIONAL SUBMITTALS

A. Product Test Reports: Based on tests performed according to AMCA 500-L.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Aluminum Extrusions: ASTM B 221 (ASTM B 221M), Alloy 6063-T5, T-52, or T6.

B. Aluminum Sheet: ASTM B 209 (ASTM B 209M), Alloy 3003 or 5005 with temper as required for forming, or as otherwise recommended by metal producer for required finish.

C. Fasteners: Use types and sizes to suit unit installation conditions.

1. For fastening aluminum, use aluminum or 300 series stainless-steel fasteners.
2. For fastening galvanized steel, use hot-dip-galvanized steel or 300 series stainless-steel fasteners.
3. For fastening stainless steel, use 300 series stainless-steel fasteners.
4. For color-finished louvers, use fasteners with heads that match color of louvers.

D. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D 1187.

2.2 FABRICATION, GENERAL

A. Fabricate frames, including integral sills, to fit in openings of sizes indicated, with allowances made for fabrication and installation tolerances, adjoining material tolerances, and perimeter sealant joints.

B. Join frame members to each other and to fixed louver blades with fillet as standard with louver manufacturer unless otherwise indicated or size of louver assembly makes bolted connections between frame members necessary.

2.3 FIXED, EXTRUDED-ALUMINUM LOUVERS

A. Horizontal Storm-Resistant Louver

1. Louver Depth: [5 inches (125 mm)] or to match required louver depth required by Mechanical Design
2. Frame and Blade Nominal Thickness: Not less than 0.060 inch (1.52 mm) for blades and 0.080 inch (2.03 mm) for frames.
3. Louver Performance Ratings: Refer to Mechanical Design requirements. Submit data of the following for Mechanical Consultant’s review and approval:

a. Free Area:
b. Air Performance:

c. Wind-Driven Rain Performance:

B. FIXED, ACOUSTICAL LOUVERS

1. Louver with formed-metal blades filled on interior with mineral-fiber, acoustical insulation retained by perforated metal sheet of same material and finish as blade
2. Basis of Design: C/S Acoustic Louver System
3. Louver depth: 300mm
4. Frame Material: Extruded aluminum not less than 0.080-inch nominal thickness.
5. Blade material: Aluminum sheet, not less than 0.080-inch nominal thickness.
6. Blade shape: Airfoil
7. Blade angle: 45 degress unless otherwise indicated.
8. Louver Performance ratings: (Verify Mechanical Plans/ Design Calculations)
9. Air-borne Sound-Transmission Loss:

| Frequency Hz | 63 | 125 | 250 | 500 | 1000 | 2000 | 4000 | 8000 |
|---|---|---|---|---|---|---|---|---|
| Noise Reduction | 13 | 10 | 13 | 15 | 16 | 16 | 17 | 20 |

C. Horizontal, Nondrainable-Blade Louver

1. Louver Depth: 6 inches (150 mm)].
2. Blade Profile: Blade with center baffle.
3. Frame and Blade Nominal Thickness: Not less than 0.080 inch (2.03 mm).
4. Louver Performance Ratings: Submit the following data for Mechanical Consultant's review and approval:

a. Free Area:
b. Point of Beginning Water Penetration:
c. Air Performance:

2.4 ALUMINUM FINISHES

A. High-Performance Organic Finish: 3-coat fluoropolymer finish complying with [AAMA 2604] [AAMA 2605] and containing not less than 70 percent PVDF resin by weight in color coat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.

1. Color and Gloss: Match Architect's sample

PART 3 - EXECUTION

3.1 INSTALLATION

A. Locate and place louvers and vents level, plumb, and at indicated alignment with adjacent work.

B. Use concealed anchorages where possible. Provide brass or lead washers fitted to screws where required to protect metal surfaces and to make a weathertight connection.

C. Provide perimeter reveals and openings of uniform width for sealants and joint fillers, as indicated.

D. Repair damaged finishes so no evidence remains of corrective work. Return items that cannot be refinished in the field to the factory and refinish entire unit or provide new units.

E. Protect galvanized and nonferrous-metal surfaces that will be in contact with concrete, masonry, or dissimilar metals from corrosion and galvanic action by applying a heavy coating of bituminous paint.

END OF SECTION 089000

**SECTION 092216**

**NON-STRUCTURAL METAL FRAMING**

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. Non-load-bearing steel framing systems for interior gypsum board assemblies.
2. Suspension systems for interior gypsum ceilings and soffits.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Fire-Test-Response Characteristics: Provide materials and construction identical to those tested according to ASTM E 119.

B. STC-Rated Assemblies: Provide materials and construction identical to those tested in assembly indicated according to ASTM E 90 and classified according to ASTM E 413.

C. Recycled Content of Steel Products: Provide products with average recycled content of steel products such that postconsumer recycled content plus one-half of preconsumer recycled content is not less than [25] percent.

2.2 FRAMING SYSTEMS

A. Steel Studs and Runners: ASTM C 645. Use either steel studs and runners or dimpled steel studs and runners of equivalent minimum base-metal thickness.

1. Minimum Base-Metal Thickness: 0.033 inch (0.84 mm).
2. Depth: As indicated on Drawings

B. Slip-Type Head Joints: Where indicated, provide the following in thickness not less than indicated for studs and in width to accommodate depth of studs:

1. Single Long-Leg Runner System: ASTM C 645 top runner with 2-inch- (51-mm-) deep flanges, installed with studs friction fit into top runner and with continuous bridging located within 12 inches (305 mm) of the top of studs to provide lateral bracing.
2. Double-Runner System: ASTM C 645 top runners, inside runner with 2-inch- (51-mm-) deep flanges and fastened to studs, and outer runner sized to friction fit inside runner.
3. Deflection Track: Steel sheet top runner manufactured to prevent cracking of finishes due to deflection of structure above.

C. Firestop Tracks: Manufactured to allow partition heads to expand and contract with movement of the structure while maintaining continuity of fire-resistance-rated assembly indicated; in thickness not less than indicated for studs and in width to accommodate depth of studs.

D. Flat Strap and Backing Plate: Steel sheet for blocking and bracing in length and width indicated.

1. Minimum Base-Metal Thickness: 0.033 inch (0.84 mm)

E. Cold-Rolled Channel Bridging: Steel, 0.053-inch (1.34-mm) minimum base-metal thickness, with minimum 1/2-inch- (13-mm-) wide flanges.

1. Depth: 1-1/2 inches (38 mm)
2. Clip Angle: Not less than 1-1/2 by 1-1/2 inches (38 by 38 mm), 0.068-inch- (1.72-mm-) thick, galvanized steel.

F. Hat-Shaped, Rigid Furring Channels: ASTM C 645.

1. Minimum Base-Metal Thickness: 0.033 inch (0.84 mm)
2. Depth: 1-1/2 inches (38.1 mm).

G. Resilient Furring Channels: 1/2-inch- (13-mm-) deep, steel sheet members designed to reduce sound transmission.

1. Configuration: hat shaped

H. Cold-Rolled Furring Channels: 0.053-inch (1.34-mm) uncoated-steel thickness, with minimum 1/2-inch- (13-mm-) wide flanges.

1. Depth: As indicated in the drawings.
2. Furring Brackets: Adjustable, corrugated-edge type of steel sheet with minimum uncoated-steel thickness of 0.033 inch (0.8 mm).
3. Tie Wire: ASTM A 641/A 641M, Class 1 zinc coating, soft temper, 0.062-inch- (1.59-mm-) diameter wire, or double strand of 0.048-inch- (1.21-mm-) diameter wire.

I. Z-Shaped Furring: With slotted or nonslotted web, face flange of 1-1/4 inches (31.8 mm) wall attachment flange of 7/8 inch (22 mm), minimum uncoated-metal thickness of 0.018 inch (0.45 mm), and depth required to fit insulation thickness indicated.

## 2.3 SUSPENSION SYSTEMS

A. Tie Wire: ASTM A 641/A 641M, Class 1 zinc coating, soft temper, 0.062-inch- (1.59-mm-) diameter wire, or double strand of 0.048-inch- (1.21-mm-) diameter wire.

B. Hanger Attachments to Concrete:

1. Anchors: Capable of sustaining a load equal to 5 times that imposed as determined by ASTM E 488.

    a. Type: Post-installed, expansion anchor.

2. Powder-Actuated Fasteners: Capable of sustaining, a load equal to 10 times that imposed as determined by ASTM E 1190.

C. Wire Hangers: ASTM A 641/A 641M, Class 1 zinc coating, soft temper, 0.16 inch (4.12 mm) in diameter.

D. Flat Hangers: Steel sheet, 1 by 3/16 inch (25 by 5 mm) by length indicated.

E. Carrying Channels: Cold-rolled, commercial-steel sheet with a base-metal thickness of 0.053 inch (1.34 mm) and minimum 1/2-inch- (13-mm-) wide flanges.

1. Depth: 2-1/2 inches (64 mm).

F. Furring Channels (Furring Members):

1. Cold-Rolled Channels: 0.053-inch (1.34-mm) uncoated-steel thickness, with minimum 1/2-inch- (13-mm-) wide flanges, 3/4 inch (19 mm) deep.
2. Steel Studs and Runners: ASTM C 645. Use either steel studs and runners or dimpled steel studs and runners of equivalent minimum base-metal thickness.

    a. Minimum Base-Metal Thickness: 0.033 inch (0.84 mm).
    b. Depth: As indicated on Drawings.

3. Hat-Shaped, Rigid Furring Channels: ASTM C 645, 7/8 inch (22 mm) deep.

    a. Minimum Base-Metal Thickness: 0.033 inch (0.84 mm).

4. Resilient Furring Channels: 1/2-inch- (13-mm-) deep members designed to reduce sound transmission.

    a. Configuration: hat shaped.

## 2.4 AUXILIARY MATERIALS

A. Fasteners for Metal Framing: Of type, material, size, corrosion resistance, holding power, and other properties required to fasten steel members to substrates.

B. Isolation Strip at Exterior Walls: Provide asphalt saturated organic felt or foam gasket.

# PART 3 - EXECUTION

## 3.1 INSTALLATION, GENERAL

A. Installation Standard: ASTM C 754.

1. Gypsum Plaster Assemblies: Also comply with requirements in ASTM C 841 that apply to framing installation.

2. Portland Cement Plaster Assemblies: Also comply with requirements in ASTM C 1063 that apply to framing installation.
3. Gypsum Veneer Plaster Assemblies: Also comply with requirements in ASTM C 844 that apply to framing installation.
4. Gypsum Board Assemblies: Also comply with requirements in ASTM C 840 that apply to framing installation.

B. Install supplementary framing, and blocking to support fixtures, equipment services, heavy trim, grab bars, toilet accessories, furnishings, or similar construction.

C. Install bracing at terminations in assemblies.

D. Do not bridge building control and expansion joints with non-load-bearing steel framing members. Frame both sides of joints independently.

## 3.2 INSTALLING FRAMED ASSEMBLIES

A. Install framing system components according to spacings indicated, but not greater than spacings required by referenced installation standards for assembly types.

B. Where studs are installed directly against exterior masonry walls or dissimilar metals at exterior walls, install isolation strip between studs and exterior wall.

C. Install studs so flanges within framing system point in same direction.

D. Install tracks (runners) at floors and overhead supports. Extend framing full height to structural supports or substrates above suspended ceilings, except where partitions are indicated to terminate at suspended ceilings. Continue framing around ducts penetrating partitions above ceiling.

1. Slip-Type Head Joints: Where framing extends to overhead structural supports, install to produce joints at tops of framing systems that prevent axial loading of finished assemblies.
2. Door Openings: Screw vertical studs at jambs to jamb anchor clips on door frames; install runner track section (for cripple studs) at head and secure to jamb studs.

    a. Install two studs at each jamb unless otherwise indicated.
    b. Install cripple studs at head adjacent to each jamb stud, with a minimum 1/2-inch (13-mm) clearance from jamb stud to allow for installation of control joint in finished assembly.
    c. Extend jamb studs through suspended ceilings and attach to underside of overhead structure.

3. Other Framed Openings: Frame openings other than door openings the same as required for door openings unless otherwise indicated. Install framing below sills of openings to match framing required above door heads.
4. Fire-Resistance-Rated Partitions: Install framing to comply with fire-resistance-rated assembly indicated and support closures and to make partitions continuous from floor to underside of solid structure.

    a. Firestop Track: Where indicated, install to maintain continuity of fire-resistance-rated assembly indicated.

5. Sound-Rated Partitions: Install framing to comply with sound-rated assembly indicated.
6. Curved Partitions:

a. Bend track to uniform curve and locate straight lengths so they are tangent to arcs.
b. Begin and end each arc with a stud, and space intermediate studs equally along arcs. On straight lengths of no fewer than two studs at ends of arcs, place studs 6 inches (150 mm) o.c.

E. Direct Furring:

1. Screw to wood framing.
2. Attach to concrete or masonry with stub nails, screws designed for masonry attachment, or powder-driven fasteners spaced 24 inches (610 mm) o.c.

F. Z-Furring Members:

1. Erect insulation vertically and hold in place with Z-furring members spaced [24 inches (610 mm)] [600 mm] o.c.
2. Except at exterior corners, securely attach narrow flanges of furring members to wall with concrete stub nails, screws designed for masonry attachment, or powder-driven fasteners spaced 24 inches (610 mm) o.c.
3. At exterior corners, attach wide flange of furring members to wall with short flange extending beyond corner; on adjacent wall surface, screw-attach short flange of furring channel to web of attached channel. At interior corners, space second member no more than 12 inches (305 mm) from corner and cut insulation to fit.

G. Installation Tolerance: Install each framing member so fastening surfaces vary not more than 1/8 inch (3 mm) from the plane formed by faces of adjacent framing.

## 3.3 INSTALLING SUSPENSION SYSTEMS

A. Install suspension system components according to spacings indicated, but not greater than spacings required by referenced installation standards for assembly types.

B. Isolate suspension systems from building structure where they abut or are penetrated by building structure to prevent transfer of loading imposed by structural movement.

C. Suspend hangers from building structure as follows:

1. Install hangers plumb and free from contact with insulation or other objects within ceiling plenum that are not part of supporting structural or suspension system.

a. Splay hangers only where required to miss obstructions and offset resulting horizontal forces by bracing, countersplaying, or other equally effective means.

2. Where width of ducts and other construction within ceiling plenum produces hanger spacings that interfere with locations of hangers, install supplemental suspension members and hangers in the form of trapezes or equivalent devices.
3. Do not attach hangers to steel roof deck.
4. Do not attach hangers to permanent metal forms. Furnish cast-in-place hanger inserts that extend through forms.
5. Do not attach hangers to rolled-in hanger tabs of composite steel floor deck.
6. Do not connect or suspend steel framing from ducts, pipes, or conduit.

D. Fire-Resistance-Rated Assemblies: Wire tie furring channels to supports.

E. Seismic Bracing: Sway-brace suspension systems with hangers used for support.

F. Installation Tolerances: Install suspension systems that are level to within [1/8 inch in 12 feet (3 mm in 3.6 m) measured lengthwise on each member that will receive finishes and transversely between parallel members that will receive finishes.

END OF SECTION 092216

**SECTION 092400**

**PORTLAND CEMENT PLASTERING**

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Interior portland cement plasterwork on unit masonry and monolithic concrete.

1.2 ACTION SUBMITTALS

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

B. Shop Drawings: Show locations and installation of control and expansion joints including plans, elevations, sections, details of components, and attachments to other work.

C. Samples: For each type of factory-prepared finish coat indicated.

1.3 QUALITY ASSURANCE

A. Fire-Resistance Ratings: Where indicated, provide portland cement plaster assemblies identical to those of assemblies tested for fire resistance per ASTM E 119 by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

B. Sound-Transmission Characteristics: Where indicated, provide portland cement plaster assemblies identical to those of assemblies tested for STC ratings per ASTM E 90 and classified according to ASTM E 413 by a qualified testing agency.

C. Mockups: Before plastering, install mockups of at least 100 sq. ft. (9.3 sq. m) in surface area to demonstrate aesthetic effects and set quality standards for materials and execution.

1. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.4 PROJECT CONDITIONS

A. Comply with ASTM C 926 requirements.

B. Factory-Prepared Finishes: Comply with manufacturer's written recommendations for environmental conditions for applying finishes.

PART 2 - PRODUCTS

2.1 MISCELLANEOUS MATERIALS

A. Water for Mixing: Potable and free of substances capable of affecting plaster set or of damaging plaster, lath, or accessories.

B. Fiber for Base Coat: Alkaline-resistant glass or polypropylene fibers, 1/2 inch (13 mm) long, free of contaminants, manufactured for use in portland cement plaster.

C. Bonding Compound: ASTM C 932.

D. Sound Attenuation Blankets: ASTM C 665, Type I (blankets without membrane facing) produced by combining thermosetting resins with mineral fibers manufactured from glass, slag wool, or rock wool.

1. Fire-Resistance-Rated Assemblies: Comply with mineral-fiber requirements of assembly.

E. Acoustical Sealant: As specified in Division 07 Section "Joint Sealants"

1. Sealants shall have a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
2. Sealants shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

2.2 PLASTER MATERIALS

A. Portland Cement: ASTM C 150, Type I.

1. Color for Finish Coats: Gray.

B. Lime: ASTM C 206, Type S; or ASTM C 207, Type S.

C. Sand Aggregate: ASTM C 897.

D. Perlite Aggregate: ASTM C 35.

2.3 PLASTER MIXES

A. General: Comply with ASTM C 926 for applications indicated.

1. Fiber Content: Add fiber to base-coat mixes after ingredients have mixed at least two minutes. Comply with fiber manufacturer's written instructions for fiber quantities in mixes, but do not exceed 1 lb of fiber/cu. yd. (0.6 kg of fiber/cu. m) of cementitious materials.

B. Base-Coat Mixes: Single base coats for two-coat plasterwork as follows:

1. Portland Cement Mix: For cementitious material, mix 1 part portland cement and 0 to 3/4 part lime. Use 2-1/2 to 4 parts aggregate per part of cementitious material.
2. Portland and Masonry Cement Mix: For cementitious material, mix 1 part portland cement and 1 part masonry cement. Use 2-1/2 to 4 parts aggregate per part of cementitious material.
3. Plastic Cement Mix: Use 1 part plastic cement and 2-1/2 to 4 parts aggregate.

C. Base-Coat Mixes: Single base coats for two-coat plasterwork as follows:

1. Portland Cement Mix: For cementitious material, mix 1 part portland cement and 3/4 to 1-1/2 parts lime. Use 2-1/2 to 4 parts aggregate per part of cementitious material.
2. Masonry Cement Mix: Use 1 part masonry cement and 2-1/2 to 4 parts aggregate.
3. Plastic Cement Mix: Use 1 part plastic cement and 2-1/2 to 4 parts aggregate.

D. Job-Mixed Finish-Coat Mixes:

1. Portland Cement Mix: For cementitious materials, mix 1 part portland cement and [3/4 to 1-1/2] [1-1/2 to 2] parts lime. Use 1-1/2 to 3 parts aggregate per part of cementitious material.
2. Masonry Cement Mix: 1 part masonry cement and 1-1/2 to 3 parts aggregate.
3. Portland and Masonry Cement Mix: For cementitious materials, mix 1 part portland cement and 1 part masonry cement. Use 1-1/2 to 3 parts aggregate per part of cementitious material.
4. Plastic Cement Mix: 1 part plastic cement and 1-1/2 to 3 parts aggregate.

## PART 3 - EXECUTION

### 3.1 PREPARATION

A. Protect adjacent work from soiling, spattering, moisture deterioration, and other harmful effects caused by plastering.

B. Prepare solid substrates for plaster that are smooth or that do not have the suction capability required to bond with plaster according to ASTM C 926.

### 3.2 INSTALLATION, GENERAL

A. Fire-Resistance-Rated Assemblies: Install components according to requirements for design designations from listing organization and publication indicated on Drawings.

B. Sound Attenuation Blankets: Where required, install blankets before installing lath unless blankets are readily installed after lath has been installed on one side.

C. Acoustical Sealant: Where required, seal joints between edges of plasterwork and abutting construction with acoustical sealant.

### 3.3 INSTALLING ACCESSORIES

A. Install according to ASTM C 1063 and at locations indicated on Drawings.

B. Reinforcement for Corners:
1. Install cornerbead at interior locations.

C. Control Joints: Install control joints at locations indicated on Drawings.

1. As required to delineate plasterwork into areas (panels) of the following maximum sizes:

a. Vertical Surfaces: 144 sq. ft. (13.4 sq. m).
b. Horizontal and other Nonvertical Surfaces: 100 sq. ft. (9.3 sq. m).

2. At distances between control joints of not greater than 18 feet (5.5 m) o.c.

3. As required to delineate plasterwork into areas (panels) with length-to-width ratios of not greater than 2-1/2:1.
4. Where control joints occur in surface of construction directly behind plaster.
5. Where plasterwork areas change dimensions, to delineate rectangular-shaped areas (panels) and to relieve the stress that occurs at the corner formed by the dimension change.

## 3.4 PLASTER APPLICATION

A. General: Comply with ASTM C 926.

B. Bonding Compound: Apply on unit masonry and concrete plaster bases.

C. Walls; Base-Coat Mix: Scratch coat for two-coat plasterwork, 3/8 inch (10 mm) thick on concrete masonry.

1. Portland cement mixes.
2. Masonry cement mixes.
3. Portland and masonry cement mixes.
4. Plastic cement mixes.
5. Portland and plastic cement mixes.

D. Ceilings; Base-Coat Mix: Scratch coat for two-coat plasterwork, 1/4 inch (6 mm) thick on concrete.

1. Portland cement mixes.
2. Masonry cement mixes.
3. Portland and masonry cement mixes.
4. Plastic cement mixes.
5. Portland and plastic cement mixes.

E. Plaster Finish Coats: Apply to provide finish to match Architect's sample.

F. Acrylic-Based Finish Coatings: Apply coating system, including primers, finish coats, and sealing topcoats, according to manufacturer's written instructions.

G. Concealed Interior Plasterwork:

1. Where plaster application will be concealed behind built-in cabinets, similar furnishings, and equipment, apply finish coat.
2. Where plaster application will be concealed above suspended ceilings and in similar locations, finish coat may be omitted.
3. Where plaster application will be used as a base for adhesive application of tile and similar finishes, omit finish coat.

## 3.5 PLASTER REPAIRS

A. Repair or replace work to eliminate cracks, dents, blisters, buckles, crazing and check cracking, dry outs, efflorescence, sweat outs, and similar defects and where bond to substrate has failed.

END OF SECTION 092400

**SECTION 092900**

**GYPSUM BOARD**

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 ACTION SUBMITTALS

A. Product Data: For each type of product.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Fire-Resistance-Rated Assemblies: For fire-resistance-rated assemblies, provide materials and construction identical to those tested in assembly indicated according to ASTM E 119 by an independent testing agency.

B. STC-Rated Assemblies: For STC-rated assemblies, provide materials and construction identical to those tested in assembly indicated according to ASTM E 90 and classified according to ASTM E 413 by an independent testing agency.

C. Low Emitting Materials: For ceiling and wall assemblies, provide materials and construction identical to those tested in assembly and complying with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

2.2 GYPSUM BOARD, GENERAL

A. Recycled Content of Gypsum Panel Products: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 25 percent.

2.3 GYPSUM BOARD

A. Gypsum Ceiling Board: ASTM C 1396/C 1396M.

1. Thickness: 1/2 inch (12.7 mm).
2. Long Edges: Tapered.

B. Moisture- and Mold-Resistant Gypsum Board: ASTM C 1396/C 1396M. With moisture- and mold-resistant core and paper surfaces.

1. Core: 1/2 inch (12.7 mm), regular type.
2. Long Edges: Tapered.
3. Mold Resistance: ASTM D 3273, score of 10.

C. Impact Gypsum Board: ASTM C 1396/C 1396M. For drywall assembly

1. Core: 16 / 19 mm.
2. Long Edges: Tapered.

D. Perforated Gypsum Board: ASTM C 1396/C 1396 M. Absorptive perforated gypsum board

1. Core: 1/2 inch (12.7 mm), regular type.
2. Long Edges: Tapered.
3. NRC: up to 0.70
4. Dimensions: 1200 X 2400mm

## 2.4 TRIM ACCESSORIES

A. Interior Trim: ASTM C 1047.

1. Shapes:
   a. Cornerbead: Paper faced metal B1 super wide
   b. LC-Bead: J-shaped long flange receives joint compiund: Paper faced metal B9J
   c. Control joint: Zinc control joint No. 093
   d. Curved-edge cornerbead: With notched or flexible flanges
   e. Bullnose inside corner: Paper faced metal SLIC

B. Aluminum Trim: ASTM B 221 (ASTM B 221M), Alloy 6063-T5.

## 2.5 JOINT TREATMENT MATERIALS

A. General: Comply with ASTM C 475/C 475M.

B. Joint Tape:

1. Interior Gypsum Board: Paper.
2. Exterior Gypsum Soffit Board: Paper.

C. Joint Compound for Interior Gypsum Board: For each coat use formulation that is compatible with other compounds applied on previous or for successive coats.

1. Prefilling: At open joints beveled panel edges, and damaged surface areas, use setting-type taping compound.
2. Embedding and First Coat: For embedding tape and first coat on joints, fasteners, and trim flanges, use setting-type taping compound.
   a. Use setting-type compound for installing paper-faced metal trim accessories
3. Fill Coat: For second coat, use setting type, sandable topping compound
4. Finish Coat: For third coat, use setting-type, sandable topping compound
5. Skim coat: For final coat of Level 5 finish, use setting-type, sandable topping compound or drying-type, all purpose compound.

D. Joint Compound for Exterior Applications:

1. Exterior Gypsum Soffit Board: Use setting-type taping compound and setting type, sandable topping compound.

## 2.6 AUXILIARY MATERIALS

A. General: Provide auxiliary materials that comply with referenced installation standards and manufacturer's written recommendations.

B. Steel Drill Screws: ASTM C 1002, unless otherwise indicated.

C. Sound Attenuation Blankets: ASTM C 665, Type I (blankets without membrane facing).

1. Recycled Content of Blankets: Postconsumer recycled content plus one-half of preconsumer recycled content not less than <Insert number> percent.

D. Acoustical Joint Sealant: ASTM C 834. Product effectively reduces airborne sound transmission through perimeter joints and openings as demonstrated by testing according to ASTM E 90. As specified in Division 07 Section "Joint Sealants".

## 2.7 NON-LOADBEARING STEEL FRAMING AND ACCESSORIES

A. All metal framing must be gauge indicated or heavier. "Equivalent" gauge is not acceptable.

B. Provide metal framing materials in accordance with ASTM C 645 and C 754. Verify limiting heights and gauges of members of wall system with manufacturer's data and increase gauge if required. Use L/240 for gypsum board. Metal framing shall be 25% recycled material.

C. Steel Studs: G40 (G60 where subject to moisture), galvanized steel, 20 gauge structural, minimum 0.0329 inch uncoated steel thickness, sizes as noted on drawings.

D. Steel Furring Members: Galvanized steel, G40 (G60 where subject to moisture), stud, or Type DWC (hat-shaped), 25 gauge, minimum 0.0179 inch uncoated steel thickness or 20 gauge, minimum 0.0296 inch uncoated steel thickness as required, Type Unimast Z, 24 gauge, or cold-rolled channel, 16 gauge of sizes indicated on Drawings or as required structurally.

E. Fasteners and Anchorages: ASTM C 1002 as recommended by manufacturer and as required for loads. Exception: Use only low-profile head screws for steel-to-steel fasteners.

F. Adjustable Furring Brackets: 20 gauge galvanized steel.

G. Blocking: 20 gauge steel stud sections and/or 16 gauge cold rolled steel plate and/or lumber, width to suit specific requirements as specified herein in PART 3- EXECUTION.

H. Metal Angles: Sized as indicated on drawings, galvanized steel, 24 gauge.

I. Cold Rolled Channels: 16 gauge in 3/4 inch and 11/2 inch sizes, G40 (G60 where subject to moisture).

J. Resilient Channels: One leg 1/2 inch deep members, design thickness 0.0188 inch designed to reduce sound transmission.

PART 3 - EXECUTION

3.1 APPLYING AND FINISHING PANELS

A. Comply with ASTM C 840.

B. Examine panels before installation. Reject panels that are wet, moisture damaged, and mold damaged.

C. Isolate perimeter of gypsum board applied to non-load-bearing partitions at structural abutments, except floors. Provide 1/4- to 1/2-inch- (6.4- to 12.7-mm-) wide spaces at these locations and trim edges with edge trim where edges of panels are exposed. Seal joints between edges and abutting structural surfaces with acoustical sealant.

D. Install trim with back flanges intended for fasteners, attach to framing with same fasteners used for panels. Otherwise, attach trim according to manufacturer's written instructions.

1. Aluminum Trim: Install in locations indicated on Drawings.
2. Control Joints: Install control joints according to ASTM C 840 and in specific locations approved by Architect for visual effect.

E. Prefill open joints and damaged surface areas.

F. Apply joint tape over gypsum board joints, except for trim products specifically indicated as not intended to receive tape.

G. Gypsum Board Finish Levels: Finish panels to levels according to ASTM C 840:

H. Protect adjacent surfaces from drywall compound and texture finishes and promptly remove from floors and other non-drywall surfaces. Repair surfaces stained, marred, or otherwise damaged during drywall application.

I. Remove and replace panels that are wet, moisture damaged, and mold damaged.

END OF SECTION 092900

**SECTION 093000**

**TILING**

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Homogeneous Polished and Unpolished Tiles
2. Waffle-type Non-skid Cement-based tiles
3. Waterproof membrane.
4. Metal edge strips.

1.2 ACTION SUBMITTALS

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

B. Samples:

1. Each type and composition of tile and for each color and finish required.
2. Assembled samples, with grouted joints, for each type and composition of tile and for each color and finish required.

1.3 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials that match and are from same production runs as products installed and that are packaged with protective covering and identified with labels describing contents.

1. Tile and Trim Units: Furnish quantity of full-size units equal to 3 percent of amount installed for each type, composition, color, pattern, and size indicated.

1.4 QUALITY ASSURANCE

A. Mockups: Build mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.

1. Build mockup of each type of floor tile installation.
2. Build mockup of each type of wall tile installation.
3. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

PART 2 - PRODUCTS

2.1 TILE PRODUCTS

A. ANSI Ceramic Tile Standard: Provide Standard grade tile that complies with ANSI A137.1 for types, compositions, and other characteristics indicated.

B. FloorScore Compliance: Tile for floors shall comply with requirements of FloorScore Standard.

C. Low-Emitting Materials: Tile flooring systems shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

D. Homogeneous Slip Resistant Floor tiles
1. Module Size: 600x1200mm <F-9>
2. Module Size: 600x600mm <F-10>
3. Thickness: 12mm
4. Finish: As selected by Architect from manufacturer's full range
5. Tile Color and Pattern: As selected by Architect from manufacturer's full range
6. Grout Color: As selected by Architect from manufacturer's full range

E. Homogeneous Slip Resistant Floor tiles
1. Module Size: 300x600mm <F-11>
2. Module Size: 300x300mm <F-12>
3. Thickness: 10mm
4. Finish: As selected by Architect from manufacturer's full range
5. Tile Color and Pattern: As selected by Architect from manufacturer's full range
6. Grout Color: As selected by Architect from manufacturer's full range

F. Homogeneous Polished Wall tiles
1. Module Size: 600x1200mm <W-8>
2. Thickness: 12 mm.
3. Face: Pattern of design indicated
4. Finish: As selected by Architect from manufacturer's full range
5. Tile Color and Pattern: As selected by Architect from manufacturer's full range
6. Grout Color: As selected by Architect from manufacturer's full range

G. Homogeneous Polished Wall tiles
1. Module Size: 300x300mm <W-6>
2. Module Size: 300x600mm <W-7>
3. Thickness: 10 mm.
4. Face: Pattern of design indicated
5. Finish: As selected by Architect from manufacturer's full range
6. Tile Color and Pattern: As selected by Architect from manufacturer's full range
7. Grout Color: As selected by Architect from manufacturer's full range

## 2.2 THRESHOLDS

A. General: Fabricate to sizes and profiles indicated or required to provide transition between adjacent floor finishes.

1. Bevel edges at 1:2 slope, with lower edge of bevel aligned with or up to 1/16 inch (1.5 mm) above adjacent floor surface. Finish bevel to match top surface of threshold. Limit height of threshold to 1/2 inch (12.7 mm) or less above adjacent floor surface.

## 2.3 WATERPROOF MEMBRANE

A. General: Refer to Division 07 Thermal and Moisture Protection Section

2.4 SETTING MATERIALS

A. Portland Cement Mortar (Thickset) Installation Materials: ANSI A108.02.

B. Dry-Set Portland Cement Mortar (Thin Set): ANSI A118.1.

1. For wall applications, provide nonsagging mortar.

C. Latex-Portland Cement Mortar (Thin Set): ANSI A118.4.

1. Prepackaged, dry-mortar mix to which only water must be added.
2. Prepackaged, dry-mortar mix combined with liquid-latex additive.
3. For wall applications, provide nonsagging mortar.

2.5 GROUT MATERIALS

A. Sand-Portland Cement Grout: ANSI A108.10.

B. Standard Cement Grout: ANSI A118.6.

C. Polymer-Modified Tile Grout: ANSI A118.7.

1. Polymer Type: Dry, redispersible form, prepackaged with other dry ingredients.
2. Polymer Type: Liquid-latex form for addition to prepackaged dry-grout mix.

D. Water-Cleanable Epoxy Grout: ANSI A118.3[, with a VOC content of 65 g/L or less when calculated according to 40 CFR 59, Subpart D].

E. Grout for Pregrouted Tile Sheets: Same product used in factory to pregrout tile sheets.

2.6 ELASTOMERIC SEALANTS

A. General: Provide sealants, primers, backer rods, and other sealant accessories that comply with the following requirements and with the applicable requirements in Division 07 Section "Joint Sealants."

1. Sealants shall have a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
2. Sealants shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

B. One-Part, Mildew-Resistant Silicone Sealant: ASTM C 920; Type S; Grade NS; Class 25; Uses NT, G, A, and, as applicable to nonporous joint substrates indicated, O; formulated with fungicide, intended for sealing interior ceramic tile joints and other nonporous substrates that are subject to in-service exposures of high humidity and extreme temperatures.

C. Multipart, Pourable Urethane Sealant for Use T: ASTM C 920; Type M; Grade P; Class 25; Uses T, M, A, and, as applicable to joint substrates indicated, O.

2.7 MISCELLANEOUS MATERIALS

A. Trowelable Underlayments and Patching Compounds: Latex-modified, portland cement-based formulation provided or approved by manufacturer of tile-setting materials for installations indicated.

B. Metal Edge Strips: Angle or L-shape, stainless steel, ASTM A 666, 300 Series exposed-edge material.

C. Grout Sealer: Manufacturer's standard silicone product for sealing grout joints and that does not change color or appearance of grout.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

A. Examine substrates, areas, and conditions where tile will be installed, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of installed tile.

1. Verify that substrates for setting tile are firm, dry, clean, free of coatings that are incompatible with tile-setting materials including curing compounds and other substances that contain soap, wax, oil, or silicone; and comply with flatness tolerances required by ANSI A108.01 for installations indicated.

### 3.2 PREPARATION

A. Fill cracks, holes, and depressions in concrete substrates for tile floors installed with adhesives with trowelable leveling and patching compound specifically recommended by tile-setting material manufacturer.

B. Where indicated, prepare substrates to receive waterproofing by applying a reinforced mortar bed that complies with ANSI A108.1A and is sloped 1/4 inch per foot (1:50) toward drains.

C. Blending: For tile exhibiting color variations, use factory blended tile or blend tiles at Project site before installing.

D. Field-Applied Temporary Protective Coating: If indicated under tile type or needed to prevent grout from staining or adhering to exposed tile surfaces, precoat them with continuous film of temporary protective coating, taking care not to coat unexposed tile surfaces.

### 3.3 INSTALLATION

A. Comply with TCA's "Handbook for Ceramic Tile Installation" for TCA installation methods specified in tile installation schedules. Comply with parts of the ANSI A108 Series "Specifications for Installation of Ceramic Tile" that are referenced in TCA installation methods, specified in tile installation schedules, and apply to types of setting and grouting materials used.

1. For the following installations, follow procedures in the ANSI A108 Series of tile installation standards for providing 95 percent mortar coverage:

a. All floor tiles.
b. All non-skid cement-based tiles.

B. Extend tile work into recesses and under or behind equipment and fixtures to form complete covering without interruptions unless otherwise indicated. Terminate work neatly at obstructions, edges, and corners without disrupting pattern or joint alignments.

C. Accurately form intersections and returns. Perform cutting and drilling of tile without marring visible surfaces. Carefully grind cut edges of tile abutting trim, finish, or built-in items for straight aligned joints. Fit tile closely to electrical outlets, piping, fixtures, and other penetrations so plates, collars, or covers overlap tile.

D. Provide manufacturer's standard trim shapes where necessary to eliminate exposed tile edges.

E. Jointing Pattern: Lay tile in grid pattern unless otherwise indicated. Lay out tile work and center tile fields in both directions in each space or on each wall area. Lay out tile work to minimize the use of pieces that are less than half of a tile. Provide uniform joint widths unless otherwise indicated.

F. Joint Widths: Unless otherwise indicated, install tile with the following joint widths:

1. Ceramic Mosaic Tile: 1/16 inch (1.6 mm).
2. Glazed Wall Tile: 1/16 inch (1.6 mm).

G. Expansion Joints: Provide expansion joints and other sealant-filled joints, including control, contraction, and isolation joints, where indicated. Form joints during installation of setting materials, mortar beds, and tile. Do not saw-cut joints after installing tiles.

1. Where joints occur in concrete substrates, locate joints in tile surfaces directly above them.
2. Prepare joints and apply sealants to comply with requirements in Division 07 Section "Joint Sealants."

H. Metal Edge Strips: Install at locations indicated.

I. Grout Sealer: Apply grout sealer to cementitious grout joints in tile floors according to grout-sealer manufacturer's written instructions. As soon as grout sealer has penetrated grout joints, remove excess sealer and sealer from tile faces by wiping with soft cloth.

J. Install waterproofing to comply with ANSI A108.13 and manufacturer's written instructions to produce waterproof membrane of uniform thickness and bonded securely to substrate.

END OF SECTION 093000

**SECTION 095123**

**ACOUSTIC TILE CEILING**

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes acoustical panels and exposed suspension systems for ceilings.

1.2 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site

1.3 SUBMITTALS

A. Product Data: For each type of product.

B. Samples: For each exposed product and for each color and texture specified.

1.4 INFORMATIONAL SUBMITTALS

A. Product test reports.

B. Evaluation reports.

C. Field quality-control reports.

1.5 CLOSEOUT SUBMITTALS

A. Maintenance data.

1.6 QUALITY ASSURANCE

A. Testing Agency Qualifications: Qualified according to NVLAP.

B. Mockups: Build mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.

1. Build mockup of typical ceiling area as shown on Drawings.
2. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Seismic Performance: Acoustical ceiling shall withstand the effects of earthquake motions determined according to ASCE/SEI 7

B. Surface-Burning Characteristics: Comply with ASTM E 84; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

1. Flame-Spread Index: Comply with ASTM E 1264 for Class A materials.
2. Smoke-Developed Index: 450 or less.

2.2 ACOUSTICAL PANEL CEILINGS, GENERAL

A. Glass-Fiber-Based Panels: Made with binder containing no urea formaldehyde.

B. Acoustical Panel Standard: Comply with ASTM E 1264.

C. Metal Suspension System Standard: Comply with ASTM C 635.

D. Attachment Devices: Size for five times the design load indicated in ASTM C 635, Table 1, "Direct Hung," unless otherwise indicated. Comply with seismic design requirements.

2.3 ACOUSTICAL PANELS ACT 1

A. Color: As indicated on Drawings

B. LR: .90

C. NRC: 0.70, Type E-400 mounting according to ASTM E 795.

D. CAC: 35

E. AC: N/A

F. Edge/Joint Detail: Beveled Tegular

G. Thickness: 9/16 inch (15 mm)

H. Modular Size: As indicated on Drawings

2.4 SUSPENSION SYSTEM 1

2.5 METAL SUSPENSION SYSTEM 1

1. For use with ACT 1 refer to drawings

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B. Narrow-Face, Capped, Double-Web, Steel Suspension System: Main and cross runners roll formed from cold-rolled steel sheet; prepainted, electrolytically zinc coated, or hot-dip galvanized according to

ASTM A 653/A 653M, not less than G30 (Z90) coating designation; with prefinished 9/16-inch- (15-mm-) wide metal caps on flanges.

1. Structural Classification: Heavy-duty system.
2. End Condition of Cross Runners: Override (stepped) type.
3. Face Design: Flat, flush
4. Cap Material: Steel cold-rolled sheet.
5. Cap Finish: Painted white

C. Roll-Formed, Sheet-Metal Edge Moldings and Trim: Type and profile indicated or, if not indicated, manufacturer's standard moldings for edges and penetrations that comply with seismic design requirements; formed from sheet metal of same material, finish, and color as that used for exposed flanges of suspension-system runners.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

A. Install acoustical panel ceilings to comply with ASTM C 636/C 636M and seismic design requirements indicated, according to manufacturer's written instructions and CISCA's "Ceiling Systems Handbook."

B. Measure each ceiling area and establish layout of acoustical panels to balance border widths at opposite edges of each ceiling. Avoid using less-than-half-width panels at borders, and comply with layout shown on reflected ceiling plans.

1. Arrange directionally patterned acoustical panels as indicated on reflected ceiling plans.

END OF SECTION 095113

**SECTION 095133**

**ACOUSTICAL METAL PAN CEILING**

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes snap-in (clip-in) acoustical metal pans and the following suspension system for ceilings:

1. Direct-hung, concealed grid designed to support metal pans.

1.2 ACTION SUBMITTALS

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

B. Samples: For each exposed finish.

1.3 INFORMATIONAL SUBMITTALS

A. Coordination Drawings: Drawn to scale and coordinating and showing the following:

1. Ceiling suspension members.
2. Method of attaching hangers to building structure.
3. Ceiling-mounted items.
4. Ceiling perimeter and penetrations through the ceiling; and trim and moldings.

B. Product test reports.

C. Evaluation reports.

1.4 CLOSEOUT SUBMITTALS

A. Maintenance data.

1.5 QUALITY ASSURANCE

A. Acoustical Testing Agency Qualifications: An independent testing laboratory or an NVLAP-accredited laboratory.

B. Surface-Burning Characteristics: Complying with ASTM E 1264 for Class A materials as determined by testing identical products according to ASTM E 84 by UL or another testing and inspecting agency acceptable to authorities having jurisdiction.

C. Seismic Standard: Comply with the following:

1. Standard for Ceiling Suspension Systems Requiring Seismic Restraint: Comply with ASTM E 580.
2. CISCA's Recommendations for Acoustical Ceilings: Comply with CISCA's "Recommendations for Direct-Hung Acoustical Tile and Lay-in Panel Ceilings - Seismic Zones 0-2."
3. CISCA's Guidelines for Systems Requiring Seismic Restraint: Comply with CISCA's "Guidelines for Seismic Restraint of Direct-Hung Suspended Ceiling Assemblies - Seismic Zones 3 & 4."
4. UBC Standard 25-2, "Metal Suspension Systems for Acoustical Tile and for Lay-in Panel Ceilings."
5. SEI/ASCE 7, "Minimum Design Loads for Buildings and Other Structures": Section 9, "Earthquake Loads."
6. National Structural Code of the Philippines
7. National Building Code of the Philippines

D. Mockups: Build mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.

1. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

E. Preinstallation Conference: Conduct conference at Project site.

## PART 2 - PRODUCTS

### 2.1 ACOUSTICAL METAL CEILING PANS

A. Low-Emitting Materials: Acoustical metal pan ceilings shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

B. Acoustical Metal Pan Standard: Provide manufacturer's standard acoustical metal pans of configuration indicated that comply with ASTM E 1264.

1. Mounting Method for Measuring NRC: Type E-400.

C. Sheet Metal Characteristics: For metal components exposed to view in the completed Work, provide materials with smooth, flat surfaces without blemishes. Do not use materials with exposed pitting, seam marks, roller marks, roughness, stains, or discolorations.

1. Aluminum Sheet: Roll-formed aluminum sheet, complying with ASTM B 209 (ASTM B 209M); alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated.

D. Sound-Absorbent Fabric Layer: Sized to fit concealed surface of pan, bonded to pan in the factory with manufacturer's standard nonflammable adhesive, and consisting of black, nonwoven, nonflammable, sound-absorbent material with surface-burning characteristics for flame-spread index of 25 or less and smoke-developed index of 50 or less, as determined by testing per ASTM E 84.

### 2.2 ALUMINUM PANS FOR ACOUSTICAL METAL PAN CEILING (Designated as C-7 in the Schedule of Finishes)

A. Aluminum Metal Pans:

1. Product: Tiles Clip-In 4.2mm

B. Classification: Units complying with ASTM E 1264 for Type VII, perforated aluminum facing (pan) with mineral- or glass-fiber-base backing, Type XX, other types described as perforated aluminum facing (pan) units with sound-absorbent fabric backing, Type XX, other types described as unperforated aluminum facing (pan) units.

1. Pattern: D1522 or R2516 subject to Architect approval.

C. Pan Fabrication: Manufacturer's standard units of size, profile, and edge treatment indicated, formed from metal indicated and finished to comply with requirements indicated.
1. Clip-in Pans: Designed to clip-in and be securely retained in exposed suspension grid by formed edges or accessory clips.

D. Pan Thickness: Not less than 0.025 inch (0.6 mm)

E. Pan Edge Detail: Beveled

F. Pan Joint Detail: Butt

G. Pan Size: 600 x 600 mm

H. Pan Face Finish: Polyester Powder-coated aluminum (minimum 60 microns)

I. LR: Not less than 0.70-0.75

J. NRC: Not less than 0.70

## 2.3 METAL SUSPENSION SYSTEMS

A. Metal Suspension System Standard: Provide manufacturer's standard metal suspension systems of types, structural classifications, and finishes indicated that comply with applicable ASTM C 635 requirements.

B. Attachment Devices: Size for five times the design load indicated in ASTM C 635, Table 1, "Direct Hung," unless otherwise indicated. Comply with seismic design requirements.

1. Post installed Expansion Anchors: With capability to sustain, without failure, a load equal to five (5) times that imposed by ceiling construction, as determined by testing per ASTM E 488 or ASTM E 1512 as applicable, conducted by a qualified testing and inspecting agency.
2. Power-Actuated Fasteners: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with clips or other accessory devices for attaching hangers of type indicated, and with capability to sustain, without failure, a load equal to ten (10) times that imposed by ceiling construction, as determined by testing per ASTM E 1190, conducted by a qualified testing and inspecting agency.

C. Wire Hangers, Braces, and Ties: Zinc-coated carbon-steel wire; ASTM A 641/A 641M, Class 1 zinc coating, soft temper.

1. Size: Yield stress of wire to exceed 3 times the hanger design load (ASTM C 635, Table 1, Direct Hung), but not less than 0.106-inch- (2.69-mm-) diameter wire.

D. Seismic stabilizer bars.

E. Seismic struts.

F. Seismic clips.

G. Hold-Down Clips: Manufacturer's standard hold-down clips spaced to secure acoustical metal pans in place to molding and trim at perimeter at each pan.

H. Edge Moldings and Trim: As required to comply with seismic requirements of authorities having jurisdiction, to conceal edges of and penetrations through ceiling, to conceal edges of pans and runners, for fixture trim and adapters, for fasciae at changes in ceiling height, and for other conditions; of metal and finish matching acoustical metal pan ceiling units, unless otherwise indicated.

## 2.4 METAL SUSPENSION SYSTEM FOR ACOUSTICAL SNAP-IN METAL PAN CEILING

A. Indirect-Hung, Snap-Bar System: Manufactured standard, designed to support metal pans that snap into main runners, consisting of main runners connected to carrying channels that are attached by hangers to building structure.

B. Access Panels: For access at locations indicated.

## 2.5 ALUMINUM FINISHES

A. Color-Coated Finish: Manufacturer's standard powder-coat.

B. Bright-Reflective Finish: Manufacturer's standard chemical/mechanical bright-reflective metallic finish free of blisters, pits, roughness, nodules, burning, cracks, unfinished areas, and other visible defects.

# PART 3 - EXECUTION

## 3.1 INSTALLATION

A. Comply with ASTM C 636 and UBC Standard 25-2 and seismic requirements indicated, per manufacturer's written instructions and CISCA's "Ceiling Systems Handbook."

B. Suspend ceiling hangers from building's structural members, plumb and free from contact with insulation or other objects within ceiling plenum. Splay hangers only where required to miss obstructions; offset resulting horizontal forces by bracing, countersplaying, or other equally effective means. Where width of ducts and other construction within ceiling plenum produces hanger spacings that interfere with location of hangers, use trapezes or equivalent devices. When steel framing does not permit installation of hanger wires at spacing required, install carrying channels or other supplemental support for attachment of hanger wires.

1. Do not support ceilings directly from permanent metal forms or floor deck; anchor into concrete slabs.
2. Do not attach hangers to steel deck tabs or to steel roof deck.

C. Install edge moldings and trim of type indicated at perimeter of each suspended decorative grid and where necessary to conceal edges of grids. Screw attach moldings to substrate at intervals not more than 16 inches (400 mm) o.c. and not more than 3 inches (75 mm) from ends, leveling with ceiling suspension system to a tolerance of 1/8 inch in 12 feet (3.2 mm in 3.6 m). Miter corners accurately and connect securely.

D. Install suspension system runners so they are square and securely interlocked with one another. Remove and replace dented, bent, or kinked members.

E. Cut acoustical metal pan units for accurate fit at borders and at interruptions and penetrations by other work through ceilings. Stiffen edges of cut units as required to eliminate evidence of buckling or variations in flatness exceeding referenced standards for stretcher-leveled metal sheet.

F. Install acoustical metal pans in coordination with suspension system and exposed moldings and trim.

1. Install sound-absorbent fabric layers in perforated metal pans.

END OF SECTION 095133

**SECTION 095423**

**LINEAR METAL CEILINGS**

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes strip linear metal pans and suspension systems for ceilings.

1.2 ACTION SUBMITTALS

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

B. Samples: For each exposed finish.

1.3 INFORMATIONAL SUBMITTALS

A. Coordination Drawings: Drawn to scale and coordinating and showing the following:

1. Linear pattern.
2. Joint pattern.
3. Ceiling suspension members.
4. Method of attaching hangers to building structure.
5. Ceiling-mounted items.
6. Ceiling perimeter and penetrations through ceiling; trim and moldings.

B. Product test reports.

C. Evaluation reports.

1.4 CLOSEOUT SUBMITTALS

A. Maintenance data.

1.5 QUALITY ASSURANCE

A. Acoustical Testing Agency Qualifications: An independent testing laboratory or an NVLAP-accredited laboratory.

B. Surface-Burning Characteristics: Complying with ASTM E 1264 for Class A materials, as determined by testing identical products according to ASTM E 84 by UL or another testing and inspecting agency acceptable to authorities having jurisdiction.

C. Seismic Standard: Comply with the following:

1. Standard for Ceiling Suspension Systems Requiring Seismic Restraint: Comply with ASTM E 580.

2. CISCA's Recommendations for Acoustical Ceilings: Comply with CISCA's "Recommendations for Direct-Hung Acoustical Tile and Lay-in Panel Ceilings - Seismic Zones 0-2."
3. CISCA's Guidelines for Systems Requiring Seismic Restraint: Comply with CISCA's "Guidelines for Seismic Restraint of Direct-Hung Suspended Ceiling Assemblies - Seismic Zones 3 & 4."
4. UBC Standard 25-2, "Metal Suspension Systems for Acoustical Tile and for Lay-in Panel Ceilings."
5. SEI/ASCE 7, "Minimum Design Loads for Buildings and Other Structures": Section 9, "Earthquake Loads."
6. National Structural Code of the Philippines

D. Mockups: Build mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.

1. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

E. Preinstallation Conference: Conduct conference at Project Site.

## PART 2 - PRODUCTS

### 2.1 LINEAR METAL CEILING SPANDREL <C-8>

A. Metal Pan Standard: Provide manufacturer's standard linear metal pans of configuration indicated that comply with ASTM E 1264.

1. Mounting Method for Measuring NRC: Type E-400.

B. Sheet Metal Characteristics: For metal components exposed to view in the completed Work, provide materials with smooth, flat surfaces without blemishes. Do not use materials with exposed pitting, seam marks, roller marks, roughness, stains, or discolorations.

1. Aluminum Sheet: Roll-formed aluminum sheet, complying with ASTM B 209 (ASTM B 209M); alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated.
2. Steel Sheet: Commercial-quality, cold-rolled, carbon-steel sheet; stretcher leveled and ASTM A 591/A 591M, 40Z (12G) coating for painted finish ASTM A 1008/A 1008M for electroplating; with protective coating complying with ASTM C 635 and recommended by finisher for finish indicated.

C. Pan Fabrication: Manufacturer's standard units formed from metal indicated to snap on and be securely retained on carriers without separate fasteners and finished to comply with requirements indicated.

D. Pan Splices: Construction same as pans, in lengths 8 to 12 inches (200 to 300 mm); with manufacturer's standard finish.

E. End Caps: Manufacturer's standard material fabricated to fit and conceal exposed ends of pans.

F. Filler Strips: Manufacturer's standard material; fabricated to uninterruptedly close voids between pans.

G. Moldings and Trim: Provide manufacturer's standard moldings and trim for exposed members, and as indicated or required, for edges and penetrations of ceiling, around fixtures, at changes in ceiling height, and for other conditions; of same metal and finish as linear metal ceiling pans.

H. Sound-Absorbent Fabric Layer: Sized to fit concealed surface of pan, bonded to pan in the factory with manufacturer's standard nonflammable adhesive, and consisting of black, nonwoven, nonflammable, sound-absorbent material with surface-burning characteristics for flame-spread index of 25 or less and smoke-developed index of 50 or less, as determined by testing per ASTM E 84.

I. Sound-Absorbent Pads: Plastic sheet-wrapped glass-fiber insulation complying with ASTM C 553, width and length to completely fill between carriers, joined at center of panel, with surface-burning characteristics for flame-spread index of 25 or less and smoke-developed index of 50 or less, as determined by testing per ASTM E 84.

## 2.2 METAL SUSPENSION SYSTEMS

A. Metal Suspension Systems Standard: Provide ceiling manufacturer's standard metal suspension systems of types and finishes indicated that comply with applicable ASTM C 635 requirements.

B. Attachment Devices: Size for five times the design load indicated in ASTM C 635, Table 1, Direct Hung, unless otherwise indicated.

1. Postinstalled expansion Anchors: With capability to sustain, without failure, a load equal to five (5) times that imposed by ceiling construction, as determined by testing per ASTM E 488 or ASTM E 1512 as applicable, conducted by a qualified testing and inspecting agency.

    a. Corrosion Protection: Zinc-plated steel, ASTM B 633, Class Fe/Zn 5 (0.005 mm) for Class SC

2. Power-Actuated Fasteners: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with clips or other accessory devices for attaching hangers of type indicated, and with capability to sustain, without failure, a load equal to ten 10 times that imposed by ceiling construction, as determined by testing per ASTM E 1190, conducted by a qualified testing and inspecting agency.

C. Wire Hangers, Braces, and Ties: Zinc-coated carbon-steel wire; ASTM A 641/A 641M, Class 1 zinc coating, soft temper.

1. Size: Yield stress of wire to exceed 3 times the hanger design load (ASTM C 635, Table 1, Direct Hung), but not less than 0.106-inch- (2.69-mm-) diameter wire.

D. Carriers: Factory finished

1. Main Carriers: Aluminum, not less than 0.240-inch (6.0-mm) rolled sheet, alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated, complying with ASTM B 209 (ASTM B 209M).
2. Main Carriers: Steel, not less than 0.0209-inch (0.53-mm) nominal thickness, cold-rolled sheet, with factory-applied protective coating, complying with ASTM C 635.
3. Carriers: Manufacturer's standard.

E. Carrier Splices: Same metal, profile, and finish as indicated for carriers.

F. Stabilizer Channels, Tees, and Bars: Manufacturer's standard components for stabilizing main carriers at regular intervals; spaced as standard with manufacturer for use indicated; and factory finished with matte-black baked finish.

G. Seismic Struts: Manufacturer's standard.

H. Edge Moldings and Trim: As indicated or required to comply with seismic requirements of authorities having jurisdiction, to conceal edges of penetrations through ceiling, to conceal ends of pans and carriers, for fixture trim and adapters, for fasciae at changes in ceiling height, and for other conditions; of metal and finish matching linear metal pans or extruded plastic unless otherwise indicated.

2.3 ALUMINUM PANS AND SUSPENSION SYSTEM FOR LINEAR METAL CEILING

A. Aluminum Pans and Suspension System:

B. Classification: Units complying with ASTM E 1264 for Form 2, unperforated

C. Pan Thickness: Not less than 0.032 inch (0.8 mm).

D. Pan Edge Detail: Beveled

E. Linear Module Width and Pan Face Width: 8-inch (203-mm) module width and 7-1/4-inch (184-mm) face width

F. Pan Depth: 3/4 inch (19 mm) deep

G. Pan Face Finish: High-performance organic coating in color selected from manufacturer's full range

H. End Cap, Finish of Exposed Portions: To match pan

I. Filler Strip Design: Recessed

J. Filler Strip, Finish of Exposed Portions: To match pan.

K. LR: Not less than 0.70

L. NRC: Not less than 0.65

M. Suspension-System Main-Carrier Material: Aluminum or Manufacturer's standard material and protective finish.

2.4 ALUMINUM FINISHES

A. High-Performance Organic Finish: 2-coat fluoropolymer finish complying with [AAMA 2604] [AAMA 2605] and containing not less than 70 percent PVDF resin by weight.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Comply with [ASTM C 636] [UBC Standard 25-2] and seismic requirement indicated, per manufacturer's written instructions and CISCA's "Ceiling Systems Handbook."

B. Suspend ceiling hangers from building's structural members, plumb and free from contact with insulation or other objects within ceiling plenum. Splay hangers only where required to miss obstructions; offset resulting horizontal forces by bracing, countersplaying, or other equally effective means. Where width of ducts and other construction within ceiling plenum produces hanger spacings that interfere with location of hangers, use trapezes or equivalent devices. When steel framing does not permit installation of hanger wires at spacing required, install carrying channels or other supplemental support for attachment of hanger wires.

1. Do not support ceilings directly from permanent metal forms or floor deck; anchor into concrete slabs.
2. Do not attach hangers to steel deck tabs

C. Install edge moldings and trim of type indicated at perimeter of each suspended decorative grid and where necessary to conceal edges of grids. Screw attach moldings to substrate at intervals not more than 16 inches (400 mm) o.c. and not more than 3 inches (75 mm) from ends, leveling with ceiling suspension system to a tolerance of 1/8 inch in 12 feet (3.2 mm in 3.6 m). Miter corners accurately and connect securely.

D. Install suspension system carriers so they are aligned and securely interlocked with one another. Remove and replace dented, bent, or kinked members.

E. Cut linear metal pans for accurate fit at borders and at interruptions and penetrations by other work through ceilings. Stiffen edges of cut units as required to eliminate evidence of buckling or variations in flatness exceeding referenced standards for stretcher-leveled metal sheet.

F. Install linear metal pans in coordination with suspension system and exposed moldings and trim.

1. Align joints in adjacent courses to form uniform, straight joints parallel to room axis in both directions.
2. Fit adjoining units to form flush, tight joints. Scribe and cut units for accurate fit at borders and around construction penetrating ceiling.
3. Install pans with butt joints using internal pan splices.

    a. Joint Configuration: Aligned, every other panel length

4. Where metal pan ends are visible, install end caps unless trim is indicated.
5. Install filler strips where indicated.
6. Install sound-absorbent fabric layers in perforated metal pans.
7. Install sound-absorbent pads at right angle to perforated metal pans so pads do not hang unsupported.

END OF SECTION 095423

**SECTION 096340**

**STONE FLOORING**

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. Dimension stone

1.3 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.4 ACTION SUBMITTALS

A. Product Data: For each variety of stone, stone accessory, and manufactured product.

B. Shop Drawings: Include plans, sections, details, and attachments to other work.

1. Show locations and details of joints both within stone flooring and between stone flooring and other finish materials.
2. Show direction of veining, grain, or other directional patterns.

C. Samples for Initial Selection: For joint materials involving color selection.

D. Samples for Verification:

1. For each stone type indicated, in sets of Samples not less than 300 mm square. Include at least three or more Samples in each set and show the full range of color and other visual characteristics in completed Work.
2. For each color of grout required.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For fabricator.

B. Material Test Reports:

1. Stone Test Reports: For each stone variety proposed for use on Project, by a qualified testing agency, indicating compliance with required physical properties, according to referenced ASTM standards.

1.6 CLOSEOUT SUBMITTALS

A. Maintenance Data: For stone flooring to include in maintenance manuals. Include product data for stone-care products used or recommended by Installer and names, addresses, and telephone numbers of local sources for products.

1.7 QUALITY ASSURANCE

A. Fabricator Qualifications: Shop that employs skilled workers who custom fabricate stone flooring.

B. Installer Qualifications: Fabricator of stone flooring.

C. Installer Qualifications: A firm or individual experienced in installing stone flooring similar in material, design, and extent to that indicated for this Project, whose work has a record of successful in-service performance.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Store and handle stone and related materials to prevent deterioration or damage due to moisture, temperature changes, contaminants, corrosion, breaking, chipping, and other causes.

1. Lift stone with wide-belt slings; do not use wire rope or ropes that might cause staining. Move stone, if required, using dollies with cushioned wood supports.
2. Store stone on wood A-frames or pallets with nonstaining, waterproof covers. Arrange to distribute weight evenly and to prevent damage to stone. Ventilate under covers to prevent condensation.

B. Mark stone units, on surface that is concealed after installation, with designations used on Shop Drawings to identify individual stone units. Orient markings on vertical panels so that they are right side up when units are installed.

C. Store cementitious materials on elevated platforms, under cover, and in a dry location. Do not use cementitious materials that have become damp.

1.9 FIELD CONDITIONS

A. Maintain air and material temperatures to comply with requirements of installation material manufacturers, but not less than 50 deg F (10 deg C) during installation and for seven days after completion.

B. Hot-Weather Requirements for Stone Flooring: Comply with hot-weather construction requirements contained in ACI 530.1/ASCE 6/TMS 602 and with the following:

1. Maintain temperature of materials below 100 deg F (38 deg C).
2. Do not apply mortar to substrates with temperatures of 100 deg F (38 deg C) and above.
3. When the ambient temperature exceeds 90 deg F (32 deg C), fog spray installed stone flooring until damp at least three times a day until flooring is three days old.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Source Limitations for Stone: Obtain each variety of stone, regardless of finish, from single quarry, with resources to provide materials of consistent quality in appearance and physical properties.

1. For stone types that include same list of varieties and sources, provide same variety from same source for each.
2. Make quarried blocks available for examination by Architect.
3. Make stone slabs available for examination by Architect.

a. Architect will select aesthetically acceptable slabs.
b. Segregate slabs selected for use on Project and mark backs indicating approval.

2.2 PERFORMANCE REQUIREMENTS

A. FloorScore Compliance: Stone for floors shall comply with requirements of FloorScore Standard.

B. Low-Emitting Materials: Interior stone flooring systems shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

2.3 GRANITE <F-7, F-8>

A. Material Standard: Comply with ASTM C 615.

B. Regional Materials: Granite shall be fabricated within 800 km of Project site from stone that has been extracted within 800 km of Project site.

C. Regional Materials: Granite shall be fabricated within 800 km of Project site.

D. Match Architect's samples for color, finish, and other stone characteristics relating to aesthetic effects.

2.4 MORTAR MATERIALS

A. Portland Cement: ASTM C 150, Type I or Type II. Provide natural color or white cement as required to produce mortar color indicated.

1. Low-Alkali Cement: Not more than 0.60 percent total alkali when tested according to ASTM C 114.

B. Hydrated Lime: ASTM C 207, Type S.

C. Portland Cement-Lime Mix: Packaged blend of portland cement complying with ASTM C 150, Type I or Type III, and hydrated lime complying with ASTM C 207, Type S.

D. Mortar Pigments: Natural and synthetic iron oxides and chromium oxides, compounded for use in mortar mixes and complying with ASTM C 979. Use only pigments with a record of satisfactory performance in stone masonry mortar.

E. Colored Portland Cement-Lime Mix: Packaged blend of portland cement, hydrated lime, and mortar pigments. Mix shall produce color indicated or, if not indicated, as selected from manufacturer's standard colors. Pigments shall not exceed 10 percent of portland cement by weight.

F. Aggregate: ASTM C 144; except for joints narrower than 6 mm and pointing mortar, use aggregate graded with 100 percent passing No. 16 (1.18-mm) sieve.

1. White Aggregates: Natural white sand or ground white stone.
2. Colored Aggregates: Natural-colored sand or ground marble, granite, or other durable stone; of color necessary to produce required mortar color.

G. Latex Additive: Manufacturer's standard water emulsion, serving as replacement for part of or all gaging water, of type specifically recommended by latex-additive manufacturer for use with field-mixed portland cement mortar bed, and not containing a retarder.

H. Thin-Set Mortar:

1. Dry-Set Portland Cement Mortar: ANSI A118.1, packaged.
2. Latex-Portland Cement Mortar: ANSI A118.4, consisting of the following:

a. Prepackaged Dry-Mortar Mix: Factory-prepared, packaged mixture of portland cement; dry, redispersible, ethylene vinyl acetate additive; and other ingredients to which only water needs to be added at Project site.
b. Mixture of Dry-Mortar Mix and Latex Additive: Mixture of packaged dry-mortar mix and acrylic-resin liquid-latex additive.

I. Water: Potable.

## 2.5 GROUT

A. Grout Colors: Match Architect's samples.

B. Sand-Portland Cement Grout: ANSI A108.10, composed of white or gray cement and white or colored aggregate to produce required color.

C. Standard Cement Grout: ANSI A118.6, packaged.

1. Unsanded grout mixture for joints 3 mm and narrower.
2. Sanded grout mixture for joints wider than 3 mm.

D. Polymer-Modified Cement Grout: ANSI A118.7, packaged.

1. Polymer Type: Acrylic resin, in dry, redispersible form, packaged with other dry ingredients.
2. Polymer Type: Acrylic resin in liquid-latex form for addition to packaged dry-grout mix.
3. Unsanded grout mix for joints 3 mm and narrower.
4. Sanded grout mix for joints wider than 3 mm.

E. Water-Cleanable Epoxy Grout: ANSI A118.3 packaged, chemical-resistant, water-cleanable, tile-setting and -grouting epoxy.

2.6 WATERPROOF MEMBRANES (verify with Architect and Installer recommendation)

A. General: Manufacturer's standard product, selected from the following, that complies with ANSI A118.10 and is recommended by the manufacturer for the application indicated. Include reinforcement and accessories recommended by manufacturer.

B. Chlorinated Polyethylene Sheet: Nonplasticized, chlorinated polyethylene faced on both sides with nonwoven polyester fabric; 0.76-mm nominal thickness.

C. PVC Sheet: Two layers of PVC sheet heat-fused together and to facings of nonwoven polyester; 1.01-mm nominal thickness.

D. Polyethylene Sheet: Polyethylene faced on both sides with fleece webbing; 0.203-mm nominal thickness.

E. Fabric-Reinforced, Modified-Bituminous Sheet: Self-adhering, SBS-modified-bituminous sheet with woven reinforcement facing; 1.01-mm nominal thickness.

F. Fabric-Reinforced, Fluid-Applied Membrane: System consisting of liquid-latex rubber or elastomeric polymer and continuous fabric reinforcement.

G. Fluid-Applied Membrane: Liquid-latex rubber or elastomeric polymer.

H. Latex-Portland Cement: Flexible mortar consisting of cement-based mix and latex additive.

I. Urethane Waterproofing and Tile-Setting Adhesive: One-part, liquid-applied urethane, with a VOC content of 65 g/L or less, that complies with the testing and product requirements of the Department of Health Services in a consistency suitable for trowel application and intended for use as both waterproofing and tile-setting adhesive in a two-step process.

2.7 ACCESSORIES

A. Water-Cleanable Epoxy Adhesive: ANSI A118.3 with a VOC content of 65 g/L or less.

B. Paver Pedestals: Manufacturer's standard paver support assembly, including fixed-height pedestals, shims, and spacer tabs for joint spacing of 3 mm or 5 mm.

C. Temporary Spacers: Resilient plastic, non-staining to stone, sized to suit joint thickness.

D. Cleavage Membrane: Polyethylene sheeting, ASTM D 4397, 0.1 mm thick; or unperforated asphalt felt, ASTM D 226/D 226M, Type I (No. 15).

E. Reinforcing Wire: Galvanized, welded, 1.57-mm diameter wire; 50-by-50-mm mesh; comply with ASTM A 185/A 185M and ASTM A 82/A 82M except for minimum wire size.

F. Divider Strips and Edging: Metal or combination of metal and PVC or neoprene base, designed specifically for flooring applications, in longest lengths available, and as follows:

1. Exposed-Edge Material: Stainless steel; ASTM A 666, Type 302.
2. Cross-Section Profile: Angle or L-shape, T-shape, single or two part, Straight shape.
3. Height: Match stone thickness.
4. Exposed-Edge Width: 1.6 mm, 3.2 mm, 6.4 mm, 10 mm.
5. Control-Joint Filler: Neoprene.

G. Abrasive Inserts for Stair Treads: Abrasive strips consisting of aluminum oxide, silicon carbide, or a combination of both, in an epoxy-resin binder, fabricated for installing in routed grooves of stair treads to provide slip resistance. Provide epoxy-resin installation adhesive compatible with inserts.

1. Width: 6.4 mm.
2. Depth: 12.7 mm.
3. Length: 100 mm.

H. Cork Joint Filler: Preformed strips complying with ASTM D 1752, Type II.

I. Cleaner: Stone cleaner specifically formulated for stone types, finishes, and applications indicated, as recommended by stone producer and by sealer manufacturer. Do not use cleaning compounds containing acids, caustics, harsh fillers, or abrasives.

J. Floor Sealer: Colorless, slip- and stain-resistant sealer that does not affect color or physical properties of stone surfaces, as recommended by stone producer for application indicated.

## 2.8 MORTAR AND GROUT MIXES

A. Mortar: Comply with referenced standards and with manufacturers' written instructions for mix proportions, mixing equipment, mixer speeds, mixing containers, mixing time, and other procedures needed to produce mortar of uniform quality and with optimum performance characteristics.

1. Do not use admixtures, including pigments, air-entraining agents, accelerators, retarders, water-repellent agents, antifreeze compounds, or other admixtures, unless otherwise indicated. Do not use calcium chloride.
2. Combine mortar materials and thoroughly mix in a mechanical batch mixer unless otherwise indicated. Discard mortar when it has reached initial set.
3. Mixing Pointing Mortar: Thoroughly mix cementitious and aggregate materials together before adding any water. Add only enough water to produce a damp, unworkable mix that retains its form when pressed into a ball. Maintain mortar in this dampened condition for one to two hours. Add remaining water in small portions until mortar reaches desired consistency. Use mortar within 30 minutes of final mixing; do not retemper or use partially hardened material.

B. Portland Cement-Lime Setting Mortar: ASTM C 270, Proportion Specification, Type N for interior applications and Type S for exterior applications. Use amount of water to produce a stiff mixture with a moist surface when bed is ready to receive stone.

C. Latex-Modified Portland Cement Setting Mortar: Proportion and mix portland cement, aggregate, and latex additive to comply with latex-additive manufacturer's written instructions and to produce a stiff mixture with a moist surface when bed is ready to receive stone.

D. Mortar-Bed Bond Coat: Mix neat cement and water, latex additive to a creamy consistency.

E. Cement-Paste Bond Coat: Mix either neat cement or cement and sand with water to a consistency similar to that of thick cream.

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

G. Pointing Mortar: Comply with requirements indicated above for setting mortar, including type and the following:

1. Pigmented Pointing Mortar: Select and proportion pigments with other ingredients to produce color required. Do not exceed pigment-to-cement ratio of 1:10, by weight.
2. Packaged Portland Cement-Lime Mix Mortar: Use portland cement-lime mix of selected color.
3. Colored-Aggregate Pointing Mortar: Produce color required by combining colored aggregates with portland cement of selected color.

H. Joint Grout: Comply with mixing requirements in referenced ANSI standards and with manufacturer's written instructions.

## 2.9 STONE FABRICATION

A. Select stone for intended use to prevent fabricated units from containing cracks, seams, and starts that could impair structural integrity or function.

1. Repairs that are characteristic of the varieties specified are acceptable provided they do not impair structural integrity or function and are not aesthetically unpleasing, as judged by Architect.

B. Pattern Arrangement: Fabricate and arrange stone units with veining and other natural markings to comply with the following requirements:

1. Cut stone from one block or contiguous, matched blocks in which natural markings occur.
2. Arrange units with veining as indicated on Drawings.
3. Book match adjacent units in each row and between adjacent rows.
4. Book match adjacent units in each row, and arrange units in end-slip pattern between adjacent rows.
5. Arrange units in side-slip and end-slip pattern.
6. Arrange four units adjoining center point of room in two-way book match, and arrange surrounding units in side-slip and end-slip pattern.
7. Number stone units and note numbers on Shop Drawings to designate installation location of each unit.

C. Fabricate stone thresholds in sizes and profiles as indicated or required to provide transition between adjacent floor finishes.

1. Bevel edges of thresholds at 1:2 slope, aligning lower edge of bevel with adjacent floor finish. Limit height of bevel to 13 mm or less, and finish bevel to match adjacent surfaces of threshold.
2. Where difference in floor levels exceeds 13 mm, bevel edge of threshold at 1:12 slope, aligning lower edge of bevel with adjacent floor finish. Finish bevel to match adjacent surfaces of threshold.

D. Fabricate stone stair treads in sizes and profiles indicated

E. Carefully inspect finished stone units at fabrication plant for compliance with appearance, material, and fabrication requirements. Replace defective units. Clean sawed backs of stones to remove rust stains and iron particles.

1. Grade and select stone for overall uniform appearance when assembled in place.
2. Natural variations in appearance are acceptable if installed stone units match range of colors and other appearance characteristics represented in approved Samples.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine surfaces to receive stone flooring and conditions under which stone flooring will be installed, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of stone flooring.

B. Prepare written report, endorsed by Installer, listing conditions detrimental to performance of stone flooring.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Sweep concrete substrates to remove dirt, dust, debris, and loose particles.

B. Remove substances from concrete substrates that could impair mortar bond, including curing and sealing compounds, form oil, and laitance.

C. Where indicated, prepare substrates to receive waterproofing by applying a reinforced mortar bed that complies with ANSI A108.1A and is sloped 1:50 toward drains.

D. Before setting stone, clean dirty or stained stone surfaces by removing soil, stains, and foreign materials. Clean stone by thoroughly scrubbing with fiber brushes and then drenching with clear water. Use only mild cleaning compounds that contain no caustic or harsh materials or abrasives.

3.3 INSTALLATION, GENERAL

A. Do necessary field cutting as stone is set. Cut lines straight and true and finish field-cut edges to match shop-cut edges.

1. Use power saws with diamond blades to cut stone except for stone that is specified to have rough-split edges.

B. Set stone to comply with requirements indicated. Match stone for color and pattern by using units numbered in sequence as indicated on Shop Drawings.

C. Scribe and field cut stone as necessary to fit at obstructions. Produce neat joints of size specified or indicated.

D. Provide control and expansion joints of widths and at locations indicated. Keep control and expansion joints free of mortar, grout, and other rigid materials.

3.4 INSTALLATION TOLERANCES

A. Variation in Line: For positions shown in plan for edges of flooring, ramps, steps, changes in color or finish, and continuous joint lines, do not exceed 1/8 inch in 10 feet (3 mm in 3 m), 1/4 inch in 20 feet (6 mm in 6 m), or 3/8 inch (10 mm) maximum.

B. Variation in Joint Width: Do not vary from average joint width more than plus or minus 1/16 inch (1.5 mm) or one-fourth of nominal joint width, whichever is less.

C. Variation in Surface Plane: Do not exceed 1/8 inch in 10 feet (3 mm in 3 m), 1/4 inch in 20 feet (6 mm in 6 m), or 3/8 inch (10 mm) maximum from level or slope indicated.

D. Variation in Plane between Adjacent Units (Lipping): Do not exceed 1/32-inch (0.8-mm) difference between planes of adjacent units.

## 3.5 INSTALLATION OF STONE BONDED TO CONCRETE

A. Saturate concrete with clean water several hours before placing setting bed. Remove surface water about one hour before placing setting bed.

B. Apply mortar-bed bond coat to damp concrete and broom to provide an even coating that completely covers the concrete. Do not exceed 1/16-inch (1.5-mm) thickness. Limit area of mortar-bed bond coat to avoid its drying out before placing setting bed.

1. Place reinforcing wire mesh over concrete, lapped at joints by at least one full mesh and supported so mesh becomes embedded in middle of mortar bed. Hold edges back from vertical surfaces about 1/2 inch (13 mm).

C. Apply mortar bed immediately after applying mortar-bed bond coat. Spread, tamp, and screed to uniform thickness at elevations required for setting stone to finished elevations indicated.

D. Mix and place only that amount of mortar bed that can be covered with stone before initial set. Cut back, bevel edge, and discard material that has reached initial set before stone can be placed.

E. Place stone before initial set of mortar occurs. Immediately before placing stone on setting bed, apply uniform 1/16-inch- (1.5-mm-) thick bond coat to mortar bed or to back of each stone unit.

F. Tamp and beat stone with a wooden block or rubber mallet to obtain full contact with mortar bed and to bring finished surfaces within indicated tolerances. Set each unit in a single operation before initial set of mortar; do not return to areas already set and disturb stone for purposes of realigning finished surfaces or adjusting joints.

G. Rake out joints to depth required to receive grout as units are set.

H. Point joints after setting. Fill full with mortar type and color indicated. Tool joints flat, uniform, and smooth, without visible voids.

## 3.6 INSTALLATION OF STONE OVER WATERPROOFING

A. Place cleavage membrane over substrates indicated to receive stone, lapped at least 4 inches (100 mm) at joints.

B. See waterproofing Section for installation of waterproofing and protection board.

1. Carefully place stone and setting materials over waterproofing so protection materials are not displaced and waterproofing is not punctured or otherwise damaged. Replace protection materials that become displaced and arrange for repair of damaged waterproofing before covering with stone flooring.
2. Provide cork joint filler, where indicated, at waterproofing that is turned up on vertical surfaces or, if not indicated, provide temporary filler or protection until stone flooring installation is complete.

C. Install waterproof membrane to comply with ANSI A108.13 and manufacturer's written instructions to produce waterproof membrane of uniform thickness that is bonded securely to substrate.

1. Do not install tile or setting materials over waterproofing until waterproofing has cured and been tested to determine that it is watertight.

D. Place reinforcing wire fabric over cleavage membrane, waterproofing, lapped at least one full mesh at joints and supported so mesh becomes embedded in middle of mortar bed. Hold edges back from vertical surfaces and control and expansion joints about 1/2 inch (13 mm).

E. Place mortar bed over cleavage membrane, waterproofing with reinforcing wire fabric fully embedded in middle of mortar bed. Spread, tamp, and screed to uniform thickness at elevations required for setting stone to finished elevations indicated.

F. Mix and place only that amount of mortar bed that can be covered with stone before initial set. Cut back, bevel edge, and discard material that has reached initial set before stone can be placed.

G. Place stone before initial set of mortar occurs. Immediately before placing stone on setting bed, apply uniform 1/16-inch- (1.5-mm-) thick bond coat to mortar bed or to back of each stone unit.

H. Tamp and beat stone with a wooden block or rubber mallet to obtain full contact with mortar bed and to bring finished surfaces within indicated tolerances. Set each unit in a single operation before initial set of mortar; do not return to areas already set and disturb stone for purposes of realigning finished surfaces or adjusting joints.

I. Rake out joints to depth required to receive grout as units are set.

J. Point joints after setting. Fill full with mortar type and color indicated. Tool joints flat, uniform, and smooth, without visible voids.

## 3.7 INSTALLATION OF STONE FLOORING ON PEDESTALS OVER WATERPROOFING

A. See waterproofing Section for installation of waterproofing.

B. Accurately install pedestals and other accessories to elevations required. Adjust for final level and slope with shims.

1. Fill pedestal with concrete mix, strike smooth with top of pedestal, and cure according to ACI 301.

C. Loosely lay stone flooring units on pedestals, maintaining a uniform, open joint width. Tightly seat stone units against spacers to eliminate lateral movement or drift of flooring assembly. Align joint patterns parallel in each direction.

1. Lay out stone units to avoid less than half-width units at perimeter or other terminations.

D. Install stone flooring units to not vary more than 1/16 inch (1.5 mm) in elevation between adjacent units.

## 3.8 STONE THRESHOLD INSTALLATION

A. At locations adjacent to stone flooring, install stone thresholds in same type of setting bed as abutting stone flooring unless otherwise indicated.

1. Set thresholds in thin-set, latex-portland cement mortar to comply with ANSI A108.5 at locations where mortar bed would otherwise be exposed above other adjacent flooring.

B. At locations not adjacent to stone flooring, install stone thresholds in thin-set, latex-portland cement mortar to comply with ANSI A108.5 or water-cleanable epoxy adhesive to comply with ANSI A108.4.

## 3.9 STONE STAIR TREAD INSTALLATION

A. Install stone stair treads to comply with "Installation of Stone Bonded to Concrete"

B. Install stone stair treads in thin-set, latex-portland cement mortar to comply with ANSI A108.5 or water-cleanable epoxy adhesive to comply with ANSI A108.4.

## 3.10 GROUTING

A. Grout stone joints to comply with ANSI A108.10 and with manufacturer's written instructions.

1. Do not use sanded grout for polished stone.
2. Grout joints as soon as possible after initial set of setting bed. Force grout into joints, taking care not to smear grout on adjoining stone and other surfaces. After initial set of grout, finish joints by tooling to produce a slightly concave polished joint, free of drying cracks.

B. Grout stone joints with water-cleanable epoxy grout to comply with ANSI A108.6 and with manufacturer's written instructions.

## 3.11 ADJUSTING AND CLEANING

A. Remove and replace stonework of the following description:

1. Broken, chipped, stained, or otherwise damaged stone. Stone may be repaired if methods and results are approved by Architect.
2. Defective joints.
3. Stone flooring and joints not matching approved Samples and mockups.
4. Stonework not complying with other requirements indicated.

B. Replace in a manner that results in stonework matching approved Samples and mockups, complying with other requirements, and showing no evidence of replacement.

C. In-Progress Cleaning: Clean stonework as work progresses. Remove mortar fins and smears, grout smears before tooling joints.

D. Clean stonework after setting and pointing, grouting are complete. Use procedures recommended by stone fabricator for application types.

E. Apply sealer to cleaned stonework according to sealer manufacturer's written instructions.

## 3.12 PROTECTION

A. Prohibit traffic from installed stone for a minimum of 72 hours.

B. Protect installed stonework during construction with nonstaining kraft paper. Where adjoining areas require construction work access, cover stonework with a minimum of 3/4-inch (20-mm) untreated plywood over nonstaining kraft paper.

END OF SECTION 096340

**SECTION 096466**

**WOOD ATHLETIC FLOORING**

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes wood athletic flooring.

1.2 ACTION SUBMITTALS

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

B. Shop Drawings: For each type of floor assembly and accessory. Include plans, elevations, sections, details, and attachments to other work. Include the following:

1. Expansion provisions and trim details.
2. Layout, colors, widths, and dimensions of game lines and markers.
3. Locations of floor inserts for athletic equipment installed through flooring assembly.

C. Samples: For each exposed finish.

1.3 INFORMATIONAL SUBMITTALS

A. Product test reports.

1.4 CLOSEOUT SUBMITTALS

A. Maintenance data.

1.5 QUALITY ASSURANCE

A. Maple Flooring: Comply with MFMA grading rules for species, grade, and cut.

1. Certification: Provide flooring that carries MFMA mark on each bundle or piece.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. FloorScore Compliance: Wood athletic flooring shall comply with requirements of FloorScore Standard.

B. Low-Emitting Materials: Wood athletic flooring systems shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

## 2.2 FLOORING MATERIALS

A. Certified Wood: Provide wood flooring produced from wood obtained from forests certified by an FSC-accredited certification body to comply with FSC STD-01-001, "FSC Principles and Criteria for Forest Stewardship."

B. Random-Length Strip Flooring: kiln dried, random length, tongue and groove, and end matched.

1. Grade: MFMA-RL Second and Better

2. Cut: Edge
3. Thickness: 25/32 inch (20 mm)] [33/32 inch (26 mm)
4. Face Width: 2-1/4 inches (57 mm)] [1-1/2 inches (38 mm)

## 2.3 SUBFLOOR MATERIALS

A. Board Underlayment: Nominal 1-by-6-inch (25-by-150-mm) graded boards; of SPIB No. 2 Southern pine, WCLIB Construction grade (any species), or WWPA No. 3 (any species), dried to 15 percent moisture content.

B. Plywood Underlayment: APA rated, C-D plugged, exterior glue, tongue and groove, [15/32 inch (12 mm)] [23/32 inch (18 mm)] thick.

C. Wood Sleepers: Standard grade; 48 inches (1200 mm) long; kiln-dried Eastern hemlock, fir, pine, or spruce.

1. Size: Nominal [2 by 3 inches (50 by 75 mm)] [2 by 4 inches (50 by 100 mm)].
2. Sleeper Anchors: Manufacturer's standard drive pins recommended by anchor manufacturer to achieve minimum 900-lbf (4000-N) pullout strength in 3000-psi (20.7-MPa) concrete.
3. Sleeper Shims: In size and type recommended in writing by flooring manufacturer for application indicated.
4. Asphalt Primer: ASTM D 41.
5. Asphalt Mastic: ASTM D 312, Type I, cold-applied dead-level asphalt or Type III, hot-applied steep asphalt, as recommended in writing by manufacturer.

D. Channels: Manufacturer's standard as indicated by product designation above

1. Channel Anchors: Manufacturer's standard, but not less than modified steel drive pins recommended by anchor manufacturer to achieve minimum 900-lbf (4000-N) pullout strength.
2. Clips: Manufacturer's standard as indicated by product designation above

E. Resilient Pads: With air voids for resiliency and installed at manufacturer's standard spacing for product designation indicated above.

1. Type:
2. Material: [PVC] or [Rubber] or [Neoprene]
3. Thickness: [3/8 inch (10 mm)] [7/16 inch (11 mm)] [5/8 inch (16 mm)] [3/4 inch (19 mm)

F. Resilient Underlayment: Flexible, multicellular, closed-cell, expanded polyethylene-foam sheet; nominal 2-lb/cu. ft. (32-kg/cu. m) density.

1. Thickness: [1/4 inch (6 mm)] [1/2 inch (13 mm)] [3/4 inch (19 mm)] [1 inch (25 mm)

2.4 FINISHES

A. Floor-Finish System: System of compatible components recommended in writing by flooring manufacturer, and MFMA approved.

1. Floor-Sealer Formulation: Pliable, penetrating type. MFMA Group 1, Sealers.
2. Finish-Coat Formulation: Formulated for gloss finish indicated and multicoat application.

a. Type: MFMA Group 3, Gymnasium-Type Surface Finishes] [MFMA Group 5, Water-Based Finishes

3. Game-Line and Marker Paint: Industrial enamel compatible with finish coats and recommended in writing by manufacturers of finish coats, and paint for this use.
4. VOC Content: Products shall comply with the following limits for VOC content when calculated according to 40 CFR 59, Subpart D (EPA Method 24):

a. Floor Sealers and Finish Coats: VOC content of not more than 350 g/L.
b. Game-Line and Marker Paint: VOC content of not more than 150 g/L.

5. Finish system materials, game-line, and marker paint shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

2.5 ACCESSORIES

A. Vapor Retarder: ASTM D 4397, polyethylene sheet not less than 6 mils (0.15 mm) thick.

B. Resilient Wall Base: Molded, vented, rubber or vinyl cove base; 4 by 3 by 48 inches (100 by 75 by 1200 mm); with premolded outside corners.

1. Color: [Black] [Brown].

C. Wood Wall Base: [Nominal 1-by-3-inch (25-by-75-mm) wood base] [Built-up wood base as indicated on Drawings] matching species, grade, and cut of wood flooring.

D. Thresholds: As specified in Division 08 Section "Door Hardware."

E. Fasteners: Type and size recommended by manufacturer, but not less than those recommended by MFMA for application indicated.

F. Trowelable Leveling and Patching Compound: Latex-modified, hydraulic-cement-based formulation approved by wood athletic flooring manufacturer.

G. Adhesives: Manufacturer's standard for application indicated that has a VOC content of 100 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

H. Adhesives: Manufacturer's standard for application indicated that comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

## PART 3 - EXECUTION

### 3.1 PREPARATION

A. Concrete Slabs: Verify that concrete substrates are dry and moisture-vapor emissions are within acceptable levels according to manufacturer's written instructions.

B. Grind high spots and fill low spots on concrete substrates to produce a maximum 1/8-inch (3-mm) deviation in any direction when checked with a 10-foot (3-m) straight edge.

1. Use trowelable leveling and patching compounds, according to manufacturer's written instructions, to fill cracks, holes, and depressions in substrates.

C. Remove coatings including curing compounds and other substances on substrates that are incompatible with installation adhesives and that contain soap, wax, oil, or silicone; use mechanical methods recommended by manufacturer. Do not use solvents.

D. Broom and vacuum clean substrates to be covered immediately before product installation. After cleaning, examine substrates for moisture, alkaline salts, carbonation, or dust. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 INSTALLATION

A. General: Comply with wood athletic flooring manufacturer's written instructions, but not less than written recommendations of MFMA applicable to flooring type indicated.

B. Expansion Spaces: Provide as indicated, but not less than that required by manufacturer's written instructions and MFMA's written recommendations at walls and other obstructions, and at interruptions and terminations of flooring.

1. Cover expansion spaces with base molding, trim, and saddles, as indicated on Drawings.

C. Vapor Retarder: Cover entire slab area beneath wood flooring. Install with joints lapped a minimum of 6 inches (150 mm) and sealed.

D. Sleepers:

1. Install sleepers perpendicular to direction of flooring, staggering end joints a minimum of [24 inches (610 mm)]
2. Space [at spacing recommended by manufacturer for system components indicated] [12 inches (305 mm) o.c.] [9 inches (229 mm) o.c.] [8 inches (203 mm) o.c.
3. Shim and level sleepers and install anchors at spacing recommended by manufacturer, but not less than 30 inches (760 mm) o.c.
4. Anchor predrilled sleepers through resilient pads.

E. Channels: Anchor channels to substrate according to manufacturer's written instructions.

F. Installation Tolerances: 1/8 inch in 10 feet (3 mm in 3 m) of variance from level.

3.3 SANDING AND FINISHING

A. Allow installed flooring to acclimate to ambient conditions before sanding.

B. Follow applicable recommendations in MFMA's "Industry Recommendations for Sanding, Sealing, Court Lining, Finishing, and Resurfacing of Maple Gym Floors."

C. Machine sand with coarse, medium, and fine grades of sandpaper to achieve a level, smooth, uniform surface without ridges or cups. Remove sanding dust by tack or vacuum.

D. Finish: Apply seal and finish coats of finish system according to finish manufacturer's written instructions. Provide no fewer than [four] coats total and no fewer than [two] finish coats.

1. Game-Line and Marker Paint: Apply game-line and marker paint between final seal coat and first finish coat according to paint manufacturer's written instructions.

a. Mask flooring at game lines and markers, and apply paint to produce lines and markers with sharp edges.
b. Where game lines cross, break minor game line at intersection; do not overlap lines.
c. Apply finish coats after game-line and marker paint is fully cured.

E. Protect wood athletic flooring during remainder of construction period to allow finish to cure and to ensure that flooring and finish are without damage or deterioration at time of Substantial Completion.

END OF SECTION 096466

**SECTION 096513**

**RESILIENT BASE AND ACCESSORIES**

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. Resilient base.

1.3 ACTION SUBMITTALS

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

B. Samples: For each type of product indicated, in manufacturer's standard-size Samples but not less than 300mm long, of each resilient product color, texture, and pattern required.

1.4 QUALITY ASSURANCE

A. Fire-Test-Response Characteristics: As determined by testing identical products according to ASTM E 648 or NFPA 253 by a qualified testing agency.

1. Critical Radiant Flux Classification: Class I, not less than 0.45 W/sq. cm.

1.5 PROJECT CONDITIONS

A. Maintain ambient temperatures within range recommended by manufacturer in spaces to receive resilient products.

B. Until Substantial Completion, maintain ambient temperatures within range recommended by manufacturer.

C. Install resilient products after other finishing operations, including painting, have been completed.

PART 2 - PRODUCTS

2.1 RESILIENT BASE

A. B-1 100mm high PVC baseboard with Cove Toe

B. B-2 100mm high PVC baseboard with Straight Toe

C. B-3 Integral Cove with Capping Seal

D. Resilient Base Standard: ASTM F 1861.

1. Material Requirement: Type TS rubber, vulcanized thermoset).
2. Manufacturing Method: Group I (solid, homogeneous).
3. Style: Cove (base with toe).

E. Minimum Thickness: 0.125 inch (3.2 mm).

F. Height: 4 inches (102 mm).

G. Lengths: Each piece as long as possible, per surface.

H. Outside Corners: Job formed

I. Inside Corners: Job formed

J. Finish: Matte

K. Colors and Patterns: As selected by Architect from full range of industry colors.

2.2 INSTALLATION MATERIALS

A. Trowelable Leveling and Patching Compounds: Latex-modified, portland cement based or blended hydraulic-cement-based formulation provided or approved by manufacturer for applications indicated.

B. Adhesives: Water-resistant type recommended by manufacturer to suit resilient products and substrate conditions indicated.

1. Adhesives shall have a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

C. ADA Compliance: All flooring in wet condition shall be in accordance with ADA recommendation for slip-resistance, COF of 0.6 for level and 0.8 for ramped surfaces.

PART 3 - EXECUTION

3.1 PREPARATION

A. Prepare substrates according to manufacturer's written instructions to ensure adhesion of resilient products.

B. Concrete Substrates for Resilient Stair Treads and Accessories: Prepare according to ASTM F 710.

1. Verify that substrates are dry and free of curing compounds, sealers, and hardeners.
2. Remove substrate coatings and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, using mechanical methods recommended by manufacturer. Do not use solvents.
3. Alkalinity and Adhesion Testing: Perform tests recommended by manufacturer.
4. Moisture Testing: Perform tests recommended by manufacturer. Proceed with installation only after substrates pass testing.

    a. Perform anhydrous calcium chloride test, ASTM F 1869. Proceed with installation only after substrates have maximum moisture-vapor-emission rate of 3 lb of water/1000 sq. ft. (1.36 kg of water/92.9 sq. m) in 24 hours.
    b. Perform relative humidity test using in situ probes, ASTM F 2170. Proceed with installation only after substrates have maximum 75 percent relative humidity level measurement.

C. Fill cracks, holes, and depressions in substrates with trowelable leveling and patching compound and remove bumps and ridges to produce a uniform and smooth substrate.

D. Do not install resilient products until they are same temperature as the space where they are to be installed.

1. Move resilient products and installation materials into spaces where they will be installed at least 48 hours in advance of installation.

E. Sweep and vacuum clean substrates to be covered by resilient products immediately before installation.

## 3.2 RESILIENT BASE INSTALLATION

A. Comply with manufacturer's written instructions for installing resilient base.

B. Apply resilient base to walls, columns, pilasters, casework and cabinets in toe spaces, and other permanent fixtures in rooms and areas where base is required.

C. Install resilient base in lengths as long as practicable without gaps at seams and with tops of adjacent pieces aligned.

D. Tightly adhere resilient base to substrate throughout length of each piece, with base in continuous contact with horizontal and vertical substrates.

E. Do not stretch resilient base during installation.

## 3.3 CLEANING AND PROTECTION

A. Comply with manufacturer's written instructions for cleaning and protection of resilient products.

B. Cover resilient products until Substantial Completion.

END OF SECTION 096513

**SECTION 096516**

**RESILIENT FLOORING**

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. Vinyl Sheet.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: For each type of floor. Include floor layouts, edges, columns, doorways, enclosing partitions, built-in furniture, cabinets, and cutouts.

1. Show details of special patterns.

C. Samples: Full-size units of each color and pattern of floor required.

1. For heat-welding bead, manufacturer's standard-size Samples, but not less than 9 inches long, of each color required.

D. Samples for Initial Selection: For each type of floor indicated.

E. Samples for Verification: Full-size units of each color and pattern of floor required.

1. For heat-welding bead, manufacturer's standard-size Samples, but not less than 9 inches long, of each color required.

F. Welded-Seam Samples: For seamless-installation technique indicated and for each flooring product, color, and pattern required; with seam running lengthwise and in center of 6-by-9-inch Sample applied to a rigid backing and prepared by Installer for this Project.

1.4 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer.

1.5 CLOSEOUT SUBMITTALS

A. Maintenance Data: For each type of floor to include in maintenance manuals.

1.6 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1.7 QUALITY ASSURANCE

A. Installer Qualifications: A qualified installer who employs workers for this Project who are competent in techniques required by manufacturer for floor installation and seaming method indicated.

1. Engage an installer who employs workers for this Project who are trained or certified by floor manufacturer for installation techniques required.

B. Mockups: Build mockups to verify selections made under Sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.

1. Build mockups for floor including resilient base and accessories.

a. Size: Minimum 9.3 sq. m for each type, color, and pattern in locations directed by Architect.

2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
3. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Store floor material and installation materials in dry spaces protected from the weather, with ambient temperatures maintained within range recommended by manufacturer, but not less than 10 deg C or more than 32 deg C. Store on flat surfaces.

1.9 FIELD CONDITIONS

A. Maintain ambient temperatures within range recommended by manufacturer, but not less than 21 deg C or more than 35 deg C, in spaces to receive flooring during the following time periods:

1. 48 hours before installation.
2. During installation.
3. 48 hours after installation.

B. After installation and until Substantial Completion, maintain ambient temperatures within range recommended by manufacturer, but not less than 13 deg C or more than 35 deg C.

C. Close spaces to traffic during floor installation.

D. Close spaces to traffic for 48 hours after floor installation.

E. Install floor after other finishing operations, including painting, have been completed.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Fire-Test-Response Characteristics: For resilient flooring, as determined by testing identical products according to ASTM E 648 or NFPA 253 by a qualified testing agency.

1. Critical Radiant Flux Classification: Class I, not less than 0.45 W/sq. cm.

B. FloorScore Compliance: Resilient flooring shall comply with requirements of FloorScore certification.

C. Low-Emitting Materials: Flooring system shall comply with the testing and product requirements of the Department of Health

2.2 VINYL SHEET <F-4>

A. Wearing Surface: Verify with Architect.

B. Thickness: 2 mm.

C. Substrate Preparation: Provide self-leveling compound

D. Colors and Patterns: Match Architect’s sample

2.3 INSTALLATION MATERIALS

A. Trowelable Leveling and Patching Compounds: Latex-modified, portland cement based or blended hydraulic-cement-based formulation provided or approved by floor manufacturer for applications indicated.

B. Adhesives: Water-resistant type recommended by floor and adhesive manufacturers to suit floor tand substrate conditions indicated.

1. Adhesives shall comply with the following limits for VOC content:

a. Vinyl Adhesives: 50 g/L or less.

2. Adhesives shall comply with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."

C. Seamless-Installation Accessories:

1. Heat-Welding Bead: Manufacturer's solid-strand product for heat welding seams.

a. Color: Match floor.

2. Chemical-Bonding Compound: Manufacturer's product for chemically bonding seams.

a. Bonding compound shall have a VOC content of 350 g/L or less.
b. Bonding compound shall comply with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation

of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."

D. Floor Polish: Provide protective, liquid floor-polish products recommended by floor manufacturer.

E. Joint Sealant for Resilient Terrazzo Floor : Silicone sealant of type and grade recommended in writing by floor manufacturer to suit resilient terrazzo floor.

1. Sealant shall have a VOC content of 250 g/L or less.
2. Sealant shall comply with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."
3. Joint-Sealant Color: Match floor .

F. Sealers and Finish Coats for Resilient Terrazzo Floor: Products recommended by floor manufacturer for resilient terrazzo floor .

## PART 3 - EXECUTION

### 3.1 EXAMINATION

A. Examine substrates, with Installer present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.

1. Verify that finishes of substrates comply with tolerances and other requirements specified in other Sections and that substrates are free of cracks, ridges, depressions, scale, and foreign deposits that might interfere with adhesion of floor.

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

### 3.2 PREPARATION

A. Prepare substrates according to floor manufacturer's written instructions to ensure adhesion of resilient products.

B. Concrete Substrates: Prepare according to ASTM F 710.

1. Verify that substrates are dry and free of curing compounds, sealers, and hardeners.
2. Remove substrate coatings and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, using mechanical methods recommended by floor manufacturer. Do not use solvents.
3. Alkalinity and Adhesion Testing: Perform tests recommended by floor manufacturer. Proceed with installation only after substrate alkalinity falls within range on pH scale recommended by manufacturer in writing, but not less than 5 or more than 9 pH.
4. Moisture Testing: Proceed with installation only after substrates pass testing according to floor manufacturer's written recommendations, but not less stringent than the following:

a. Perform anhydrous calcium chloride test according to ASTM F 1869. Proceed with installation only after substrates have maximum moisture-vapor-emission rate of 1.36 kg of water/92.9 sq. m in 24 hours.

b. Perform relative humidity test using in situ probes according to ASTM F 2170. Proceed with installation only after substrates have a maximum 75 percent relative humidity level.

C. Access Flooring Panels: Remove protective film of oil or other coating using method recommended by access flooring manufacturer.

D. Fill cracks, holes, and depressions in substrates with trowelable leveling and patching compound; remove bumps and ridges to produce a uniform and smooth substrate.

E. Do not install floor until they are the same temperature as the space where they are to be installed.

1. At least 48 hours in advance of installation, move resilient floor and installation materials into spaces where they will be installed.

F. Immediately before installation, sweep and vacuum clean substrates to be covered by resilient floor.

## 3.3 FLOOR INSTALLATION

A. Comply with manufacturer's written instructions for installing floor.

B. Lay out floor from center marks established with principal walls, discounting minor offsets. Adjust as necessary.

1. Lay in pattern indicated.

C. Maintain reference markers, holes, and openings that are in place or marked for future cutting by repeating on floor as marked on substrates. Use chalk or other nonpermanent marking device.

D. Adhere floor to flooring substrates using a full spread of adhesive applied to substrate to produce a completed installation without open cracks, voids, raising and puckering at joints, telegraphing of adhesive spreader marks, and other surface imperfections.

E. Seamless Installation:

1. Heat-Welded Seams: Comply with ASTM F 1516. Rout joints and heat weld with welding bead to permanently fuse sections into a seamless flooring. Prepare, weld, and finish seams to produce surfaces flush with adjoining flooring surfaces.
2. Chemically Bonded Seams: Bond seams with chemical-bonding compound to permanently fuse sections into a seamless flooring. Prepare seams and apply compound to produce tightly fitted seams without gaps, overlays, or excess bonding compound on flooring surfaces.

## 3.4 CLEANING AND PROTECTION

A. Comply with manufacturer's written instructions for cleaning and protecting floor.

B. Perform the following operations immediately after completing floor installation:

1. Remove adhesive and other blemishes from exposed surfaces.
2. Sweep and vacuum surfaces thoroughly.
3. Damp-mop surfaces to remove marks and soil.

C. Protect floor from mars, marks, indentations, and other damage from construction operations and placement of equipment and fixtures during remainder of construction period.

D. Floor Polish: Remove soil, adhesive, and blemishes from floor surfaces before applying liquid floor polish.

1. Apply three coat(s).

E. Joint Sealant: Apply sealant to resilient terrazzo floor perimeter and around columns, at door frames, and at other joints and penetrations.

F. Sealers and Finish Coats: Remove soil, visible adhesive, and surface blemishes from resilient terrazzo floor surfaces before applying liquid cleaners, sealers, and finish products.

1. Sealer: Apply two base coats of liquid sealer.
2. Finish: Apply three coats of liquid floor finish.

G. Cover floor until Substantial Completion.

END OF SECTION 096519

**SECTION 096519**

**RESILIENT TILE FLOORING**

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. Vinyl composition floor tile.

1.3 ACTION SUBMITTALS

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

B. Shop Drawings: For each type of floor tile. Include floor tile layouts, edges, columns, doorways, enclosing partitions, built-in furniture, cabinets, and cutouts.

C. Samples: Full-size units of each color and pattern of floor tile required.

1.4 CLOSEOUT SUBMITTALS

A. Maintenance data.

1.5 QUALITY ASSURANCE

A. Fire-Test-Response Characteristics: As determined by testing identical products according to ASTM E 648 or NFPA 253 by a qualified testing agency.

   1. Critical Radiant Flux Classification: Class I, not less than 0.45 W/sq. cm.

B. Installer Qualifications: A qualified installer who employs workers for this Project who are competent in techniques required by manufacturer for floor covering installation and seaming method indicated.

   1. Engage an installer who employs workers for this Project who are trained or certified by floor covering manufacturer for installation techniques required.

C. Mockups: Build mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.

   1. Build mockups for floor coverings including resilient base and accessories.

a. Size: Minimum 9 SQM, type color and pattern in locations directed by Architect.

1.6 PROJECT CONDITIONS

A. Maintain ambient temperatures within range recommended by manufacturer in spaces to receive floor tile.

B. Until Substantial Completion, maintain ambient temperatures within range recommended by manufacturer.

C. Close spaces to traffic during floor tile installation.

D. Close spaces to traffic for 48 hours after floor tile installation.

E. Install floor tile after other finishing operations, including painting, have been completed.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Store floor coverings and installation materials in dry spaces protected from the weather, with ambient temperatures maintained within range recommended by manufacturer, but not less than 50 deg F or more than 90 deg F.

1.8 EXTRA MATERIALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
1. Furnish quantity of not less than 1.5% for each color, pattern, and type of floor tiles installed.

PART 2 - PRODUCTS

2.1 VINYL COMPOSITION FLOOR TILE <F-1 300mm x 300mm, F-2 450mm x 450mm, F-3 150mm X 900mm>

A. Tile Standard: ASTM F 1066, Class 2, through-pattern tile

B. Thickness: 3mm

C. Size: 450 x 450mm.

D. Colors and Patterns: As selected by Architect from full range of industry colors.

E. Substrate Preparation: Provide Self-Leveling Compound

2.2 INSTALLATION MATERIALS

A. Trowelable Leveling and Patching Compounds: Latex-modified, portland cement based or blended hydraulic-cement-based formulation provided or approved by manufacturer for applications indicated.

B. Adhesives: Water-resistant type recommended by manufacturer to suit floor tile and substrate conditions indicated.

C. FloorScore Compliance: Resilient tile flooring shall comply with requirements of FloorScore Standard.

1. Adhesives shall comply with the following limits for VOC content when calculated according to 40 CFR 59, Subpart D (EPA Method 24):

a. VCT and Asphalt Tile Adhesives: Not more than 50 g/L.

2. Adhesives shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

D. Floor Polish: Provide protective liquid floor polish products as recommended by manufacturer.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

A. Examine substrates, with Installer present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.

B. Verify that finishes of substrates comply with tolerances and other requirements specified in other Sections and that substrates are free of cracks, ridges, depressions, scale and foreign deposits that might interfere with adhesion of floor coverings.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 PREPARATION

A. Prepare substrates according to manufacturer's written instructions to ensure adhesion of resilient products.

B. Concrete Substrates: Prepare according to ASTM F 710.

1. Verify that substrates are dry and free of curing compounds, sealers, and hardeners.
2. Remove substrate coatings and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, using mechanical methods recommended by manufacturer. Do not use solvents.
3. Alkalinity and Adhesion Testing: Perform tests recommended by manufacturer. Proceed with installation only after substrates pass testing.
4. Moisture Testing: Perform tests recommended by floor covering manufacturer. Proceed with installation only after substrates pass testing.

C. Fill cracks, holes, and depressions in substrates with trowelable leveling and patching compound and remove bumps and ridges to produce a uniform and smooth substrate.

D. Do not install floor tiles until they are same temperature as space where they are to be installed.

1. Move resilient products and installation materials into spaces where they will be installed at least 48 hours in advance of installation.

E. Sweep and vacuum clean substrates to be covered by resilient products immediately before installation.

## 3.3 FLOOR TILE INSTALLATION

A. Comply with manufacturer's written instructions for installing floor tile.

B. Lay out floor tiles from center marks established with principal walls, discounting minor offsets, so tiles at opposite edges of room are of equal width. Adjust as necessary to avoid using cut widths that equal less than one-half tile at perimeter.

1. Lay tiles in pattern indicated.

C. Match floor tiles for color and pattern by selecting tiles from cartons in the same sequence as manufactured and packaged, if so numbered. Discard broken, cracked, chipped, or deformed tiles.

1. Lay tiles in pattern of colors and sizes indicated.

D. Scribe, cut, and fit floor tiles to butt neatly and tightly to vertical surfaces and permanent fixtures including built-in furniture, cabinets, pipes, outlets, and door frames.

E. Extend floor tiles into toe spaces, door reveals, closets, and similar openings. Extend floor tiles to center of door openings.

F. Maintain reference markers, holes, and openings that are in place or marked for future cutting by repeating on floor tiles as marked on substrates. Use chalk or other nonpermanent, nonstaining marking device.

G. Adhere floor tiles to flooring substrates using a full spread of adhesive applied to substrate to produce a completed installation without open cracks, voids, raising and puckering at joints, telegraphing of adhesive spreader marks, and other surface imperfections.

## 3.4 CLEANING AND PROTECTION

A. Comply with manufacturer's written instructions for cleaning and protection of floor tile.

B. Floor Polish: Remove soil, visible adhesive, and surface blemishes from floor tile surfaces before applying liquid floor polish.

1. Apply two (2) coats.

C. Cover floor tile until Substantial Completion.

END OF SECTION 096519

**SECTION 096536**

**STATIC-CONTROL RESILIENT FLOORING**

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Conductive, solid vinyl floor tile.

1.2 PERFORMANCE REQUIREMENTS

A. Static-Dissipative Properties: Provide floor coverings with static-control properties indicated as determined by testing identical products per test method indicated by an independent testing and inspecting agency.

   1. Electrical Resistance: Test per [ASTM F 150 with 100-V applied voltage] [ESD-STM-7.1].

      a. Average greater than 1 megohm and less than or equal to 1000 megohms when test specimens are tested surface to ground.
      b. Average no less than 1 megohm and less than or equal to 1000 megohms when installed floor coverings are tested surface to ground.

   2. Static Generation: Less than [300] V when tested per AATCC-134 at 20 percent relative humidity with conductive footwear.
   3. Static Decay: 5000 to 0 V in less than [0.25] seconds when tested per FED-STD-101C/4046.1.

B. Conductive Properties: Provide floor coverings with static-control properties indicated as determined by testing identical products per test method indicated by an independent testing and inspecting agency.

   1. Electrical Resistance: Test per [ASTM F 150 with 500-V applied voltage] [ESD-STM-7.1] [NFPA 99, Annex E] [UL 779].

      a. Average greater than 25,000 ohms and less than 1 megohm when test specimens and installed floor coverings are tested surface to surface (point to point).
      b. Average no less than 25,000 ohms with no single measurement less than 10,000 ohms when installed floor coverings are tested surface to ground.

   2. Static Generation: Less than [100] V when tested per AATCC-134 at 20 percent relative humidity with conductive footwear.
   3. Static Decay: 5000 to 0 V in less than [0.03] [0.01]seconds when tested per FED-STD-101C/4046.1.

C. FloorScore Compliance: Static-control resilient flooring shall comply with requirements of FloorScore Standard.

D. Low-Emitting Materials: Flooring system shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

1.3 ACTION SUBMITTALS

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

B. Shop Drawings: For each type of floor covering. Include floor covering layouts, edges, columns, doorways, enclosing partitions, built-in furniture, cabinets, and cutouts.

C. Samples: In manufacturer's standard size, but not less than [6-by-9-inch (152-by-230-mm)] sections of each color and pattern of floor covering required.

1.4 INFORMATIONAL SUBMITTALS

A. Product test reports.

B. Field quality-control reports.

1.5 CLOSEOUT SUBMITTALS

A. Maintenance data.

1.6 QUALITY ASSURANCE

A. Fire-Test-Response Characteristics: As determined by testing identical products according to ASTM E 648 or NFPA 253 by a qualified testing agency.

1. Critical Radiant Flux Classification: Class I, not less than 0.45 W/sq. cm.

1.7 PROJECT CONDITIONS

A. Maintain ambient temperatures within range recommended by manufacturer in spaces to receive floor coverings.

B. Until Substantial Completion, maintain ambient temperatures within range recommended by manufacturer.

C. Close spaces to traffic during floor covering installation.

D. Close spaces to traffic for 48 hours after floor covering installation.

E. Install floor coverings after other finishing operations, including painting, have been completed.

PART 2 - PRODUCTS

2.1 CONDUCTIVE RESILIENT FLOOR COVERINGS <F-6 Vinyl Sheet Anti-Static>

A. Conductive, Solid Vinyl Floor Tile: ASTM F 1700, Class I (monolithic), Type A (smooth surface).

1. Thickness: In manufacturer's standard thickness, but not less than 0.08 inch (2.0 mm).
2. Colors and Patterns: As selected by Architect from full range of industry colors.
3. Substrate Preparation: Provide self-leveling compound

2.2 ANTISTATIVE (DISSIPATIVE) RESILIENT FLOOR COVERINGS <F-5 Vinyl Sheet Anti-Static>

A. Anti Static, Solid Vinyl Floor Tile: ASTM F 1700, Class I (monolithic), Type A (smooth surface).

1. Thickness: In manufacturer's standard thickness, but not less than 0.08 inch (2.0 mm).
2. Colors and Patterns: As selected by Architect from full range of industry colors.
3. Substrate Preparation: Provide self-leveling compound

2.3 INSTALLATION MATERIALS

A. Trowelable Leveling and Patching Compounds: Latex-modified, portland cement or blended hydraulic-cement-based formulation provided or approved by manufacturer for applications indicated.

B. Static-Control Adhesive: Provided or approved by manufacturer; type that maintains electrical continuity of floor covering system to ground connection.

1. Adhesives shall comply with the following limits for VOC content when calculated according to 40 CFR, Subpart D (EPA Method 24):

a. VCT and Asphalt Tile Adhesives: Not more than 50 g/L.
b. Rubber Floor Adhesives: Not more than 60 g/L.

2. Adhesives shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

C. Grounding Strips: Provided or approved by manufacturer; type and size that maintains electrical continuity of floor covering system to ground connection.

D. Integral-Flash-Cove Base Accessories:

1. Cove Strip: 1-inch (25-mm) radius support strip provided or approved by manufacturer.
2. Cap Strip: Square metal, vinyl, or rubber cap provided or approved by manufacturer.
3. Corners: Metal inside and outside corners and end stops provided or approved by floor covering manufacturer.

E. Maintenance Floor Tiles: Special floor tiles inscribed "Conductive floor. Do not wax."

F. Floor Polish: Provide protective, static-control liquid floor polish products as recommended by floor covering manufacturer.

PART 3 - EXECUTION

3.1 PREPARATION

A. Prepare substrates according to manufacturer's written instructions and with oversight by manufacturer's representative to ensure adhesion of floor coverings and electrical continuity of floor covering systems.

B. Concrete Substrates: Prepare according to ASTM F 710.

1. Verify that substrates are dry and free of curing compounds, sealers, and hardeners.

2. Remove substrate coatings and other substances that are incompatible with floor covering adhesives and that contain soap, wax, oil, or silicone, using mechanical methods recommended by manufacturer. Do not use solvents.
3. Alkalinity and Adhesion Testing: Perform tests recommended by manufacturer. Proceed with installation only after substrates pass testing.
4. Moisture Testing: Perform tests recommended by manufacturer and as follows. Proceed with installation only after substrates pass testing.

    a. Perform anhydrous calcium chloride test, ASTM F 1869. Proceed with installation only after substrates have maximum moisture-vapor-emission rate of 3 lb of water/1000 sq. ft. (1.36 kg of water/92.9 sq. m) in 24 hours.
    b. Perform relative humidity test using in situ probes, ASTM F 2170. Proceed with installation only after substrates have maximum 75 percent relative humidity level measurement.

C. Fill cracks, holes, and depressions in substrates with trowelable leveling and patching compound and remove bumps and ridges to produce a uniform and smooth substrate.

D. Do not install floor coverings until they are same temperature as space where they are to be installed.

1. Move floor coverings and installation materials into spaces where they will be installed at least 48 hours in advance of installation.

E. Sweep and vacuum clean substrates to be covered by floor coverings immediately before installation.

## 3.2 INSTALLATION, GENERAL

A. Install static-control resilient floor covering according to manufacturer's written instructions and with oversight by manufacturer's representative.

B. Embed grounding strips in static-control adhesive. Extend grounding strips beyond perimeter of static-control resilient floor covering surfaces to ground connections.

C. Scribe, cut, and fit floor coverings to butt neatly and tightly to vertical surfaces and permanent fixtures including built-in furniture, cabinets, pipes, outlets, and door frames.

D. Extend floor coverings into toe spaces, door reveals, closets, and similar openings. Extend floor covering to center of door openings.

E. Maintain reference markers, holes, and openings that are in place or marked for future cutting by repeating on floor coverings as marked on substrates. Use chalk or other nonpermanent, nonstaining marking device.

F. Adhere floor coverings to substrates using a full spread of static-control adhesive applied to substrate to produce a completed installation without open cracks, voids, raising and puckering at joints, telegraphing of adhesive spreader marks, and other surface imperfections.

G. Integral-Flash-Cove Base: Cove floor coverings 6 inches (152 mm) up vertical surfaces. Support floor coverings at horizontal and vertical junction with cove strip. Butt at top against cap strip.

1. Install metal corners at inside and outside corners.

3.3 FLOOR TILE INSTALLATION

A. Comply with manufacturer's written instructions for installing floor tile.

B. Lay out floor tiles from center marks established with principal walls, discounting minor offsets, so floor tiles at opposite edges of room are of equal width. Adjust as necessary to avoid using cut widths that equal less than one-half floor tile at perimeter.

1. Lay floor tiles square with room axis

C. Match floor tiles for color and pattern by selecting floor tiles from cartons in same sequence as manufactured and packaged, if so numbered. Discard broken, cracked, chipped, or deformed floor tiles.

D. In each space where conductive, solid vinyl floor tile is installed, install maintenance floor tile identifying conductive floor tile in location approved by Architect.

3.4 SHEET FLOOR COVERING INSTALLATION

A. Comply with manufacturer's written instructions for installing sheet floor coverings.

B. Unroll sheet floor coverings and allow them to stabilize before cutting and fitting.

C. Lay out sheet floor coverings as follows:

1. Maintain uniformity of sheet floor covering direction.
2. Minimize number of seams and place them in inconspicuous and low-traffic areas, at least 6 inches (152 mm) away from parallel joints in floor covering substrates.
3. Match edges of floor coverings for color shading at seams.
4. Avoid cross seams.

3.5 FIELD QUALITY CONTROL

A. Testing: Engage a qualified testing agency to test electrical resistance of static-control resilient floor covering systems for compliance with requirements.

1. Arrange for testing after installation static-control adhesives have fully cured and floor covering systems have stabilized to ambient conditions and after ground connections are completed.
2. Arrange for testing of floor coverings before and after performing floor polish procedures.

B. Static-control resilient floor coverings will be considered defective if they do not pass tests and inspections.

C. Prepare test and inspection reports.

3.6 CLEANING AND PROTECTION

A. Comply with manufacturer's written instructions for cleaning and protection of floor coverings.

B. Protect floor coverings from mars, marks, indentations, and other damage from construction operations and placement of equipment and fixtures during remainder of construction period.

1. Do not wax static-control resilient floor coverings.

2. If recommended in writing by manufacturer, apply protective static-control floor polish formulated to maintain or enhance floor covering's electrical properties to floor covering surfaces that are free from soil, static-control adhesive, and surface blemishes.

    a. Verify that both floor polish and its application method are approved by manufacturer and that floor polish will not leave an insulating film that reduces floor coverings' effectiveness for static control.

C. Cover floor coverings until Substantial Completion.

END OF SECTION 096536

**SECTION 096813**

**TILE CARPETING**

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes modular, fusion-bonded and tufted carpet tile.

1.2 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.3 ACTION SUBMITTALS

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

B. Shop Drawings: Show the following:

1. Columns, doorways, enclosing walls or partitions, built-in cabinets, and locations where cutouts are required in carpet tiles.
2. Type of subfloor.
3. Type of installation.
4. Pattern of installation.
5. Pattern type, location, and direction.
6. Pile direction.

C. Samples: For each exposed product and for each color and texture specified.

1.4 INFORMATIONAL SUBMITTALS

A. Product test reports.

B. Sample warranty.

1.5 CLOSEOUT SUBMITTALS

A. Maintenance data.

1.6 QUALITY ASSURANCE

A. Installer Qualifications: An experienced installer who has at least 10 years of experience.

B. Fire-Test-Response Ratings: Where indicated, provide carpet tile identical to those of assemblies tested for fire response according to NFPA 253 by a qualified testing agency.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Comply with CRI 104.

1.8 FIELD CONDITIONS

A. Comply with CRI 104 for temperature, humidity, and ventilation limitations.

1.9 WARRANTY

A. Special Warranty for Carpet Tiles: Manufacturer agrees to repair or replace components of carpet tile installation that fail in materials or workmanship within specified warranty period.

1. Warranty does not include deterioration or failure of carpet tile due to unusual traffic, failure of substrate, vandalism, or abuse.
2. Failures include, but are not limited to, more than 10 percent edge raveling, snags, runs, dimensional stability, excess static discharge, loss of tuft bind strength, loss of face fiber, and delamination.
3. Warranty Period: Five (5) years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 CARPET TILE

A. Color: As selected by Architect from manufacturer's full range

B. Pattern: Match Architect's samples

C. Fiber Content: [100 percent nylon 6, 6] [100 percent nylon 6] [100 percent polypropylene] [100 percent wool] [80 percent wool; 20 percent nylon 6, 6] [80 percent wool; 20 percent nylon 6]

D. Fiber Type: <Insert proprietary fiber type>.

E. Pile Characteristic: [Level-loop] [Cut] [Cut-and-loop] <Insert construction> pile.

F. Yarn Twist: <Insert TPI (TPCM)>.

G. Yarn Count: <Insert count>.

H. Density: <Insert oz./cu. yd. (g/cu. cm)>.

I. Pile Thickness: <Insert inches (mm)> for finished carpet tile[ according to ASTM D 6859].

J. Stitches: <Insert stitches per inch (mm)>.

K. Gage: <Insert ends per inch (mm)>.

L. Surface Pile Weight: <Insert oz./sq. yd. (g/sq. m)>.

M. Total Weight: <Insert oz./sq. yd. (g/sq. m)> for finished carpet tile.

N. Primary Backing/Backcoating: [Manufacturer's standard composite materials] [PVC] [Fiberglass-reinforced PVC] [Fiberglass-reinforced amorphous resin] [Reinforced polyurethane composite cushion] [Reinforced polyurethane composite] [Reinforced thermoplastic copolymer] <Insert specific primary backing materials; consult manufacturers>.

O. Secondary Backing: [Manufacturer's standard material] <Insert specific secondary backing material>.

P. Backing System: <Insert proprietary name>.

Q. Size: [18 by 18 inches (457 by 457 mm)] [24 by 24 inches (610 by 610 mm)] [18 by 36 inches (457 by 914 mm)] [36 by 36 inches (914 by 914 mm)] <Insert dimensions>.

R. Applied Soil-Resistance Treatment: [Manufacturer's standard material] <Insert treatment>.

S. Antimicrobial Treatment: [Manufacturer's standard material] <Insert treatment>.

T. Performance Characteristics: As follows:

1. Appearance Retention Rating: [Moderate traffic, 2.5] [Heavy traffic, 3.0] [Severe traffic, 3.5] <Insert number> minimum according to ASTM D 7330.
2. Critical Radiant Flux Classification: Not less than [0.45 W/sq. cm] [0.22 W/sq. cm].
3. Dry Breaking Strength: Not less than 100 lbf (445 N) according to ASTM D 2646.
4. Tuft Bind: Not less than [3 lbf (13 N)] [5 lbf (22 N)] [6.2 lbf (28 N)] [8 lbf (36 N)] [10 lbf (45 N)] <Insert value> according to ASTM D 1335.
5. Delamination: Not less than [3.5 lbf/in. (15 N/mm)] [4 lbf/in. (18 N/mm)] <Insert value> according to ASTM D 3936.
6. Dimensional Tolerance: Within 1/32 inch (0.8 mm) of specified size dimensions, as determined by physical measurement.
7. Dimensional Stability: 0.2 percent or less according to ISO 2551 (Aachen Test).
8. Resistance to Insects: Comply with AATCC 24.
9. Colorfastness to Crocking: Not less than 4, wet and dry, according to AATCC 165.
10. Colorfastness to Light: Not less than 4 after [40] [60] <Insert number> AFU (AATCC fading units) according to AATCC 16, Option E.
11. Antimicrobial Activity: Not less than 2-mm halo of inhibition for gram-positive bacteria, not less than 1-mm halo of inhibition for gram-negative bacteria, and no fungal growth, according to AATCC 174.
12. Electrostatic Propensity: Less than [3.5] [2] <Insert number> kV according to AATCC 134.
13. Emissions: Provide carpet tile that complies with testing and product requirements of CRI's "Green Label Plus" program.
14. Emissions: Provide carpet tile that complies with the product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

## 2.2 INSTALLATION ACCESSORIES

A. Trowelable Leveling and Patching Compounds: Latex-modified, hydraulic-cement-based formulation provided or recommended by carpet tile manufacturer.

B. Adhesives: Water-resistant, mildew-resistant, nonstaining, pressure-sensitive type to suit products and subfloor conditions indicated, that complies with flammability requirements for installed carpet tile and is recommended by carpet tile manufacturer for releasable installation.

1. Adhesives shall have a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

2. Adhesives shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

PART 3 - EXECUTION

3.1 INSTALLATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for maximum moisture content, alkalinity range, installation tolerances, and other conditions affecting carpet tile performance. Examine carpet tile for type, color, pattern, and potential defects.

B. Concrete Subfloors: Verify that concrete slabs comply with ASTM F 710.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

D. Preparation: Comply with CRI 104, Section 6.2, "Site Conditions; Floor Preparation," and with carpet tile manufacturer's written installation instructions for preparing substrates indicated to receive carpet tile installation.

E. Installation: Comply with CRI 104, Section 14, "Carpet Modules," and with carpet tile manufacturer's written installation instructions.

F. Installation Method: [As recommended in writing by carpet tile manufacturer] [Glue down; install every tile with full-spread, releasable, pressure-sensitive adhesive] [Partial glue down; install periodic tiles with releasable, pressure-sensitive adhesive] [Free lay; install carpet tiles without adhesive].

G. Maintain dye lot integrity. Do not mix dye lots in same area.

H. Cut and fit carpet tile to butt tightly to vertical surfaces, permanent fixtures, and built-in furniture including cabinets, pipes, outlets, edgings, thresholds, and nosings. Bind or seal cut edges as recommended by carpet tile manufacturer.

I. Extend carpet tile into toe spaces, door reveals, closets, open-bottomed obstructions, removable flanges, alcoves, and similar openings.

J. Maintain reference markers, holes, and openings that are in place or marked for future cutting by repeating on finish flooring as marked on subfloor. Use nonpermanent, nonstaining marking device.

K. Install pattern parallel to walls and borders.

L. Perform the following operations immediately after installing carpet tile:

1. Remove excess adhesive, seam sealer, and other surface blemishes using cleaner recommended by carpet tile manufacturer.
2. Remove yarns that protrude from carpet tile surface.
3. Vacuum carpet tile using commercial machine with face-beater element.

M. Protect installed carpet tile to comply with CRI 104, Section 16, "Protecting Indoor Installations."

END OF SECTION 096813

**SECTION 097200**

**WALL COVERINGS**

PART 1.0 GENERAL

1.1 SUMMARY

A. Section Includes:
1. PVC-backed Wallpaper (Scrubbable and Anti-Bacterial)

1.2 ACTION SUBMITTALS

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

B. Shop Drawings: Show location and extent of each wall-covering type. Indicate pattern placement, seams and termination points.

C. Samples: Full width by 36-inch- (914-mm-) long section of wall covering from same print run or dye lot to be used for the Work, with specified [treatments] [paint] applied.[ Show complete pattern repeat.] Mark top and face of fabric.

1.3 INFORMATIONAL SUBMITTALS

A. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for wall covering.

1.4 CLOSEOUT SUBMITTALS

A. Maintenance Data: For wall coverings to include in maintenance manuals.

1.5 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Wall-Covering Materials: For each type, full-size units equal to 5 percent of amount installed.

1.6 QUALITY ASSURANCE

A. Fire-Test-Response Characteristics: As determined by testing identical wall coverings applied with identical adhesives to substrates according to test method indicated below by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

1. Surface-Burning Characteristics: As follows, per ASTM E 84:

a. Flame-Spread Index: 25 or less.
b. Smoke-Developed Index: 450or less.

2. Fire-Growth Contribution: Textile wall coverings complying with acceptance criteria of UBC Standard 8-2.
3. Fire-Growth Contribution: Textile wall coverings tested according to [NFPA 265] [NFPA 286] and complying with test protocol and criteria in the 2003 IBC.

## PART 2.0 PRODUCTS

### 2.1 PERFORMANCE REQUIREMENTS

A. Low-Emitting Materials: Wall covering system shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

### 2.2 WALL COVERINGS

A. General: Provide rolls of each type of wall covering from same print run or dye lot.

### 2.3 VINYL WALL COVERING <W-13>

A. Vinyl Wall-Covering Standards: Provide mildew-resistant products
B. Total Weight Excluding Coatings: Manufacturer to provide information
C. Width: Manufacturer’s standard dimensions
D. Backing: PVC
E. Repeat: horizontal and vertical repeat.
F. Colors, Textures, and Patterns: As selected by Architect from manufacturer's full range.

### 2.4 ACCESSORIES

A. Adhesive: Mildew-resistant, nonstaining, adhesive, for use with specific wall covering and substrate application; as recommended in writing by wall-covering manufacturer.

1. Adhesive shall have VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
2. Adhesive shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

B. Primer/Sealer: Mildew resistant, complying with requirements in Division 09 Section "Interior Painting” and recommended in writing by wall-covering manufacturer for intended substrate.

C. Wall Liner: Nonwoven, synthetic underlayment and adhesive as recommended by wall-covering manufacturer.

D. Seam Tape: As recommended in writing by wall-covering manufacturer.

PART 3.0 EXECUTION

3.1 INSTALLATION

A. Clean substrates of substances that could impair bond of wall covering, including dirt, oil, grease, mold, mildew, and incompatible primers.

B. Prepare substrates to achieve a smooth, dry, clean, structurally sound surface free of flaking, unsound coatings, cracks, and defects.

1. Moisture Content: Maximum of 5 percent on new plaster, concrete, and concrete masonry units when tested with an electronic moisture meter.
2. Plaster: Allow new plaster to cure. Neutralize areas of high alkalinity. Prime with primer as recommended in writing by primer/sealer manufacturer and wall-covering manufacturer.
3. Metals: If not factory primed, clean and apply metal as recommended in writing by primer/sealer manufacturer and wall-covering manufacturer.
4. Gypsum Board: Prime with primer as recommended in writing by primer/sealer manufacturer and wall-covering manufacturer.
5. Painted Surfaces: Treat areas susceptible to pigment bleeding.

C. Remove hardware and hardware accessories, electrical plates and covers, light fixture trims, and similar items.

D. Acclimatize wall-covering materials by removing them from packaging in the installation areas not less than 24 hours before installation.

E. Install wall liner, with no gaps or overlaps, where required by wall-covering manufacturer. Form smooth wrinkle-free surface for finished installation. Do not begin wall-covering installation until wall liner has dried.

F. Cut wall-covering strips in roll number sequence. Change roll numbers at partition breaks and corners.

G. Install strips in same order as cut from roll.

H. Install reversing every other strip.

I. Install wall covering with no gaps or overlaps, no lifted or curling edges, and no visible shrinkage.

J. Match pattern 72 inches (1830 mm) above the finish floor.

K. Install seams vertical and plumb at least 6 inches (150 mm) from outside corners and [3 inches (75 mm)] [6 inches (150 mm)] from inside corners unless a change of pattern or color exists at corner. No horizontal seams are permitted.

L. Fully bond wall covering to substrate. Remove air bubbles, wrinkles, blisters, and other defects.

M. Trim edges and seams for color uniformity, pattern match, and tight closure. Butt seams without any overlay or spacing between strips.

N. Remove excess adhesive at finished seams, perimeter edges, and adjacent surfaces.

O. Reinstall hardware and hardware accessories, electrical plates and covers, light fixture trims, and similar items.

END OF SECTION 097200

**SECTION 097500**

**STONE FACING**

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following interior applications of dimension stone:
   1. Wall paneling.
   2. Column facing.
   3. Base.

B. See Division 09 Section "Stone Flooring" for stone flooring.

C. See Division 12 Section “Stone Countertops” for stone countertops

1.2 ACTION SUBMITTALS

A. Product Data: For each variety of stone, installation materials, and other manufactured products.

B. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.

   1. For installed products indicated to comply with design loads, include structural analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

C. Samples:

   1. For Each Stone Type: Include three (3) or more Samples in each set and show the full range of variations in appearance characteristics expected in completed Work.
   2. For each color of grout and pointing mortar required.

1.3 QUALITY ASSURANCE

A. Installer Qualifications: An installer who employs experienced stone setters who are skilled in installing interior stone facing similar in material, design, and extent to that indicated for this Project, whose work has resulted in applications with a record of successful in-service performance.

   1. Installer's responsibilities include fabricating and installing interior stone facing, including anchoring system and providing professional engineering services needed to assume engineering responsibility.
   2. Engineering Responsibility: Preparation of Shop Drawings and comprehensive engineering analysis by a qualified professional engineer.

B. Source Limitations for Stone: Obtain each variety of stone, regardless of finish, from a single quarry, whether specified in this Section or in another Section.

C. Mockups: Build mockups to demonstrate aesthetic effects and set quality standards for materials and execution.

   1. Build mockups for the following kinds of interior stone facing:

a. Typical interior stone wall paneling, about 1000mm long by 1800mm high.
b. Stone base, about 1200mm long.

PART 2 - PRODUCTS

2.1 GRANITE :

A. Granite: Comply with ASTM C 615.

B. Available Varieties and Sources: Subject to compliance with requirements, stone varieties that may be incorporated into the Work include, but are not limited to, the following:

C. Finish: Polished and Flamed.

2.2 TRAVERTINE

A. Travertine: Comply with ASTM C 1527, Classification II Interior.

B. Available Varieties and Sources: Subject to compliance with requirements, stone varieties that may be incorporated into the Work include, but are not limited to, the following:

C. Cut: Vein cut.

1. Orientation of Veining: As indicated.

D. Cut stone from one block or contiguous, matched blocks in which natural markings occur.

E. Filling: Fill pores on faces of stone with cementitious filler of color selected by Architect.

F. Finish: Polished.

2.3 SETTING MATERIALS

A. Molding Plaster: ASTM C 59/C 59M.

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

1. Low-Alkali Cement: Not more than 0.60 percent total alkali when tested according to ASTM C 114.

C. Hydrated Lime: ASTM C 207, Type S.

D. Aggregate: ASTM C 144.

E. Water: Potable.

2.4 GROUT

A. Grout Colors: Match stone, as selected by Architect from manufacturer's full range.

B. Sand-Portland Cement Grout: ANSI A108.10, composed of white or gray cement and white or colored aggregate as required to produce required color.

C. Polymer-Modified Tile Grout: ANSI A118.7.

1. Polymer Type: Ethylene vinyl acetate, in dry, redispersible form, prepackaged with other dry ingredients.
2. Polymer Type: Acrylic resin or styrene-butadiene rubber in liquid-latex form for addition to prepackaged dry-grout mix.
3. Polymer Type: Either ethylene vinyl acetate, in dry, redispersible form, prepackaged with other dry ingredients, or acrylic resin or styrene-butadiene rubber in liquid-latex form for addition to prepackaged dry-grout mix.
4. Grout Type: Unsanded.

D. Water-Cleanable Epoxy Grout: ANSI A118.3, chemical-resistant, water-cleanable, tile-setting and -grouting epoxy.

## 2.5 POINTING MORTAR MATERIALS

A. Portland Cement: ASTM C 150, Type I or II. Provide natural color or white cement as required to produce mortar color indicated.

1. Low-Alkali Cement: Not more than 0.60 percent total alkali when tested according to ASTM C 114.

B. Hydrated Lime: ASTM C 207, Type S.

C. Aggregate: ASTM C 144; except with 100 percent passing No. 16 (1.18-mm) sieve.

1. White Aggregates: Natural white sand or ground white stone.
2. Colored Aggregates: Natural-colored sand or ground marble, granite, or other durable stone; of color necessary to produce required mortar color.

D. Mortar Pigments: Natural and synthetic iron oxides, compounded for use in mortar mixes. Use only pigments with a record of satisfactory performance in mortar and containing no carbon black.

E. Water: Potable.

## 2.6 STONE ANCHORS AND ATTACHMENTS

A. Fabricate anchors from stainless steel, ASTM A 240/A 240M, Type 304.

1. Fasteners for Stainless-Steel Anchors: Annealed stainless-steel bolts, nuts, and washers; ASTM F 593 (ASTM F 738M) for bolts and ASTM F 594 (ASTM F 836M) for nuts, Alloy Group 1 (A1).

B. Anchor Support Grids: Roll-formed steel channels, of size and shape required for application indicated, formed from galvanized steel sheet not less than 0.108 inch (2.8 mm) thick and complying with ASTM A 653/A 653M, G90 (Z275).

C. Wire Tiebacks: 0.120-inch- (3.0-mm-) diameter, stainless-steel wire.

D. Direct-Mount Anchoring Systems: Stainless-steel stone anchors designed to be applied directly to wall surfaces. System is secured to wall framing, furring, or sheet-metal reinforcing strips built into wall

with self-drilling screws. Anchors fit into kerfs or holes in edges of interior stone facing panels and do not need setting spots.

2.7 STONE ACCESSORIES

A. Temporary Setting Shims: Rigid plastic shims, nonstaining to stone.

B. Setting Shims for Direct-Mount Anchoring Systems: Strips of resilient plastic or neoprene, nonstaining to stone, of thickness needed to prevent point loading of stone on anchors and of depths to suit anchors without intruding into required depths of pointing materials.

2.8 STONE FABRICATION, GENERAL

A. Fabricate interior stone facing in sizes and shapes required to comply with requirements indicated, including details on Drawings and Shop Drawings.

1. For granite, comply with recommendations in NBGQA's "Specifications for Architectural Granite."

B. Cut stone to produce pieces of thickness, size, and shape indicated and to comply with fabrication and construction tolerances recommended by applicable stone association.

1. Where items are installed with adhesive or where edges of stone is visible in the finished work, make items uniform in thickness and of identical thickness for each type of item; gage back of stone if necessary.
2. Dress joints straight and at right angle to face, unless otherwise indicated.

C. Fabricate molded work to produce stone shapes with a uniform profile throughout entire unit length and with precisely formed arris slightly eased to prevent snipping, and matched at joints between units.

1. Produce moldings with machines having abrasive shaping wheels made to reverse contour of molding shape; do not sculpt moldings.
2. Miter moldings at corners, unless otherwise indicated, with edges of miters slightly eased at outside corners.

2.9 STONE PANELING AND COLUMN FACING

A. Quirk-miter corners, unless otherwise indicated. Install anchorage in top and bottom bed joints of corner units.

B. Pattern Arrangement: Fabricate and arrange panels with veining and other natural markings to comply with the following requirements:

1. Arrange panels with veining as indicated on Drawings.

2.10 MIXES

A. Spotting Plaster: Stiff mix of molding plaster and water.

B. Mortar: Comply with referenced standards and with manufacturers' written instructions to produce mortar of uniform quality and with optimum performance characteristics.

1. Do not use admixtures, unless otherwise indicated. Do not use calcium chloride.
2. Combine and thoroughly mix materials in a mechanical batch mixer. Discard mortar when it has reached initial set.

C. Setting Mortar: Comply with ASTM C 270, Proportion Specification; Type N.

D. Pointing Mortar: Comply with ASTM C 270, Proportion Specification; Type N.

1. Pigmented Pointing Mortar: Select and proportion pigments with other ingredients to produce color required. Do not exceed pigment-to-cement ratio of 1:10, by weight.

E. Grout: Comply with mixing requirements of referenced ANSI standards and with manufacturer's written instructions.

## PART 3 - EXECUTION

### 3.1 SETTING OF STONE, GENERAL

A. Do necessary field cutting as stone is set. Use power saws with diamond blades to cut stone. Cut lines straight and true, with edges eased slightly to prevent snipping.

B. Contiguous Work: Provide reveals and openings as required to accommodate contiguous work.

C. Set stone to comply with requirements indicated on Drawings and Shop Drawings. Install anchors, supports, fasteners, and other attachments indicated or necessary to secure stone in place. Shim and adjust anchors, supports, and accessories to set stone accurately in locations indicated, with edges and faces aligned according to established relationships and indicated tolerances.

D. Provide expansion, control, and pressure-relieving joints of widths and at locations indicated.

1. Sealing of expansion, control, and pressure-relieving joints is specified in Division 07 Section "Joint Sealants."
2. Keep expansion, control, and pressure-relieving joints free of plaster, mortar, grout, and other rigid materials.

### 3.2 CONSTRUCTION TOLERANCES

A. Variation from Plumb: For vertical lines and surfaces, do not exceed 3 mm in 2400 mm, (6 mm maximum.

B. Variation from Level: For lintels, sills, chair rails, horizontal bands, horizontal grooves, and other conspicuous lines, do not exceed 3 mm in 3 m, 6 mm in 6 m, 10 mm maximum.

C. Variation in Joint Width: Do not vary joint thickness more than 1.5 mm or 1/4 of nominal joint width, whichever is less.

D. Variation in Plane between Adjacent Stone Units (Lipping): Do not exceed 0.8-mm difference between planes of adjacent units.

3.3 INSTALLATION OF STONE PANELING AND COLUMN FACING

A. Set units firmly against setting spots. Locate setting spots at anchors and spaced not more than 450 mm apart across back of unit, but provide no fewer than 1 setting spot per 0.18 sq. m, unless otherwise indicated.

1. Moisture Exposure: Use portland cement mortar for setting spots where stone is applied to inside face of exterior walls and at other locations where stone or cavity will be exposed to moisture.

B. Set units on direct-mount anchoring system with anchors securely attached to stone and to backup surfaces. Comply with recommendations in ASTM C 1242.

C. Minimum Anchors: Provide anchors at a maximum of 24 inches (600 mm) o.c. around perimeter of interior stone facing panels with a minimum of 4 anchors per panel.

D. Minimum Anchors: Provide a minimum of 4 anchors per panel up to 1.1 sq. m in face area, plus a minimum of 2 additional anchors for each additional 0.7 sq. m.

E. Grout or Point joints after setting.

3.4 GROUTING JOINTS

A. Grout stone to comply with ANSI A108.10.

B. Remove temporary shims before grouting.

C. Tool joints uniformly and smoothly with plastic tool.

3.5 POINTING JOINTS WITH MORTAR

A. Prepare stone-joint surfaces for pointing with mortar by removing temporary shims, dust, and mortar particles. Where setting spots occur at joints, rake out excess setting mortar or plaster to a depth of not less than 13 mm.

B. Point stone joints by placing pointing mortar in layers not more than 10 mm. Compact each layer thoroughly and allow to become thumbprint hard before applying next layer. Apply mortar first to areas where depths are greater than surrounding areas until a uniform depth is formed.

C. Tool joints when pointing mortar is thumbprint hard. Use a round jointer having a diameter 3 mm larger than width of joint.

3.6 ADJUSTING, CLEANING AND SEALING

A. In-Progress Cleaning: Clean interior stone facing as work progresses. Remove adhesive, grout, mortar, and sealant smears immediately.

B. Clean interior stone facing no fewer than six days after completion of grouting and pointing, using clean water and soft rags or stiff-bristle fiber brushes. Do not use wire brushes, acid-type cleaning agents, cleaning compounds with caustic or harsh fillers, or other materials or methods that could damage stone. Use procedures recommended by stone producer for types of applications indicated.

C. Apply sealer to cleaned interior stone facing in compliance with sealer manufacturer’s instructions.

3.7 PROTECTION

A. Protect stone facing works during construction period by covering with kraft paper or other acceptable covering that will not stain or discolor stone.

B. Advise Contractor of additional protection needed to ensure that stone facing works will be without damage to deterioration at time of substantial completion.

C. Before inspection for substantial completion, remove protective covering and clean surfaces using procedures and materials recommended by manufacturer.

END OF SECTION 097500

**SECTION 098433**

**SOUND - ABSORBING WALL UNITS**

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes shop-fabricated, fabric-wrapped and perforated metal-wrapped, sound-absorbing wall panel units tested for acoustical performance.

1.2 ACTION SUBMITTALS

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

B. Shop Drawings: For sound-absorbing wall units. Include mounting devices and details.

C. Samples: For each exposed product and for each color and texture specified.

1.3 INFORMATIONAL SUBMITTALS

A. Product certificates.

1.4 CLOSEOUT SUBMITTALS

A. Maintenance data.

1.5 QUALITY ASSURANCE

A. Fire-Test-Response Characteristics: Provide sound-absorbing wall units meeting the following as determined by testing identical products by UL or another testing and inspecting agency acceptable to authorities having jurisdiction:

1. Surface-Burning Characteristics: As determined by testing per ASTM E 84.

a. Flame-Spread Index: 25 or less.
b. Smoke-Developed Index: 450 or less.

2. Fire Growth Contribution: Meeting acceptance criteria of local code and authorities having jurisdiction when tested according to [NFPA 265] [NFPA 286].

B. Preinstallation Conference: Conduct conference at Project site

PART 2 - PRODUCTS

2.1 SOUND-ABSORBING WALL UNITS <W-14>

A. General Requirements for Sound-Absorbing Wall Units: Units shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

B. Sound-Absorbing Wall Panel: Manufacturer's standard panel construction consisting of facing material stretched over front face of edge-framed core and bonded or attached to edges and back of frame.
1. Mounting: Edge mounted with splines secured to substrate.
2. Mounting: Back mounted with manufacturer's standard adhesive secured to substrate.
3. Core: Rockwool

4. Edge Construction: Manufacturer's standard extruded-aluminum or zinc-coated, rolled-steel frame.
5. Edge Profile: Chamfered (beveled)
6. Corner Detail in Elevation: Square with continuous edge profile indicated.
7. Reveals between Panel: Recessed
8. Facing Material: Non-flammable Sound Absorption Fabric ; Megasorber and Powder-coated aluminum perforated metal (as indicated in the drawings)
9. Acoustical Performance: Sound absorption NRC after acoustic treatment = 8 to 10dBA according to ASTM C 423 for mounting according to ASTM E 795.
10. Nominal CoreThickness: 50mm

2.2 MATERIALS

A. Core Materials: Manufacturer's standard mineral wool fiber

B. Facing Material: Non-flammable Sound Absorption Fabric; Megasorber G8, SMC Australia Pty Ltd

1. Applied Treatments: Stain resistance

C. Facing Material: Aluminum Perforated Metal Sheet: (Location indicated in the Architect’s Drawings)

D. Mounting Devices: Concealed on back of unit, recommended by manufacturer to support weight of unit, and as follows:

1. Adhesives: As recommended by sound-absorbing wall unit manufacturer and with a VOC content of [70] g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
2. Adhesives: As recommended by sound-absorbing wall unit manufacturer and that comply with the testing and product requirements of the Department of Health

2.3 FABRICATION

A. General: Use manufacturer's standard construction except as otherwise indicated; with facing material applied to face, edges, and back border of dimensionally stable core; and with rigid edges to reinforce panel perimeter against warpage and damage.

B. Core-Face Layer: Evenly stretched over core face and edges and securely attached to core; free from puckers, ripples, wrinkles, or sags.

C. Facing Material: Apply fabric facing fully covering visible surfaces of unit; with material stretched straight, on the grain, tight, square, and free from puckers, ripples, wrinkles, sags, blisters, seams, adhesive, or other visible distortions or foreign matter.

1. Fabrics with Directional or Repeating Patterns or Directional Weave: Mark fabric top and attach fabric in same direction so pattern or weave matches in adjacent units.

D. Dimensional Tolerances of Finished Units: Plus or minus 1/16 inch (1.6 mm).

## PART 3 - EXECUTION

### 3.1 INSTALLATION

A. Install sound-absorbing wall units in locations indicated with vertical surfaces and edges plumb, top edges level and in alignment with other units, faces flush, and scribed to fit adjoining work accurately at borders and at penetrations.

B. Comply with sound-absorbing wall unit manufacturer's written instructions for installation of units using type of mounting devices indicated. Mount units securely to supporting substrate.

C. Align and level fabric pattern and grain among adjacent units.

D. Clip loose threads; remove pills and extraneous materials.

E. Clean panels on completion of installation to remove dust and other foreign materials according to manufacturer's written instructions.

END OF SECTION 098433

**SECTION 098436**

**SOUND-ABSORBING CEILING UNITS**

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes shop-fabricated, fabric-wrapped, sound-absorbing panels tested for acoustical performance.

1.2 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project Site.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: For sound-absorbing ceiling units. Include mounting devices and details.

C. Samples: For each exposed product and for each color and texture specified.

1.4 INFORMATIONAL SUBMITTALS

A. Coordination Drawings: Reflected ceiling plans and other details, drawn to scale and coordinated with each other, using input from installers of the items involved.

B. Product certificates.

1.5 CLOSEOUT SUBMITTALS

A. Maintenance data.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. General Requirements for Sound-Absorbing Ceiling Units: Provide sound-absorbing panels that comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

B. Fire-Test-Response Characteristics: Provide sound-absorbing ceiling units meeting the following requirements as determined by testing identical products by UL or another testing and inspecting agency acceptable to authorities having jurisdiction:

1. Surface-Burning Characteristics: Comply with ASTM E 84; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

    a. Flame-Spread Index: [25] or less.
    b. Smoke-Developed Index: [450] or less.

2. Fire Growth Contribution: Comply with acceptance criteria of local code and authorities having jurisdiction when tested according to [NFPA 265] [NFPA 286].

## 2.2 SOUND-ABSORBING CEILING UNITS <C-10>

A. Sound-Absorbing Ceiling Panel: Manufacturer's standard panel construction consisting of facing stretched over front face of edge-framed core and bonded or attached to edges and back of frame.
    1. Mounting: Back mounted with manufacturer's standard suspension system with stiffening secured to substrate.
    2. Core: Rockwool Rigid Insulation
    3. Edge Profile: Chamfered (beveled)
    4. Corner Detail in Elevation: Square
    5. Reveals between Panels: Exposed Runners
    6. Facing Material: Black Megasorber G8 Non-flammable sound absorption fabric
    7. Acoustical Performance: 8-10dBA Noise Reduction after acoustical treatment.
    8. Nominal Core Thickness: 50mm

## 2.3 MATERIALS

A. Facing Material : Megasorber G8 Non-flammable sound-absorption fabric

    1. Applied Treatments: Stain resistance

B. Mounting Devices: Exposed; recommended by manufacturer to support weight of unit.

## 2.4 FABRICATION

A. General: Use manufacturer's standard construction except as otherwise indicated, with facing material applied to face, edges, and back border of dimensionally stable core and with rigid edges to reinforce panel perimeter against warpage and damage.

B. Measure each area and establish layout of panels and joints of sizes indicated on Drawings within a given area.

C. Facing Material: Apply fabric facing fully covering visible surfaces of unit; with material stretched straight, on the grain, tight, square, and free from puckers, ripples, wrinkles, sags, blisters, seams, adhesive, or other visible distortions or foreign matter.

    1. Fabrics with Directional or Repeating Patterns or Directional Weave: Mark fabric top and attach fabric in same direction so pattern or weave matches adjacent units.

D. Dimensional Tolerances of Finished Units: Plus or minus 1/16 inch (1.6 mm).

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install sound-absorbing ceiling units in locations indicated with edges in alignment with walls and other units, faces flush, and scribed to fit adjoining work accurately at borders and at penetrations.

B. Comply with sound-absorbing ceiling unit manufacturer's written instructions for installation of units using type of mounting devices indicated. Mount units securely to supporting substrate.

C. Align fabric pattern and grain with adjacent units.

D. Clip loose threads; remove pills and extraneous materials.

E. Clean panels on completion of installation to remove dust and other foreign materials according to manufacturer's written instructions.

END OF SECTION 098436

**SECTION 099113**

**EXTERIOR PAINTING**

**(PERFORMANCE SPECIFICATIONS)**

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes surface preparation and the application of paint systems on exterior substrates:

1. Concrete.
2. Concrete masonry units (CMU).
3. Steel.
4. Galvanized metal.
5. Aluminum (not anodized or otherwise coated).
6. Stainless-steel flashing.
7. Wood.
8. Plastic trim fabrications.
9. Exterior portland cement plaster (stucco).
10. Exterior gypsum board.

1.3 DEFINITIONS

A. Gloss Level 1: Not more than 5 units at 60 degrees and 10 units at 85 degrees, according to ASTM D 523.

B. Gloss Level 3: 10 to 25 units at 60 degrees and 10 to 35 units at 85 degrees, according to ASTM D 523.

C. Gloss Level 4: 20 to 35 units at 60 degrees and not less than 35 units at 85 degrees, according to ASTM D 523.

D. Gloss Level 5: 35 to 70 units at 60 degrees, according to ASTM D 523.

E. Gloss Level 6: 70 to 85 units at 60 degrees, according to ASTM D 523.

F. Gloss Level 7: More than 85 units at 60 degrees, according to ASTM D 523.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product. Include preparation requirements and application instructions.

B. Samples for Initial Selection: For each type of topcoat product.

C. Samples for Verification: For each type of paint system and each color and gloss of topcoat.

1. Submit Samples on rigid backing, 8 inches (200 mm) square.
2. Step coats on Samples to show each coat required for system.
3. Label each coat of each Sample.
4. Label each Sample for location and application area.

D. Product List: For each product indicated, include the following:

1. Cross-reference to paint system and locations of application areas. Use same designations indicated on Drawings and in schedules.
2. Printout of current "MPI Approved Products List" for each product category specified, with the proposed product highlighted.
3. VOC content.

## 1.5 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials, from the same product run, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Paint: 5 percent, but not less than 1 gal. (3.8 L) of each material and color applied.

## 1.6 QUALITY ASSURANCE

A. Mockups: Apply mockups of each paint system indicated and each color and finish selected to verify preliminary selections made under Sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.

1. Architect will select one surface to represent surfaces and conditions for application of each paint system specified in Part 3.

a. Vertical and Horizontal Surfaces: Provide samples of at least 100 sq. ft. (9 sq. m).
b. Other Items: Architect will designate items or areas required.

2. Final approval of color selections will be based on mockups.

a. If preliminary color selections are not approved, apply additional mockups of additional colors selected by Architect at no added cost to Owner.

3. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
4. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

## 1.7 DELIVERY, STORAGE, AND HANDLING

A. Store materials not in use in tightly covered containers in well-ventilated areas with ambient temperatures continuously maintained at not less than 45 deg F (7 deg C).

1. Maintain containers in clean condition, free of foreign materials and residue.
2. Remove rags and waste from storage areas daily.

1.8 FIELD CONDITIONS

A. Apply paints only when temperature of surfaces to be painted and ambient air temperatures are between 50 and 95 deg F (10 and 35 deg C).

B. Do not apply paints in snow, rain, fog, or mist; when relative humidity exceeds 85 percent; at temperatures less than 5 deg F (3 deg C) above the dew point; or to damp or wet surfaces.

PART 2 - PRODUCTS

2.1 PAINT, GENERAL

A. MPI Standards: Provide products that comply with MPI standards indicated and that are listed in its "MPI Approved Products List."

B. Material Compatibility:

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

C. VOC Content: Provide materials that comply with VOC limits of authorities having jurisdiction.

D. Colors: Match Architect's samples.

2.2 BLOCK FILLERS

A. Block Filler, Latex, Interior/Exterior: MPI #4.

2.3 PRIMERS/SEALERS

A. Primer, Alkali Resistant, Water Based: MPI #3.

B. Primer, Bonding, Water Based: MPI #17.

C. Primer, Bonding, Solvent Based: MPI #69.

D. Wood-Knot Sealer: Sealer recommended in writing by topcoat manufacturer for exterior use in paint system indicated.

2.4 METAL PRIMERS

A. Primer, Alkyd, Anti-Corrosive for Metal: MPI #79.

B. Primer, Alkyd, Quick Dry, for Metal: MPI #76.

C. Primer, Galvanized, Water Based: MPI #134.

D. Primer, Galvanized: As recommended in writing by topcoat manufacturer.

E. Primer, Quick Dry, for Aluminum: MPI #95.

2.5 WOOD PRIMERS

A. Primer, Latex for Exterior Wood: MPI #6.

B. Primer, Alkyd for Exterior Wood: MPI #5.

C. Primer, Oil for Exterior Wood: MPI #7.

2.6 WATER-BASED PAINTS

A. Latex, Exterior Flat (Gloss Level 1): MPI #10.

B. Latex, Exterior Low Sheen (Gloss Level 3-4): MPI #15.

C. Latex, Exterior Semi-Gloss (Gloss Level 5): MPI #11.

D. Latex, Exterior, Gloss (Gloss Level 6: MPI #119.

E. Light Industrial Coating, Exterior, Water Based (Gloss Level 3): MPI #161

F. Light Industrial Coating, Exterior, Water Based, Semi-Gloss (Gloss Level 5): MPI #163.

G. Light Industrial Coating, Exterior, Water Based, Gloss (Gloss Level 6): MPI #164.

2.7 SOLVENT-BASED PAINTS

A. Alkyd, Exterior Flat (Gloss Level 1): MPI #8.

B. Alkyd, Exterior, Semi-Gloss (Gloss Level 5): MPI #94.

C. Alkyd, Exterior Gloss (Gloss Level 6): MPI #9.

D. Alkyd, Quick Dry, Semi-Gloss (Gloss Level 5): MPI #81.

E. Alkyd, Quick Dry, Gloss (Gloss Level 7): MPI #96.

2.8 TEXTURED AND HIGH-BUILD COATINGS

A. Primer for Textured Coating, Latex, Flat: As recommended in writing by topcoat manufacturer.

B. Intermediate Coat for Textured Coating, Latex, Flat: As recommended in writing by topcoat manufacturer.

C. Textured Coating, Latex, Flat: MPI #42.

D. Primer for Latex, Exterior, High Build: As recommended in writing by topcoat manufacturer.

E. Intermediate Coat for Latex, Exterior, High Build: As recommended in writing by topcoat manufacturer.

F. Latex, Exterior, High Build: MPI #40.

2.9 ALUMINUM PAINT

A. Aluminum Paint: MPI #1.

2.10 FLOOR COATINGS

A. Sealer, Water Based, for Concrete Floors: MPI #99.

B. Sealer, Solvent Based, for Concrete Floors: MPI #104.

C. Floor Paint, Latex, Low Gloss (Maximum Gloss Level 3): MPI #60.

D. Floor Enamel, Alkyd, Gloss (Gloss Level 6): MPI #27.

2.11 SOURCE QUALITY CONTROL

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

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

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.

B. Maximum Moisture Content of Substrates: When measured with an electronic moisture meter as follows:

1. Concrete: 12 percent.
2. Masonry (Clay and CMU): 12 percent.

3. Wood: 15 percent.
4. Portland Cement Plaster: 12 percent.
5. Gypsum Board: 12 percent.

C. Portland Cement Plaster Substrates: Verify that plaster is fully cured.

D. Exterior Gypsum Board Substrates: Verify that finishing compound is sanded smooth.

E. Verify suitability of substrates, including surface conditions and compatibility with existing finishes and primers.

F. Proceed with coating application only after unsatisfactory conditions have been corrected.

1. Application of coating indicates acceptance of surfaces and conditions.

## 3.2 PREPARATION

A. Comply with manufacturer's written instructions and recommendations in "MPI Manual" applicable to substrates and paint systems indicated.

B. Remove hardware, covers, plates, and similar items already in place that are removable and are not to be painted. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and painting.

1. After completing painting operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection.

C. Clean substrates of substances that could impair bond of paints, including dust, dirt, oil, grease, and incompatible paints and encapsulants.

1. Remove incompatible primers and reprime substrate with compatible primers or apply tie coat as required to produce paint systems indicated.

D. Concrete Substrates: Remove release agents, curing compounds, efflorescence, and chalk. Do not paint surfaces if moisture content or alkalinity of surfaces to be painted exceeds that permitted in manufacturer's written instructions.

E. Masonry Substrates: Remove efflorescence and chalk. Do not paint surfaces if moisture content or alkalinity of surfaces or mortar joints exceeds that permitted in manufacturer's written instructions.

F. Steel Substrates: Remove rust, loose mill scale, and shop primer if any. Clean using methods recommended in writing by paint manufacturer[.] [ but not less than the following:]

1. SSPC-SP 2, "Hand Tool Cleaning."
2. SSPC-SP 3, "Power Tool Cleaning."
3. SSPC-SP 7/NACE No. 4, "Brush-off Blast Cleaning."
4. SSPC-SP 11, "Power Tool Cleaning to Bare Metal."

G. Shop-Primed Steel Substrates: Clean field welds, bolted connections, and abraded areas of shop paint, and paint exposed areas with the same material as used for shop priming to comply with SSPC-PA 1 for touching up shop-primed surfaces.

H. Galvanized-Metal Substrates: Remove grease and oil residue from galvanized sheet metal by mechanical methods to produce clean, lightly etched surfaces that promote adhesion of subsequently applied paints.

I. Aluminum Substrates: Remove loose surface oxidation.

J. Wood Substrates:

1. Scrape and clean knots. Before applying primer, apply coat of knot sealer recommended in writing by topcoat manufacturer for exterior use in paint system indicated.
2. Sand surfaces that will be exposed to view, and dust off.
3. Prime edges, ends, faces, undersides, and backsides of wood.
4. After priming, fill holes and imperfections in the finish surfaces with putty or plastic wood filler. Sand smooth when dried.

K. Plastic Trim Fabrication Substrates: Remove dust, dirt, and other foreign material that might impair bond of paints to substrates.

## 3.3 APPLICATION

A. Apply paints according to manufacturer's written instructions and recommendations in "MPI Manual."

1. Use applicators and techniques suited for paint and substrate indicated.
2. Paint surfaces behind movable items same as similar exposed surfaces. Before final installation, paint surfaces behind permanently fixed items with prime coat only.
3. Paint both sides and edges of exterior doors and entire exposed surface of exterior door frames.
4. Paint entire exposed surface of window frames and sashes.
5. Do not paint over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates.
6. Primers specified in painting schedules may be omitted on items that are factory primed or factory finished if acceptable to topcoat manufacturers.

B. Tint undercoats same color as topcoat, but tint each undercoat a lighter shade to facilitate identification of each coat if multiple coats of same material are to be applied. Provide sufficient difference in shade of undercoats to distinguish each separate coat.

C. If undercoats or other conditions show through topcoat, apply additional coats until cured film has a uniform paint finish, color, and appearance.

D. Apply paints to produce surface films without cloudiness, spotting, holidays, laps, brush marks, roller tracking, runs, sags, ropiness, or other surface imperfections. Cut in sharp lines and color breaks.

E. Painting Fire Suppression, Plumbing, HVAC, Electrical, Communication, and Electronic Safety and Security Work:

1. Paint the following work where exposed to view:

a. Equipment, including panelboards and switch gear.
b. Uninsulated metal piping.
c. Uninsulated plastic piping.
d. Pipe hangers and supports.

e. Metal conduit.
f. Plastic conduit.
g. Tanks that do not have factory-applied final finishes.
h. <Insert mechanical items to be painted>.

## 3.4 FIELD QUALITY CONTROL

A. Dry Film Thickness Testing: Owner may engage the services of a qualified testing and inspecting agency to inspect and test paint for dry film thickness.

1. Contractor shall touch up and restore painted surfaces damaged by testing.
2. If test results show that dry film thickness of applied paint does not comply with paint manufacturer's written recommendations, Contractor shall pay for testing and apply additional coats as needed to provide dry film thickness that complies with paint manufacturer's written recommendations.

## 3.5 CLEANING AND PROTECTION

A. At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site.

B. After completing paint application, clean spattered surfaces. Remove spattered paints by washing, scraping, or other methods. Do not scratch or damage adjacent finished surfaces.

C. Protect work of other trades against damage from paint application. Correct damage to work of other trades by cleaning, repairing, replacing, and refinishing, as approved by Architect, and leave in an undamaged condition.

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

## 3.6 EXTERIOR PAINTING SCHEDULE

A. Concrete Substrates, Nontraffic Surfaces:

1. Latex System:

a. Prime Coat: Latex, exterior, matching topcoat.
b. Prime Coat: Primer, alkali resistant, water based[, MPI #3].
c. Intermediate Coat: Latex, exterior, matching topcoat.
d. Topcoat: Latex, exterior flat (Gloss Level 1)[, MPI #10].
e. Topcoat: Latex, exterior, low sheen (Gloss Level 3-4)[, MPI #15].
f. Topcoat: Latex, exterior semi-gloss (Gloss Level 5)[, MPI #11].
g. Topcoat: Latex, exterior gloss (Gloss Level 6)[, MPI #119].

2. Latex Aggregate/Latex System:

a. Prime Coat: Textured coating, latex, flat[, MPI #42].
b. Intermediate Coat: Latex, exterior, matching topcoat.
c. Topcoat: Latex, exterior flat (Gloss Level 1)[, MPI #10].

d. Topcoat: Latex, exterior, low sheen (Gloss Level 3-4)[, MPI #15].
e. Topcoat: Latex, exterior semi-gloss (Gloss Level 5)[, MPI #11].
f. Topcoat: Latex, exterior gloss (Gloss Level 6)[, MPI #119].

3. High-Build Latex System: Dry film thickness not less than 10 mils (0.25 mm).

a. Prime Coat: As recommended in writing by topcoat manufacturer.
b. Intermediate Coat: As recommended in writing by topcoat manufacturer.
c. Topcoat: Latex, exterior, high build[, MPI #40].

4. Latex Aggregate System:

a. Prime Coat: As recommended in writing by topcoat manufacturer.
b. Intermediate Coat: As recommended in writing by topcoat manufacturer.
c. Topcoat: Textured coating, latex, flat[, MPI #42].

B. Concrete Substrates, Traffic Surfaces:

1. Latex Floor Paint System:

a. Prime Coat: Floor paint, latex, low gloss (maximum Gloss Level 3)[, MPI #60].
b. Intermediate Coat: Floor paint, latex, low gloss (maximum Gloss Level 3)[, MPI #60].
c. Topcoat: Floor paint, latex, low gloss (maximum Gloss Level 3)[, MPI #60].

2. Alkyd Floor Enamel System:

a. Prime Coat: Floor enamel, alkyd, gloss (Gloss Level 6)[, MPI #27].
b. Intermediate Coat: Floor enamel, alkyd, gloss (Gloss Level 6)[, MPI #27].
c. Topcoat: Floor enamel, alkyd, gloss (Gloss Level 6)[, MPI #27].
d. Additive: Manufacturer's standard additive to increase skid resistance of painted surface.

3. Water-Based Clear Sealer System:

a. Prime Coat: Sealer, water based, for concrete floors[, MPI #99].
b. Intermediate Coat: Sealer, water based, for concrete floors[, MPI #99].
c. Topcoat: Sealer, water based, for concrete floors[, MPI #99].

4. Solvent-Based Clear Sealer System:

a. Prime Coat: Sealer, solvent based, for concrete floors[, MPI #104].
b. Intermediate Coat: Sealer, solvent based, for concrete floors[, MPI #104].
c. Topcoat: Sealer, solvent based, for concrete floors[, MPI #104].

C. Clay-Masonry Substrates:

1. Latex System:

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

2. High-Build Latex System: Dry film thickness not less than 10 mils (0.25 mm).

    a. Prime Coat: As recommended in writing by topcoat manufacturer.
    b. Intermediate Coat: As recommended in writing by topcoat manufacturer.
    c. Topcoat: Latex, exterior, high build[, MPI #40].

3. Latex Aggregate System:

    a. Prime Coat: As recommended in writing by topcoat manufacturer.
    b. Intermediate Coat: As recommended in writing by topcoat manufacturer.
    c. Topcoat: Textured coating, latex, flat[, MPI #42].

D. CMU Substrates:

1. Latex System:

    a. Prime Coat: Block filler, latex, interior/exterior[, MPI #4].
    b. Intermediate Coat: Latex, exterior, matching topcoat.
    c. Topcoat: Latex, exterior flat (Gloss Level 1)[, MPI #10].
    d. Topcoat: Latex, exterior, low sheen (Gloss Level 3-4)[, MPI #15].
    e. Topcoat: Latex, exterior semi-gloss (Gloss Level 5)[, MPI #11].
    f. Topcoat: Latex, exterior gloss (Gloss Level 6)[, MPI #119].

2. Latex over Alkali-Resistant Primer System:

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

3. High-Build Latex System: Dry film thickness not less than 10 mils (0.25 mm).

    a. Prime Coat: As recommended in writing by topcoat manufacturer.
    b. Intermediate Coat: As recommended in writing by topcoat manufacturer.
    c. Topcoat: Latex, exterior, high build[, MPI #40].

4. Latex Aggregate System:

    a. Prime Coat: As recommended in writing by topcoat manufacturer.
    b. Intermediate Coat: As recommended in writing by topcoat manufacturer.
    c. Topcoat: Textured coating, latex, flat[, MPI #42].

E. Steel Substrates:

1. Water-Based Light Industrial Coating System:

    a. Prime Coat: Primer, alkyd, anti-corrosive for metal[, MPI #79].
    b. Prime Coat: Shop primer specified in Section where substrate is specified.
    c. Intermediate Coat: Light industrial coating, exterior, water based, matching topcoat.
    d. Topcoat: Light industrial coating, exterior, water based (Gloss Level 3)[, MPI #161].

e. Topcoat: Light industrial coating, exterior, water based, semi-gloss (Gloss Level 5)[, MPI #163].
f. Topcoat: Light industrial coating, exterior, water based, gloss (Gloss Level 6)[, MPI #164].

2. Alkyd System:

a. Prime Coat: Primer, alkyd, anticorrosive for metal[, MPI #79].
b. Prime Coat: Shop primer specified in Section where substrate is specified.
c. Intermediate Coat: Exterior alkyd enamel matching topcoat.
d. Topcoat: Alkyd, exterior, flat (Gloss Level 1)[, MPI #8].
e. Topcoat: Alkyd, exterior, semi-gloss (Gloss Level 5)[, MPI #94].
f. Topcoat: Alkyd, exterior, gloss (Gloss Level 6)[, MPI #9].

3. Quick-Drying Enamel System:

a. Prime Coat: Primer, alkyd, quick dry, for metal[, MPI #76].
b. Intermediate Coat: Alkyd, quick dry, matching topcoat.
c. Topcoat: Alkyd, quick dry, semi-gloss (Gloss Level 5)[, MPI #81].
d. Topcoat: Alkyd, quick dry, gloss (Gloss Level 7)[, MPI #96].

4. Aluminum Paint System:

a. Prime Coat: Primer, alkyd, anti-corrosive for metal[, MPI #79].
b. Prime Coat: Shop primer specified in Section where substrate is specified.
c. Intermediate Coat: Aluminum paint[, MPI #1].
d. Topcoat: Aluminum paint[, MPI #1].

F. Galvanized-Metal Substrates:

1. Latex System:

a. Prime Coat: Primer, galvanized, water based[, MPI #134].
b. Prime Coat: Primer, galvanized metal[, as recommended in writing by topcoat manufacturer for exterior use on galvanized-metal substrates with topcoat indicated].
c. Intermediate Coat: Latex, exterior, matching topcoat.
d. Topcoat: Latex, exterior flat (Gloss Level 1)[, MPI #10].
e. Topcoat: Latex, exterior, low sheen (Gloss Level 3-4)[, MPI #15].
f. Topcoat: Latex, exterior semi-gloss (Gloss Level 5)[, MPI #11].
g. Topcoat: Latex, exterior gloss (Gloss Level 6)[, MPI #119].

2. Water-Based Light Industrial Coating System:

a. Prime Coat: Primer, galvanized, water based[, MPI #134].
b. Prime Coat: Primer, galvanized metal[, as recommended in writing by topcoat manufacturer for exterior use on galvanized-metal substrates with topcoat indicated].
c. Intermediate Coat: Light industrial coating, exterior, water based, matching topcoat.
d. Topcoat: Light industrial coating, exterior, water based (Gloss Level 3)[, MPI #161].
e. Topcoat: Light industrial coating, exterior, water based, semi-gloss (Gloss Level 5)[, MPI #163].
f. Topcoat: Light industrial coating, exterior, water based, gloss (Gloss Level 6)[, MPI #164].

3. Alkyd System:

    a. Prime Coat: Primer, galvanized metal[, as recommended in writing by topcoat manufacturer for exterior use on galvanized-metal substrates with topcoat indicated].
    b. Intermediate Coat: Exterior alkyd enamel matching topcoat.
    c. Topcoat: Alkyd, exterior, flat (Gloss Level 5)[, MPI #8].
    d. Topcoat: Alkyd, exterior, semi-gloss (Gloss Level 5)[, MPI #94].
    e. Topcoat: Alkyd, exterior, gloss (Gloss Level 5)[, MPI #9].

G. Aluminum Substrates:

1. Latex System:

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

2. Water-Based Light Industrial Coating System:

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

3. Alkyd System:

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

H. Stainless-Steel Substrates:

1. Latex System:

    a. Prime Coat: Primer, bonding, solvent based[, MPI #69].
    b. Intermediate Coat: Latex, exterior, matching topcoat.
    c. Topcoat: Latex, exterior flat (Gloss Level 1)[, MPI #10].
    d. Topcoat: Latex, exterior, low sheen (Gloss Level 3-4)[, MPI #15].
    e. Topcoat: Latex, exterior semi-gloss (Gloss Level 5)[, MPI #11].
    f. Topcoat: Latex, exterior gloss (Gloss Level 6)[, MPI #119].

2. Water-Based Light Industrial Coating System:

    a. Prime Coat: Primer, quick dry, for aluminum[, MPI #95].
    b. Intermediate Coat: Light industrial coating, exterior, water based, matching topcoat.

c. Topcoat: Light industrial coating, exterior, water based (Gloss Level 3)[, MPI #161].
d. Topcoat: Light industrial coating, exterior, water based, semi-gloss (Gloss Level 5)[, MPI #163].
e. Topcoat: Light industrial coating, exterior, water based, gloss (Gloss Level 6)[, MPI #164].

I. Wood Substrates: Including [wood trim] [architectural woodwork] [doors] [windows] [wood siding] [wood fences] [wood-based panel products] [glued-laminated construction] [exposed joists] [exposed beams] [wood shingles and shakes (excluding roofs)] <Insert description>.

1. Latex System:

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

2. Latex over Alkyd Primer System:

a. Prime Coat: Primer, alkyd for exterior wood[, MPI #5].
b. Prime Coat: Primer, oil for exterior wood[, MPI #7].
c. Intermediate Coat: Latex, exterior, matching topcoat.
d. Topcoat: Latex, exterior flat (Gloss Level 1)[, MPI #10].
e. Topcoat: Latex, exterior, low sheen (Gloss Level 3-4)[, MPI #15].
f. Topcoat: Latex, exterior semi-gloss (Gloss Level 5)[, MPI #11].
g. Topcoat: Latex, exterior gloss (Gloss Level 6)[, MPI #119].

3. Alkyd System:

a. Prime Coat: Primer, alkyd for exterior wood[, MPI #5].
b. Prime Coat: Primer, oil for exterior wood[, MPI #7].
c. Intermediate Coat: Exterior alkyd enamel matching topcoat.
d. Topcoat: Alkyd, exterior, flat (Gloss Level 5)[, MPI #8].
e. Topcoat: Alkyd, exterior, semi-gloss (Gloss Level 5)[, MPI #94].
f. Topcoat: Alkyd, exterior, gloss (Gloss Level 5)[, MPI #9].

J. Wood Substrates, Traffic Surfaces: Including [lumber decking] [stairs] <Insert description>.

1. Latex System:

a. Prime Coat: Primer, latex for exterior wood[, MPI #6].
b. Intermediate Coat: Interior/exterior latex floor and porch (low gloss).
c. Topcoat: Interior/exterior latex floor and porch (low gloss).

1) With additive to increase skid resistance of painted surface.

2. Latex over Alkyd Primer System:

a. Prime Coat: Primer, alkyd for exterior wood[, MPI #5].
b. Intermediate Coat: Interior/exterior latex floor and porch (low gloss).
c. Topcoat: Interior/exterior latex floor and porch (low gloss).

1) With additive to increase skid resistance of painted surface.

3. Alkyd Floor Enamel System:

a. Prime Coat: Floor enamel, alkyd, gloss (Gloss Level 6)[, MPI #27].
b. Intermediate Coat: Floor enamel, alkyd, gloss (Gloss Level 6)[, MPI #27].
c. Topcoat: Floor enamel, alkyd, gloss (Gloss Level 6)[, MPI #27].
d. Additive: Manufacturer's standard additive to increase skid resistance of painted surface.

K. Plastic Trim Fabrication Substrates:

1. Latex System:

a. Prime Coat: Primer, bonding, water based[, MPI #17].
b. Prime Coat: Primer, bonding, solvent based[, MPI #69].
c. Intermediate Coat: Latex, exterior, matching topcoat.
d. Topcoat: Latex, exterior flat (Gloss Level 1)[, MPI #10].
e. Topcoat: Latex, exterior, low sheen (Gloss Level 3-4)[, MPI #15].
f. Topcoat: Latex, exterior semi-gloss (Gloss Level 5)[, MPI #11].
g. Topcoat: Latex, exterior gloss (Gloss Level 6)[, MPI #119].

2. Alkyd System:

a. Prime Coat: Primer, bonding, water based[, MPI #17].
b. Prime Coat: Primer, bonding, solvent based[, MPI #69].
c. Intermediate Coat: Exterior alkyd enamel matching topcoat.
d. Topcoat: Alkyd, exterior, flat (Gloss Level 5)[, MPI #8].
e. Topcoat: Alkyd, exterior, semi-gloss (Gloss Level 5)[, MPI #94].
f. Topcoat: Alkyd, exterior, gloss (Gloss Level 5)[, MPI #9].

L. Portland Cement Plaster Substrates:

1. Latex System:

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

2. Latex over Alkali-Resistant Primer System:

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

3. High-Build Latex System: Dry film thickness not less than 10 mils (0.25 mm).

a. Prime Coat: As recommended in writing by topcoat manufacturer.

b. Intermediate Coat: As recommended in writing by topcoat manufacturer.
c. Topcoat: Latex, exterior, high build[, MPI #40].

M. Exterior Gypsum Board Substrates:

1. Latex System:

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

END OF SECTION 099113

**SECTION 099123**

**INTERIOR PAINTING**

**(PERFORMANCE SPECIFICATIONS)**

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 surface preparation and the application of paint systems on the following interior substrates:

1. Concrete.
2. Ferrous metals
3. Wood.
4. Gypsum board.
5. Concrete masonry units (CMU).
6. Steel.
7. Cast iron.
8. Galvanized metal.
9. Aluminum (not anodized or otherwise coated).
10. Gypsum board.
11. Plaster.

1.3 SUBMITTALS

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

B. Samples for Verification: For each type of paint system and in each color and gloss of topcoat indicated.

1. Submit Samples on rigid backing, 8 inches square.
2. Step coats on Samples to show each coat required for system.
3. Label each coat of each Sample.
4. Label each Sample for location and application area.

QUALITY ASSURANCE

A. MPI (Master Painting Institute) Standards:

1. Products: Complying with MPI standards indicated and listed in "MPI Approved Products List."
2. Preparation and Workmanship: Comply with requirements in "MPI Architectural Painting Specification Manual" for products and paint systems indicated.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Store materials not in use in tightly covered containers in well-ventilated areas with ambient temperatures continuously maintained at not less than 45 deg F.

1. Maintain containers in clean condition, free of foreign materials and residue.
2. Remove rags and waste from storage areas daily.

1.5 PROJECT CONDITIONS

A. Apply paints only when temperature of surfaces to be painted and ambient air temperatures are between 10 and 35 deg C.

B. Do not apply paints when relative humidity exceeds 85 percent; or to damp or wet surfaces.

1.6 EXTRA MATERIALS

A. Furnish extra materials described below that are from same production run (batch mix) as materials applied and that are packaged for storage and identified with labels describing contents.

1. Quantity: Furnish an additional 5 percent, but not less than 4 liters. of each material and color applied.

PART 2.0 PRODUCTS

2.1 PAINT, GENERAL

A. Material Compatibility:

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

B. Chemical Components of Field-Applied Interior Paints and Coatings: Provide products that comply with the following limits for VOC content, exclusive of colorants added to a tint base, when calculated according to 40 CFR 59, Subpart D (EPA Method 24) and the following chemical restrictions; these requirements do not apply to primers or finishes that are applied in a fabrication or finishing shop:

1. Flat Paints and Coatings: VOC content of not more than 50 g/L.
2. Nonflat Paints and Coatings: VOC content of not more than 150 g/L.
3. Aromatic Compounds: Paints and coatings shall not contain more than 1.0 percent by weight of total aromatic compounds (hydrocarbon compounds containing one or more benzene rings).
4. Restricted Components: Paints and coatings shall not contain any of the following:

a. Acrolein.
b. Acrylonitrile.
c. Antimony.

d. Benzene.
e. Butyl benzyl phthalate.
f. Cadmium.
g. Di (2-ethylhexyl) phthalate.
h. Di-n-butyl phthalate.
i. Di-n-octyl phthalate.
j. 1,2-dichlorobenzene.
k. Diethyl phthalate.
l. Dimethyl phthalate.
m. Ethylbenzene.
n. Formaldehyde.
o. Hexavalent chromium.
p. Isophorone.
q. Lead.
r. Mercury.
s. Methyl ethyl ketone.
t. Methyl isobutyl ketone.
u. Methylene chloride.
v. Naphthalene.
w. Toluene (methylbenzene).
x. 1,1,1-trichloroethane.
y. Vinyl chloride.

C. Colors: As indicated in on drawings.

2.2 PRIMERS/SEALERS

A. Interior Latex Primer/Sealer.
1. VOC Content: 0.00% lbs/gal.

2.3 METAL PRIMERS

A. Acrylic Metal Primer
1. VOC Content: 0.97 lbs/gal

2.4 LATEX PAINTS

A. Institutional Low-Odor/VOC Latex (Flat): MPI #143 (Gloss Level 1).
1. VOC Content: 0.00 lbs/gal.

B. Institutional Low-Odor/VOC Latex (Eggshell): MPI #145 (Gloss Level 3).
1. VOC Content: 0.00 lbs/gal.

C. Institutional Low-Odor/VOC Latex (Semigloss): MPI #147 (Gloss Level 5).
1. VOC Content: 0.00 lbs/gal.

2.5 ENAMELS

A. Enamel:
1. VOC Content: 1.87 lbs/gal. (Satin), 1. 66 lbs/gal. (High gloss)

2.6 FLOOR COATINGS

A. Interior/Exterior Clear Concrete Floor Sealer (Water Based):
1. VOC Content: 1.30 lbs/gal.

2.7 BLOCK FILLERS

A. Block Filler, Latex, Interior/Exterior: MPI #4.

2.8 PRIMERS/SEALERS

A. Primer Sealer, Latex, Interior: MPI #50.

B. Primer, Alkali Resistant, Water Based: MPI #3.

C. Primer Sealer, Interior, Institutional Low Odor/VOC: MPI #149.

D. Primer, Latex, for Interior Wood: MPI #39.

E. Primer Sealer, Alkyd, Interior: MPI #45.

F. Primer, Bonding, Water Based: MPI #17.

G. Primer, Bonding, Solvent Based: MPI #69.

H. Wood-Knot Sealer: Sealer recommended in writing by topcoat manufacturer for use in paint systems indicated.

2.9 METAL PRIMERS

A. Primer, Rust-Inhibitive, Water Based: MPI #107.

B. Primer, Alkyd, Anti-Corrosive, for Metal: MPI #79.

C. Primer, Alkyd, Quick Dry, for Metal: MPI #76.

D. Primer, Galvanized, Water Based: MPI #134.

E. Primer, Vinyl Wash: MPI #80.

F. Primer, Quick Dry, for Aluminum:[ MPI #95.]

2.10 WATER-BASED PAINTS

A. Latex, Interior, Flat, (Gloss Level 1): MPI #53.

B. Latex, Interior, (Gloss Level 2): MPI #44.

C. Latex, Interior, (Gloss Level 3): MPI #52.

D. Latex, Interior, (Gloss Level 4): MPI #43.

E. Latex, Interior, Semi-Gloss, (Gloss Level 5):[ MPI #54.]

F. Latex, Interior, Gloss, (Gloss Level 6, except minimum gloss of 65 units at 60 degrees): MPI #114.

G. Latex, Interior, Institutional Low Odor/VOC, Flat (Gloss Level 1): MPI #143.

H. Latex, Interior, Institutional Low Odor/VOC, (Gloss Level 2): MPI #144.

I. Latex, Interior, Institutional Low Odor/VOC, (Gloss Level 3): MPI #145.

J. Latex, Interior, Institutional Low Odor/VOC, Semi-Gloss (Gloss Level 5): MPI #147.

K. Latex, Interior, High Performance Architectural, (Gloss Level 2): MPI #138.

L. Latex, Interior, High Performance Architectural, (Gloss Level 3): MPI #139.

M. Latex, Interior, High Performance Architectural, (Gloss Level 4): MPI #140.

N. Latex, Interior, High Performance Architectural, Semi-Gloss (Gloss Level 5): MPI #141.

O. Light Industrial Coating, Interior, Water Based (Gloss Level 3): MPI #151.

P. Light Industrial Coating, Interior, Water Based, Semi-Gloss (Gloss Level 5): MPI #153.

Q. Light Industrial Coating, Interior, Water Based, Gloss (Gloss Level 6): MPI #154.

2.11 SOLVENT-BASED PAINTS

A. Alkyd, Interior, Flat (Gloss Level 1): MPI #49.

B. Alkyd, Interior, (Gloss Level 3): MPI #51.

C. Alkyd, Interior, Semi-Gloss (Gloss Level 5): MPI #47.

D. Alkyd, Interior, Gloss (Gloss Level 6): MPI #48.

E. Alkyd, Quick Dry, Semi-Gloss (Gloss Level 5): MPI #81.

F. Alkyd, Quick Dry, Gloss (Gloss Level 7): MPI #96.

2.12 TEXTURED COATING

A. Primer for Textured Coating, Latex, Flat: As recommended in writing by topcoat manufacturer.

B. Intermediate Coat for Textured Coating, Latex, Flat: As recommended in writing by topcoat manufacturer.

C. Textured Coating, Latex, Flat: MPI #42.

2.13 DRY FOG/FALL COATINGS

A. Dry Fall, Latex, Flat: MPI #118.

B. Dry Fall, Water Based, for Galvanized Steel, Flat (Gloss Level 1): MPI #133.

C. Dry Fall, Alkyd, Flat: MPI #55.

2.14 ALUMINUM PAINT

A. Aluminum Paint MPI #1.

2.15 FLOOR COATINGS

A. Stain, Interior, for Concrete Floors: MPI #58.

B. Sealer, Water Based, for Concrete Floors: MPI #99

C. Sealer, Solvent Based, for Concrete Floors: MPI #104.

D. Floor Paint, Latex, Low Gloss (Maximum Gloss Level 3): MPI #60.

E. Floor Enamel, Alkyd, Gloss (Gloss Level 6): MPI #27.

2.16 SOURCE QUALITY CONTROL

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

PART 3.0 EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.

B. Maximum Moisture Content of Substrates: When measured with an electronic moisture meter as follows:
   1. Concrete: 12 percent.
   2. Masonry (Clay and CMU): 12 percent.
   3. Wood: 15 percent.
   4. Gypsum Board: 12 percent.
   5. Plaster: 12 percent.

C. Gypsum Board Substrates: Verify that finishing compound is sanded smooth.

D. Plaster Substrates: Verify that plaster is fully cured.

E. Spray-Textured Ceiling Substrates: Verify that surfaces are dry.

F. Verify suitability of substrates, including surface conditions and compatibility with existing finishes and primers.

G. Proceed with coating application only after unsatisfactory conditions have been corrected.
   1. Application of coating indicates acceptance of surfaces and conditions.

3.2 PREPARATION

A. Comply with manufacturer's written instructions and recommendations in "MPI Manual" applicable to substrates indicated.

B. Remove hardware, covers, plates, and similar items already in place that are removable and are not to be painted. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and painting.
   1. After completing painting operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection if any.

C. Clean substrates of substances that could impair bond of paints, including dust, dirt, oil, grease, and incompatible paints and encapsulants.
   1. Remove incompatible primers and reprime substrate with compatible primers or apply tie coat as required to produce paint systems indicated.

D. Concrete Substrates: Remove release agents, curing compounds, efflorescence, and chalk. Do not paint surfaces if moisture content or alkalinity of surfaces to be painted exceeds that permitted in manufacturer's written instructions.

E. Masonry Substrates: Remove efflorescence and chalk. Do not paint surfaces if moisture content or alkalinity of surfaces or mortar joints exceed that permitted in manufacturer's written instructions.

F. Steel Substrates: Remove rust, loose mill scale, and shop primer, if any. Clean using methods recommended in writing by paint manufacturer but not less than the following:
   1. SSPC-SP 2, "Hand Tool Cleaning."
   2. SSPC-SP 3, "Power Tool Cleaning."
   3. SSPC-SP 7/NACE No. 4, "Brush-off Blast Cleaning."
   4. SSPC-SP 11, "Power Tool Cleaning to Bare Metal."

G. Shop-Primed Steel Substrates: Clean field welds, bolted connections, and abraded areas of shop paint, and paint exposed areas with the same material as used for shop priming to comply with SSPC-PA 1 for touching up shop-primed surfaces.

H. Galvanized-Metal Substrates: Remove grease and oil residue from galvanized sheet metal fabricated from coil stock by mechanical methods to produce clean, lightly etched surfaces that promote adhesion of subsequently applied paints.

I. Aluminum Substrates: Remove loose surface oxidation.

J. Wood Substrates:

1. Scrape and clean knots, and apply coat of knot sealer before applying primer.
2. Sand surfaces that will be exposed to view, and dust off.
3. Prime edges, ends, faces, undersides, and backsides of wood.
4. After priming, fill holes and imperfections in the finish surfaces with putty or plastic wood filler. Sand smooth when dried.

K. Cotton or Canvas Insulation Covering Substrates: Remove dust, dirt, and other foreign material that might impair bond of paints to substrates.

3.3 APPLICATION

A. Apply paints according to manufacturer's written instructions and to recommendations in "MPI Manual."
1. Use applicators and techniques suited for paint and substrate indicated.
2. Paint surfaces behind movable equipment and furniture same as similar exposed surfaces. Before final installation, paint surfaces behind permanently fixed equipment or furniture with prime coat only.
3. Paint front and backsides of access panels, removable or hinged covers, and similar hinged items to match exposed surfaces.
4. Do not paint over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates.
5. Primers specified in painting schedules may be omitted on items that are factory primed or factory finished if acceptable to topcoat manufacturers.

B. Tint each undercoat a lighter shade to facilitate identification of each coat if multiple coats of same material are to be applied. Tint undercoats to match color of topcoat, but provide sufficient difference in shade of undercoats to distinguish each separate coat.

C. If undercoats or other conditions show through topcoat, apply additional coats until cured film has a uniform paint finish, color, and appearance.

D. Apply paints to produce surface films without cloudiness, spotting, holidays, laps, brush marks, roller tracking, runs, sags, ropiness, or other surface imperfections. Cut in sharp lines and color breaks.

E. Painting Fire Suppression, Plumbing, HVAC, Electrical, Communication, and Electronic Safety and Security Work:
1. Paint the following work where exposed in equipment rooms:
    a. Equipment, including panelboards and switch gear.
    b. Uninsulated metal piping.
    c. Uninsulated plastic piping.
    d. Pipe hangers and supports.
    e. Metal conduit.
    f. Plastic conduit.
    g. Tanks that do not have factory-applied final finishes.
    h. Duct, equipment, and pipe insulation having cotton or canvas insulation covering or other paintable jacket material.
2. Paint the following work where exposed in occupied spaces:
    a. Equipment, including panelboards.
    b. Uninsulated metal piping.
    c. Uninsulated plastic piping.
    d. Pipe hangers and supports.
    e. Metal conduit.
    f. Plastic conduit.

g. Duct, equipment, and pipe insulation having cotton or canvas insulation covering or other paintable jacket material.
h. Other items as directed by Architect.

3. Paint portions of internal surfaces of metal ducts, without liner, behind air inlets and outlets that are visible from occupied spaces.

## 3.4 FIELD QUALITY CONTROL

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

## 3.5 CLEANING AND PROTECTION

A. At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site.

B. After completing paint application, clean spattered surfaces. Remove spattered paints by washing, scraping, or other methods. Do not scratch or damage adjacent finished surfaces.

C. Protect work of other trades against damage from paint application. Correct damage to work of other trades by cleaning, repairing, replacing, and refinishing, as approved by Architect, and leave in an undamaged condition.

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

## 3.6 INTERIOR PAINTING SCHEDULE

A. Concrete Substrates, Nontraffic Surfaces:
1. Latex System:
a. Prime Coat: Primer sealer, latex, interior[, MPI #50].
b. Prime Coat: Latex, interior, matching topcoat.
c. Intermediate Coat: Latex, interior, matching topcoat.
d. Topcoat: Latex, interior, flat, (Gloss Level 1)[, MPI #53].
e. Topcoat: Latex, interior, (Gloss Level 2)[, MPI #44].
f. Topcoat: Latex, interior, (Gloss Level 3)[, MPI #52].
g. Topcoat: Latex, interior, (Gloss Level 4)[, MPI #43].
h. Topcoat: Latex, interior, semi-gloss, (Gloss Level 5)[, MPI #54].
i. Topcoat: Latex, interior, gloss, (Gloss Level 6, except minimum gloss of 65 units at 60 degrees)[, MPI #114].
2. Latex over Latex Aggregate System:
a. Prime Coat: Textured coating, latex, flat[, MPI #42].
b. Intermediate Coat: Latex, interior, matching topcoat.
c. Topcoat: Latex, interior, flat, (Gloss Level 1)[, MPI #53].
d. Topcoat: Latex, interior, (Gloss Level 2)[, MPI #44].

e. Topcoat: Latex, interior, (Gloss Level 3)[, MPI #52].
f. Topcoat: Latex, interior, (Gloss Level 4)[, MPI #43].
g. Topcoat: Latex, interior, semi-gloss, (Gloss Level 5)[, MPI #54].
h. Topcoat: Latex, interior, gloss, (Gloss Level 6, except minimum gloss of 65 units at 60 degrees)[, MPI #114].

3. Institutional Low-Odor/VOC Latex System:
   a. Prime Coat: Primer sealer, interior, institutional low odor/VOC[, MPI #149].
   b. Intermediate Coat: Latex, interior, institutional low odor/VOC, matching topcoat.
   c. Topcoat: Latex, interior, institutional low odor/VOC, flat (Gloss Level 1)[, MPI #143].
   d. Topcoat: Latex, interior, institutional low odor/VOC, (Gloss Level 2)[, MPI #144].
   e. Topcoat: Latex, interior, institutional low odor/VOC, (Gloss Level 3)[, MPI #145].
   f. Topcoat: Latex, interior, institutional low odor/VOC, semi-gloss (Gloss Level 5)[, MPI #147].
4. High-Performance Architectural Latex System:
   a. Prime Coat: Primer, alkali resistant, water based[, MPI #3].
   b. Intermediate Coat: Latex, interior, high performance architectural, matching topcoat.
   c. Topcoat: Latex, interior, high performance architectural, (Gloss Level 2)[, MPI #138].
   d. Topcoat: Latex, interior, high performance architectural, (Gloss Level 3)[, MPI #139].
   e. Topcoat: Latex, interior, high performance architectural, (Gloss Level 4)[, MPI #140].
   f. Topcoat: Latex, interior, high performance architectural, semi-gloss (Gloss Level 5)[, MPI #141].
5. Water-Based Light Industrial Coating System:
   a. Prime Coat: Primer, alkali resistant, water based[, MPI #3].
   b. Intermediate Coat: Light industrial coating, interior, water based, matching topcoat.
   c. Topcoat: Light industrial coating, interior, water based (Gloss Level 3)[, MPI #151].
   d. Topcoat: Light industrial coating, interior, water based, semi-gloss (Gloss Level 5)[, MPI #153].
   e. Topcoat: Light industrial coating, interior, water based, gloss (Gloss Level 6)[, MPI #154].
6. Alkyd System:
   a. Prime Coat: Primer, alkali resistant, water based[, MPI #3].
   b. Intermediate Coat: Alkyd, interior, matching topcoat.
   c. Topcoat: Alkyd, interior, flat (Gloss Level 1)[, MPI #49].
   d. Topcoat: Alkyd, interior, (Gloss Level 3)[, MPI #51].
   e. Topcoat: Alkyd, interior, semi-gloss (Gloss Level 5)[, MPI #47].
   f. Topcoat: Alkyd, interior, gloss (Gloss Level 6)[, MPI #48].

B. Concrete Substrates, Traffic Surfaces:
1. Latex Floor Enamel System:
   a. Prime Coat: Floor paint, latex, low gloss (maximum Gloss Level 3)[, MPI #60].
   b. Intermediate Coat: Floor paint, latex, low gloss (maximum Gloss Level 3)[, MPI #60].
   c. Topcoat: Floor paint, latex, low gloss (maximum Gloss Level 3)[, MPI #60].
2. Alkyd Floor Enamel System:
   a. Prime Coat: Floor enamel, alkyd, gloss (Gloss Level 6)[, MPI #27].
   b. Intermediate Coat: Floor enamel, alkyd, gloss (Gloss Level 6)[, MPI #27].
   c. Topcoat: Floor enamel, alkyd, gloss (Gloss Level 6)[, MPI #27].
3. Concrete Stain System:
   a. First Coat: Stain, interior, for concrete floors[, MPI #58].
   b. Topcoat: Stain, interior, for concrete floors[, MPI #58].
4. Water-Based Clear Sealer System:
   a. First Coat: Sealer, water based, for concrete floors[, MPI #99].
   b. Topcoat: Sealer, water based, for concrete floors[, MPI #99].
5. Solvent-Based Clear Sealer System:

a. First Coat: Sealer, solvent based, for concrete floors[, MPI #104].
b. Topcoat: Sealer, solvent based, for concrete floors[, MPI #104].

C. Clay-Masonry Substrates:
1. Latex System:
a. Prime Coat: Latex, interior, matching topcoat.
b. Intermediate Coat: Latex, interior, matching topcoat.
c. Topcoat: Latex, interior, flat, (Gloss Level 1)[, MPI #53].
d. Topcoat: Latex, interior, (Gloss Level 2)[, MPI #44].
e. Topcoat: Latex, interior, (Gloss Level 3)[, MPI #52].
f. Topcoat: Latex, interior, (Gloss Level 4)[, MPI #43].
g. Topcoat: Latex, interior, semi-gloss, (Gloss Level 5)[, MPI #54].
h. Topcoat: Latex, interior, gloss, (Gloss Level 6, except minimum gloss of 65 units at 60 degrees)[, MPI #114].
2. Latex Aggregate System:
a. Prime Coat: Primer for textured coating, latex, flat[, as recommended in writing by topcoat manufacturer].
b. Intermediate Coat: Intermediate coat for textured coating, latex, flat[, as recommended in writing by topcoat manufacturer].
c. Topcoat: Textured coating, latex, flat[, MPI #42].
3. Institutional Low-Odor/VOC Latex System:
a. Prime Coat: Primer sealer, interior, institutional low odor/VOC[, MPI #149].
b. Intermediate Coat: Latex, interior, institutional low odor/VOC, matching topcoat.
c. Topcoat: Latex, interior, institutional low odor/VOC, flat (Gloss Level 1)[, MPI #143].
d. Topcoat: Latex, interior, institutional low odor/VOC, (Gloss Level 2)[, MPI #144].
e. Topcoat: Latex, interior, institutional low odor/VOC, (Gloss Level 3)[, MPI #145].
f. Topcoat: Latex, interior, institutional low odor/VOC, semi-gloss (Gloss Level 5)[, MPI #147].
4. High-Performance Architectural Latex System:
a. Prime Coat: Primer, alkali resistant, water based[, MPI #3].
b. Intermediate Coat: Latex, interior, high performance architectural, matching topcoat.
c. Topcoat: Latex, interior, high performance architectural, (Gloss Level 2)[, MPI #138].
d. Topcoat: Latex, interior, high performance architectural, (Gloss Level 3)[, MPI #139].
e. Topcoat: Latex, interior, high performance architectural, (Gloss Level 4)[, MPI #140].
f. Topcoat: Latex, interior, high performance architectural, semi-gloss (Gloss Level 5)[, MPI #141].
5. Water-Based Light Industrial Coating System:
a. Prime Coat: Primer, alkali resistant, water based[, MPI #3].
b. Intermediate Coat: Light industrial coating, interior, water based, matching topcoat.
c. Topcoat: Light industrial coating, interior, water based (Gloss Level 3)[, MPI #151].
d. Topcoat: Light industrial coating, interior, water based, semi-gloss (Gloss Level 5)[, MPI #153].
e. Topcoat: Light industrial coating, interior, water based, gloss (Gloss Level 6)[, MPI #154].
6. Alkyd System:
a. Prime Coat: Primer sealer, latex, interior[, MPI #50].
b. Intermediate Coat: Alkyd, interior, matching topcoat.
c. Topcoat: Alkyd, interior, flat (Gloss Level 1)[, MPI #49].
d. Topcoat: Alkyd, interior, (Gloss Level 3)[, MPI #51].
e. Topcoat: Alkyd, interior, semi-gloss (Gloss Level 5)[, MPI #47].
f. Topcoat: Alkyd, interior, gloss (Gloss Level 6)[, MPI #48].

D. CMU Substrates:

1. Latex System:
   a. Block Filler: Block filler, latex, interior/exterior[, MPI #4].
   b. Intermediate Coat: Latex, interior, matching topcoat.
   c. Topcoat: Latex, interior, flat, (Gloss Level 1)[, MPI #53].
   d. Topcoat: Latex, interior, (Gloss Level 2)[, MPI #44].
   e. Topcoat: Latex, interior, (Gloss Level 3)[, MPI #52].
   f. Topcoat: Latex, interior, (Gloss Level 4)[, MPI #43].
   g. Topcoat: Latex, interior, semi-gloss, (Gloss Level 5)[, MPI #54].
   h. Topcoat: Latex, interior, gloss, (Gloss Level 6, except minimum gloss of 65 units at 60 degrees)[, MPI #114].
2. Institutional Low-Odor/VOC Latex System:
   a. Block Filler: Block filler, latex, interior/exterior[, MPI #4].
   b. Intermediate Coat: Latex, interior, institutional low odor/VOC, matching topcoat.
   c. Topcoat: Latex, interior, institutional low odor/VOC, flat (Gloss Level 1)[, MPI #143].
   d. Topcoat: Latex, interior, institutional low odor/VOC, (Gloss Level 2)[, MPI #144].
   e. Topcoat: Latex, interior, institutional low odor/VOC, (Gloss Level 3)[, MPI #145].
   f. Topcoat: Latex, interior, institutional low odor/VOC, semi-gloss (Gloss Level 5)[, MPI #147].
3. High-Performance Architectural Latex System:
   a. Block Filler: Block filler, latex, interior/exterior[, MPI #4].
   b. Intermediate Coat: Latex, interior, high performance architectural, matching topcoat.
   c. Topcoat: Latex, interior, high performance architectural, (Gloss Level 2)[, MPI #138].
   d. Topcoat: Latex, interior, high performance architectural, (Gloss Level 3)[, MPI #139].
   e. Topcoat: Latex, interior, high performance architectural, (Gloss Level 4)[, MPI #140].
   f. Topcoat: Latex, interior, high performance architectural, semi-gloss (Gloss Level 5)[, MPI #141].
4. Water-Based Light Industrial Coating System:
   a. Block Filler: Block filler, latex, interior/exterior[, MPI #4].
   b. Intermediate Coat: Light industrial coating, interior, water based, matching topcoat.
   c. Topcoat: Light industrial coating, interior, water based (Gloss Level 3)[, MPI #151].
   d. Topcoat: Light industrial coating, interior, water based, semi-gloss (Gloss Level 5)[, MPI #153].
   e. Topcoat: Light industrial coating, interior, water based, gloss (Gloss Level 6)[, MPI #154].
5. Alkyd System:
   a. Block Filler: Block filler, latex, interior/exterior[, MPI #4].
   b. Sealer Coat: Primer sealer, latex, interior[, MPI #50].
   c. Intermediate Coat: Alkyd, interior, matching topcoat.
   d. Topcoat: Alkyd, interior, flat (Gloss Level 1)[, MPI #49].
   e. Topcoat: Alkyd, interior, (Gloss Level 3)[, MPI #51].
   f. Topcoat: Alkyd, interior, semi-gloss (Gloss Level 5)[, MPI #47].
   g. Topcoat: Alkyd, interior, gloss (Gloss Level 6)[, MPI #48].

E. Steel Substrates:
1. Latex over Alkyd Primer System:
   a. Prime Coat: Primer, alkyd, anti-corrosive, for metal[, MPI #79].
   b. Prime Coat: Primer, alkyd, quick dry, for metal[, MPI #76].
   c. Prime Coat: Primer, alkyd, anti-corrosive, for metal[, MPI #79] or primer, alkyd, quick dry, for metal[, MPI #76].
   d. Prime Coat: Shop primer specified in Section where substrate is specified.
   e. Intermediate Coat: Latex, interior, matching topcoat.
   f. Topcoat: Latex, interior, flat, (Gloss Level 1)[, MPI #53].
   g. Topcoat: Latex, interior, (Gloss Level 2)[, MPI #44].

h. Topcoat: Latex, interior, (Gloss Level 3)[, MPI #52].
i. Topcoat: Latex, interior, (Gloss Level 4)[, MPI #43].
j. Topcoat: Latex, interior, semi-gloss, (Gloss Level 5)[, MPI #54].
k. Topcoat: Latex, interior, gloss, (Gloss Level 6, except minimum gloss of 65 units at 60 degrees)[, MPI #114].

2. Water-Based Dry-Fall System:
   a. Prime Coat: Primer, alkyd, anti-corrosive, for metal[, MPI #79].
   b. Prime Coat: Primer, alkyd, quick dry, for metal[, MPI #76].
   c. Prime Coat: Primer, alkyd, anti-corrosive, for metal[, MPI #79] or primer, alkyd, quick dry, for metal[, MPI #76].
   d. Prime Coat: Shop primer specified in Section where substrate is specified.
   e. Topcoat: Dry fall, latex, flat[, MPI #118].
   f. Topcoat: Dry fall, water based, for galvanized steel, flat (Gloss Level 1)[, MPI #133].
3. Institutional Low-Odor/VOC Latex System:
   a. Prime Coat: Primer, rust-inhibitive, water based[ MPI #107].
   b. Intermediate Coat: Latex, interior, institutional low odor/VOC, matching topcoat.
   c. Topcoat: Latex, interior, institutional low odor/VOC, flat (Gloss Level 1)[, MPI #143].
   d. Topcoat: Latex, interior, institutional low odor/VOC, (Gloss Level 2)[, MPI #144].
   e. Topcoat: Latex, interior, institutional low odor/VOC, (Gloss Level 3)[, MPI #145].
   f. Topcoat: Latex, interior, institutional low odor/VOC, semi-gloss (Gloss Level 5)[, MPI #147].
4. High-Performance Architectural Latex System:
   a. Prime Coat: Primer, alkyd, anti-corrosive, for metal[, MPI #79].
   b. Prime Coat: Primer, alkyd, quick dry, for metal[, MPI #76].
   c. Prime Coat: Primer, alkyd, anti-corrosive, for metal[, MPI #79] or primer, alkyd, quick dry, for metal[, MPI #76].
   d. Prime Coat: Shop primer specified in Section where substrate is specified.
   e. Intermediate Coat: Latex, interior, high performance architectural, matching topcoat.
   f. Topcoat: Latex, interior, high performance architectural, (Gloss Level 2)[, MPI #138].
   g. Topcoat: Latex, interior, high performance architectural, (Gloss Level 3)[, MPI #139].
   h. Topcoat: Latex, interior, high performance architectural, (Gloss Level 4)[, MPI #140].
   i. Topcoat: Latex, interior, high performance architectural, semi-gloss (Gloss Level 5)[, MPI #141].
5. Water-Based Light Industrial Coating System:
   a. Prime Coat: Primer, rust-inhibitive, water based[ MPI #107].
   b. Intermediate Coat: Light industrial coating, interior, water based, matching topcoat.
   c. Topcoat: Light industrial coating, interior, water based (Gloss Level 3)[, MPI #151].
   d. Topcoat: Light industrial coating, interior, water based, semi-gloss (Gloss Level 5)[, MPI #153].
   e. Topcoat: Light industrial coating, interior, water based, gloss (Gloss Level 6)[, MPI #154].
6. Alkyd System:
   a. Prime Coat: Primer, alkyd, anti-corrosive, for metal[, MPI #79].
   b. Prime Coat: Primer, alkyd, quick dry, for metal[, MPI #76].
   c. Prime Coat: Primer, alkyd, anti-corrosive, for metal[, MPI #79] or primer, alkyd, quick dry, for metal[, MPI #76].
   d. Prime Coat: Shop primer specified in Section where substrate is specified.
   e. Intermediate Coat: Alkyd, interior, matching topcoat.
   f. Topcoat: Alkyd, interior, flat (Gloss Level 1)[, MPI #49].
   g. Topcoat: Alkyd, interior, (Gloss Level 3)[, MPI #51].
   h. Topcoat: Alkyd, interior, semi-gloss (Gloss Level 5)[, MPI #47].
   i. Topcoat: Alkyd, interior, gloss (Gloss Level 6)[, MPI #48].
7. Quick-Drying Enamel System:

a. Prime Coat: Primer, alkyd, quick dry, for metal[, MPI #76].
b. Intermediate Coat: Alkyd, quick dry, matching topcoat.
c. Topcoat: Alkyd, quick dry, semi-gloss (Gloss Level 5)[, MPI #81].
d. Topcoat: Alkyd, quick dry, gloss (Gloss Level 7)[, MPI #96].

8. Alkyd Dry-Fall System:
   a. Prime Coat: Primer, alkyd, anti-corrosive, for metal[, MPI #79].
   b. Prime Coat: Primer, alkyd, quick dry, for metal[, MPI #76].
   c. Prime Coat: Primer, alkyd, anti-corrosive, for metal[, MPI #79] or primer, alkyd, quick dry, for metal[, MPI #76].
   d. Prime Coat: Shop primer specified in Section where substrate is specified.
   e. Topcoat: Dry fall, alkyd, flat[, MPI #55].
9. Aluminum Paint System:
   a. Prime Coat: Primer, alkyd, anti-corrosive, for metal[, MPI #79].
   b. Prime Coat: Primer, alkyd, quick dry, for metal[, MPI #76].
   c. Prime Coat: Primer, alkyd, anti-corrosive, for metal[, MPI #79] or primer, alkyd, quick dry, for metal[, MPI #76].
   d. Prime Coat: Shop primer specified in Section where substrate is specified.
   e. Intermediate Coat: Aluminum paint[, MPI #1].
   f. Topcoat: Aluminum paint[, MPI #1].

F. Galvanized-Metal Substrates:
1. Latex over Waterborne Primer System:
   a. Prime Coat: Primer, galvanized, water based[, MPI #134].
   b. Intermediate Coat: Latex, interior, matching topcoat.
   c. Topcoat: Latex, interior, flat, (Gloss Level 1)[, MPI #53].
   d. Topcoat: Latex, interior, (Gloss Level 2)[, MPI #44].
   e. Topcoat: Latex, interior, (Gloss Level 3)[, MPI #52].
   f. Topcoat: Latex, interior, (Gloss Level 4)[, MPI #43].
   g. Topcoat: Latex, interior, semi-gloss, (Gloss Level 5)[, MPI #54].
   h. Topcoat: Latex, interior, gloss, (Gloss Level 6, except minimum gloss of 65 units at 60 degrees)[, MPI #114].
2. Water-Based Dry-Fall System:
   a. Prime Coat: Dry fall, water based, for galvanized steel, flat (Gloss Level 1)[, MPI #133].
   b. Topcoat: Dry fall, water based, for galvanized steel, flat (Gloss Level 1)[, MPI #133].
3. Institutional Low-Odor/VOC Latex System:
   a. Prime Coat: Primer, galvanized, water based[, MPI #134].
   b. Intermediate Coat: Latex, interior, institutional low odor/VOC, matching topcoat.
   c. Topcoat: Latex, interior, institutional low odor/VOC, flat (Gloss Level 1)[, MPI #143].
   d. Topcoat: Latex, interior, institutional low odor/VOC, (Gloss Level 2)[, MPI #144].
   e. Topcoat: Latex, interior, institutional low odor/VOC, (Gloss Level 3)[, MPI #145].
   f. Topcoat: Latex, interior, institutional low odor/VOC, semi-gloss (Gloss Level 5)[, MPI #147].
4. High-Performance Architectural Latex System:
   a. Prime Coat: Primer, galvanized, water based[, MPI #134].
   b. Intermediate Coat: Latex, interior, high performance architectural, matching topcoat.
   c. Topcoat: Latex, interior, high performance architectural, (Gloss Level 2)[, MPI #138].
   d. Topcoat: Latex, interior, high performance architectural, (Gloss Level 3)[, MPI #139].
   e. Topcoat: Latex, interior, high performance architectural, (Gloss Level 4)[, MPI #140].
   f. Topcoat: Latex, interior, high performance architectural, semi-gloss (Gloss Level 5)[, MPI #141].
5. Water-Based Light Industrial Coating Over Waterborne Primer System:
   a. Prime Coat: Primer, galvanized, water based[, MPI #134].
   b. Intermediate Coat: Light industrial coating, interior, water based, matching topcoat.

c. Topcoat: Light industrial coating, interior, water based (Gloss Level 3)[, MPI #151].
d. Topcoat: Light industrial coating, interior, water based, semi-gloss (Gloss Level 5)[, MPI #153].
e. Topcoat: Light industrial coating, interior, water based, gloss (Gloss Level 6)[, MPI #154].

6. Aluminum Paint System:
   a. Prime Coat: Primer, galvanized metal, as recommended in writing by topcoat manufacturer for use on galvanized-metal substrates with topcoat indicated.
   b. Intermediate Coat: Aluminum paint[, MPI #1].
   c. Topcoat: Aluminum paint[, MPI #1].

G. Aluminum (Not Anodized or Otherwise Coated) Substrates:
1. Latex System:
   a. Prime Coat: Primer, quick dry, for aluminum[, MPI #95].
   b. Intermediate Coat: Latex, interior, matching topcoat.
   c. Topcoat: Latex, interior, flat, (Gloss Level 1)[, MPI #53].
   d. Topcoat: Latex, interior, (Gloss Level 2)[, MPI #44].
   e. Topcoat: Latex, interior, (Gloss Level 3)[, MPI #52].
   f. Topcoat: Latex, interior, (Gloss Level 4)[, MPI #43].
   g. Topcoat: Latex, interior, semi-gloss, (Gloss Level 5)[, MPI #54].
   h. Topcoat: Latex, interior, gloss, (Gloss Level 6, except minimum gloss of 65 units at 60 degrees)[, MPI #114].
2. Institutional Low-Odor/VOC Latex System:
   a. Prime Coat: Primer, quick dry, for aluminum[, MPI #95].
   b. Intermediate Coat: Latex, interior, institutional low odor/VOC, matching topcoat.
   c. Topcoat: Latex, interior, institutional low odor/VOC, flat (Gloss Level 1)[, MPI #143].
   d. Topcoat: Latex, interior, institutional low odor/VOC, (Gloss Level 2)[, MPI #144].
   e. Topcoat: Latex, interior, institutional low odor/VOC, (Gloss Level 3)[, MPI #145].
   f. Topcoat: Latex, interior, institutional low odor/VOC, semi-gloss (Gloss Level 5)[, MPI #147].
3. High-Performance Architectural Latex System:
   a. Prime Coat: Primer, quick dry, for aluminum[, MPI #95].
   b. Intermediate Coat: Latex, interior, high performance architectural, matching topcoat.
   c. Topcoat: Latex, interior, high performance architectural, (Gloss Level 2)[, MPI #138].
   d. Topcoat: Latex, interior, high performance architectural, (Gloss Level 3)[, MPI #139].
   e. Topcoat: Latex, interior, high performance architectural, (Gloss Level 4)[, MPI #140].
   f. Topcoat: Latex, interior, high performance architectural, semi-gloss (Gloss Level 5)[, MPI #141].
4. Water-Based Light Industrial Coating System:
   a. Prime Coat: Primer, quick dry, for aluminum[, MPI #95].
   b. Intermediate Coat: Light industrial coating, interior, water based, matching topcoat.
   c. Topcoat: Light industrial coating, interior, water based (Gloss Level 3)[, MPI #151].
   d. Topcoat: Light industrial coating, interior, water based, semi-gloss (Gloss Level 5)[, MPI #153].
   e. Topcoat: Light industrial coating, interior, water based, gloss (Gloss Level 6)[, MPI #154].
5. Alkyd System:
   a. Prime Coat: Primer, vinyl wash[, MPI #80].
   b. Prime Coat: Primer, quick dry, for aluminum[, MPI #95].
   c. Intermediate Coat: Alkyd, interior, matching topcoat.
   d. Topcoat: Alkyd, interior, flat (Gloss Level 1)[, MPI #49].
   e. Topcoat: Alkyd, interior, (Gloss Level 3)[, MPI #51].
   f. Topcoat: Alkyd, interior, semi-gloss (Gloss Level 5)[, MPI #47].

g. Topcoat: Alkyd, interior, gloss (Gloss Level 6)[, MPI #48].

6. Aluminum Paint System:
   a. Prime Coat: Primer, vinyl wash[, MPI #80].
   b. Intermediate Coat: Aluminum paint[, MPI #1].
   c. Topcoat: Aluminum paint[, MPI #1].

H. Wood Substrates: Including [wood trim] [architectural woodwork] [doors] [windows] [wood-based panel products] [glued-laminated construction] [exposed joists] [exposed beams] <Insert description>.
   1. Latex System:
      a. Prime Coat: Primer, latex, for interior wood[, MPI #39].
      b. Intermediate Coat: Latex, interior, matching topcoat.
      c. Topcoat: Latex, interior, flat, (Gloss Level 1)[, MPI #53].
      d. Topcoat: Latex, interior, (Gloss Level 2)[, MPI #44].
      e. Topcoat: Latex, interior, (Gloss Level 3)[, MPI #52].
      f. Topcoat: Latex, interior, (Gloss Level 4)[, MPI #43].
      g. Topcoat: Latex, interior, semi-gloss, (Gloss Level 5)[, MPI #54].
      h. Topcoat: Latex, interior, gloss, (Gloss Level 6, except minimum gloss of 65 units at 60 degrees)[, MPI #114].
   2. Latex over Alkyd Primer System:
      a. Prime Coat: Primer sealer, alkyd, interior[, MPI #45].
      b. Intermediate Coat: Latex, interior, matching topcoat.
      c. Topcoat: Latex, interior, flat, (Gloss Level 1)[, MPI #53].
      d. Topcoat: Latex, interior, (Gloss Level 2)[, MPI #44].
      e. Topcoat: Latex, interior, (Gloss Level 3)[, MPI #52].
      f. Topcoat: Latex, interior, (Gloss Level 4)[, MPI #43].
      g. Topcoat: Latex, interior, semi-gloss, (Gloss Level 5)[, MPI #54].
      h. Topcoat: Latex, interior, gloss, (Gloss Level 6, except minimum gloss of 65 units at 60 degrees)[, MPI #114].
   3. Institutional Low-Odor/VOC Latex System:
      a. Prime Coat: Primer, latex, for interior wood[, MPI #39].
      b. Intermediate Coat: Latex, interior, institutional low odor/VOC, matching topcoat.
      c. Topcoat: Latex, interior, institutional low odor/VOC, flat (Gloss Level 1)[, MPI #143].
      d. Topcoat: Latex, interior, institutional low odor/VOC, (Gloss Level 2)[, MPI #144].
      e. Topcoat: Latex, interior, institutional low odor/VOC, (Gloss Level 3)[, MPI #145].
      f. Topcoat: Latex, interior, institutional low odor/VOC, semi-gloss (Gloss Level 5)[, MPI #147].
   4. High-Performance Architectural Latex System:
      a. Prime Coat: Primer, latex, for interior wood[, MPI #39].
      b. Intermediate Coat: Latex, interior, high performance architectural, matching topcoat.
      c. Topcoat: Latex, interior, high performance architectural, (Gloss Level 2)[, MPI #138].
      d. Topcoat: Latex, interior, high performance architectural, (Gloss Level 3)[, MPI #139].
      e. Topcoat: Latex, interior, high performance architectural, (Gloss Level 4)[, MPI #140].
      f. Topcoat: Latex, interior, high performance architectural, semi-gloss (Gloss Level 5)[, MPI #141].
   5. Alkyd System:
      a. Prime Coat: Primer sealer, alkyd, interior[, MPI #45].
      b. Intermediate Coat: Alkyd, interior, matching topcoat.
      c. Topcoat: Alkyd, interior, flat (Gloss Level 1)[, MPI #49].
      d. Topcoat: Alkyd, interior, (Gloss Level 3)[, MPI #51].
      e. Topcoat: Alkyd, interior, semi-gloss (Gloss Level 5)[, MPI #47].
      f. Topcoat: Alkyd, interior, gloss (Gloss Level 6)[, MPI #48].

I. Wood Substrates, Traffic Surfaces:

1. Latex Floor Paint System:
   a. Prime Coat: Primer sealer, alkyd, interior[, MPI #45].
   b. Intermediate Coat: Floor paint, latex, low gloss (maximum Gloss Level 3)[, MPI #60].
   c. Topcoat: Floor paint, latex, low gloss (maximum Gloss Level 3)[, MPI #60].
2. Alkyd Floor Enamel System:
   a. Prime Coat: Floor enamel, alkyd, gloss (Gloss Level 6)[, MPI #27].
   b. Intermediate Coat: Floor enamel, alkyd, gloss (Gloss Level 6)[, MPI #27].
   c. Topcoat: Floor enamel, alkyd, gloss (Gloss Level 6)[, MPI #27].

J. Fiberglass and Plastic Substrates:
1. Latex System:
   a. Prime Coat: Primer, bonding, water based[, MPI #17].
   b. Prime Coat: Primer, bonding, solvent based[, MPI #69].
   c. Intermediate Coat: Latex, interior, matching topcoat.
   d. Topcoat: Latex, interior, flat, (Gloss Level 1)[, MPI #53].
   e. Topcoat: Latex, interior, (Gloss Level 2)[, MPI #44].
   f. Topcoat: Latex, interior, (Gloss Level 3)[, MPI #52].
   g. Topcoat: Latex, interior, (Gloss Level 4)[, MPI #43].
   h. Topcoat: Latex, interior, semi-gloss, (Gloss Level 5)[, MPI #54].
   i. Topcoat: Latex, interior, gloss, (Gloss Level 6, except minimum gloss of 65 units at 60 degrees)[, MPI #114].
2. Institutional Low-Odor/VOC Latex System:
   a. Prime Coat: Primer, bonding, water based[, MPI #17].
   b. Prime Coat: Primer, bonding, solvent based[, MPI #69].
   c. Intermediate Coat: Latex, interior, institutional low odor/VOC, matching topcoat.
   d. Topcoat: Latex, interior, institutional low odor/VOC, flat (Gloss Level 1)[, MPI #143].
   e. Topcoat: Latex, interior, institutional low odor/VOC, (Gloss Level 2)[, MPI #144].
   f. Topcoat: Latex, interior, institutional low odor/VOC, (Gloss Level 3)[, MPI #145].
   g. Topcoat: Latex, interior, institutional low odor/VOC, semi-gloss (Gloss Level 5)[, MPI #147].
3. High-Performance Architectural Latex System:
   a. Prime Coat: Primer, bonding, water based[, MPI #17].
   b. Prime Coat: Primer, bonding, solvent based[, MPI #69].
   c. Intermediate Coat: Latex, interior, high performance architectural, matching topcoat.
   d. Topcoat: Latex, interior, high performance architectural, (Gloss Level 2)[, MPI #138].
   e. Topcoat: Latex, interior, high performance architectural, (Gloss Level 3)[, MPI #139].
   f. Topcoat: Latex, interior, high performance architectural, (Gloss Level 4)[, MPI #140].
   g. Topcoat: Latex, interior, high performance architectural, semi-gloss (Gloss Level 5)[, MPI #141].
4. Water-Based Light Industrial Coating System:
   a. Prime Coat: Primer, bonding, water based[, MPI #17].
   b. Prime Coat: Primer, bonding, solvent based[, MPI #69].
   c. Intermediate Coat: Light industrial coating, interior, water based, matching topcoat.
   d. Topcoat: Light industrial coating, interior, water based (Gloss Level 3)[, MPI #151].
   e. Topcoat: Light industrial coating, interior, water based, semi-gloss (Gloss Level 5)[, MPI #153].
   f. Topcoat: Light industrial coating, interior, water based, gloss (Gloss Level 6)[, MPI #154].
5. Alkyd System:
   a. Prime Coat: Primer, bonding, water based[, MPI #17].
   b. Prime Coat: Primer, bonding, solvent based[, MPI #69].
   c. Intermediate Coat: Alkyd, interior, matching topcoat.
   d. Topcoat: Alkyd, interior, flat (Gloss Level 1)[, MPI #49].

e. Topcoat: Alkyd, interior, (Gloss Level 3)[, MPI #51].
f. Topcoat: Alkyd, interior, semi-gloss (Gloss Level 5)[, MPI #47].
g. Topcoat: Alkyd, interior, gloss (Gloss Level 6)[, MPI #48].

K. [Gypsum Board] [Plaster] Substrates:
1. Latex System:
a. Prime Coat: Primer sealer, latex, interior[, MPI #50].
b. Prime Coat: Latex, interior, matching topcoat.
c. Intermediate Coat: Latex, interior, matching topcoat.
d. Topcoat: Latex, interior, flat, (Gloss Level 1)[, MPI #53].
e. Topcoat: Latex, interior, (Gloss Level 2)[, MPI #44].
f. Topcoat: Latex, interior, (Gloss Level 3)[, MPI #52].
g. Topcoat: Latex, interior, (Gloss Level 4)[, MPI #43].
h. Topcoat: Latex, interior, semi-gloss, (Gloss Level 5)[, MPI #54].
i. Topcoat: Latex, interior, gloss, (Gloss Level 6, except minimum gloss of 65 units at 60 degrees)[, MPI #114].
2. Institutional Low-Odor/VOC Latex System:
a. Prime Coat: Primer sealer, interior, institutional low odor/VOC[, MPI #149].
b. Intermediate Coat: Latex, interior, institutional low odor/VOC, matching topcoat.
c. Topcoat: Latex, interior, institutional low odor/VOC, flat (Gloss Level 1)[, MPI #143].
d. Topcoat: Latex, interior, institutional low odor/VOC, (Gloss Level 2)[, MPI #144].
e. Topcoat: Latex, interior, institutional low odor/VOC, (Gloss Level 3)[, MPI #145].
f. Topcoat: Latex, interior, institutional low odor/VOC, semi-gloss (Gloss Level 5)[, MPI #147].
3. High-Performance Architectural Latex System:
a. Prime Coat: Primer sealer, latex, interior[, MPI #50].
b. Intermediate Coat: Latex, interior, high performance architectural, matching topcoat.
c. Topcoat: Latex, interior, high performance architectural, (Gloss Level 2)[, MPI #138].
d. Topcoat: Latex, interior, high performance architectural, (Gloss Level 3)[, MPI #139].
e. Topcoat: Latex, interior, high performance architectural, (Gloss Level 4)[, MPI #140].
f. Topcoat: Latex, interior, high performance architectural, semi-gloss (Gloss Level 5)[, MPI #141].
4. Water-Based Light Industrial Coating System:
a. Prime Coat: Primer sealer, latex, interior[, MPI #50].
b. Intermediate Coat: Light industrial coating, interior, water based, matching topcoat.
c. Topcoat: Light industrial coating, interior, water based (Gloss Level 3)[, MPI #151].
d. Topcoat: Light industrial coating, interior, water based, semi-gloss (Gloss Level 5)[, MPI #153].
e. Topcoat: Light industrial coating, interior, water based, gloss (Gloss Level 6)[, MPI #154].
5. Alkyd over Latex Primer System:
a. Prime Coat: Primer sealer, latex, interior[, MPI #50].
b. Intermediate Coat: Alkyd, interior, matching topcoat.
c. Topcoat: Alkyd, interior, flat (Gloss Level 1)[, MPI #49].
d. Topcoat: Alkyd, interior, (Gloss Level 3)[, MPI #51].
e. Topcoat: Alkyd, interior, semi-gloss (Gloss Level 5)[, MPI #47].
f. Topcoat: Alkyd, interior, gloss (Gloss Level 6)[, MPI #48].

L. Spray-Textured Ceiling Substrates:
1. Latex (Flat) System: Spray applied.
a. Prime Coat: Latex, interior, flat, (Gloss Level 1)[, MPI #53].
b. Topcoat: Latex, interior, flat, (Gloss Level 1)[, MPI #53].
2. Latex System: Spray applied.

a. Prime Coat: Latex, interior, matching topcoat.
b. Intermediate Coat: Latex, interior, matching topcoat.
c. Topcoat: Latex, interior, flat, (Gloss Level 1)[, MPI #53].
d. Topcoat: Latex, interior, (Gloss Level 2)[, MPI #44].
e. Topcoat: Latex, interior, (Gloss Level 3)[, MPI #52].
f. Topcoat: Latex, interior, (Gloss Level 4)[, MPI #43].
g. Topcoat: Latex, interior, semi-gloss, (Gloss Level 5)[, MPI #54].
h. Topcoat: Latex, interior, gloss, (Gloss Level 6, except minimum gloss of 65 units at 60 degrees)[, MPI #114].

3. Latex over Alkyd Primer System:
   a. Prime Coat: Primer sealer, alkyd, interior[, MPI #45].
   b. Topcoat: Latex, interior, flat, (Gloss Level 1)[, MPI #53].
   c. Topcoat: Latex, interior, (Gloss Level 2)[, MPI #44].
   d. Topcoat: Latex, interior, (Gloss Level 3)[, MPI #52].
   e. Topcoat: Latex, interior, (Gloss Level 4)[, MPI #43].
   f. Topcoat: Latex, interior, semi-gloss, (Gloss Level 5)[, MPI #54].
   g. Topcoat: Latex, interior, gloss, (Gloss Level 6, except minimum gloss of 65 units at 60 degrees)[, MPI #114].
4. Alkyd (Flat) System:
   a. Prime Coat: Alkyd, interior, flat (Gloss Level 1)[, MPI #49].
   b. Topcoat: Alkyd, interior, flat (Gloss Level 1)[, MPI #49].
5. Alkyd System:
   a. Prime Coat: Primer sealer, alkyd, interior[, MPI #45].
   b. Intermediate Coat: Alkyd, interior, matching topcoat.
   c. Topcoat: Alkyd, interior, flat (Gloss Level 1)[, MPI #49].
   d. Topcoat: Alkyd, interior, (Gloss Level 3)[, MPI #51].
   e. Topcoat: Alkyd, interior, semi-gloss (Gloss Level 5)[, MPI #47].
   f. Topcoat: Alkyd, interior, gloss (Gloss Level 6)[, MPI #48].

M. Insulation-Covering Substrates: Including pipe and duct coverings.
1. Latex System:
   a. Prime Coat: Primer sealer, latex, interior[, MPI #50].
   b. Intermediate Coat: Latex, interior, matching topcoat.
   c. Topcoat: Latex, interior, flat, (Gloss Level 1)[, MPI #53].
   d. Topcoat: Latex, interior, (Gloss Level 2)[, MPI #44].
   e. Topcoat: Latex, interior, (Gloss Level 3)[, MPI #52].
   f. Topcoat: Latex, interior, (Gloss Level 4)[, MPI #43].
   g. Topcoat: Latex, interior, semi-gloss, (Gloss Level 5)[, MPI #54].
   h. Topcoat: Latex, interior, gloss, (Gloss Level 6, except minimum gloss of 65 units at 60 degrees)[, MPI #114].
2. Institutional Low-Odor/VOC Latex System:
   a. Prime Coat: Primer sealer, latex, interior[, MPI #50].
   b. Intermediate Coat: Latex, interior, institutional low odor/VOC, matching topcoat.
   c. Topcoat: Latex, interior, institutional low odor/VOC, flat (Gloss Level 1)[, MPI #143].
   d. Topcoat: Latex, interior, institutional low odor/VOC, (Gloss Level 2)[, MPI #144].
   e. Topcoat: Latex, interior, institutional low odor/VOC, (Gloss Level 3)[, MPI #145].
   f. Topcoat: Latex, interior, institutional low odor/VOC, semi-gloss (Gloss Level 5)[, MPI #147].
3. Alkyd over Latex Primer System:
   a. Prime Coat: Primer sealer, latex, interior[, MPI #50].
   b. Intermediate Coat: Alkyd, interior, matching topcoat.
   c. Topcoat: Alkyd, interior, flat (Gloss Level 1)[, MPI #49].
   d. Topcoat: Alkyd, interior, (Gloss Level 3)[, MPI #51].

e. Topcoat: Alkyd, interior, semi-gloss (Gloss Level 5)[, MPI #47].
f. Topcoat: Alkyd, interior, gloss (Gloss Level 6)[, MPI #48].

4. Aluminum Paint System:
   a. Prime Coat: Primer sealer, latex, interior[, MPI #50].
   b. Intermediate Coat: Aluminum paint[, MPI #1].
   c. Topcoat: Aluminum paint[, MPI #1].

END OF SECTION 099123

**SECTION 099600**

**HIGH-PERFORMANCE COATINGS**

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes surface preparation and application of high-performance coating systems on the following substrates:

1. Interior Substrates:

a. Concrete, vertical and horizontal surfaces.
b. Concrete masonry units (CMU).

1.2 DEFINITIONS

A. Gloss Level 6: 70 to 85 units at 60 degrees, according to ASTM D 523.

B. Gloss Level 7: More than 85 units at 60 degrees, according to ASTM D 523.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product indicated. Include preparation requirements and application instructions.

B. Samples: For each type of coating system and in each color and gloss of topcoat indicated.

C. Product List: For each product indicated, include printout of current "MPI Approved Products List" for each product category specified in Part 2, with the proposed product highlighted.

1.4 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Coatings: 5 percent, but not less than 1 gal. (3.8 L) of each material and color applied.

1.5 QUALITY ASSURANCE

A. Mockups: Apply mockups of each coating system indicated to verify preliminary selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.

1. Architect will select one surface to represent surfaces and conditions for application of each coating system specified in Part 3.

a. Wall and Ceiling Surfaces: Provide samples of at least 9m2
b. Other Items: Architect will designate items or areas required.

2. Final approval of color selections will be based on mockups.

a. If preliminary color selections are not approved, apply additional mockups of additional colors selected by Architect at no added cost to Owner.

## PART 2 - PRODUCTS

### 2.1 HIGH-PERFORMANCE COATINGS, GENERAL

A. MPI Standards: Provide products that comply with MPI standards indicated and are listed in "MPI Approved Products List."

B. Material Compatibility:

1. Provide materials for use within each coating system that are compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.
2. For each coat in a coating system, provide products recommended in writing by manufacturers of topcoat for use in coating system and on substrate indicated.
3. Provide products of same manufacturer for each coat in a coating system.

C. VOC Content: Products shall comply with VOC limits of authorities having jurisdiction and, for interior coatings applied at project site, the following VOC limits, exclusive of colorants added to a tint base, when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

1. Flat Paints and Coatings: 50 g/L.
2. Nonflat Paints and Coatings: 150 g/L.
3. Primers, Sealers, and Undercoaters: 200 g/L.
4. Anti-Corrosive and Anti-Rust Paints Applied to Ferrous Metals: 250 g/L.
5. Zinc-Rich Industrial Maintenance Primers: 340 g/L.
6. Pre-Treatment Wash Primers: 420 g/L.
7. Floor Coatings: 100 g/L.
8. Shellacs, Clear: 730 g/L.
9. Shellacs, Pigmented: 550 g/L.

D. Low-Emitting Materials: Interior coatings shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

E. Colors: As selected by Architect from manufacturer's full range.

### 2.2 EPOXY COATINGS

A. Epoxy Tank Lining: Gloss

B. Epoxy Floor Coating

C. Block Fillers

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.

1. Maximum Moisture Content of Substrates: When measured with an electronic moisture meter as follows:

a. Concrete: 12 percent.
b. Masonry (Clay and CMU): 12 percent.
c. Wood: 15 percent.
d. Gypsum Board: 12 percent.

B. Verify suitability of substrates, including surface conditions and compatibility with existing finishes and primers.

C. Proceed with coating application only after unsatisfactory conditions have been corrected.

1. Beginning coating application constitutes Contractor's acceptance of substrates and conditions.

3.2 PREPARATION

A. Comply with manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual" applicable to substrates indicated.

B. Clean substrates of substances that could impair bond of coatings, including dust, dirt, oil, grease, and incompatible paints and encapsulants.

1. Remove incompatible primers and reprime substrate with compatible primers or apply tie coat as required to produce coating systems indicated.

3.3 APPLICATION

A. Apply high-performance coatings according to manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual."

B. Apply coatings to produce surface films without cloudiness, spotting, holidays, laps, brush marks, runs, sags, ropiness, or other surface imperfections. Produce sharp glass lines and color breaks.

3.4 CLEANING AND PROTECTION

A. Protect work of other trades against damage from coating operation. Correct damage by cleaning, repairing, replacing, and recoating, as approved by Architect, and leave in an undamaged condition.

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

3.5 INTERIOR HIGH-PERFORMANCE COATING SCHEDULE

A. Concrete Substrates, Vertical Surfaces:

1. Epoxy System:

a. Prime Coat: Epoxy, gloss, MPI #77.
b. Intermediate Coat: Epoxy, gloss, MPI #77.
c. Topcoat: Epoxy, gloss, MPI #77.

2. Epoxy-Modified Latex System:

a. Prime Coat: Epoxy-modified latex, interior, gloss (Gloss Level 6), MPI #115.
b. Intermediate Coat: Epoxy-modified latex, interior, gloss (Gloss Level 6), MPI #115.
c. Topcoat: Epoxy-modified latex, interior, gloss (Gloss Level 6), MPI #115.

B. Concrete Substrates, Horizontal Surfaces.

1. Epoxy System:

a. Prime Coat: Epoxy, gloss, MPI #77.
b. Intermediate Coat: Epoxy, gloss, MPI #77.
c. Topcoat: Epoxy, gloss, MPI #77.

2. Pigmented Polyurethane System:

a. Prime Coat: Epoxy, gloss, MPI #77.
b. Intermediate Coat: Polyurethane, two-component, pigmented, gloss (Gloss Level 6), MPI #72.
c. Topcoat: Polyurethane, two-component, pigmented, gloss (Gloss Level 6), MPI #72.

3. Pigmented Polyurethane System:

a. Prime Coat: Epoxy, as recommended in writing by topcoat manufacturer.
b. Intermediate Coat: Polyurethane, two-component, pigmented, gloss (Gloss Level 6), MPI #72.
c. Topcoat: Polyurethane, two-component, pigmented, gloss (Gloss Level 6), MPI #72.

C. CMU Substrates:

1. Epoxy System:

a. Block Filler: Block filler, latex, interior/exterior, MPI #4.
b. Block Filler: Block filler, epoxy, MPI #116.
c. Intermediate Coat: Epoxy, gloss, MPI #77.
d. Topcoat: Epoxy, gloss, MPI #77.

2. Epoxy-Modified Latex System:

a. Block Filler: Block filler, latex, interior/exterior[, MPI #4].
b. Intermediate Coat: Epoxy-modified latex, interior, gloss (Gloss Level 6)[, MPI #115].
c. Topcoat: Epoxy-modified latex, interior, gloss (Gloss Level 6), MPI #115.

END OF SECTION 099600

**SECTION 099646**

**INTUMESCENT PAINTING**

PART 1.0 GENERAL

1.1 SUMMARY

A. Section includes surface preparation and application of fire-retardant intumescent paint.

1.2 ACTION SUBMITTALS

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

B. Samples: For each intumescent paint and for each color required.

1.3 QUALITY ASSURANCE

A. Surface-Burning Characteristics: As determined by testing identical products according to ASTM E 84 by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

1. Flame-Spread Index: 26 to 75.
2. Smoke-Developed Index: 450 or less

B. MPI Standards: Comply with indicated requirements for the following:

1. Products: MPI standards indicated and listed in "MPI Approved Products List."
2. Preparation and Workmanship: "MPI Architectural Painting Specification Manual" for products and paint systems indicated.

C. Mockups: Apply benchmark Samples of paint system indicated and of each color and finish selected to verify preliminary selections made under Sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.

1. Wall Surfaces: Prepare Samples of at least 100 sq. ft. (9.3 sq. m)

PART 2.0 PRODUCTS

2.1 INTUMESCENT PAINT MATERIALS, GENERAL

A. Material Compatibility:

1. Provide materials for use within each paint system that are compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.

2. For each material or coat, provide products and spreading rates recommended in writing by intumescent paint manufacturer for use on substrate indicated. Comply with requirements for fire-retardant coating classification and surface-burning characteristics indicated.

B. Colors and Gloss: As selected by Architect from manufacturer's full range.

2.2 INTERIOR, PIGMENTED, INTUMESCENT PAINT SYSTEM

A. Primer: Intumescent paint manufacturer's recommended primer compatible with substrate and other materials indicated.

B. Fire-Retardant Intumescent Paint: Solvent-based, modified-alkyd-type, fire-retardant paint for interior wood and other combustible surfaces[; MPI #63].

C. Fire-Retardant Intumescent Paint: Water-based, latex-type, fire-retardant paint for interior wood and other combustible surfaces; MPI #64.

D. Topcoat/Overcoat: Solvent-based, alkyd-type, pigmented, fire-inert, protective-finish coating that will not affect fire-retardant class of intumescent coating.

E. Topcoat/Overcoat: Water-based, latex-type, pigmented, fire-inert, protective-finish coating that will not affect fire-retardant class of intumescent coating[; MPI #67].

2.3 INTERIOR, CLEAR, INTUMESCENT PAINT SYSTEM

A. Stain Coat: Factory-formulated, nonbleeding, solvent-based, alkyd-type penetrating wood stain.

1. Stain approved by intumescent paint manufacturer.

B. Clear Sanding Sealer: Solvent-based, modified-alkyd type for interior wood surfaces[; MPI #65;].

C. Fire-Retardant Intumescent Paint: Solvent-or water-based, fire-retardant paint for interior wood and other combustible surfaces[; MPI #62].

D. Topcoat/Overcoat: Protective fire-inert clear coating that will not affect fire-test-response characteristics of intumescent coating[; MPI #66].

PART 3.0 EXECUTION

3.1 APPLICATION

A. Preparation: Comply with manufacturer's written instructions applicable to substrates and coating systems indicated.

B. Apply intumescent paints according to manufacturer's written instructions and to comply with requirements for fire-retardant coating classification.

1. Finish doors on faces with intumescent finish. Paint tops, bottoms, and side edges with fire-inert finish.

C. At completion of construction activities, touch up and restore damaged or defaced coated surfaces.

3.2 PAINT SYSTEM SCHEDULE

A. Prime Coat: If required and approved by intumescent paint manufacturer.

B. Fire-Retardant Intumescent Coating: Minimum two coats to comply with requirements for fire-retardant coating classification and surface-burning characteristics indicated.

C. Topcoat/Overcoat: Apply if required or recommended and approved by intumescent paint manufacturer.

END OF SECTION 099646

**SECTION 099653**

**ELASTOMERIC COATINGS**

PART 1.0 GENERAL

1.1 SUMMARY

A. Section includes surface preparation and application of elastomeric coatings to exterior concrete wall substrates as shown on the drawings and as specified herein (Refer to Architectural Plans and Schedule of Finishes).

1.2 ACTION SUBMITTALS

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

B. Samples: For each exposed product and for each color and gloss specified

1.3 QUALITY ASSURANCE

A. QUALIFICATION OF INSTALLER: Provide at least one person who shall be present at all times during execution of this portion of the work and who shall be thoroughly experienced in the installation of the specified products and shall direct all work performed under this Section.

B. MANUFACTURER'S CERTIFICATION : Prior to the installation of the work of this Section, secure a visit to the jobsite by a representative of the manufacturer of the waterproofing materials used, who shall inspect and shall certify :

1. That the surfaces to which the waterproofing was applied were in condition suitable for that application;

2. That the materials installed complied in all respects with the requirement of this Section of the specifications;

3. That the materials were installed in complete accordance with the manufacturer's current recommendations.

C. Mockups: Prepare three (3) mockups of each coating system indicated and each color and finish selected to verify preliminary selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.

1. Architect will select three (3) wall surfaces of at least 9 sqm to represent surfaces and conditions for application of each type and texture of elastomeric coating.
2. Final approval of color and texture selections will be based on mockups.

a. If preliminary color selections are not approved, prepare additional mockups of additional color and textures selected by Architect at no added cost to Owner.

## PART 2.0 PRODUCTS

### 2.1 PRODUCT INFORMATION

A. Textured Elastomeric Waterproofing system <W-1>: water based single component ready mixed, heavy-bodied, high acrylic polymer wall waterproofing membrane. It is flexible, elastic, strong and durable and able to bridge small cracks and tolerate some movement of the substrate.

B. Composed of:
1. primer, water-based 100% acrylic
2. bodycoat undiluted
3. water-based 100% acrylic

### 2.2 MATERIALS, GENERAL

A. Material Compatibility:

1. Provide elastomeric finish coatings and crack fillers, primers, and block fillers as applicable for use within elastomeric finish coatings that are compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.
2. For each material or coat, provide products and spreading rates recommended in writing by elastomeric-coating manufacturer for use on substrate indicated.

### 2.3 OTHER MATERIALS

A. Crack Fillers: Elastomeric-coating manufacturer's recommended, factory-formulated crack fillers or sealants, including crack filler primers, compatible with substrate and other materials indicated. Use thick heavy coat of FORMELAST AF over cracks.

B. Primer: Elastomeric-coating manufacturer's recommended, factory-formulated, alkali-resistant primer compatible with substrate and other materials indicated.

## PART 3.0 EXECUTION

### 3.1 EXAMINATION

A. Examine substrates and conditions, with Applicator present, for compliance with manufacturer's requirements for maximum moisture content, alkalinity, and other conditions affecting performance of work.

B. Begin coating only when moisture content of substrate is 12 percent or less when measured with an electronic moisture meter.

C. Begin coating no sooner than twenty eight (28) days after substrate is constructed and is visually dry on both sides.

3.2 PREPARATION

A. Comply with manufacturer's written instructions.

B. Remove hardware and hardware accessories, plates, machined surfaces, light fixtures, and similar items already installed that are not to be coated. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and coating.

1. After completing coating operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection if any.

C. PRIMING: Apply one (1) coat primer to the prepared surface either by brush or roller. Use water based 100% acrylic primer for substrate such as concrete, hollow blocks, bricks and plaster surface

D. CRACK REPAIR: Fill cracks according to manufacturer's written instructions before coating surfaces. Apply a thick heavy coat over cracks. Application should at least be 50mm wide on both sides of the cracks. If the crack exceeds 1.0mm widths, embed a Reinforcement into the coat. Allow to dry for 16 hours before next coat

3.3 APPLICATION

A. Apply elastomeric coatings according to manufacturer's written instructions.

B. Apply coatings to produce surface films without cloudiness, spotting, holidays, laps, brush marks, roller tracking, runs, sags, ropiness, or other surface imperfections. Cut in sharp lines and color breaks.

C. BODYCOAT: Apply two (2) coats undiluted. Allow 8 to 16 hours between coats.

D. TOPCOAT: Apply two (2) coats, a decorative topcoat with low-sheen finish for the system. It is water based, 100% acrylic, low-sheen topcoat that can be used for both interior and exterior applications.

E. PERFORMANCE WARRANTY: Provided that this specification is strictly adhered to and all materials are applied by Hitchins approved and trained applicator, working in strict accordance with the manufacturer’s instructions. In addition, the treated area is backed up with a protection plan by a well-established international fidelity fund. Minimum of seven (7) years warranty.

END OF SECTION 099653

**SECTION 101400**

**SIGNAGE**

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:
   1. Public Signs
   2. Acrylic Lighted Signs

1.2 ACTION 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 and layout for each sign.
   3. Wiring Diagrams: Power, signal, and control wiring.

C. Samples: For each sign type and for each color and texture required.

1.3 QUALITY ASSURANCE

A. 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.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Aluminum Castings: ASTM B 26/B 26M, of alloy and temper recommended by sign manufacturer for casting process used and for use and finish indicated.

B. Aluminum Sheet and Plate: ASTM B 209 (ASTM B 209M), alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated, and with at least the strength and durability properties of Alloy 5005-H32.

C. Aluminum Extrusions: ASTM B 221 (ASTM B 221M), alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated, and with at least the strength and durability properties of Alloy 6063-T5.

D. Brass Castings: ASTM B 584, Alloy UNS No. C85200 (high-copper yellow brass).

E. Brass, Yellow, Sheet: ASTM B 36/B 36M, Alloy UNS No. C26000.

F. Bronze Castings: ASTM B 584, Alloy UNS No. C86500 (No. 1 manganese bronze).

G. Bronze Plate: ASTM B 36/B 36M.

H. Copper Sheet: ASTM B 152/B 152M.

I. Steel:

1. Steel Sheet: Electrolytic zinc-coated, ASTM A 591/A 591M, with steel sheet substrate complying with ASTM A 1008/A 1008M, commercial steel, exposed.
2. Stainless-Steel Sheet: ASTM A 240/A 240M or ASTM A 666, Type 316, stretcher-leveled standard of flatness.
3. Steel Members Fabricated from Plate or Bar Stock: ASTM A 529/A 529M or ASTM A 572/A 572M, 42,000-psi (290-MPa) minimum yield strength.
4. For steel exposed to view on completion, provide materials having flat, smooth surfaces without blemishes. Do not use materials whose surfaces exhibit pitting, seam marks, roller marks, rolled trade names, or roughness.

J. Fiberglass Sheet: Molded, seamless, thermosetting, glass-fiber-reinforced polyester panels with a minimum tensile strength of 15,000 psi (103 MPa) when tested according to ASTM D 638 and with a minimum flexural strength of 30,000 psi (207 MPa) when tested according to ASTM D 790.

K. Acrylic Sheet: ASTM D 4802, Category A-1 (cell-cast sheet), Type UVA (UV absorbing).

L. Polycarbonate Sheet: Of thickness indicated, manufactured by extrusion process, coated on both surfaces with abrasion-resistant coating:

1. Impact Resistance: 16 ft-lbf/in. (854 J/m) per ASTM D 256, Method A.
2. Tensile Strength: 9000 lbf/sq. in. (62 MPa) per ASTM D 638.
3. Flexural Modulus of Elasticity: 340,000 lbf/sq. in. (2345 MPa) per ASTM D 790.
4. Heat Deflection: 265 deg F (129 deg C) at 264 lbf/sq. in. (1.82 MPa) per ASTM D 648.
5. Abrasion Resistance: 1.5 percent maximum haze increase for 100 revolutions of a Taber abraser with a load of 500 g per ASTM D 1044.

M. Applied Vinyl: Die-cut characters from vinyl film of nominal thickness of 3 mils (0.076 mm) with pressure-sensitive adhesive backing, suitable for exterior applications.

## 2.2 DIMENSIONAL CHARACTERS

A. Aluminum Extrusions: Comply with the following requirements:

1. Finish: Painted
2. Thickness: As indicated
3. Color(s): As indicated
4. Mounting: Concealed studs, noncorroding for substrates encountered.

B. Fabricated Channel Characters: Form exposed faces and sides of characters to produce surfaces free from warp and distortion. Include internal bracing for stability and attachment of mounting accessories. Comply with the following requirements:

1. Illuminated Backlighted and Frontlighted Channel Characters: Manufacturer's standard LED lighting including transformers, insulators, and other components. Make provisions for servicing and concealing connections to building electrical system.

2. Stainless-Steel Sheet: Not less than 0.050 inch (1.27 mm) thick for face and 0.031 inch (0.78 mm) thick for returns.

    a. Finish: No. 4 Hairline Finish

3. Provide manufacturer's hardware for projection mounting of backlighted channel characters at manufacturer's recommended distance from wall surface.
4. Provide translucent acrylic face sheet of thickness indicated. Attach characters to sheet metal back channels. Provide required to illuminate sign faces evenly.

    a. Color: As per Owner's standard colors.

## 2.3 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.

## 2.4 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.

## 2.5 STEEL FINISHES

A. Surface Preparation: Remove mill scale and rust, if present, from uncoated steel, complying with SSPC-SP 5/NACE No. 1, "White Metal Blast Cleaning," or SSPC-SP 8, "Pickling."

B. Factory Priming for Painted Finish: Apply shop primer specified below immediately after surface preparation and pretreatment.

1. Shop Primer: Manufacturer's or fabricator's standard, fast-curing, lead- and chromate-free, universal primer, selected for resistance to normal atmospheric corrosion, for compatibility with substrate and field-applied finish paint system indicated, and for capability to provide a sound foundation for field-applied topcoats despite prolonged exposure.

C. Baked-Enamel Finish: Immediately after cleaning and pretreating, apply manufacturer's standard two-coat, baked-enamel finish consisting of prime coat and thermosetting topcoat. Comply with paint manufacturer's written instructions for applying and baking to achieve a minimum dry film thickness of 2 mils (0.05 mm).

2.6 STAINLESS-STEEL FINISHES

A. Remove tool and die marks and stretch lines or blend into finish. Grind and polish surfaces to produce uniform, directionally textured, polished finish indicated, free of cross scratches. Run grain with long dimension of each piece.

B. Directional Satin Finish: No. 4 finish.

C. When polishing is completed, passivate and rinse surfaces. Remove embedded foreign matter and leave surfaces chemically clean.

2.7 ACRYLIC SHEET FINISHES

A. Colored Coatings for Acrylic Sheet: For copy and background and frame colors, provide colored coatings, including inks, dyes, and paints, that are recommended by acrylic manufacturers for optimum adherence to acrylic surface and that are UV and water resistant for five years for application intended.

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.
2. Mechanical Fasteners: Use nonremovable 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.

B. Bracket-Mounted Signs: Provide manufacturer's standard brackets, fittings, and hardware for mounting signs that project at right angles from walls and ceilings. Attach brackets and fittings securely to walls and ceilings with concealed fasteners and anchoring devices to comply with manufacturer's written instructions.

C. Dimensional Characters: Mount characters using standard fastening methods to comply with manufacturer's written instructions for character form, type of mounting, wall construction, and condition of exposure indicated. Provide heavy paper template to establish character spacing and to locate holes for fasteners.

1. Flush Mounting: Mount characters with backs in contact with wall surface.
2. Projected Mounting: Mount characters at projection distance from wall surface indicated.

END OF SECTION 101400

**SECTION 102113**

**TOILET COMPARTMENTS**

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Phenolic-core toilet compartments configured as Toilet Enclosures and Urinal Screens.

1.2 ACTION SUBMITTALS

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

B. Shop Drawings: For toilet compartments. Include plans, elevations, sections, details, and attachments to other work.

C. Samples for each exposed product and for each color and texture specified.

1.3 INFORMATIONAL SUBMITTALS

A. Product certificates.

1.4 CLOSEOUT SUBMITTALS

A. Maintenance data.

1.5 QUALITY ASSURANCE

A. Regulatory Requirements: Comply with applicable provisions in the National Building Code of the Philippines (BP 344) for toilet compartments designated as accessible.

PART 2 - PRODUCTS

2.1 PHENOLIC-CORE UNITS

A. Toilet-Enclosure Style: Overhead braced and Floor anchored.

B. Urinal-Screen Style: Wall hung

C. Door, Panel, Urinal 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 and no-sightline system. Provide minimum 3/4-inch- (19-mm-) thick doors and pilasters and minimum 1/2-inch- (13-mm-) thick panels.

D. Pilaster [Shoes and Sleeves (Caps): Fabricated from stainless-steel sheet, not less than 76mm high, finished to match hardware.

E. Brackets (Fittings):

1. Stirrup Type: Ear or U-brackets, stainless steel.
2. Full-Height (Continuous) Type: Manufacturer's standard design; stainless steel.

F. Phenolic-Panel Finish: Facing sheet of one color and pattern.

1. Color and Pattern: As selected by Architect from manufacturer's full range, with manufacturer's standard dark-color core.

## 2.2 ACCESSORIES

A. Hardware and Accessories: Manufacturer's standard design, heavy-duty operating hardware and accessories.

1. Material: Stainless steel.
2. Hinges: Manufacturer's standard paired, self-closing type that can be adjusted to hold doors open at any angle up to 90 degrees.
3. Latch and Keeper: Manufacturer's standard latch unit designed for emergency access and with combination rubber-faced door strike and keeper. Provide units that comply with regulatory requirements for accessibility at compartments designated as accessible.
4. Coat Hook: Manufacturer's standard combination hook and rubber-tipped bumper, sized to prevent in-swinging door from hitting compartment-mounted accessories.
5. Door Bumper: Manufacturer's standard rubber-tipped bumper at out-swinging doors.
6. Door Pull: Manufacturer's standard unit at out-swinging doors that complies with regulatory requirements for accessibility. Provide units on both sides of doors at compartments designated as accessible.

B. Overhead Bracing: Manufacturer's standard continuous, extruded-aluminum head rail with antigrip profile and in manufacturer's standard finish.

C. 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 stainless steel.

## 2.3 FABRICATION

A. Overhead-Braced Units: Provide manufacturer's standard corrosion-resistant supports, leveling mechanism, and anchors at pilasters to suit floor conditions. Provide shoes at pilasters to conceal supports and leveling mechanism.

B. Floor-Anchored Units: Provide manufacturer's standard corrosion-resistant anchoring assemblies with leveling adjustment nuts at pilasters for structural connection to floor. Provide shoes at pilasters to conceal anchorage.

C. Ceiling-Hung Units: Provide manufacturer's standard corrosion-resistant anchoring assemblies with leveling adjustment nuts at pilasters for connection to structural support above finished ceiling. Provide assemblies that support pilasters from structure without transmitting load to finished ceiling. Provide sleeves (caps) at tops of pilasters to conceal anchorage.

D. Floor-and-Ceiling-Anchored Units: Provide manufacturer's standard corrosion-resistant anchoring assemblies with leveling adjustment at tops and bottoms of pilasters. Provide shoes and sleeves (caps) at pilasters to conceal anchorage.

E. Door Size and Swings: Unless otherwise indicated, provide 610-mm - wide, in-swinging doors for standard toilet compartments and 914-mm - wide, out-swinging doors with a minimum 813m - wide, clear opening for compartments designated as accessible.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

A. General: Comply with manufacturer's written installation instructions. Install units rigid, straight, level, and plumb. Secure units in position with manufacturer's recommended anchoring devices.

B. Clearances: Maximum 13mm between pilasters and panels; 25mm between panels and walls.

C. Stirrup Brackets: Secure panels to walls and to pilasters with no fewer than three brackets attached at midpoint and near top and bottom of panel. Locate wall brackets so holes for wall anchors occur in masonry or tile joints. Align brackets at pilasters with brackets at walls.

### 3.2 ADJUSTING

A. Hardware Adjustment: Adjust and lubricate hardware according to hardware manufacturer's written instructions for proper operation. Set hinges on in-swinging doors to hold doors open approximately 30 degrees from closed position when unlatched. Set hinges on out-swinging doors to return doors to fully closed position.

END OF SECTION 102113

**SECTION 102123**

**CUBICLES**

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Curtain tracks and carriers.
2. Intravenous (IV) tracks, carriers and bottle holders.
3. Curtains.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: Show layout of cubicles, sizes of curtains, number of carriers, anchorage details, and accessories.

C. Samples: For each type of curtain.

D. Schedule: Use same designations indicated on Drawings.

1.3 CLOSEOUT SUBMITTALS

A. Operation and maintenance data.

1.4 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials described below.

1. Curtain Carriers and Track End Caps: Full-size units equal to 3 percent of amount installed, but no fewer than 20 units.
2. Curtains: Full-size units equal to 10 percent of amount installed, but no fewer than 10 units.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Curtains: Provide curtain fabrics with the following characteristics:

1. Launderable to a temperature of not less than [160 deg F (71 deg C)] [90 deg F (32 deg C)].
2. Flame resistant and identical to those that have passed NFPA 701 when tested by a testing and inspecting agency acceptable to authorities having jurisdiction.

2.2 CURTAIN SUPPORT SYSTEMS

A. Extruded-Aluminum Curtain Track: Not less than [1-1/4 inches wide by 3/4 inch high (32 mm wide by 19 mm high)] [5/8 inch wide by 1/2 inch high (16 mm wide by 13 mm high)]; with manufacturer's standard wall thickness.

1. Curved Track: Factory-fabricated, [12-inch- (305-mm-)] radius bends.
2. Finish: Satin anodized
3. PVC Curtain Track: Not less than 1-1/4 inches wide by 15/16 inch high (32 mm wide by 24 mm high).

4. Curved Track: Factory-fabricated, 12-inch- (305-mm-) radius bends.

B. Curtain Track Accessories: Fabricate from same material and with same finish as track.

C. Curtain Carriers: [Two nylon rollers and nylon axle] [One-piece nylon glide] with [chrome-plated steel] [nylon] [aluminum] hook.

D. Breakaway Curtain Carriers: [One-piece nylon] [Velcro] breakaway curtain carriers designed to allow curtains to detach from tracks with a pulling force of no more than 5 lbf (22.2 N).

E. Exposed Fasteners: Stainless steel.

F. Concealed Fasteners: Hot-dip galvanized.

2.3 CURTAINS

A. Cubicle Curtain Fabric: Curtain manufacturer's standard, 100 percent polyester, inherently and permanently flame resistant, stain resistant, and antimicrobial.

B. Shower Curtain Fabric: Curtain manufacturer's standard, polyester-reinforced vinyl fabric; flame resistant, stain resistant, and antimicrobial.

1. Color: As selected by Architect from manufacturer's full range

C. Curtain Grommets: Nickel-plated brass; spaced not more than 6 inches (152 mm) o.c.; machined into top hem.

D. Mesh Top: Not less than [20-inch- (508-mm-)] [22-inch- (559-mm-)] high mesh top of No. [50] [40] [42] nylon mesh.

E. Beaded-Chain Curtain Drop: [6 inches (152 mm)] [9 inches (229 mm)] [12 inches (305 mm)] [15 inches (381 mm)] [18 inches (457 mm)] long; nickel-plated steel with aluminum hook.

F. PVC-Strip Curtain Drop: [16 inches (406 mm)] [18 inches (457 mm)] long with chrome-plated steel hook.

G. Curtain Tieback: Nickel-plated brass chain; one at each curtain termination.

H. Fabricate curtains as follows:

1. Width: Equal to track length from which curtain is hung plus 10 percent added fullness, but not less than 12 inches (305 mm) added fullness.

2. Length: Equal to floor-to-ceiling height, minus depth of track and carrier at top, and minus clearance above the finished floor as follows:

    a. Cubicle Curtains: [12 inches (305 mm)] [15 inches (381 mm)].
    b. Dressing-Area Curtains: [4 inches (102 mm)] [6 inches (152 mm)].
    c. Tub Curtains: 6 inches (152 mm).
    d. Shower Curtains: 1/2 inch (13 mm).

I. Vertical Seams: Not less than 1/2 inch (13 mm) wide, double turned and double stitched.

## 2.4 IV SUPPORT SYSTEMS

A. IV Tracks: Extruded aluminum, not less than 1-1/4 inches wide by 3/4 inch high (32 mm wide by 19 mm high); with manufacturer's standard wall thickness.

1. Curved Track: Factory-fabricated, [12-inch- (305-mm-) radius bends.
2. Finish: Satin anodized
3. IV Carriers: Four nylon rollers and [nylon] [steel] [stainless-steel] axles[ with ball bearings and] with hanger loop fabricated from 1/4-inch- (6-mm-) diameter stainless steel.

B. Stationary IV Bottle Holders: 24-inch (610-mm) fixed height with stainless-steel shaft; with four nonfolding 1/4-inch (6-mm) stainless-steel arms with loops, a stainless-steel bottom loop, and a stainless-steel top loop to attach to carrier.

1. Top Loop: Coated for nonconductivity

# PART 3 - EXECUTION

## 3.1 INSTALLATION

A. General: Install tracks level and plumb, according to manufacturer's written instructions.

B. Up to 20 feet (6.0 m) in length, provide track fabricated from single continuous length.

1. Curtain Track Mounting: Surface, Suspended, or As indicated on Drawings.
2. IV Track Mounting: Surface.

C. Surface-Track Mounting: Fasten tracks to ceilings at intervals recommended by manufacturer. Fasten tracks to structure at each splice and tangent point of each corner. Center fasteners in track to ensure unencumbered carrier operation.

D. Suspended-Track Mounting: Install track with manufacturer's standard tubular aluminum suspended supports at intervals and with fasteners recommended by manufacturer. Fasten supports to structure. Provide supports at each splice and tangent point of each corner. Secure ends of track to wall with flanged fittings or brackets.

E. Track Accessories: Install splices, end caps, connectors, end stops, coupling and joining sleeves, and other accessories as required for a secure and operational installation.

F. IV Bottle Holders: Unless otherwise indicated, install one IV hook on each IV track and hang one IV hanger.

G. Curtain Carriers: Provide curtain carriers adequate for 6-inch (152-mm) spacing along full length of curtain plus an additional carrier.

H. Curtains: Hang curtains on each curtain track. Secure with curtain tieback.

END OF SECTION 102123

**SECTION 102226**

**OPERABLE PARTITIONS**

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Manually operated, acoustical panel partitions.
2. Electrically operated, acoustical panel partitions.
3. Manually operated, fire-rated panel partitions.
4. Manually operated, glass panel partitions.

1.2 PERFORMANCE REQUIREMENTS

A. Delegated Design: Design operable panel partitions including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.

B. Seismic Performance: Operable panel partitions shall withstand the effects of earthquake motions determined according to [SEI/ASCE 7]

1. The term "withstand" means "the panels will remain in place without separation of any parts from the assembly when subjected to the seismic forces specified."

C. Acoustical Performance: Provide operable panel partitions tested by a qualified testing agency for the following acoustical properties according to test methods indicated:

1. Sound-Transmission Requirements: Operable panel partition assembly tested for laboratory sound-transmission loss performance according to ASTM E 90, determined by ASTM E 413, and rated for not less than the STC indicated.
2. Acoustical Performance Requirements: Installed operable panel partition assembly, identical to partition tested for STC, tested for NIC according to ASTM E 336, determined by ASTM E 413, and rated for [10 dB less than STC value indicated] <Insert value>.

1.3 ACTION SUBMITTALS

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

B. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.

1. Indicate storage and operating clearances. Indicate location and installation requirements for hardware and track, blocking, and direction of travel.
2. Wiring Diagrams: For power, signal, and control wiring.

C. Samples: For each type of exposed material, finish, covering, or facing indicated.

D. Delegated-Design Submittal: For operable panel partitions indicated to comply with performance requirements, including analysis data and calculations signed and sealed by the qualified professional engineer responsible for their preparation.

1. Design Calculations: Calculate requirements for seismic restraints.

1.4 INFORMATIONAL SUBMITTALS

A. Coordination Drawings: Reflected ceiling plans, drawn to scale and coordinated with each other, based on input from installers of the items involved:

B. Setting Drawings: For embedded items and cutouts required in other work, including support-beam, mounting-hole template.

C. Seismic Qualification Certificates: For operable panel partitions, accessories, and components, from manufacturer.

D. Product certificates.

E. Product test reports.

F. Field quality-control reports.

G. Warranty: Sample of special warranty.

1.5 CLOSEOUT SUBMITTALS

A. Operation and maintenance data.

1.6 QUALITY ASSURANCE

A. Manufacturer Qualifications: A qualified manufacturer that is certified for chain of custody by an FSC-accredited certification body.

B. Installer Qualifications: An employer of workers trained and approved by manufacturer.

C. Testing Agency Qualifications: Qualified according to Division 01 Section "Quality Requirements" for testing indicated.

D. Fire-Test-Response Characteristics: Provide panels with finishes meeting one of the following as determined by testing identical products by UL or another testing and inspecting agency acceptable to authorities having jurisdiction:

1. Surface-Burning Characteristics: As determined by testing per ASTM E 84.

a. Flame-Spread Index: [25 or less] [26 to 75] [76 to 200].
b. Smoke-Developed Index: 450 or less.

2. Fire Growth Contribution: Meeting acceptance criteria of local code and authorities having jurisdiction when tested according to [NFPA 265] [NFPA 286].

E. Fire-Rated Door Assemblies: Comply with NFPA 80, based on testing according to UL 10B.

1. Oversize Fire-Rated Door Assemblies: For units exceeding sizes of tested assemblies, provide certification by a testing agency acceptable to authorities having jurisdiction that doors comply with standard construction requirements for tested and labeled fire-rated door assemblies except for size.

F. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

G. Preinstallation Conference: Conduct conference at Project site

1.7 DELIVERY, STORAGE, AND HANDLING

A. Protectively package and sequence panels in order for installation. Clearly mark packages and panels with numbering system used on Shop Drawings. Do not use permanent markings on panels.

1.8 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of operable panel partitions that fail in materials or workmanship within specified warranty period.

1. Warranty Period: Two years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Forest Certification: Fabricate products with wood, wood veneers, and wood-based panel products produced from wood obtained from forests certified by an FSC-accredited certification body to comply with FSC STD-01-001, "FSC Principles and Criteria for Forest Stewardship."

B. Steel Frame: Steel sheet, manufacturer's standard thickness.

C. Steel Face/Liner Sheets: Tension-leveled steel sheet, manufacturer's standard thickness.

D. Aluminum: Alloy and temper recommended by aluminum producer and finisher for type of use, corrosion resistance, and finish indicated; manufacturer's standard strengths and thicknesses for type of use.

E. Wood Frame: Clear, vertical-grain, straight, kiln-dried, fire-retardant-treated wood; of manufacturer's standard species.

F. Gypsum Board: ASTM C 36/C 36M.

G. Cement Board: ASTM C 1288.

H. Plywood: DOC PS 1.

I. Particleboard: ANSI A208.1, made with binder containing no urea formaldehyde.

J. Medium-Density Fiberboard: ANSI A208.2, made with binder containing no urea formaldehyde.

K. Composite Wood Products: Products shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

L. Adhesives: Manufacturer's standard products that comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

## 2.2 OPERABLE ACOUSTICAL PANELS

A. Operable Acoustical Panels: Operable acoustical panel partition system, including panels, seals, finish facing, suspension system, operators, and accessories.

B. Panel Operation: Manually operated, continuously hinged panels.

C. Panel Construction: Provide top reinforcement as required to support panel from suspension components and provide reinforcement for hardware attachment. Fabricate panels with tight hairline joints and concealed fasteners. Fabricate panels so finished in-place partition is rigid; level; plumb; aligned, with tight joints and uniform appearance; and free of bow, warp, twist, deformation, and surface and finish irregularities.

D. Dimensions: Fabricate operable acoustical panel partitions to form an assembled system of dimensions indicated and verified by field measurements.

E. STC: Not less than 55

F. Panel Closure: Manufacturer's standard.

G. Hardware: Manufacturer's standard as required to operate operable panel partition and accessories; with decorative, protective finish.

## 2.3 SEALS

A. General: Provide types of seals indicated that produce operable panel partitions complying with acoustical performance requirements and the following:

1. Manufacturer's standard seals.
2. Seals made from materials and in profiles that minimize sound leakage.
3. Seals fitting tight at contact surfaces and sealing continuously between adjacent panels and between operable panel partition perimeter and adjacent surfaces, when operable panel partition is extended and closed.

B. Horizontal Bottom Seals: PVC-faced, mechanical, retractable, constant-force-contact seal exerting uniform constant pressure on floor when extended, ensuring horizontal and vertical sealing and resisting panel movement.

1. Mechanically Operated for Acoustical Panels: Extension and retraction of bottom seal by operating handle or built-in operating mechanism, with operating range not less than [1-1/2 inches (38 mm)] [2 inches (50 mm)] [4 inches (102 mm)] [6 inches (152 mm)] between retracted seal and floor finish.
2. Mechanically Operated for Fire-Rated Panels: Extension and retraction of bottom seal by operating handle or built-in operating mechanism, with operating range not less than [1-1/2 inches (38 mm)] [2 inches (50 mm)] [4 inches (102 mm)] between retracted seal and floor finish.
3. Automatically Operated for Acoustical Panels: Extension and retraction of bottom seal automatically operated by movement of partition, with operating range not less than [1 inch (25 mm)] [1-1/2 inches (38 mm)] [2 inches (50 mm)] between retracted seal and floor finish.

2.4 FINISH FACING

A. General: Provide finish facings for panels that comply with indicated fire-test-response characteristics and that are factory applied to operable panel partitions with appropriate backing, using mildew-resistant nonstaining adhesive as recommended by facing manufacturer's written instructions.

1. Color/Pattern: As selected by Architect from manufacturer's full range.

B. Vinyl-Coated Fabric Wall Covering: Manufacturer's standard, mildew-resistant, washable, vinyl-coated fabric wall covering; complying with CFFA-W-101-D for type indicated; Class A.

C. Fabric Wall Covering: Manufacturer's standard fabric, from same dye lot, treated to resist stains.

D. High-Pressure Decorative Laminate: NEMA LD 3, Horizontal grade.

E. Cap-Trimmed Edges: Protective perimeter-edge trim with tight hairline joints concealing edges of panel and finish facing.

F. Trimless Edges: Fabricate exposed panel edges so finish facing wraps uninterrupted around panel, covering edge and resulting in an installed partition with facing visible on vertical panel edges, without trim, for minimal sightlines at panel-to-panel joints.

2.5 SUSPENSION SYSTEMS

A. Suspension Tracks: Steel or aluminum mounted directly to overhead structural support, with adjustable steel hanger rods for overhead support, designed for type of operation, size, and weight of operable panel partition indicated. Size track to support partition operation and storage without damage to suspension system, operable panel partitions, or adjacent construction. Limit track deflection to no more than 0.10 inch (2.54 mm) between bracket supports. Provide a continuous system of track sections and accessories to accommodate configuration and layout indicated for partition operation and storage.

B. Carriers: Trolley system as required for configuration type, size, and weight of partition and for easy operation; with ball-bearing wheels.

C. Track Intersections, Switches, and Accessories: As required for type of operation, storage, track configuration, and layout indicated for operable panel partitions, and compatible with partition assembly specified. Fabricate track intersections and switches from steel or aluminum.

1. Multidirectional Switches: Adjustable switch configuring track into L, T, or X intersections and allowing panels to be moved in all pass-through, 90-degree change, and cross-over travel direction combinations.

D. Aluminum Finish: Mill finish or manufacturer's standard, factory-applied, decorative finish unless otherwise indicated.

E. Steel Finish: Manufacturer's standard, factory-applied, corrosion-resistant, protective coating unless otherwise indicated.

2.6 ACCESSORIES

A. Pass Doors: Swinging door built into and matching panel materials, construction, acoustical qualities, fire rating finish, and thickness, complete with frames and operating hardware. Hinges finished to match other exposed hardware.

1. Single Pass Door: [36 by 80 inches (914 by 2032 mm)] [36 by 84 inches (914 by 2134 mm)], with the following:
2. Double Pass Door: [72 by 80 inches (1829 by 2032 mm)] [72 by 84 inches (1829 by 2134 mm)], with the following:

    a. Door Seals: [Mechanically operated floor seal on panels containing pass doors] [Sweep floor seals].
    b. [Panic] [Fire] exit device.
    c. Concealed door closer.
    d. Door Viewer: Installed with view in direction of swing.
    e. Exit Sign: Recessed, self-illuminated.
    f. Latchset: Passage set.
    g. Lock: Key-operated lock cylinder, keyed to master key system, operable from both sides of door. Include two keys per lock.
    h. Lock: Deadlock to receive cylinder, operable from both sides of door. Refer to Division 08 door hardware Sections for lock cylinder and keying requirements.

B. Storage Pocket Door: Full height at end of partition runs to conceal stacked partition; of same materials, finish, construction, thickness, and acoustical qualities as panels; complete with operating hardware[ and acoustical seals at soffit, floor, and jambs]. Hinges in finish to match other exposed hardware.

C. Electric Interlock: Provide each motorized operable panel partition with electric interlocks at locations indicated, to prevent operation of operable panel partition under the following conditions:

1. On storage pocket door, to prevent operation if door is not in fully open position.
2. On partitions at location of convergence by another partition, to prevent operation if merging partitions are in place.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

A. General: Comply with ASTM E 557 except as otherwise required by operable panel partition manufacturer's written installation instructions.

B. Install operable panel partitions and accessories after other finishing operations, including painting, have been completed.

C. Install panels from marked packages in numbered sequence indicated on Shop Drawings.

D. Broken, cracked, chipped, deformed, or unmatched panels are not acceptable.

E. Broken, cracked, deformed, or unmatched gasketing or gasketing with gaps at butted ends is not acceptable.

### 3.2 ADJUSTING

A. Adjust operable panel partitions to operate smoothly, without warping or binding. Lubricate hardware and other moving parts.

B. Adjust pass doors and storage pocket doors] to operate smoothly and easily, without binding or warping. Check and readjust operating hardware. Confirm that latches and locks engage accurately and securely without forcing or binding.

## 3.3 FIELD QUALITY CONTROL

A. Light-Leakage Test: Illuminate one side of partition installation and observe vertical joints and top and bottom seals for voids; adjust partitions for acceptable fit.

B. NIC Testing: Engage a qualified testing agency to perform tests and inspections.

C. Testing Methodology: Perform testing of installed operable panel partition for noise isolation according to ASTM E 336, determined by ASTM E 413, and rated for not less than NIC indicated. Adjust and fit partitions to comply with NIC test method requirements.

D. Testing Extent: Testing agency shall randomly select one operable panel partition installation(s) for testing.

E. Repair or replace operable panel partitions that do not comply with requirements.

F. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of repaired, replaced, or additional work with specified requirements.

G. Prepare test and inspection reports.

## 3.4 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain operable panel partitions.

END OF SECTION 102226

**SECTION 102600**

**WALL AND DOOR PROTECTION**

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Wall guards.
2. Impact-resistant handrails.
3. Corner guards.

1.2 PERFORMANCE REQUIREMENTS

A. Structural Performance: Provide handrails capable of withstanding the effects of gravity loads and the following loads and stresses within limits and under conditions indicated:

1. Uniform load of 50 lbf/ft. (0.73 kN/m) applied in any direction.
2. Concentrated load of 200 lbf (0.89 kN) applied in any direction.
3. Uniform and concentrated loads need not be assumed to act concurrently.

1.3 ACTION SUBMITTALS

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

B. Shop Drawings: For each impact-resistant wall protection unit. Include sections, details, and attachments to other work.

C. Samples: For each exposed product and for each color and texture specified, 12 inches long

1.4 INFORMATIONAL SUBMITTALS

A. Material certificates.

B. Material test reports.

C. Warranty: Sample of special warranty.

1.5 CLOSEOUT SUBMITTALS

A. Maintenance data.

1.6 QUALITY ASSURANCE

A. Installer Qualifications: An employer of workers trained and approved by manufacturer.

B. Surface-Burning Characteristics: As determined by testing identical products per ASTM E 84, NFPA 255, or UL 723 by UL or another qualified testing agency.

C. Regulatory Requirements: Comply with applicable provisions in the U.S. Architectural & Transportation Barriers Compliance Board's ADA-ABA Accessibility Guidelines, ICC/ANSI A117.1 and the National Building Code of the Philippines.

D. Preinstallation Conference: Conduct conference at Project site.

1.7 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of impact-resistant wall protection units that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:

a. Structural failures.
b. Deterioration of plastic and other materials beyond normal use.

2. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MATERIALS

A. PVC Plastic: ASTM D 1784, Class 1, textured, chemical- and stain-resistant, high-impact-resistant PVC or acrylic-modified vinyl plastic with integral color throughout.

1. Impact Resistance: Minimum 25.4 ft-lbf/in. (1356 J/m) of notch when tested according to ASTM D 256, Test Method A.
2. Chemical and Stain Resistance: Tested according to ASTM D 543, ASTM D 1308]
3. Self-extinguishing when tested according to ASTM D 635.
4. Flame-Spread Index: 25 or less.
5. Smoke-Developed Index: 450 or less.

B. Polycarbonate Plastic Sheet: ASTM D 6098, S-PC01, Class 1 or 2, abrasion resistant; with a minimum impact-resistance rating of 15 ft-lbf/in. (800 J/m) of notch when tested according to ASTM D 256, Test Method A.

C. Aluminum Extrusions: Alloy and temper recommended by manufacturer for type of use and finish indicated, but with not less than strength and durability properties specified in ASTM B 221 (ASTM B 221M) for Alloy 6063-T5.

D. Fasteners: Aluminum, nonmagnetic stainless-steel, or other noncorrosive metal screws, bolts, and other fasteners compatible with items being fastened. Use security-type fasteners where exposed to view.

E. Adhesive: As recommended by impact-resistant plastic wall protection manufacturer and with a VOC content of 70 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

F. Adhesive: As recommended by impact-resistant plastic wall protection manufacturer and that complies with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

## 2.2 WALL GUARDS

A. Crash Rail <CR>: Heavy-duty assembly consisting of continuous snap-on plastic cover installed over concealed retainer system; designed to withstand impacts.

1. Cover: Extruded rigid plastic, minimum 0.100-inch (2.5-mm) wall thickness; in dimensions and profiles indicated on Drawings.

    a. Surface: Uniform
    b. Color and Texture: As selected by Architect from manufacturer's full range.

2. Continuous Retainer: Minimum 0.080-inch- (2.0-mm-) thick, one-piece, extruded aluminum.
3. Retainer Clips: Manufacturer's standard impact-absorbing clips designed for heavy-duty performance.
4. Bumper: Continuous rubber or vinyl bumper cushion(s).
5. End Caps and Corners: Prefabricated, injection-molded plastic; matching color cover; field adjustable for close alignment with snap-on cover.
6. Accessories: Concealed splices and mounting hardware.
7. Mounting: [Surface mounted directly to wall] [Reveal mounted on bumper cushion(s)] [Extended mounting on injection-molded plastic mounting brackets].

B. Bumper Rail (BG) Assembly consisting of continuous snap-on plastic cover installed over concealed, continuous retainer; designed to withstand impacts.

1. Cover: Extruded rigid plastic, minimum 0.078-inch (2.0-mm) wall thickness; in dimensions and profiles indicated on Drawings.

    a. Color and Texture: As selected by Architect from manufacturer's full range.

2. Continuous Retainer: Minimum 0.080-inch- (2.0-mm-) thick, one-piece, extruded aluminum.
3. Retainer Clips: Manufacturer's standard impact-absorbing clips.
4. Bumper: Continuous rubber or vinyl bumper cushion(s).
5. End Caps and Corners: Prefabricated, injection-molded plastic; matching color cover; field adjustable for close alignment with snap-on cover.
6. Accessories: Concealed splices and mounting hardware.
7. Mounting: [Surface mounted directly to wall] [Reveal mounted on bumper cushions] [Extended mounting on injection-molded plastic mounting brackets].

## 2.3 HANDRAILS

A. Impact-Resistant Plastic Handrails (CR/HR) Assembly consisting of snap-on plastic cover installed over continuous retainer.

1. Cover: Minimum 0.100-inch- (2.5-mm-) thick, extruded rigid plastic; in dimensions and profiles indicated on Drawings.

    a. Single Handrail: Cylindrical tube profile cover with continuous retainer; with mounting brackets supporting bottom of rail.

b. Bumper Rail: Cover with sculpted with contoured thumb recess on front side; with 1-1/2-inch- (38-mm-) diameter gripping surface and finger recess on back side; supported by concealed, continuous retainer and extended mounting brackets.

1) Bumper Surface: Smooth

c. Color and Texture: As selected by Architect from manufacturer's full range

2. Retainer: Minimum 0.080-inch- (2.0-mm-) thick, one-piece, extruded aluminum.
3. Mounting Bracket: Extended mounting on [injection-molded plastic] [anodized-aluminum mounting brackets.
4. End Caps and Corners: Prefabricated, injection-molded plastic; matching color cover; field adjustable for close alignment with snap-on cover.
5. Accessories: Concealed splices, cushions, and mounting hardware.

## 2.4 CORNER GUARDS

A. Surface-Mounted, Resilient, Plastic Corner Guards (CG) Assembly consisting of snap-on plastic cover installed over continuous retainer; including mounting hardware; fabricated with 90- or 135-degree turn to match wall condition.

1. Cover: Extruded rigid plastic, minimum 0.100-inch (2.5-mm) wall thickness; in dimensions and profiles indicated on Drawings.

a. Color and Texture: As selected by Architect from manufacturer's full range.

2. Retainer: [Minimum 0.060-inch- (1.5-mm-) thick, one-piece, extruded aluminum] [One-piece extruded plastic].
3. Retainer Clips: Manufacturer's standard impact-absorbing clips.
4. Top and Bottom Caps: Prefabricated, injection-molded plastic; color matching cover; field adjustable for close alignment with snap-on cover.

B. Fire-Rated, Resilient, Plastic Corner Guards (CG) Assembly consisting of snap-on plastic cover that is flush with adjacent wall surface, installed over continuous retainer and intumescent fire barrier; including mounting hardware; fabricated with 90- or 135-degree turn to match wall condition; full wall height.

1. Fire Rating: Same rating as wall in which corner guard is installed; UL listed and labeled according to UL 2079.
2. Cover: Extruded rigid plastic, minimum 0.100-inch (2.5-mm) wall thickness; in dimensions and profiles indicated on Drawings.

a. Color and Texture: As selected by Architect from manufacturer's full range.

3. Retainer: Minimum 0.070-inch- (1.8-mm-) thick, one-piece, extruded aluminum.
4. Aluminum Cove Base: Nominal 4 inches (100 mm) high.

C. Surface-Mounted, Opaque-Plastic Corner Guards (JG) Jamb Guard: Fabricated from PVC plastic, acrylic-modified vinyl sheet or opaque polycarbonate sheet; with formed edges; fabricated with 90- or 135-degree turn to match wall condition; in dimensions and profiles indicated on Drawings.

1. Mounting: Countersunk screws through factory-drilled mounting holes
2. Color and Texture: As selected by Architect from manufacturer's full range.

PART 3 - EXECUTION

3.1 INSTALLATION

A. General: Install impact-resistant wall protection units level, plumb, and true to line without distortions. Do not use materials with chips, cracks, voids, stains, or other defects that might be visible in the finished Work.

1. Install impact-resistant wall protection units in locations and at mounting heights indicated on Drawings.
2. Provide splices, mounting hardware, anchors, and other accessories required for a complete installation.

a. Provide anchoring devices to withstand imposed loads.
b. Where splices occur in horizontal runs of more than 20 feet (6.1 m), splice aluminum retainers and plastic covers at different locations along the run, but no closer than 12 inches (305 mm).
c. Adjust end and top caps as required to ensure tight seams.

B. Immediately after completion of installation, clean plastic covers and accessories using a standard, ammonia-based, household cleaning agent.

C. Remove excess adhesive using methods and materials recommended in writing by manufacturer.

END OF SECTION 102600

**SECTION 102800**

**TOILET, BATH, AND LAUNDRY ACCESSORIES**

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Public-use washroom accessories.
2. Warm-air dryers.
3. Custodial accessories.

1.2 ACTION SUBMITTALS

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

B. Product Schedule: Indicating types, quantities, sizes, and installation locations by room of each accessory required.

1. Identify locations using room designations indicated.
2. Identify products using designations indicated.

1.3 INFORMATIONAL SUBMITTALS

A. Warranty: Sample of special warranty.

1.4 CLOSEOUT SUBMITTALS

A. Maintenance data.

1.5 QUALITY ASSURANCE

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

1.6 WARRANTY

A. Special Mirror Warranty: Manufacturer's standard form in which manufacturer agrees to replace mirrors that develop visible silver spoilage defects and that fail in materials or workmanship within specified warranty period.

1. Warranty Period: Five (5) years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PUBLIC-USE WASHROOM ACCESSORIES

A. Toilet Tissue (Roll) Dispenser:

B. Paper Towel Dispenser with Waste Receptacle

C. Liquid-Soap Dispenser.

D. Grab Bar

E. Robe Hook

2.2 WARM-AIR DRYERS

A. Warm-Air Dryer

2.3 CUSTODIAL ACCESSORIES

A. Combination Utility Shelf and Mop and Broom:

2.4 FABRICATION

A. Keys: Provide universal keys for internal access to accessories for servicing and resupplying. Provide minimum of six (6) keys to Owner's representative.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install accessories according to manufacturers' written instructions, using fasteners appropriate to substrate indicated and recommended by unit manufacturer. Install units level, plumb, and firmly anchored in locations and at heights indicated.

B. Grab Bars: Install to withstand a downward load of at least 250 lbf (1112 N), when tested according to ASTM F 446.

END OF SECTION 102800

**SECTION 104416**

**FIRE EXTINGUISHERS**

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 portable, [hand-carried] [wheeled] fire extinguishers and mounting brackets for fire extinguishers].

B. Owner-Furnished Material: [Hand-carried] [Wheeled] fire extinguishers.

1.3 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1. Review methods and procedures related to fire extinguishers including, but not limited to, the following:

a. Schedules and coordination requirements.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product. Include rating and classification, material descriptions, dimensions of individual components and profiles, and finishes for fire extinguisher and mounting brackets.

B. Product Schedule: For fire extinguishers. Coordinate final fire-extinguisher schedule with fire-protection cabinet schedule to ensure proper fit and function. Use same designations indicated on Drawings.

1.5 INFORMATIONAL SUBMITTALS

A. Warranty: Sample of special warranty.

1.6 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For fire extinguishers to include in maintenance manuals.

1.7 COORDINATION

A. Coordinate type and capacity of fire extinguishers with fire-protection cabinets to ensure fit and function.

1.8 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace fire extinguishers that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:

a. Failure of hydrostatic test according to NFPA 10.
b. Faulty operation of valves or release levers.

2. Warranty Period: Six years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. NFPA Compliance: Fabricate and label fire extinguishers to comply with NFPA 10, "Portable Fire Extinguishers."

B. Fire Extinguishers: Listed and labeled for type, rating, and classification by an independent testing agency acceptable to authorities having jurisdiction.

1. Provide fire extinguishers approved, listed, and labeled by FM Global.

2.2 PORTABLE, HAND-CARRIED FIRE EXTINGUISHERS

A. Fire Extinguishers: Type, size, and capacity for each [fire-protection cabinet] [and] [mounting bracket] indicated.

1. Valves: [Manufacturer's standard] [Nickel-plated, polished-brass body].
2. Handles and Levers: [Manufacturer's standard] [Stainless steel].
3. Instruction Labels: Include pictorial marking system complying with NFPA 10, Appendix B[, and bar coding for documenting fire-extinguisher location, inspections, maintenance, and recharging].

B. Stored-Pressure Water Type: UL-rated 2-A, 2.5-gal. (9.5-L) nominal capacity, with water in stainless-steel container; with pressure-indicating gage.

C. Stored-Pressure Antifreeze Water Type: UL-rated 2-A, 2.5-gal. (9.5-L) nominal capacity, with water and approved antifreeze solution mixed for temperatures as low as minus 40 deg F (minus 40 deg C) in stainless-steel container; with pressure-indicating gage.

D. Stored-Pressure Water-Mist Type: UL-rated 2-A:C, 2.5-gal. (9.5-L) nominal capacity, with water in enameled-steel container; with pressure-indicating gage.

E. Pressurized, AFFF-Foam Type: UL-rated [2-A:10-B, 1.6-gal. (6-L)] [3-A:20-B, 2.5-gal. (9.5-L)] nominal capacity, with AFFF foam in stainless-steel container; with pressure-indicating gage.

F. Pressurized, FFFP-Foam Type: UL-rated 3-A:20-B, 2.5-gal. (9.5-L) nominal capacity, with FFFP foam in stainless-steel container; with pressure-indicating gage.

G. Wet-Chemical Type: UL-rated 2-A:1-B:C:K, [1.6-gal. (6-L)] [2.5-gal. (9.5-L)] nominal capacity, with potassium [acetate] [citrate] [carbonate]-based chemical in stainless-steel container; with pressure-indicating gage.

H. Regular Dry-Chemical Type: UL-rated <Insert capacity> nominal capacity, with sodium bicarbonate-based dry chemical in manufacturer's standard enameled container.

I. Regular Dry-Chemical Type in Steel Container: UL-rated [2-B:C, 1-lb (0.4-kg)] [10-B:C, 2.5-lb (1.1-kg)] [10-B:C, 5-lb (2.3-kg)] [40-B:C, 5.5-lb (2.5-kg)] [40-B:C, 6-lb (2.7-kg)] [60-B:C, 10-lb (4.5-kg)] [120-B:C, 20-lb (9.1-kg)] nominal capacity, with sodium bicarbonate-based dry chemical in enameled-steel container.

J. Regular Dry-Chemical Type in Aluminum Container: UL-rated [2-B:C, 1-lb (0.4-kg)] [10-B:C, 2.5-lb (1.1-kg)] [10-B:C, 5-lb (2.3-kg)] [40-B:C, 5.5-lb (2.5-kg)] [60-B:C, 10-lb (4.5-kg)] [120-B:C, 20-lb (9.1-kg)] nominal capacity, with sodium bicarbonate-based dry chemical in enameled-aluminum container.

K. Regular Dry-Chemical Type in Brass Container: UL-rated [40-B:C, 6-lb (2.7-kg)] [60-B:C, 10-lb (4.5-kg)] [120-B:C, 20-lb (9.1-kg)] nominal capacity, with sodium bicarbonate-based dry chemical in chrome-plated-brass container.

L. Multipurpose Dry-Chemical Type: UL-rated <Insert capacity> nominal capacity, with monoammonium phosphate-based dry chemical in manufacturer's standard enameled container.

M. Multipurpose Dry-Chemical Type in Steel Container: UL-rated [1-A:10-B:C, 2.5-lb (1.1-kg)] [2-A:10-B:C, 5-lb (2.3-kg)] [3-A:40-B:C, 5-lb (2.3-kg)] [3-A:40-B:C, 6-lb (2.7-kg)] [4-A:60-B:C, 10-lb (4.5-kg)] [10-A:120-B:C, 20-lb (9.1-kg)] nominal capacity, with monoammonium phosphate-based dry chemical in enameled-steel container.

N. Multipurpose Dry-Chemical Type in Aluminum Container : UL-rated [1-A:10-B:C, 2.5-lb (1.1-kg)] [2-A:10-B:C, 5-lb (2.3-kg)] [3-A:40-B:C, 5-lb (2.3-kg)] [3-A:40-B:C, 6-lb (2.7-kg)] [4-A:60-B:C, 10-lb (4.5-kg)] [10-A:120-B:C, 20-lb (9.1-kg)] nominal capacity, with monoammonium phosphate-based dry chemical in enameled-aluminum container.

O. Multipurpose Dry-Chemical Type in Brass Container: UL-rated [2-A:10-B:C, 5-lb (2.3-kg)] [3-A:40-B:C, 6-lb (2.7-kg)] [4-A:60-B:C, 10-lb (4.5-kg)] [4-A:80-B:C, 10-lb (4.5-kg)] [10-A:120-B:C, 20-lb (9.1-kg)] nominal capacity, with monoammonium phosphate-based dry chemical in chrome-plated-brass container.

P. Purple-K Dry-Chemical Type in Aluminum Container: UL-rated [10-B:C, 2.5-lb (1.1-kg)] [30-B:C, 5-lb (2.3-kg)] [120-B:C, 20-lb (9.1-kg)] nominal capacity, with potassium bicarbonate-based dry chemical in enameled-aluminum container.

Q. Purple-K Dry-Chemical Type in Brass Container: UL-rated [80-B:C, 10-lb (4.5-kg)] [120-B:C, 20-lb (9.1-kg)] nominal capacity, with potassium bicarbonate-based dry chemical in chrome-plated-brass container.

R. Carbon Dioxide Type: UL-rated [5-B:C, 5-lb (2.3-kg)] [10-B:C, 10-lb (4.5-kg)] [10-B:C, 15-lb (6.8-kg)] [10-B:C, 20-lb (9.1-kg)] nominal capacity, with carbon dioxide in [manufacturer's standard enameled-metal] [enameled-steel] [enameled-aluminum] container.

S. Dry-Powder Type: [FM approved, ]UL-rated Class D, 30-lb (13.6-kg) nominal capacity, with [sodium chloride] [copper]-based powder in enameled-steel container; with pressure-indicating gage.

T. Halon Type: UL-rated [5-B:C, 2.5-lb (1.1-kg)] [10-B:C, 5-lb (2.3-kg)] nominal capacity, in enameled-steel container; with pressure-indicating gage.

U. Clean-Agent Type in Aluminum Container: UL-rated [1-B:C, 1.4-lb (0.6-kg)] [2-B:C, 2.5-lb (1.1-kg)] [5-B:C, 5-lb (2.3-kg)] nominal capacity, with HCFC Blend B agent and inert material in enameled-aluminum container; with pressure-indicating gage.

V. Clean-Agent Type in Brass Container: UL-rated [1-A:10-B:C, 11-lb (5-kg)] [2-A:10-B:C, 15.5-lb (7-kg)] nominal capacity, with HCFC Blend B agent and inert material in chrome-plated-brass container; with pressure-indicating gage.

W. Clean-Agent Type in Steel Container: UL-rated [5-B:C, 4.75-lb (2.2-kg)] [1-A:10-B:C, 10-lb (4.5-kg)] [2-A:10-B:C, 14-lb (6.4-kg)] nominal capacity, with HFC blend agent and inert material in enameled-steel container; with pressure-indicating gage.

## 2.3 MOUNTING BRACKETS

A. Mounting Brackets: Manufacturer's standard[ galvanized] steel, designed to secure fire extinguisher to wall or structure, of sizes required for types and capacities of fire extinguishers indicated, with plated or [red] [black] baked-enamel finish.

B. Identification: Lettering complying with authorities having jurisdiction for letter style, size, spacing, and location. Locate as indicated by Architect.

1. Identify bracket-mounted fire extinguishers with the words "FIRE EXTINGUISHER" in red letter decals applied to mounting surface.

a. Orientation: [Vertical] [Horizontal].

## 2.4 WHEELED FIRE EXTINGUISHERS <Insert drawing designation>

A. Wheeled Fire Extinguishers: Type, size, and capacity for locations indicated, complete with carriage.

1. Carriage: Fabricated from enameled-steel pipe, complete with hanger assembly, long-range nozzle, hose, and [semipneumatic solid-rubber tires] [wide-rim wheels].

a. Hose: [15 feet (4.6 m)] [50 feet (15.2 m)] [100 feet (30.5 m)].

B. Pressurized, FFFP-Foam Type: UL-rated 20-A:160-B, 33-gal. (125-L) nominal capacity, with FFFP foam in stainless-steel container.

C. Regular Dry-Chemical Type: UL-rated [160-B:C, 50-lb (23-kg)] [240-B:C, 150-lb (68-kg)] [160-B:C, 250-lb (113-kg)] nominal capacity, with sodium bicarbonate-based dry chemical in [regulated] [stored] [direct]-pressure, enameled-steel container.

D. Multipurpose Dry-Chemical Type: UL-rated [20-A:160-B:C, 30-lb (13.6-kg)] [30-A:160-B:C, 50-lb (23-kg)] [40-A:240-B:C, 125-lb (57-kg)] [40-A:160-B:C, 250-lb (113-kg)] nominal capacity, with monoammonium phosphate-based dry chemical in [regulated] [stored] [direct]-pressure, enameled-[steel] [aluminum] [steel or -aluminum] container.

E. Purple-K Dry-Chemical Type: UL-rated [160-B:C, 50-lb (23-kg)] [320-B:C, 125-lb (57-kg)] [160-B:C, 250-lb (113-kg)] nominal capacity, with potassium bicarbonate-based dry chemical in [regulated] [stored] [direct]-pressure, enameled-steel container.

F. Carbon Dioxide Type: UL-rated [20-B:C, 50-lb (23-kg)] [20-B:C, 100-lb (45-kg)] nominal capacity, with carbon dioxide in [manufacturer's standard enameled-metal] [enameled-steel] [enameled-aluminum] container.

G. Dry-Powder Type: [FM approved, ]UL-rated Class D, [sodium chloride-based powder, 150-lb (68-kg)] [copper-based powder, 250-lb (113-kg)] nominal capacity, in regulated-pressure, enameled-steel container; with pressure-indicating gage.

H. Clean-Agent Type: UL-rated [4-A:40-B:C, 65-lb (29-kg)] [10-A:80-B:C, 150-lb (68-kg)] nominal capacity, with HCFC Blend B agent and inert material in stored-pressure, enameled-steel container; with pressure-indicating gage.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

A. Examine fire extinguishers for proper charging and tagging.

1. Remove and replace damaged, defective, or undercharged fire extinguishers.

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

### 3.2 INSTALLATION

A. General: Install fire extinguishers[ and mounting brackets] in locations indicated and in compliance with requirements of authorities having jurisdiction.

1. Mounting Brackets: [54 inches (1372 mm)] <Insert dimension> above finished floor to top of fire extinguisher.

B. Mounting Brackets: Fasten mounting brackets to surfaces, square and plumb, at locations indicated.

END OF SECTION 104416

**SECTION 11 24 00**

**FACADE MAINTENANCE EQUIPMENT**

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Roof Mounted Facade Maintenance Equipment:
   1. Davit systems.
   2. Communication equipment.
   3. Power requirements.

1.2 SUBMITTALS

A. Pre-Design Submittal: Before beginning design submit an overall system description including the following:
   1. Description of major items of equipment and catalogue cut sheets.
   2. Preparation instructions and recommendations.
   3. Storage and handling requirements and recommendations.
   4. Installation methods.
   5. Verification Samples: For each finish product specified, two samples, minimum size 6 inches (150 mm) square, representing actual product, color, and patterns.
   6. Manufacturer's evidence of insurance. Manufacturer shall have specific liability insurance (products and completed operations insurance in the amount of 10,000,000 dollars). This insurance shall cover the failure of the facade maintenance equipment.

B. Design and Construction Submittal:
   1. Dimensioned Shop Drawings: Before beginning fabrication of equipment submit scaled shop drawings showing layout, profiles and product components, including anchorage, accessories and finish, along with general arrangement of the equipment and their working positions.
   2. Load Requirements: Indicate loads imposed on the building structure and curtain wall.
   3. Structural calculations prepared and certified by a Licensed Professional Engineer registered in the State where the project is located. Demonstrating design assumptions and method of design.
   4. Location and characteristics of electrical connections.
   5. Test Reports: Certified test reports showing compliance with specified performance characteristics and physical properties.
   6. Certificates: Product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria, and physical properties.

C. Operation and Maintenance Manual: Submit 3 sets of the Operation and Maintenance Manuals that are bound and neatly labeled describing operation and maintenance of all equipment installed; include methods for maintaining installed products, and precautions against cleaning materials and methods detrimental to finishes and performance. Include in these manuals a detailed rescue plan.
   1. Provide complete listing of replacement parts, including identifying numbers and ordering instructions.
   2. Include 3 copies of the warranty documents specified.
   3. Provide a sample inspection log for Owner's use in recording inspections; include recommended list of daily, weekly, periodic, and biannual inspections.

D. Project Record Documents: Submit project record ("as-built") drawings showing actual installed locations and configuration, and record specifications documenting all changes to original design criteria and other specification requirements. Include in the "as built" drawings wiring diagrams showing all electrical connections of equipment, including a legend sheet.

E. Closeout Submittals: Documentation of manufacturer's warranty.

1.3 MAINTENANCE CONTRACT

A. Submit a proposal for a one-year equipment maintenance contract to provide services four times per annum.

B. Submit a separate quotation to renew equipment maintenance contract for anadditional four years to provide services four times per annum.

1.4 QUALITY ASSURANCE

A. Manufacturer and Installer Qualifications:
   1. Facade Maintenance Equipment Contractor is solely responsible for quality control of the Work. Comply with the requirements specified in Section Quality Control.
   2. Regulatory Requirements: Comply with applicable requirements of the laws, codes, ordinances and regulations of the authorities having jurisdiction. Obtain necessary approvals from all such authorities.
   3. Required tests shall be made in the presence of the authorized representative of such local authorities. The Facade Maintenance Equipment Contractor shall issue a certificate of adequacy of the whole installation and of the testing performed.

B. Pre-Installation Meetings: Conduct pre-installation meetings to verify project requirements, substrate conditions, construction documents, details and manufacturer's warranty requirements.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Delivery: Deliver materials in manufacturer's original, unopened, undamaged rolls/pallets with identification labels intact.
   1. All facade maintenance equipment unloading at the job site shall be the responsibility of the facade maintenance equipment Contractor.

B. Storage and Protection: Store materials protected from exposure to harmful environmental conditions and at temperature and humidity conditions recommended by the manufacturer.

1.6 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 recommended limits.

1.7 WARRANTY

A. Provide manufacturer's warranty for 1 year against defects in materials and installation, executed by an authorized company official.

1.8 MANUFACTURERS

A. Acceptable Manufacturer: MHE-Demag

B. Requests for substitutions will be considered in accordance with these provisions:
   1. Approved equivalent contractor (manufacturer) shall be firm whose main concern and

business is engineering design, manufacture and installation of building maintenance equipment, and has been actively engaged in this business for (10) years minimum.

2. Facade Maintenance Equipment shall show proof of products insurance. Companies such as miscellaneous metal fabricators, who are not normally designing and manufacturing Permanent Facade Maintenance Equipment are not permitted to bid.

1.9 GENERAL REQUIREMENTS

A. Construct components of heat-treated aluminum alloy, stainless steel, or hot-dipped galvanized structural steel. Protect dissimilar metals against electrolytic actions.
   1. Connectors: Stainless steel unless otherwise noted.
   2. Welding: By certified welders. Examine all welds by non-destructive testing.

B. Components contacting facades and platform casters to be non-marking and scuff resistant material.

C. Exterior finish of roof carriages and other factory painted assemblies shall be machinery enamel of a color as directed by the Architect or Owner. Aluminum and stainless steel assemblies to be mill finished. Carbon steel components are hot-dipped galvanized.

D. Hardware, i.e. clips, bolts, nuts, washers, etc. shall be stainless steel.

E. Electrical equipment shall have phase protection.

F. Design: Structural members designed with a minimum 4:1 safety factor based on ultimate strength and normal operating conditions unless otherwise noted. Stresses and deflections are limited in accordance with governing codes and regulations.

1.10 DAVIT SYSTEMS

A. Davit Systems: Traditional and effective method to provide access to exterior building facades.

Platform Type : Synchro-powered cradle
Structure base : Aluminum
Finish : Natural anodized
Safe working load : 200 kg
Length of platform : 1.6 m (L) x 0.63m (W) x 1.1m (H)
Self weight (platform) ~ 280 kg
Facade roller type : Soft, spongy type
Floor board : Anti skid type
No. Of castor wheel : 4
Hoisting Motor
Hoist model : Synchro-Winch SW500
Hoist type : Synchro system
No. Of hoist : 1
Brake type : Primary - electro magnetic
Secondary - centrifugal
Electric : 3 ph, 400V, 60 Hz
Total amps : 4.8 amps
Emergency release : Included, downward only
Self Powered work platform hoist
Power source : 3 ph, 400V, 60 Hz
Amperes require : 4.8 Amps
Components : contactors/relays
Control : "Dead man" push button type
Plug socket : CEE, male 4 pins, all weatherproof type

Electric cable type/colour : 4 cores, Neoprene, black
Female Socket Requirement : 4 Holes, 3 Phase, 16 Amperes, 400V, 60Hz
Wire ropes
Φ Of ropes : 6.5 mm
No. Of ropes : 2
Working Height : 160 meters max
Finish : Galvanized
Strand ; Left and Right hand, cross lay 5 x 26 constructions
Breaking strength ~ 5,595 kg
Safety factor : > 12

1. Standard Requirements:
   a. The stability factor of each system shall be calculated, considering the suspended scaffold in its most outboard positions for traversing, operating and storage. System stability shall be obtained by attachment to structural supports and track systems.
   b. Wind Velocities: Equipment to be capable of withstanding highest wind velocities expected, for the specific area, when equipment is in a stored position. When in use equipment to be capable of withstanding 100 mph (1770 mph).
   c. Automatically Applied Braking System: Prevents unintentional traverse of the powered rolling davit carriages.
   d. Key Lockout: Prevents unauthorized use.
   e. Enclosures and Guards: Prevent accidental contact by personnel with moving parts or pinch points.
   f. Interlocks on Carriage and Power Cord Reel: Preventing undue strain on power cord and prevents cord from being trapped between carriage wheels and roof tracks.
   g. Traversing Controls: Continuous pressure weatherproof type. Multi controls when provided, are arranged to permit operation from only one control station at a time.

1.11 COMMUNICATION EQUIPMENT

A. Communication equipment provided for each operator for use in an emergency. Equipment to be Owner furnished walkie-talkies.

1.12 PREPARATION

A. If preparation is the responsibility of another installer, notify Architect in writing of deviations from manufacturer's recommended installation tolerances and conditions.

B. Do not proceed with installation until substrates have been properly prepared and deviations from manufacturer's recommended tolerances are corrected. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

C. Commencement of installation constitutes acceptance of conditions.

1.13 INSTALLATION

A. Install products in strict accordance with manufacturer's instructions and recommendations.

B. Install facade maintenance equipment and components in strict accordance with the approved shop drawings when construction and finish of adjoining work will permit and in sufficient time to avoid delays to the construction process. All equipment shall be secured in place as shown on drawings and/or as herein specified by rigid approved methods.

1.14 FIELD QUALITY CONTROL

A. Conduct full live load and operational tests, after completion of the installation, under maximum design live loading conditions over the full range of all the building surfaces, in accord with applicable standards.

B. At a time, mutually agreeable to all parties, allow one full day to conduct operational demonstrations for the Owner and/or the Owner's representative, after completion of the operational tests.

C. Repair or replace any components and correct all deficiencies observed because of these tests and demonstrations, and retest to assure compliance with the Contract Documents.

D. Approvals: Submit documentation required to obtain the necessary approval for the equipment installation from the governing authority for operation of the facade maintenance system. Conduct field operational tests for personnel from the governing authority (separate from the Owner's demonstrations).

1.15 CERTIFICATION

A. Provide written certification that all components have been successfully operated, and will perform in accordance with the intent of this design.

1.16 INSTRUCTIONS

A. The Facade Maintenance Equipment supplier shall instruct the Owner's Representatives and selected User Personnel in the proper usage of the BME. Representative of the BME supplier shall, at time as selected by the Owner, spend one man-day as needed at the building furnishing this instruction.

B. Facade Maintenance Equipment training attendance certificates are to be issued by the Facade Maintenance Equipment supplier to each of the Owner's Representatives and selected User Personnel upon completion of training.

1.17 PROTECTION

A. Protect installed products until completion of project.

B. Touch-up, repair or replace damaged products before Substantial Completion.

END OF SECTION

**SECTION 123200**

**MANUFACTURED CASEWORK**

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
1. Plastic-laminate-faced wood cabinets of stock design.
2. Plastic-laminate countertops.
3. Solid-Surfacing materials.

1.2 DEFINITIONS

A. MDF: Medium-density fiberboard.

1.3 ACTION SUBMITTALS

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

B. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.

C. Samples: For cabinet finishes and for each type of top material indicated.

1.4 QUALITY ASSURANCE

A. Manufacturer Qualifications: A qualified manufacturer that is certified for chain of custody by an FSC-accredited certification body.

B. Product Designations: Drawings indicate sizes, configurations, and finish material of manufactured wood casework by referencing designated manufacturer's catalog numbers. Other manufacturers' casework of similar sizes and door and drawer configurations, of same finish material, and complying with the Specifications may be considered. Refer to Division 01 Section "Product Requirements."

1.5 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of manufactured wood casework that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:

a. Delamination of components or other failures of glue bond.
b. Warping of components.
c. Failure of operating hardware.
d. Deterioration of finishes.

2. Warranty Period: Five (5) years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MATERIALS, GENERAL

A. Low-Emitting Materials: Fabricate manufactured wood casework, including countertops, with adhesives and composite wood products containing no urea formaldehyde.

B. Low-Emitting Materials: Adhesives and composite wood products shall comply with the testing and product requirements of the Department of Health

C. Maximum Moisture Content for Lumber: 7 percent for hardwood and 12 percent for softwood.

D. Hardwood Plywood: HPVA HP-1, either veneer core or particleboard core unless otherwise indicated.

E. Softwood Plywood: DOC PS 1.

F. Particleboard: ANSI A208.1, Grade M-2.

G. MDF: ANSI A208.2, [Grade 130]

H. Hardboard: AHA A135.4, Class 1 Tempered.

I. Plastic Laminate: High-pressure decorative laminate complying with NEMA LD 3.

J. Thermoset Decorative Panels: Particleboard or MDF finished with thermally fused, melamine-impregnated decorative paper complying with LMA SAT-1.

K. Edgebanding for Plastic Laminate: Plastic laminate matching adjacent surfaces

L. Stainless-Steel Sheet: ASTM A 240 or ASTM A 666, Type 304, with No. 4 satin finish.

M. Solid-Surfacing Material: Homogeneous solid sheets of filled plastic resin complying with ISSFA-2.

2.2 CABINET MATERIALS

A. Exposed Cabinet Materials:
1. Plastic Laminate: Grade HGS.

B. Semiexposed Cabinet Materials:
1. Plastic Laminate: Grade VGS.

a. Provide plastic laminate for semiexposed surfaces unless otherwise indicated.
b. Provide plastic laminate for interior faces of doors and drawer fronts.

2. Thermoset Decorative Panels: Provide thermoset decorative panels for semiexposed surfaces unless otherwise indicated.

2.3 DESIGN, COLOR, AND FINISH

A. Design: Provide manufactured wood casework based on Architect's details.

B. Plastic-Laminate Colors, Patterns, and Finishes: Match Architect's Sample.

C. PVC Edgebanding Color: Match Architect's sample.

D. Solid-Surfacing Material Colors and Patterns: Match Architects's Sample.

## 2.4 CASEWORK HARDWARE

A. Hardware, General: Unless otherwise indicated, provide manufacturer's standard satin-finish commercial-quality, heavy-duty hardware.

1. Use threaded metal or plastic inserts with machine screws for fastening to particleboard except where hardware is through-bolted from back side.

B. Butt Hinges: Stainless-steel, semiconcealed, 5-knuckle hinges complying with BHMA A156.9, Grade 1, with antifriction bearings and rounded tips.

C. Frameless Concealed Hinges (European Type): BHMA A156.9, Type B01602[, self-closing].

D. Pulls: Solid stainless-steel wire pulls.

E. Pulls: Semirecessed plastic pulls.

F. Door Catches: [Nylon-roller spring catch] [

G. Drawer Slides: BHMA A156.9, Type B05091.

1. Box Drawer Slides: [Grade 1]
2. File Drawer Slides: [Grade 1HD-100]
3. Pencil Drawer Slides: [Grade 2]

H. Drawer and Hinged Door Locks: Cylindrical (cam)type, 5-pin tumbler, complying with BHMA A156.11, Grade 1.

## 2.5 COUNTERTOPS

A. Countertops, General: Provide smooth, clean exposed tops and edges in uniform plane free of defects. Provide front and end overhang of 1 inch (25 mm) over base cabinets.

B. Plastic-Laminate Tops: Plastic-laminate sheet, shop bonded to both sides of [3/4-inch (19-mm)] [1-1/8-inch (29-mm)] plywood or particleboard.

1. Plastic Laminate for Flat Tops: Grade HGS
2. Plastic Laminate for Formed Tops: Grade HGP.
3. Plastic Laminate for Backing: Grade BKL.
4. Provide plastic-laminate edgings of the same material as top on front edge of top, on top edges of backsplashes and end splashes, and on ends of tops and splashes.
5. Construct top and backsplash from one piece of plastic laminate with rolled edges and coved intersection. Where indicated, provide separate end splashes fitted to top.
6. Use exterior plywood or exterior glue particleboard for countertops containing sinks.

C. Solid-Surfacing-Material Tops: 1-3/4-inch- (19-mm-) thick, solid-surfacing material.

1. Front: 50mm Bullnose

2. Backsplashes: 3/4-inch- (19-mm-) thick, solid-surfacing material; [slightly eased at edge] [beveled edge] [radiused edge with 3/8-inch (9.5-mm) radius].

## 2.6 WALL SHELVING

A. Plastic-Laminate Shelving: Plastic-laminate sheet, Grade HGL or HGP, shop bonded to both sides of [particleboard] [plywood]. Sand surfaces to which plastic laminate is to be bonded.

1. Shelf Thickness: 3/4 inch (19 mm)
2. Edge Treatment: Finish both edges with solid-wood edging applied before plastic laminate.

B. Adjustable Shelf Supports: [Zinc-plated] [Powder-coated] steel standards and shelf brackets, complying with BHMA A156.9, Types B04102 and B04112, surface mounted.

# PART 3 - EXECUTION

## 3.1 CASEWORK INSTALLATION

A. Install level, plumb, and true; shim as required, using concealed shims. Where manufactured wood casework abuts other finished work, apply filler strips and scribe for accurate fit, with fasteners concealed where practical.

B. Base Cabinets: Set cabinets straight, level, and plumb. Adjust subtops within 1/16 inch (1.5 mm) of a single plane. Fasten cabinets to masonry or framing, wood blocking, or reinforcements in walls and partitions with fasteners spaced 24 inches (600 mm) o.c. Bolt adjacent cabinets together with joints flush, tight, and uniform. Align similar adjoining doors and drawers to a tolerance of 1/16 inch (1.5 mm).

C. Wall Cabinets: Hang cabinets straight, level, and plumb. Adjust fronts and bottoms within 1/16 inch (1.5 mm) of a single plane. Fasten to hanging strips, masonry, or framing, blocking, or reinforcements in walls or partitions. Align similar adjoining doors to a tolerance of 1/16 inch (1.5 mm).

D. Adjust casework and hardware so doors and drawers operate smoothly without warp or bind. Lubricate operating hardware as recommended by manufacturer.

## 3.2 INSTALLATION OF TOPS

A. Field Jointing: Where possible make in the same manner as shop jointing, using dowels, splines, adhesives, and fasteners recommended by manufacturer. Prepare edges to be joined in shop so Project-site processing of top and edge surfaces is not required. Locate field joints where shown on Shop Drawings.

1. Secure field joints in plastic-laminate countertops with concealed clamping devices located within 6 inches (150 mm) of front and back edges and at intervals not exceeding 24 inches (600 mm). Tighten according to manufacturer's written instructions to exert a constant, heavy-clamping pressure at joints.

B. Secure tops to cabinets with Z- or L-type fasteners or equivalent, using two or more fasteners at each front, end, and back.

C. Secure [backsplashes] [and] [end splashes] to walls with adhesive.

D. Seal junctures of tops, splashes, and walls with mildew-resistant silicone sealant or another permanently elastic sealing compound recommended by countertop material manufacturer.

## 3.3 INSTALLATION OF SHELVING

A. Securely fasten shelf standards to masonry, partition framing, wood blocking, or reinforcements in partitions.

B. Install shelf standards plumb and at heights to align shelf brackets for level shelves.

C. Install shelving level and straight, closely fitted to other work where indicated.

## 3.4 CLEANING AND PROTECTING

A. Clean finished surfaces, touch up as required, and remove or refinish damaged or soiled areas to match original factory finish, as approved by Architect.

B. Protection: Provide 6-mil (0.15-mm) plastic or other suitable water-resistant covering over countertop surfaces. Tape to underside of countertop at a minimum of 48 inches (1220 mm) o.c. Remove protection at Substantial Completion.

END OF SECTION 123200

**SECTION 123553**

**LABORATORY CASEWORK**

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Metal laboratory casework.
2. Plastic-laminate laboratory casework.
3. Utility-space framing.
4. Filler and closure panels.
5. Laboratory countertops.
6. Tables.
7. Shelves.
8. Laboratory sinks and troughs.
9. Laboratory accessories.
10. Water, laboratory gas, and electrical service fittings.

1.2 PERFORMANCE REQUIREMENTS

A. Delegated Design: Design laboratory casework, including comprehensive engineering analysis by a qualified professional engineer, using seismic performance requirements and design criteria indicated.

B. Seismic Performance: Laboratory casework, including attachments to other work, shall withstand the effects of earthquake motions determined according to SEI/ASCE 7.

1. Design earthquake spectral response acceleration in accordance with the National Structural Code of the Philippines

1.3 ACTION SUBMITTALS

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

B. Shop Drawings: For laboratory casework. Include plans, elevations, sections, details, and attachments to other work.

C. Samples: For each type of cabinet finish.

D. Delegated-Design Submittal: For laboratory casework indicated to comply with seismic performance requirements, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1.4 INFORMATIONAL SUBMITTALS

A. Product Test Reports for Casework: Based on evaluation of comprehensive tests performed by a qualified testing agency, indicating compliance of laboratory casework with requirements of specified product standard.

B. Product Test Reports for Countertop Surface Material: Based on evaluation of comprehensive tests performed by a qualified testing agency, indicating compliance of laboratory countertop surface materials with requirements specified for chemical and physical resistance.

1.5 QUALITY ASSURANCE

A. Manufacturer Qualifications: A qualified manufacturer that is certified for chain of custody by an FSC-accredited certification body.

B. Source Limitations: Obtain laboratory casework from single source from single manufacturer unless otherwise indicated.

C. Product Designations: Drawings indicate sizes and configurations of laboratory casework by referencing designated manufacturer's catalog numbers. Other manufacturers' laboratory casework of similar sizes and similar door and drawer configurations and complying with the Specifications may be considered. Refer to Division 01 Section "Product Requirements."

D. Casework Product Standard: Comply with SEFA 8, "Laboratory Furniture - Casework, Shelving and Tables - Recommended Practices."

E. Flammable Liquid Storage: Where cabinets are indicated for solvent or flammable liquid storage, provide units that are listed and labeled as complying with requirements in NFPA 30 by a testing and inspecting agency acceptable to authorities having jurisdiction.

F. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

G. Preinstallation Conference: Conduct conference at Project Site.

PART 2 - PRODUCTS

2.1 METAL CABINET AND TABLE MATERIALS

A. Metal: Cold-rolled, commercial steel (CS) sheet, complying with ASTM A 1008/A 1008M; matte finish; suitable for exposed applications.

2.2 PLASTIC-LAMINATE CABINET MATERIALS

A. General:
1. Adhesives and Composite Wood Products: Products shall not contain urea formaldehyde.
2. Adhesives: Adhesives shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."
3. Composite Wood and Agrifiber Products: Products shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the

Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

4. Plastic Laminate: High-pressure decorative laminate complying with NEMA LD 3.
5. Edgebanding for Plastic Laminate: [Plastic laminate matching adjacent surfaces] [Rigid PVC extrusions, through color with satin finish, 3 mm thick at doors and drawer fronts, 1 mm thick elsewhere].

    a. Colors: As selected by Architect from manufacturer's full range.

B. Exposed Materials:

1. Plastic Laminate: Grade HGS

    a. Colors: As selected by Architect from manufacturer's full range.

C. Semiexposed Materials:

1. Plastic Laminate: Grade VGS

    a. Colors: As selected by Architect from manufacturer's full range.

## 2.3 AUXILIARY CABINET MATERIALS

A. Acid Storage-Cabinet Lining: 1/4-inch- (6-mm-) thick, [glass-fiber cement board complying with ASTM C 1186] [polyethylene or polypropylene] [polyethylene, polypropylene, epoxy, or phenolic-composite lining material].

B. Glass for Glazed Doors: Clear float glass complying with ASTM C 1036, Type I, Class 1, Quality-Q3; not less than 6.0 mm thick.

C. Glass for Glazed Doors: Clear tempered glass complying with ASTM C 1048, Kind FT, Condition A, Type I, Class 1, Quality-Q3; not less than 5.0 mm thick.

D. Glass for Glazed Doors: Clear laminated tempered glass complying with ASTM C 1172, Kind LT, Condition A, Type I, Class I, Quality-Q3; with 2 lites not less than 3.0 mm thick and with clear, polyvinyl butyral interlayer.

## 2.4 COUNTERTOP [TABLE TOP] [SHELF] [TROUGH] [AND] [SINK] MATERIALS

A. Plastic Laminate: High-pressure decorative laminate complying with NEMA LD 3.

1. Colors, Patterns, and Finishes: [As indicated by manufacturer's designations] [As selected by Architect from casework manufacturer's full range] [As selected by Architect from plastic-laminate manufacturer's full range] [As selected by Architect from plastic-laminate manufacturer's full range of solid colors].

B. Chemical-Resistant Plastic Laminate:

1. High-pressure decorative laminate, complying with NEMA LD 3, that has the following ratings when tested with indicated reagents according to NEMA LD 3, Test Procedure 3.4.5:

    a. No Effect: Acetic acid (98 percent), acetone, ammonium hydroxide (28 percent), amyl acetate, benzene, butyl alcohol, carbon tetrachloride, chloroform, dimethyl formamide,

dioxane, ethyl acetate, ethyl alcohol, ethyl ether, formaldehyde (37 percent), gasoline, gentian violet, hydrogen peroxide (3 percent), methyl alcohol, methyl ethyl ketone, methylene chloride, mono chlorobenzene, naphthalene, toluene, trichloroethylene, xylene, zinc chloride (saturated).

b. Slight Effect: Cresol, tincture of iodine, sodium sulfide (15 percent).

2. Color: [Black] [As indicated by manufacturer's designations] [As selected by Architect from chemical-resistant, plastic-laminate manufacturer's full range] <Insert color>.

C. Composite Wood and Agrifiber Products: Products shall [be made with binder containing no urea formaldehyde.] [comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."]

D. Adhesive for Bonding Plastic Laminate: [Manufacturer's standard waterproof adhesive.] [Manufacturer's standard waterproof, urea-formaldehyde-free adhesive.] [Manufacturer's standard waterproof adhesive that complies with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."]

E. Epoxy: Factory-molded, modified epoxy-resin formulation with smooth, nonspecular finish.

1. Physical Properties:

a. Flexural Strength: Not less than 10,000 psi (70 MPa).
b. Modulus of Elasticity: Not less than 2,000,000 psi (1400 MPa).
c. Hardness (Rockwell M): Not less than 100.
d. Water Absorption (24 Hours): Not more than 0.02 percent.
e. Heat Distortion Point: Not less than 260 deg F (127 deg C).

2. Chemical Resistance: Epoxy-resin material has the following ratings when tested with indicated reagents according to NEMA LD 3, Test Procedure 3.4.5:

a. No Effect: Acetic acid (98 percent), acetone, ammonium hydroxide (28 percent), benzene, carbon tetrachloride, dimethyl formamide, ethyl acetate, ethyl alcohol, ethyl ether, methyl alcohol, nitric acid (70 percent), phenol, sulfuric acid (60 percent), and toluene.
b. Slight Effect: Chromic acid (60 percent) and sodium hydroxide (50 percent).

3. Color: [Black] [Gray] [Beige] [As selected by Architect from manufacturer's full range] <Insert color>.

F. Phenolic Composite: Solid, high-pressure decorative laminate, complying with NEMA LD 3, Grade CGS.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
a. Formica Corporation.

2. Chemical Resistance: Composite countertop material has the following ratings when tested with indicated reagents according to NEMA LD 3, Test Procedure 3.4.5:

a. No Effect: Acetic acid (98 percent), acetone, ammonium hydroxide (28 percent), ethyl acetate, ethyl alcohol, formaldehyde (37 percent), furfural, phosphoric acid (85 percent), sulfuric acid (33 percent), toluene.

3. Color: [Black] [White] [Gray] [Beige] [As selected by Architect from manufacturer's full range] <Insert color>.

G. Stainless-Steel Sheet: ASTM A 240/A 240M, [Type 304] [Type 316L].

## 2.5 METAL CABINETS AND TABLES

A. Fabrication: Assemble and finish units at point of manufacture. Use precision dies for interchangeability of like-size drawers, doors, and similar parts. Perform assembly on precision jigs to provide units that are square. Reinforce units with angles, gussets, and channels. Except where otherwise specified, integrally frame and weld cabinet bodies to form dirt and vermin-resistant enclosures. Where applicable, reinforce base cabinets for sink support. Maintain uniform clearance around door and drawer fronts of 1/16 to 3/32 inch (1.5 to 2.4 mm).

B. Flush Doors: Outer and inner pans that nest into box formation, with full-height channel reinforcements at center of door. Fill doors with noncombustible, sound-deadening material.

C. Drawers: Fronts made from outer and inner pans that nest into box formation, with no raw metal edges at top. Sides, back, and bottom fabricated in one piece with rolled or formed top of sides for stiffening and comfortable grasp for drawer removal.

D. Tables: Welded tubing legs, not less than 2 inches (50 mm) square with channel stretchers as needed to comply with product standard. Weld or bolt stretchers to legs and cross-stretchers, and bolt legs to table aprons. Provide leveling device welded to bottom of each leg.

E. Utility-Space Framing: Laboratory casework manufacturer's standard steel framing units consisting of 2 steel slotted channels connected at top and bottom by U-shaped brackets.

F. Filler and Closure Panels: Provide where indicated and as needed to close spaces between cabinets and walls, ceilings, and indicated equipment. Fabricate from same material and with same finish as cabinets and with hemmed or flanged edges unless otherwise indicated.

## 2.6 PLASTIC-LAMINATE CABINETS

A. Design: Reveal overlay.

B. Construction: Provide plastic-laminate-faced laboratory casework of the following minimum construction:

1. Bottoms and Ends of Cabinets, and Tops of Wall Cabinets and Tall Cabinets: 3/4-inch- (19-mm-) thick particleboard, plastic-laminate faced.
2. Shelves: 3/4-inch- (19-mm-) thick plywood, plastic-laminate faced.
3. Backs of Cabinets: 1/2-inch- (12.7-mm-) thick particleboard, plastic-laminate faced.
4. Drawer Fronts: 3/4-inch- (19-mm-) thick particleboard, plastic-laminate faced.
5. Drawer Sides and Backs: 1/2-inch- (12.7-mm-) thick solid-wood or veneer-core hardwood plywood, with glued dovetail or multiple-dowel joints.
6. Drawer Bottoms: 1/4-inch- (6.4-mm-) thick hardboard glued and dadoed into front, back, and sides of drawers.

7. Doors: 3/4 inch (19 mm) thick, with particleboard or MDF cores, plastic-laminate faced.

C. Utility-Space Framing: Laboratory casework manufacturer's standard steel framing units consisting of 2 steel slotted channels connected at top and bottom by U-shaped brackets.

D. Filler and Closure Panels: Provide where indicated and as needed to close spaces between cabinets and walls, ceilings, and indicated equipment. Fabricate from same material and with same finish as adjacent exposed cabinet surfaces unless otherwise indicated.

## 2.7 METAL CABINET FINISH

A. Chemical-Resistant Finish: Laboratory casework manufacturer's standard two-coat, chemical-resistant, baked-on finish consisting of prime coat and thermosetting topcoat. Comply with coating manufacturer's written instructions for applying and baking to achieve a minimum dry film thickness of 2 mils (0.05 mm).

1. Chemical and Physical Resistance of Finish System: Finish complies with acceptance levels of cabinet surface finish tests in SEFA 8. Acceptance level for chemical spot test shall be no more than four Level 3 conditions.
2. Colors for Metal Laboratory Casework Finish: As selected by Architect from manufacturer's full range.

## 2.8 HARDWARE

A. General: Provide laboratory casework manufacturer's standard, commercial-quality, heavy-duty hardware.

B. Hinges: Stainless-steel 5-knuckle hinges with antifriction bearings and rounded tips.

C. Hinged Door and Drawer Pulls: stainless steel, or chrome-plated brass back-mounted pulls.

D. Sliding Door Pulls: Stainless-steel or chrome-plated recessed flush pulls.

E. Door Catches: [Nylon-roller spring] [Dual, self-aligning, permanent magnet] catches.

F. Locks for Metal Cabinets: Cam or half-mortise type, brass with chrome-plated finish; complying with BHMA A156.11, Type E07281,E07111, or E07021.

1. Provide a minimum of two keys per lock and two master keys.
2. Provide on all drawers and doors.
3. Keying: Key each lock separately.

G. Locks for [Wood] [and] [Plastic-Laminate] Cabinets: Cam type, brass with chrome-plated finish; complying with BHMA A156.11, Type E07281[ or E07261].

1. Provide a minimum of two keys per lock and two master keys.
2. Provide on all drawers and doors.
3. Keying: Key each lock separately.

H. Adjustable Shelf Supports for [Wood] [and] [Plastic-Laminate] Cabinets: Powder-coated steel shelf rests complying with BHMA A156.9, Type B04013.

I. Adjustable Wall Shelf Supports: Surface-type steel standards and steel shelf brackets, with epoxy powder-coated finish, complying with BHMA A156.9, Types B04102 and B04112.

2.9 COUNTERTOPS[, TABLE TOPS] [, SHELVES] [, TROUGHS,] AND SINKS

A. Countertops, General: Provide units with smooth surfaces in uniform plane free of defects. Make exposed edges and corners straight and uniformly beveled. Provide front and end overhang of 1 inch (25 mm).

B. Sinks, General: Provide sizes indicated or laboratory casework manufacturer's closest standard size of equal or greater volume, as approved by Architect.

1. Outlets: Provide with strainers and tailpieces, NPS 1-1/2 (DN 40), unless otherwise indicated.
2. Overflows: For each sink except cup sinks, provide overflow of standard beehive or open-top design with separate strainer. Height 2 inches (50 mm) less than sink depth. Provide in same material as strainer.

C. Plastic-Laminate [Countertops] [Table Tops] [and] [Shelves]:

1. Countertops: Chemical-resistant plastic laminate shop bonded to top surface and exposed edges of [3/4-inch- (19-mm-)] [1-inch- (25-mm-)] [1-3/16-inch- (30-mm-)] thick core with plastic-laminate backing bonded to bottom surface.

a. Backsplash Core Thickness: [3/4 inch (19 mm)] [1 inch (25 mm)].
b. Countertop Core: exterior plywood.
c. Countertop Core for Counters Containing Sinks: exterior plywood.
d. Countertop Configuration: Flat, with square edges, and flat backsplashes and end splashes. Finish faces and exposed edges of splashes with same plastic laminate as top.
e. Countertop Configuration: Postformed, with raised, rolled edge and integral coved backsplash with rolled top edge. Construct top and backsplash from one piece of plastic laminate. Where indicated, provide separate end splashes of same material as top and fitted to top.
f. Plastic-Laminate Grade for Flat Countertops: [HGS] [HGL] [HDS].
g. Plastic-Laminate Grade for Postformed Countertops: HGP.
h. Plastic-Laminate Grade for Backing: BKL.

2. Table Tops: Chemical-resistant plastic laminate shop bonded to top surface and exposed edges of [3/4-inch- (19-mm-)] [1-inch- (25-mm-)] [1-3/16-inch- (30-mm-)] thick core with plastic-laminate backing bonded to bottom surface.

a. Table-Top Core: exterior plywood]
b. Plastic-Laminate Grade for Tables: [HGS] [HGL] [HDS].
c. Plastic-Laminate Grade for Backing: BKL.

3. Plastic-Laminate Shelves: Chemical-resistant plastic laminate shop bonded to both faces and all edges of [3/4-inch- (19-mm-)] [1-inch- (25-mm-)] thick core.

a. Shelf Core: exterior plywood.
b. Plastic-Laminate Grade for Shelves: HGL.

D. Epoxy [Countertops] [Table Tops] [and] [Sinks]:

1. Countertop Fabrication: Fabricate with factory cutouts for sinks, holes for service fittings and accessories, and with butt joints assembled with epoxy adhesive and concealed metal splines.
   a. Countertop Configuration: Raised (marine) edge, 1-inch (25-mm) minimum thickness, with integral or applied raised edge having rounded edge and corners, and with integral coved backsplash.
   b. Countertop Construction: Epoxy composition not less than 1/4 inch (6 mm) thick, laminated to backing.

2. Table-Top Fabrication:

   a. Table-Top Configuration: Raised (marine) edge, 1-inch (25-mm)] minimum thickness, with integral or applied raised edge having rounded edge and corners.

   b. Table-Top Construction: Epoxy composition not less than 1/4 inch (6 mm) thick, laminated to backing

   c. Sink Fabrication: Molded in 1 piece with smooth surfaces, coved corners, and bottom sloped to outlet; 1/2-inch (13-mm) minimum thickness.

   d. Provide with polypropylene strainers and tailpieces.
   e. Provide sinks for drop-in installation with 1/4-inch- (6-mm-) thick lip around perimeter of sink.
   f. Provide integral sinks in epoxy countertops, bonded to countertops with invisible joint line.
   g. Provide manufacturer's recommended adjustable support system for table- and cabinet-type installations.

E. Phenolic-Composite [Countertops] [Table Tops] [and] [Shelves]:

1. Countertop Fabrication: Fabricate with cutouts for sinks, holes for service fittings and accessories, and with butt joints assembled with epoxy adhesive and concealed metal splines.

   a. Countertop Configuration: Flat, 3/4 inch (19 mm)] [1 inch (25 mm)] thick, with beveled edge and corners, and with drip groove and integral coved backsplash.

2. Table-Top Fabrication:

   a. Table-Top Configuration: Flat, 3/4 inch (19 mm) beveled edge and corners, and with drip groove at perimeter.

3. Shelf Configuration: Flat, 5/8 inch (16 mm) thick, with beveled and corners.

F. Stainless-Steel Countertops: Made from stainless-steel sheet, not less than 0.062-inch (1.59-mm) nominal thickness, with No. 4 satin finish.

1. Extend top down 1 inch (25 mm) at edges with a 1/2-inch (13-mm) return flange under frame. Apply heavy coating of heat-resistant, sound-deadening mastic to undersurface.
2. Form backsplash coved to and integral with top surface.
3. Provide raised (marine) edge around perimeter of countertops containing sinks; pitch two ways to sink to provide drainage without channeling or grooving.
4. Provide raised (marine) edge around perimeter of countertops at sinks, where indicated; pitch two ways to sink to provide drainage without channeling or grooving.

5. Punch holes for service fittings at factory.
6. Reinforce underside of countertop with channels or use thicker metal sheet where necessary to insure rigidity without deflection.
7. Weld shop-made joints.
8. Where field-made joints are required, provide hairline butt-joints mechanically bolted through continuous channels welded to underside at edges of joined ends. Keep field jointing to a minimum.
9. Where stainless-steel sinks or cup sinks occur in stainless-steel countertops, factory weld into one integral unit.
10. After fabricating and welding, grind surfaces smooth and polish as needed to produce uniform, directionally textured finish with no evidence of welds and free of cross scratches. Passivate and rinse surfaces; remove embedded foreign matter and leave surfaces clean.

G. Stainless-Steel Shelves: Made from stainless-steel sheet, not less than 0.050-inch (1.27-mm) nominal thickness, with No. 4 satin finish. Weld shop-made joints. Fold [down] [up] front edge 3/4 inch (19 mm); fold up back edge 3 inches (75 mm). Provide integral stiffening brackets, formed by folding up ends 3/4 inch (19 mm) and welding to upturned [back edge] [front and back edges]. After fabricating, grind welds smooth and polish as needed to produce uniform, directionally textured finish with no evidence of welds and free of cross scratches. Passivate and rinse surfaces; remove embedded foreign matter and leave surfaces clean.

H. Stainless-Steel Sinks: Made from stainless-steel sheet, not less than 0.050-inch (1.27-mm) nominal thickness. Fabricate with corners rounded and coved to at least 5/8-inch (16-mm) radius. Slope sink bottoms to outlet. Provide double-wall construction for sink partitions with top edge rounded to at least 1/2-inch (13-mm) diameter. Provide continuous butt-welded joints. After fabricating and welding, grind surfaces smooth and polish as needed to produce uniform finish with no evidence of welds and free of cross scratches. Passivate and rinse surfaces; remove embedded foreign matter and leave surfaces clean.

1. Punch holes for fittings at factory.
2. Provide with stainless-steel strainers and tailpieces.
3. Provide with integral rims except where located in stainless-steel countertops.
4. Apply 1/8-inch- (3-mm-) thick coating of heat-resistant, sound-deadening mastic to undersink surfaces.

I. Cup Sinks: Polypropylene 3-by-9-inch (75-by-228-mm) oval

1. Provide with polypropylene strainers and integral tailpieces.

## 2.10 LABORATORY ACCESSORIES

A. Reagent Shelves: Provide as indicated, fabricated from same material as adjacent countertop, unless otherwise indicated.

B. Burette Rods: Aluminum or stainless-steel rods, 1/2 inch (13 mm) in diameter and 18 inches (450 mm) long, threaded on 1 end to fit tapered plug adapter for flush socket receptacle. Provide with tapered plug adapter and receptacle.

C. Upright Rod Assembly and Metal Crossbar: Aluminum or stainless steel. Two vertical rods and 1 horizontal crossbar, 3/4 inch (19 mm) in diameter and 36 inches (900 mm) long, unless otherwise indicated; 2 flush socket receptacles and 2 crossbar clamps. Ends of vertical rods are tapered to fit receptacles; all other rod ends are rounded.

D. Greenlaw Arm Assembly: Aluminum or stainless-steel vertical rod, tapered on one end to fit flush socket receptacle. Adjustable crossbar of hardwood with black, acid-resistant finish, secured to upright with adjustable clamp. Provide with receptacle.

E. Lattice Assembly: Aluminum or stainless-steel, vertical and horizontal rod lattice assembly with 3/4-inch- (19-mm-) diameter rods at approximately 12 inches (300 mm) o.c. with 2 flush socket receptacles for mounting.

1. Size: [36 inches (900 mm)] [48 inches (1200 mm)] wide by [24 inches (600 mm)] [36 inches (900 mm)] high.

F. Pegboards: Polypropylene, epoxy, or phenolic-composite pegboards with removable polypropylene pegs and stainless-steel drip troughs with drain outlet.

G. Pegboards: Stainless-steel pegboards with removable polypropylene pegs and stainless-steel drip troughs with drain outlet.

## 2.11 WATER AND LABORATORY GAS SERVICE FITTINGS

A. Service Fittings: Provide units that comply with SEFA 7, "Laboratory and Hospital Fixtures - Recommended Practices." Provide fittings complete with washers, locknuts, nipples, and other installation accessories. Include wall and deck flanges, escutcheons, handle extension rods, and similar items.

1. Provide units that comply with "Vandal-Resistant Faucets and Fixtures" recommendations in SEFA 7.

B. Materials: Fabricated from cast or forged red brass unless otherwise indicated.

1. Reagent-Grade Water Service Fittings: Polypropylene, PVC, or PVDF for parts in contact with water.

C. Finish: Acid- and solvent-resistant powder coating complying with requirements in SEFA 7 for corrosion-resistant finishes.

1. Provide chemical-resistant powder coating in laboratory casework manufacturer's standard metallic brown, aluminum, white, or other color as approved by Architect.

D. Water Valves and Faucets: Provide units complying with ASME A112.18.1, with renewable seats, designed for working pressure up to 80 psig (550 kPa).

1. Vacuum Breakers: Provide ASSE 1035 vacuum breakers on water fittings with serrated outlets.
2. Aerators: Provide aerators on water fittings that do not have serrated outlets.
3. Self-Closing Valves: Provide self-closing valves where indicated.

E. Ground-Key Cocks: Tapered core and handle of one-piece forged brass, ground and lapped, and held in place under constant spring pressure. Provide units designed for working pressure up to 40 psig (280 kPa), with serrated outlets.

F. Ball Valves: Chrome-plated ball and PTFE seals. Handle requires no more than 5 lbf (22 N) to operate. Provide units designed for working pressure up to 75 psig (520 kPa), with serrated outlets.

1. Where ball valves are indicated for fuel-gas use, provide locking safety handles that must be [pushed in] [or] [pulled up] before being turned on[ unless otherwise indicated].

G. Steam Valves: Stainless-steel seat and PTFE seat disc. Provide units designed for steam working pressure up to 20 psig (140 kPa), with serrated outlets.

H. Needle Valves: Provide units with renewable, self-centering, floating cones and renewable seats of stainless steel or Monel metal, with removable serrated outlets.

1. Provide units designed for working pressure up to [60 psig (410 kPa)] [100 psig (690 kPa)] [125 psig (860 kPa)].

I. Hand of Fittings: Furnish right-hand fittings unless fitting designation is followed by "L."

J. Remote-Control Valves: Provide needle valves, straight-through or angle type as indicated for fume hoods and where indicated.

K. Handles: Provide three- or four-wing, molded plastic or powder-coated metal handles for valves unless otherwise indicated.

1. Provide lever-type handles for ground-key cocks. Lever handle aligns with outlet when valve is closed and is perpendicular to outlet when valve is fully open.
2. Provide lever-type handles for ball valves unless otherwise indicated. Lever handle aligns with outlet when valve is closed and is perpendicular to outlet when valve is fully open.
3. Provide heat-resistant plastic handles for steam valves.
4. Provide knurled, molded plastic handles for needle valves.

L. Service-Outlet Identification: Provide color-coded plastic discs with embossed identification, secured to each service-fitting handle to be tamper resistant. Comply with SEFA 7 for colors and embossed identification.

## 2.12 ELECTRICAL SERVICE FITTINGS

A. Service Fittings, General: Provide units complete with metal housings, receptacles, terminals, switches, pilot lights, device plates, accessories, and gaskets required for mounting on laboratory casework.

B. Receptacles: Comply with NEMA WD 1, NEMA WD 6, and UL 498. Duplex type, Configuration 5 20R.

1. Receptacle Grade: Hospital grade unless otherwise indicated.
2. GFCI Receptacles: Straight blade, feed-through type. Comply with UL 943, Class A, Hospital grade, and include indicator light that is lighted when device is tripped.

C. Switches: Comply with NEMA WD 1 and UL 20. Provide single-pole, double-pole, or 3-way switches as required; rated 120 to 277-V ac; and in amperage capacities to suit units served.

1. Provide pilot light adjacent to switch or neon-lighted handle, illuminated when switch is "ON," where noted as "PL" next to switch identification.
2. Provide thermal-overload switches, single or double pole, as required, with maximum overcurrent trip setting to suit particular motor controlled.

D. Service Fittings, General: Provide units with metal housings and gaskets required for mounting on laboratory casework. Receptacles, terminals, switches, pilot lights, device plates, and accessories are specified in Division 26 Section "Wiring Devices."

E. Pedestal-Type Fittings: Cast-aluminum housings with sloped single face or two faces, as indicated, with neoprene gasket under base and with concealed mounting holes in base for attaching to laboratory casework. Provide holes tapped for conduits.

F. Line-Type Fittings: Provide with cast-metal boxes with threaded holes for mounting on rigid steel conduit. Provide cover plates same size as boxes.

G. Recessed-Type Fittings: Provide with galvanized-steel boxes.

H. Finishes for Service-Fitting Components: Provide housings or boxes for pedestal- and line-type fittings with manufacturer's standard baked-on, chemical-resistant enamel in color as selected by Architect from manufacturer's full range.

I. Cover Plates: Provide satin finish, Type 304, stainless-steel cover plates with formed, beveled edges.

J. Cover-Plate Identification: Use 1/4-inch- (6-mm-) high letters unless otherwise indicated. For stainless steel or chrome-plated metal, stamp or etch plate and fill in letters with black enamel.

1. Provide on all cover plates.

a. Receptacles other than standard 125-V duplex, grounding type.
b. Switches and thermal-overload switches.
c. Pilot lights when located remotely from associated equipment or switch, where function is not obvious.
d. Receptacles, switches, and other locations indicated.

2. Provide the following information:

a. Voltage and phase for receptacles other than standard 125-V duplex, grounding type.
b. Indicate equipment being controlled by switches and thermal-overload switches.
c. Indicate equipment being controlled for pilot lights when located remotely from associated equipment or switch, where function is not obvious.
d. Number of breaker in panelboard that controls device.

## PART 3 - EXECUTION

### 3.1 INSTALLATION OF CABINETS

A. Comply with installation requirements in SEFA 2.3. Install level, plumb, and true; shim as required, using concealed shims. Where laboratory casework abuts other finished work, apply filler strips and scribe for accurate fit, with fasteners concealed where practical.

B. Utility-Space Framing: Secure to floor with two fasteners at each frame. Fasten to partition framing, wood blocking, or metal reinforcements in partitions and to base cabinets.

C. Base Cabinets: Fasten cabinets to utility-space framing, partition framing, wood blocking, or reinforcements in partitions with fasteners spaced not more than 24 inches (600 mm) o.c. Bolt adjacent cabinets together with joints flush, tight, and uniform.

1. Where base cabinets are installed away from walls, fasten to floor at toe space at not more than 24 inches (600 mm) o.c. and at sides of cabinets with not less than 2 fasteners per side.

D. Wall Cabinets: Fasten to hanging strips, masonry, partition framing, blocking, or reinforcements in partitions. Fasten each cabinet through back, near top, at not less than 24 inches (600 mm) o.c.

E. Install hardware uniformly and precisely. Set hinges snug and flat in mortises.

F. Adjust laboratory casework and hardware so doors and drawers align and operate smoothly without warp or bind and contact points meet accurately. Lubricate operating hardware as recommended by manufacturer.

## 3.2 INSTALLATION OF COUNTERTOPS

A. Comply with installation requirements in SEFA 2.3. Abut top and edge surfaces in one true plane with flush hairline joints and with internal supports placed to prevent deflection. Locate joints only where shown on Shop Drawings.

B. Field Jointing: Where possible, make in same manner as shop-made joints using dowels, splines, fasteners, adhesives, and sealants recommended by manufacturer. Prepare edges in shop for field-made joints.

1. Use concealed clamping devices for field-made joints in plastic-laminate countertops. Locate clamping devices within 6 inches (150 mm) of front and back edges and at intervals not exceeding 24 inches (600 mm). Tighten according to manufacturer's written instructions to exert a uniform heavy pressure at joints.

C. Fastening:

1. Secure countertops, except for epoxy countertops, to cabinets with Z-type fasteners or equivalent, using two or more fasteners at each cabinet front, end, and back.
2. Secure epoxy countertops to cabinets with epoxy cement, applied at each corner and along perimeter edges at not more than 48 inches (1200 mm) o.c.
3. Where necessary to penetrate countertops with fasteners, countersink heads approximately 1/8 inch (3 mm) and plug hole flush with material equal to countertop in chemical resistance, hardness, and appearance.

D. Seal unfinished edges and cutouts in plastic-laminate countertops with heavy coat of polyurethane varnish.

E. Provide scribe moldings for closures at junctures of countertop, curb, and splash with walls as recommended by manufacturer for materials involved. Match materials and finish to adjacent laboratory casework. Use chemical-resistant, permanently elastic sealing compound where recommended by manufacturer.

F. Carefully dress joints smooth, remove surface scratches, and clean entire surface.

## 3.3 INSTALLATION OF SINKS

A. Comply with installation requirements in SEFA 2.3.

B. Underside Installation of Epoxy Sinks: Use laboratory casework manufacturer's recommended adjustable support system for table- and cabinet-type installations. Set top edge of sink unit in sink and countertop manufacturers' recommended chemical-resistant sealing compound or adhesive and firmly secure to produce a tight and fully leakproof joint.

C. Semiflush Installation of Stainless-Steel Sinks: Before setting, apply sink and countertop manufacturers' recommended sealant under rim lip and along top.

D. Drop-in Installation of Epoxy Sinks: Rout groove in countertop to receive sink rim if not prepared in shop. Set sink in adhesive and fill remainder of groove with sealant or adhesive. Use procedures and products recommended by sink and countertop manufacturers.

E. Drop-in Installation of [Epoxy] [and] [Polypropylene] Cup Sinks: Rout groove in countertop to receive sink rim if not prepared in shop. Set sink in adhesive and fill remainder of groove with sealant or adhesive. Use procedures and products recommended by sink and countertop manufacturers.

F. Surface Installation of [Epoxy] [and] [Polypropylene] Cup Sinks: Set sink in sealant or adhesive. Use procedures and products recommended by sink and countertop manufacturers.

## 3.4 INSTALLATION OF LABORATORY ACCESSORIES

A. Install accessories according to Shop Drawings, installation requirements in SEFA 2.3, and manufacturer's written instructions.

B. Securely fasten adjustable shelving supports, stainless-steel shelves, and pegboards to partition framing, wood blocking, or reinforcements in partitions.

C. Install shelf standards plumb and at heights to align shelf brackets for level shelves. Install shelving level and straight, closely fitted to other work where indicated.

D. Securely fasten pegboards to partition framing, wood blocking, or reinforcements in partitions.

## 3.5 INSTALLATION OF SERVICE FITTINGS

A. Comply with requirements in Divisions 22 and 26 Sections for installing water and laboratory gas service fittings and electrical devices.

B. Install fittings according to Shop Drawings, installation requirements in SEFA 2.3, and manufacturer's written instructions. Set bases and flanges of sink- and countertop-mounted fittings in sealant recommended by manufacturer of sink or countertop material. Securely anchor fittings to laboratory casework unless otherwise indicated.

## 3.6 CLEANING AND PROTECTING

A. Clean finished surfaces, touch up as required, and remove or refinish damaged or soiled areas to match original factory finish, as approved by Architect.

B. Protect countertop surfaces during construction with 6-mil (0.15-mm) plastic or other suitable water-resistant covering. Tape to underside of countertop at a minimum of 48 inches (1200 mm) o.c.

END OF SECTION 123553

**SECTION 123570**

**HEALTHCARE CASEWORK**

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Stainless-steel medical casework.
2. Stainless-steel countertops and integral sinks.
3. Stainless-steel shelving.

1.2 PERFORMANCE REQUIREMENTS

A. Delegated Design: Design healthcare casework, including comprehensive engineering analysis by a qualified professional engineer, using seismic performance requirements indicated.

B. Seismic Performance: Provide healthcare casework, including attachments to other work, capable of withstanding the effects of earthquake motions determined according to [SEI/ASCE 7]

1. Design earthquake spectral response acceleration, short period (Sds) for Project.
2. Component Importance Factor is 1.5.

1.3 ACTION SUBMITTALS

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

B. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.

C. Samples: For units with factory-applied color finishes.

D. Delegated-Design Submittal: For healthcare casework indicated to comply with seismic performance requirements, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1.4 QUALITY ASSURANCE

A. Source Limitations: Obtain healthcare casework through one source from a single manufacturer.

B. Product Designations: Drawings indicate sizes and configurations of healthcare casework by referencing designated manufacturer's catalog numbers. Other manufacturers' metal medical casework of similar sizes, similar door and drawer configurations, and complying with the Specifications may be considered. Refer to Division 01 Section "Product Requirements."

C. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70 by a qualified testing agency, and marked for intended location and application.

PART 2 - PRODUCTS

2.1 CASEWORK MATERIALS

A. Steel Sheet: Cold-rolled commercial steel sheet, complying with ASTM A 1008/A 1008M; matte finish; suitable for exposed applications.

B. Stainless-Steel Sheet: ASTM A 240/A 240M, Type 304, stretcher-leveled standard of flatness.

C. Nominal Stainless-Steel Thicknesses for Stainless-Steel Medical Casework:

1. Sides, Ends, Fixed Backs, Bottoms, Cabinet Tops, Soffits, and Items Not Otherwise Indicated: 0.050 inch (1.27). Bottoms may be 0.038 inch (0.95 mm) if reinforced.
2. Back Panels, Doors, Drawer Fronts and Bodies, and Shelves: 0.038 inch (0.95 mm) except 0.050 inch (1.27 mm) for unreinforced shelves more than 36 inches (900 mm) long.
3. Intermediate Horizontal Rails, Center Posts, Tubular Legs, and Top Gussets: 0.062 inch (1.59 mm).

D. Glass for Glazed Doors: Clear float glass complying with ASTM C 1036, Type I, Class 1, Quality-Q3; not less than 6.0 mm thick.

E. Glass for Glazed Doors: Clear tempered glass complying with ASTM C 1048, Kind FT, Condition A, Type I, Class 1, Quality-Q3; not less than 5.0 mm thick.

F. Glass for Glazed Doors: Clear laminated tempered glass complying with ASTM C 1172, Kind LT, Condition A, Type I, Class I, Quality-Q3; with 2 lites not less than 3.0 mm thick and with clear, polyvinyl butyral interlayer.

G. Pegboard: 1/4-inch (6.4-mm) perforated hardboard, complying with AHA A135.4, Class 1 tempered; with painted finish sealing faces, edges, and perimeter of holes.

H. Pegboard: Perforated stainless-steel sheet, 0.050-inch (1.27-mm) nominal thickness.

I. Pegboard: Perforated steel sheet, 0.048-inch (1.21-mm) nominal thickness, with powder-coated finish.

J. Insulation for Warming Cabinets: Semi-rigid, glass-fiber board insulation complying with ASTM C 612, Type IA or Type IB.

2.2 CABINET FABRICATION

A. General: Assemble and finish units at point of manufacture. Use precision dies for interchangeability of like-size drawers, doors, and similar parts. Perform assembly on precision jigs to provide units that are square. Reinforce units with angles, gussets, and channels. Integrally frame and weld to form a dirt and vermin-resistant enclosure. Maintain uniform clearance around door and drawer fronts of 1/16 to 3/32 inch (1.5 to 2.4 mm).

B. Metal Flush Doors: Outer and inner pans that nest into box formation, with full-height channel reinforcements at center of door. Fill doors with noncombustible, sound-deadening material.

C. Glazed Doors: Hollow-metal stiles and rails of similar construction as flush doors, with glass held in resilient channels or gasket material.

D. Metal Drawers: Fronts made from outer and inner pans that nest into box formation, with no raw metal edges at top.

E. Metal Shelves: Front, back, and ends formed down, with edges returned horizontally at front and back to form reinforcing channels. Provide clips or other means to support shelves and allow height of shelves to be adjusted in increments of not more than 2 inches (50 mm).

F. Filler Strips: Provide as needed to close spaces between cabinets and walls, ceilings, and indicated equipment. Fabricate from same material and with same finish as cabinets and with hemmed or flanged edges.

G. Trim Flanges: Formed metal trim fabricated from same material and with same finish as cabinets. Provide at perimeter of recessed cabinets.

## 2.3 SPECIALTY CABINETS

A. Narcotics Cabinets: Construct of stainless steel as individual, freestanding units with finished sides and top and double-walled bottom. Provide with double-pan flush outer door and 0.062-inch- (1.59-mm-) nominal thickness, single-pan inner door, both with locks, each individually keyed and not master keyed.

B. Specimen Pass-Through Cabinets: Construct of stainless steel as through-wall units with double-walled construction and smooth interior. Provide with interlocking hardware that prevents each door from being opened when the other door is open. Provide with removable stainless-steel spill tray and trim flanges for both faces.

C. Warming Cabinets: Recessed units covered on back, top, and sides with 1-inch- (25-mm-) thick insulation. Insulate door and equip with heat-resistant gasket. Provide with thermostatically controlled heating system to maintain temperature within 10 deg F (5.5 deg C) of temperature setting that can be varied from 97 to 160 deg F (36 to 71 deg C).

1. Equip units with [fan-forced electric] [steam] heating system.

D. Desk Units: Recessed units with sloped stainless-steel writing surface, [magnetic stainless-steel] [white marker board] [tack board] back panel, and built-in fluorescent light fixture.

## 2.4 STAINLESS-STEEL FINISH

A. Grind and polish surfaces to produce uniform, directional satin finish matching No. 4 finish with no evidence of welds and free of cross scratches. Run grain with long dimension of each piece.

B. When polishing is completed, passivate and rinse surfaces. Remove embedded foreign matter and leave surfaces clean.

## 2.5 CABINET HARDWARE

A. General: Provide healthcare casework manufacturer's standard, commercial-quality, heavy-duty hardware complying with requirements indicated for each type.

B. Hinges: Stainless-steel 5-knuckle hinges complying with BHMA A156.9, Grade 1, with antifriction bearings and hospital tips. Provide 2 for doors 48 inches (1200 mm) high or less and 3 for doors more than 48 inches (1200 mm) high.

C. Continuous Hinges: Stainless-steel continuous hinges complying with BHMA A156.9, Grade 1. Provide for narcotics cabinets and specimen pass-through cabinets.

D. Hinged Door and Drawer Pulls: stainless-steel, back-mounted pulls.

E. Sliding Door Pulls: Stainless-steel or chrome-plated flush pulls.

F. Door Catches: Nylon-roller spring catches. Provide 2 catches on doors more than 48 inches (1200 mm) high.

G. Drawer Slides: Side-mounted, epoxy-coated steel or zinc-plated steel, self-closing, ball-bearing drawer slides; designed to prevent rebound when drawers are closed; complying with BHMA A156.9, Type B05091.

1. Provide [Grade 1] [Grade 1HD-100] for drawers not more than 6 inches (150 mm) high and 24 inches (600 mm) wide.
2. Provide [Grade 1HD-100] [Grade 1HD-200] for drawers more than 6 inches (150 mm) high or 24 inches (600 mm) wide.
3. Standard Duty (Grade 1): Full extension type.
4. Heavy Duty (Grade 1HD-100 or Grade 1HD-200): Full-overtravel-extension type.

H. Locks: Cam or half-mortise type; brass with chrome-plated finish; complying with BHMA A156.11, Type E07281, E07261, E07111, or E07021.

1. Provide minimum of two (2) keys per lock and two (2) master keys.
2. Provide locks on all drawers and doors.
3. Keying: Key each lock separately

## 2.6 STAINLESS-STEEL [COUNTERTOPS] [SHELVES] [AND] [SINKS]

A. Countertops: Provide units with smooth surfaces in uniform plane free of defects. Ease exposed edges and corners. Provide front and end overhang of 1 inch (25 mm) over base cabinets.

1. Stainless-Steel Sheet: ASTM A 240/A 240M, Type 316, not less than 0.062-inch (1.59-mm) nominal thickness, with No. 4 directional satin finish.
2. Extend top down 1 inch (25 mm) at edges with a 1/2-inch (13-mm) return flange under frame. Apply heavy coating of heat-resistant, sound-deadening mastic to undersurface.
3. Form backsplash coved to and integral with top surface.
4. Provide rolled edge unless otherwise indicated.
5. Provide raised (marine) edge around perimeter of countertops containing sinks; pitch two ways to sink to provide drainage without channeling or grooving.
6. Reinforce underside of countertop with channels or use thicker metal sheet where necessary to insure rigidity without deflection.
7. Weld shop-made joints.
8. Fabricate units for installation without field-made joints.
9. Fabricate units for field assembly, where necessary, using [welded joints] [tight-fitting butt-joints mechanically bolted through continuous channels welded to underside at edges of joined ends].[ Locate field-made joints only where indicated.]

10. Where stainless-steel sinks or cup sinks occur in stainless-steel countertops, factory weld into one integral unit.
11. After fabricating and welding, grind surfaces smooth and polish as needed to produce uniform, directionally textured finish with no evidence of welds and free of cross scratches. Passivate and rinse surfaces; remove embedded foreign matter and leave surfaces clean.

B. Wall-Mounted Shelves: Made from stainless-steel sheet, ASTM A 240/A 240M, Type 304, not less than 0.050-inch (1.27-mm) nominal thickness, with No. 4 directional satin finish. Weld shop-made joints. Fold down front edge 3/4 inch (19 mm); fold up back edge 3 inches (75 mm). Provide integral stiffening brackets, formed by folding up ends 3/4 inch (19 mm) and welding to upturned front and back edges. After fabricating, grind welds smooth and polish as needed to produce uniform, directionally textured finish with no evidence of welds and free of cross scratches. Passivate and rinse surfaces; remove embedded foreign matter and leave surfaces clean.

C. Sinks: Provide sizes indicated or healthcare casework manufacturer's closest standard size of equal or greater volume as approved by Architect.

1. Stainless-Steel Sheet: ASTM A 240/A 240M, Type 316, not less than 0.050-inch (1.27-mm) nominal thickness. Fabricate with corners rounded and coved to at least 5/8-inch (16-mm) radius. Slope sink bottoms to outlet. Provide double-wall construction for sink partitions with top edge rounded to at least 1/2-inch (13-mm) diameter. Provide continuous butt-welded joints After fabricating and welding, grind surfaces smooth and polish as needed to produce uniform finish with no evidence of welds and free of cross scratches. Passivate and rinse surfaces; remove embedded foreign matter and leave surfaces clean.
2. Punch holes for fittings at factory.
3. Provide with stainless-steel strainers and tailpieces, NPS 1-1/2 (DN 40) unless otherwise indicated.
4. Where indicated, provide stainless-steel overflow of standard beehive or open-top design with separate stainless-steel strainer. Height 2 inches (50 mm) less than sink depth.
5. Apply 1/8-inch- (3-mm-) thick coating of heat-resistant, sound-deadening mastic to undersink surfaces.

## 2.7 WATER AND COMPRESSED-AIR SERVICE FITTINGS

A. Service Fittings: Provide units that comply with SEFA 7, "Laboratory and Hospital Fixtures--Recommended Practices." Provide fittings complete with washers, locknuts, nipples, and other installation accessories. Include wall and deck flanges, escutcheons, handle extension rods, and similar items.

B. Materials: Fabricated from cast or forged red brass unless otherwise indicated.

1. Reagent-Grade Water Service Fittings: Polypropylene, PVC, or PVDF for parts in contact with water.

C. Finish: Chromium plated.

D. Water Valves and Faucets: Provide units complying with ASME A112.18.1, with renewable seats, designed for working pressure up to 80 psig (550 kPa).

1. Vacuum Breakers: Provide ASSE 1035 vacuum breakers on water fittings with serrated outlets.
2. Aerators: Provide aerators on water fittings that do not have serrated outlets.
3. Self-Closing Valves: Provide self-closing valves where indicated.

4. Handles: Provide three- or four-arm, forged-brass handles for valves unless otherwise indicated.

E. Needle Valves for Compressed Air: Provide units with renewable, self-centering, floating cones and renewable seats of stainless steel or Monel metal, with removable serrated outlets.

1. Provide units designed for working pressure up to [60 psig (410 kPa)] [100 psig (690 kPa)] [125 psig (860 kPa)].
2. Handles: Provide knurled molded plastic handles.

F. Service-Outlet Identification: Provide color-coded plastic discs with embossed identification, secured to each service-fitting handle to be tamper resistant. Comply with SEFA 7 for colors and embossed identification.

## PART 3 - EXECUTION

### 3.1 INSTALLATION OF CABINETS AND SHELVES

A. Install level, plumb, and true; shim as required, using concealed shims. Where healthcare casework abuts other finished work, apply filler strips and scribe for accurate fit, with fasteners concealed where practical.

B. Recessed Cabinets: Set cabinets in openings and fasten to partition framing, wood blocking, or reinforcements in partitions with fasteners spaced 24 inches (600 mm) o.c. Bolt adjacent cabinets together with joints flush, tight, and uniform.

C. Base Cabinets: Fasten cabinets to partition framing, wood blocking, or reinforcements in partitions with fasteners spaced not more than 24 inches (600 mm) o.c. Bolt adjacent cabinets together with joints flush, tight, and uniform.

D. Wall Cabinets: Fasten to hanging strips, masonry, partition framing, blocking, or reinforcements in partitions. Fasten each cabinet through back, near top, at not less than 24 inches (600 mm) o.c.

E. Wall-Mounted Shelves: Fasten to masonry, partition framing, blocking, or reinforcements in partitions. Fasten each shelf through upturned back edge at not less than 24 inches (600 mm) o.c.

F. Install hardware uniformly and precisely. Set hinges snug and flat in mortises.

G. Adjust healthcare casework and hardware so doors and drawers align and operate smoothly without warp or bind and contact points meet accurately. Lubricate operating hardware as recommended by manufacturer.

### 3.2 INSTALLATION OF COUNTERTOPS

A. Abut top and edge surfaces in one true plane with flush joints and with internal supports placed to prevent deflection. Locate joints only where shown on Shop Drawings.

B. Field-Made Joints: Provide welded joints in tops. Grind and polish surfaces to produce uniform, directionally textured finish with no evidence of welds and free of cross scratches. Passivate and rinse surfaces; remove embedded foreign matter and leave surfaces clean.

C. Field-Made Joints: Provide tight-fitting joints in tops using adhesives and fasteners recommended by manufacturer. Prepare edges to be joined in shop so Project-site processing of top and edge surfaces is not required.

D. Fastening: Secure countertops to cabinets with Z-type fasteners or equivalent, using two or more fasteners at each cabinet front, end, and back.

E. Provide chemical-resistant, permanently elastic sealing compound for closures at junctures of top, curb, and splash with walls as recommended by sealant manufacturer.

## 3.3 INSTALLATION OF SERVICE FITTINGS

A. Comply with requirements in Division 22 Sections for installing water and compressed-air service fittings.

B. Install fittings according to Shop Drawings and manufacturer's written instructions. Set bases and flanges of sink- and countertop-mounted fittings in sealant recommended by manufacturer of sink or countertop material. Securely anchor fittings to healthcare casework unless otherwise indicated.

## 3.4 CLEANING AND PROTECTING

A. Clean finished surfaces, touch up as required, and remove or refinish damaged or soiled areas to match original factory finish as approved by Architect.

B. Protect countertop surfaces during construction with 6-mil- (0.15-mm-) thick polyethylene or other suitable water-resistant covering. Tape to underside of countertop at minimum of 48 inches (1200 mm) o.c.

END OF SECTION 123570

**SECTION 123640**

**STONE COUNTERTOPS**

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes stone countertops.

1.2 ACTION SUBMITTALS

A. Product Data: For each variety of stone

B. Shop Drawings: Include plans, sections, details, and attachments to other work.

C. Samples: For each stone type indicated.

1.3 QUALITY ASSURANCE

A. Installer Qualifications: Fabricator of products.

B. Source Limitations for Stone: Obtain each variety of stone from a single quarry with resources to provide materials of consistent quality in appearance and physical properties.

1. Make stone slabs available for Architect to examine for appearance characteristics. Architect will select aesthetically acceptable slabs.

1.4 PROJECT CONDITIONS

A. Field Measurements: Verify dimensions of construction to receive stone countertops by field measurements before fabrication.

PART 2 - PRODUCTS

2.1 GRANITE

A. Granite: Comply with ASTM C 615.

B. Available Varieties and Sources: Subject to compliance with requirements, stone varieties that may be incorporated into the Work include, but are not limited to, the following:

C. Finish: Polished finish

2.2 ADHESIVES, GROUT, SEALANTS, AND STONE ACCESSORIES

A. Water-Cleanable Epoxy Adhesive: ANSI A118.3[.][, with a VOC content of 65 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24)

B. Water-Cleanable Epoxy Grout: ANSI A118.3, chemical-resistant, water-cleanable, tile-setting and -grouting epoxy.

C. Sealant for Countertops: Manufacturer's standard sealant of characteristics indicated below that complies with applicable requirements in Division 07 Section "Joint Sealants" and will not stain the stone it is applied to.

1. Single-component, neutral-curing silicone sealant
2. Color: Clear
3. Sealants shall have a VOC content of [250] <Insert value> g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

D. Stone Sealer: Colorless, stain-resistant sealer that does not affect color or physical properties of stone surfaces, as recommended by stone producer for application indicated.

2.3 STONE FABRICATION

A. Select stone for intended use to prevent fabricated units from containing cracks, seams, and starts that could impair structural integrity or function.

B. Fabricate stone countertops in sizes and shapes required to comply with requirements indicated, including details on Drawings and Shop Drawings.

1. Dress joints straight and at right angle to face, unless otherwise indicated.
2. Fabricate molded edges with machines having abrasive shaping wheels made to reverse contour of edge profile to produce uniform shape throughout entire length of edge.
3. Finish exposed faces of stone to comply with requirements indicated. Provide matching finish on exposed edges of countertops, splashes, and cutouts.

C. Comply with recommendations in MIA's "Dimension Stone - Design Manual."

D. Nominal Thickness: Provide thickness indicated, but not less than 3/4 inch (20 mm). Gage backs to provide units of identical thickness.

E. Splashes: Provide 3/4-inch- (20-mm-) thick [backsplashes] [and] [end splashes], unless otherwise indicated.

F. Joints: Fabricate countertops without joints.

G. Joints: Fabricate countertops in sections for joining in field, with joints at locations indicated and as follows:

1. Grouted Joints: 1/16 inch (1.5 mm) in width.
2. Sealant-Filled Joints: 1/16 inch (1.5 mm) in width.

H. Cutouts and Holes:

1. Undercounter Fixtures: Make cutouts for undercounter fixtures in shop using template or pattern furnished by fixture manufacturer. Form cutouts to smooth, even curves.

2. Counter-Mounted Fixtures: Prepare countertops in shop for field cutting openings for counter-mounted fixtures. Mark tops for cutouts and drill holes at corners of cutout locations. Make corner holes of largest radius practical.
3. Fittings: Drill countertops in shop for plumbing fittings, undercounter soap dispensers, and similar items.

## PART 3 - EXECUTION

### 3.1 INSTALLATION OF COUNTERTOPS

A. General: Install countertops over plywood subtops with full spread of water-cleanable epoxy adhesive.

B. General: Install countertops by adhering to supports with water-cleanable epoxy adhesive.

C. Set stone to comply with requirements indicated on Drawings and Shop Drawings. Shim and adjust stone to locations indicated, with uniform joints of widths indicated and with edges and faces aligned according to established relationships.

D. Space joints with 1/16-inch (1.5-mm) gap for filling with [grout] [sealant]. Use temporary shims to ensure uniform spacing.

1. Clamp units to temporary bracing, supports, or each other to ensure that countertops are properly aligned and joints are of specified width.

E. Complete cutouts not finished in shop. Mask areas of countertops adjacent to cutouts to prevent damage while cutting. Use power saws with diamond blades to cut stone. Make cutouts to accurately fit items to be installed, and at right angles to finished surfaces unless beveling is required for clearance. Ease edges slightly to prevent snipping.

F. Install backsplash and end splash by adhering to wall with water-cleanable epoxy adhesive. Leave 1/16-inch (1.5-mm) gap between countertop and splash for filling with sealant. Use temporary shims to ensure uniform spacing.

G. Grout joints to comply with ANSI A108.10. Remove temporary shims before grouting. Tool grout uniformly and smoothly with plastic tool.

### 3.2 ADJUSTING AND CLEANING

A. In-Progress Cleaning: Clean countertops as work progresses. Remove adhesive, grout, mortar, and sealant smears immediately.

B. Clean stone countertops not less than six days after completion of sealant installation using clean water and soft rags. Do not use wire brushes, acid-type cleaning agents, cleaning compounds with caustic or harsh fillers, or other materials or methods that could damage stone.

C. Sealer Application: Apply stone sealer to comply with stone producer's and sealer manufacturer's written instructions.

END OF SECTION 123640

**SECTION 123661**

**SIMULATED STONE COUNTERTOPS**

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
1. Solid-surface-material countertops and backsplashes.
2. Quartz agglomerate countertops and backsplashes.

1.2 ACTION SUBMITTALS

A. Product Data: For countertop materials.

B. Shop Drawings: For countertops. Show materials, finishes, edge and backsplash profiles, methods of joining, and cutouts for plumbing fixtures.

C. Samples: For each type of material exposed to view.

PART 2 - PRODUCTS

2.1 SOLID-SURFACE-MATERIAL COUNTERTOPS

A. Configuration: Provide countertops with the following front and backsplash style:

1. Front: [Straight, slightly eased at top] [Beveled] [3/4-inch (19-mm) bullnose] [Radius edge with apron, 2 inches (50 mm) high with 3/8-inch (9.5-mm) radius] [1-1/2-inch (38-mm) laminated bullnose] [1-inch (25-mm) laminated bullnose]
2. Backsplash: [Straight, slightly eased at corner] [Beveled] [Radius edge with 3/8-inch (9.5-mm) radius].
3. Endsplash: [Matching backsplash] [None].

B. Countertops: 3/4-inch- (19-mm-) thick, solid surface material with front edge built up with same material.

C. Backsplashes: 3/4-inch- (19-mm-) thick, solid surface material

2.2 QUARTZ AGGLOMERATE COUNTERTOPS

A. Configuration: Provide countertops with the following front and backsplash style:

1. Front: [Straight, slightly eased at top] [Beveled] [3/4-inch (19-mm) bullnose] [Radius edge with apron, 2 inches (50 mm) high with 3/8-inch (9.5-mm) radius] [1-1/2-inch (38-mm) laminated bullnose] [1-inch (25-mm) laminated bullnose]

2. Backsplash: [Straight, slightly eased at corner] [Beveled] [Radius edge with 3/8-inch (9.5-mm) radius].
3. Endsplash: [Matching backsplash] [None].

B. Countertops: 3/4-inch- (19-mm-) thick, quartz agglomerate with front edge built up with same material

C. Backsplashes: 3/4-inch- (19-mm-) thick, quartz agglomerate

2.3 COUNTERTOP MATERIALS

A. Certified Wood Materials: Fabricate countertops with wood and wood-based products produced from wood obtained from forests certified by an FSC-accredited certification body to comply with FSC STD-01-001, "FSC Principles and Criteria for Forest Stewardship."

B. Composite Wood and Agrifiber Products: Provide products that comply with the testing and product requirements of the Department of Health.

C. Particleboard: ANSI A208.1, [Grade M-2] [Grade M-2-Exterior Glue] [, made with binder containing no urea formaldehyde.

D. Plywood: Exterior softwood plywood complying with DOC PS 1, Grade C-C Plugged, touch sanded.

E. Adhesives: Adhesives comply with the testing and product requirements of the Department of Health

F. Solid Surface Material: Homogeneous solid sheets of filled plastic resin complying with ANSI SS1.

1. Type: Provide Standard Type unless Special Purpose Type is indicated.
2. Colors and Patterns: As selected by Architect from manufacturer's full range.

G. Quartz Agglomerate: Solid sheets consisting of quartz aggregates bound together with a matrix of filled plastic resin and complying with the "Physical Characteristics of Materials" Article of ANSI SS1.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Fasten countertops by screwing through corner blocks of base units into underside of countertop. Align adjacent surfaces and, using adhesive in color to match countertop, form seams to comply with manufacturer's written instructions. Carefully dress joints smooth, remove surface scratches, and clean entire surface.

END OF SECTION 123661

**SECTION 124813**

**ENTRANCE FLOOR MATS AND FRAMES**

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This section includes the following:

1. Entrance mats in recessed frames.

B. Related sections include the following:

1. Division 03 Section "Cast-in-Place Concrete" for slab depression grouting and filling for recessed mats and frames and for recessed foot grilles and frames.
2. Division 07 Section "Sheet Metal Flashing and Trim": for fabricated sheet metal foot-grille drain pans.

1.3 REFERENCES

A. AAMA 611 - Voluntary Specifications for Anodized Architectural Aluminum.

B. ASTM B 221 - Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.

C. ASTM B 221M - Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes Metric.

D. ASTM B 455 - Specification for Copper-Zinc-Lead Alloy (Leaded-Brass) Extruded Shapes.

E. ASTM D 412 - Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers - Tension.

F. ASTM D 746 - Standard Test Method for Brittleness Temperature of Plastics and Elastomers by Impact.

G. ICC A117.1 - Accessible and Usable Buildings and Facilities (ANSI).

H. National Association of Architectural Metal Manufacturers - Metal Finishes Manual for Architectural and Metal Products.

1.4 PERFORMANCE REQUIREMENTS

A. A. Structural Performance: Provide foot grilles and frames capable of withstanding the following loads and stresses:

1. Uniform floor load of 300 lbf/sq. ft.
2. Wheel load of 350 lb per wheel.

1.5 SUBMITTALS

A. Product Data: Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.

B. Shop Drawings: Show the following:

1. Items penetrating floor mats, foot grilles and frames, including the following:
   a. Door control devices
2. Divisions between mat sections
3. Divisions between grille sections
4. Perimeter floor moldings

C. Samples for Initial Selection: For each type of product indicated.

D. Samples for Verification: For each type of product indicated.

1. 1. Floor Mat: 12-inch- square, assembled sections of floor mat.
2. 2. Tread Rail: 12-inch- long Sample of each type and color.
3. 3. Foot Grille: 12-inch- square assembled sections.
4. 4. Frame Members: 12-inch- long Sample of each type and color.

E. Maintenance Data: For floor mats to include in maintenance manuals.

1.6 QUALITY ASSURANCE

A. Source Limitations: Obtain floor mats and frames through one source from a single manufacturer.

B. Accessibility Requirements: Provide installed floor mats that comply with Section 4.5 in the U.S. Architectural & Transportation Barriers Compliance Board's "Americans with Disabilities Act (ADA), BP 344 of the National Building Code of the Philippines, Accessibility Guidelines for Buildings and Facilities (ADAAG)." and Sections 302 and 303 in ICC A117.1.

1.7 PROJECT CONDITIONS

A. Field Measurements: Indicate measurements on Shop Drawings.

1.8 COORDINATION

A. Coordinate size and location of recesses in concrete with installation of finish floors to receive floor mats and frames.

1.9 EXTRA MATERIALS

A. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Entrance Tiles: Full-size units equal to 2 percent of amount installed for each size, color, and pattern indicated, but no fewer than 10 units.

PART 2 - PRODUCTS

2.1 ENTRANCE MATS

A. Resilient Link Mats: 3/8-inch- or 7/16-inch- thick, reversible vinyl rubber rubber-tire link matswith galvanized spring stainless-steel wire link rods, vulcanized edge-nosing trim, steel reinforced end trim, and links consisting of rectangular units or continuous strips in a heelproof, solid-weave pattern with no openings between links heel-proof, close-weave pattern with openings between links not exceeding 1/8 inch wide by 1 inch long open-weave pattern with openings between links about 1/2 inch wide by 1 inch long
1. 1. Color: As indicated by manufacturer's designations Match Architect's sample As selected by Architect from manufacturer's full range.
2. 2. Mat Size: As indicated

B. Rubber or Vinyl Mats: 1/4-inch- 3/8-inch- 7/16-inch- 1/2-inch- <Insert thickness> thick mats; with square edges for recessed installations beveled edges for surface applications and with solid sheet (no perforations) style perforated style, 1/4-inch diameter on standard spacing perforated style, 3/16 by 3/4 inch on standard spacing, standard pyramid design standard widewale corrugated hi-rib, narrow-wale corrugated top profile, and low-rib, narrow-wale corrugated standard knob-base flat-base bottom surface.
1. Color: As indicated by manufacturer's designations Match Architect's sample As selected by Architect from manufacturer's full range.
2. Mat Size: As indicated.

C. Cocoa Mats: Constructed from cocoa fiber yarn permanently bonded to PVC backing for dimensional stability and resistance to shedding; 5/8- to 3/4-inch overall thickness; 1.5-lb/sq. ft1-inch overall thickness; 2.0-lb/sq. ft 1-1/4-inch overall thickness; 2.5-lb/sq. ft weight.
1. Color: As indicated by manufacturer's designations Match Architect's sample As selected by Architect from manufacturer's full range.
2. Mat Size: As indicated.

D. Rubber-Tire Mats: Units of edge-grain-laminated and chenille-buffed, rubber-tire wall cuts; bonded to sheet rubber or other durable flexible backing sheet to form 3/8- to 7/16-inch- thick, 12-inch- square tile wide, continuous linear strip up to 25 feet long.
   1. Mat Size: As indicated

E. Carpet-Type Mats: Nylon Polypropylene Olefin Polyester carpet bonded to 1/8- to 1/4-inchthick, flexible vinyl backing to form mats 3/8 or 7/16 inch thick with nonraveling edges.
   1. Colors, Textures, and Patterns: As indicated by manufacturer's designations Match Architect's sample As selected by Architect from manufacturer's full range
   2. Mat Size: As indicated

F. Loop Filament Mats: 3M's "Nomad" loop filament vinyl material 3/8 inch 1/2 inch thick, with solid vinyl sheet foam sheet backing and with built-in chemical agents to reduce fungus and mildew.
   1. Color: As indicated by manufacturer's designations Match Architect's sample As selected by Architect from manufacturer's full range.
   2. Mat Size: As indicated.

G. Nuway Mats: Nylon-reinforced, 1/2-inch- wide by 7/16-inch- 11/16-inch- thick, vulcanized laminated rubber strips alternating with 9/16-inch- wide, profile shapes assembled on 0.1055- inch- diameter, galvanized steel wire, 1-1/2 inches o.c. Fibered surface buffed on rubber strips for interior unbuffed on rubber strips for exterior installations.
   1. Semiopen construction incorporating a 1/8-inch- thick, PVC spacer on each wire between each profile shape and rubber strip to allow dirt, grit, and water to drop through.
   2. Profile Shape Finish: Extruded-aluminum, mill finish Solid architectural-quality brass High-impact, solid PVC in color selected.
   3. Color: As indicated by manufacturer's designations Match Architect's sample As selected by Architect from manufacturer's full range.
   4. Mat Size: As indicated

H. Surface-Mounted Frames:
   1. Tapered Frames: Tapered flexible vinyl edge- aluminum frame members, not less than 2 inches 1-1/2 inches wide, attached to mat at all 4 edges, with welded mitered corners.
   2. Color: Mill finish As selected by Architect from manufacturer's full range.

I. Recessed Frames:
   1. Extruded Aluminum: ASTM B 221, , Alloy 6061-T6 or Alloy 6063-T5, T6, or T52.
   2. Color: Mill-finish Clear Light bronze Medium bronze Dark bronze Black As indicated by manufacturer's designations Match Architect's sample As selected by Architect from manufacturer's full range.
   3. Architectural Bronze: ASTM B 455, Alloy UNS No. C38500.

## 2.2 ENTRANCE TILES

### A. CONCRETE FILL AND GROUT MATERIALS

1. Provide concrete grout and fill equivalent in strength to cast-in-place concrete slabs for recessed mats and frames. Use aggregate no larger than one-third fill thickness.

B. FABRICATION

1. Floor Mats: Shop fabricate units to greatest extent possible in sizes indicated. Unlessotherwise indicated, provide single unit for each mat installation; do not exceed manufacturer's recommended maximum sizes for units that are removed for maintenance and cleaning. Where joints in mats and grilles are necessary, space symmetrically and away from normal traffic lanes. Miter corner joints in framing elements with hairline joints or provide prefabricated corner units without joints.
2. Shop fabricate foot grilles to greatest extent possible in sizes as indicated. Unless otherwise indicated, provide each grille as a single unit; do not exceed manufacturer's recommended maximum sizes for units that are removed for maintenance and cleaning. Where joints in grilles are necessary, space symmetrically and away from normal traffic lanes.
3. Surface-Mounted Frames: As indicated for permanent surface-mounted installation, complete with corner connectors, splice plates or connecting pins, and post installed expansion anchors.
4. Recessed Frames: As indicated, for permanent recessed installation, complete with corner pins or reinforcement and anchorage devices.

    a. Fabricate edge-frame members in single lengths or, where frame dimensions exceed maximum available lengths, provide minimum number of pieces possible, with hairline joints equally spaced and pieces spliced together by straight connecting pins.

5. Coat surfaces of aluminum frames that will contact cementitious material with manufacturer's standard protective coating.

2.3 FINISHES, GENERAL

A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

B. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

2.4 ALUMINUM FINISHES

A. Finish designations prefixed by AA comply with the system established by the Aluminum Association for designating aluminum finishes.

B. Mill Finish: AA-M10 (Mechanical Finish: as fabricated); grind and buff as required to remove scratches, welding, or abrasions produced in fabrication process.

C. Class II, Clear Anodic Finish: AA-M12C22A31 (Mechanical Finish: nonspecular as fabricated; Chemical Finish: etched, medium matte; Anodic Coating: Architectural Class II, clear coating 0.010 mm or thicker) complying with AAMA 611.

D. Class I, Clear Anodic Finish: AA-M12C22A41 (Mechanical Finish: nonspecular as fabricated; Chemical Finish: etched, medium matte; Anodic Coating: Architectural Class I, clear coating 0.018 mm or thicker) complying with AAMA 611.

E. Class II, Color Anodic Finish: AA-M12C22A32/A34 (Mechanical Finish: nonspecular as fabricated; Chemical Finish: etched, medium matte; Anodic Coating: Architectural Class II, integrally colored or electrolytically deposited color coating 0.010 mm or thicker) complying with AAMA 611.

F. Class I, Color Anodic Finish: AA-M12C22A42/A44 (Mechanical Finish: nonspecular as fabricated; Chemical Finish: etched, medium matte; Anodic Coating: Architectural Class I, integrally colored or electrolytically deposited color coating 0.018 mm or thicker) complying with AAMA 611.

2.5 STAINLESS STEEL FINISHES

A. Mill finish

B. Directional Stain Finish: No. 4.

1. When polishing is completed, passivate and rinse surfaces. Remove embedded foreign matter and leave surfaces chemically clean.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and floor conditions for compliance with requirements for location, sizes, minimum recess depth, and other conditions affecting installation of floor mats and frames.

B. Examine roughing in for drainage piping systems to verify actual locations of piping connections before foot grille and frame and drain pan installation.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Install recessed mat frames to comply with manufacturer's written instructions. Set mat tops at height recommended by manufacturer for most effective cleaning action; coordinate top of mat surfaces with bottom of doors that swing across mats to provide clearance between door and mat.

B. Install recessed foot grilles and frames and drain pans to comply with manufacturer's written instructions at locations indicated and with top of foot grilles and frames in relationship to one another and to adjoining finished flooring as recommended by manufacturer. Set foot-grille tops at height for most effective cleaning action. Coordinate top of foot-grille surfaces with doors that swing across grilles to provide clearance under door.

1. For installation in terrazzo flooring areas, provide allowance for grinding and polishing of terrazzo without grinding surface of recessed frames. Coordinate with other trades as required.
2. Install necessary shims, spacers, and anchorages for proper location and secure attachment of frames.
3. Install grout and fill around frames and, if required to set mat tops at proper elevations, in recesses under mats. Finish grout and fill smooth and level.

C. Install surface-type units to comply with manufacturer's written instructions at locations indicated; coordinate with entrance locations and traffic patterns.

1. Anchor fixed surface-type frame members to floor with devices spaced as recommended by manufacturer.

3.3 PROTECTION

A. After completing frame installation and concrete work, provide temporary filler of plywood or fiberboard in recesses and cover frames with plywood protective flooring. Maintain protection until construction traffic has ended and Project is near Substantial Completion.

END OF SECTION 124813

**SECTION 134900**

**RADIATION PROTECTION**

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Lead sheet, strip, and plate.
2. Lead glass.
3. Lead-lined building materials and products including the following:

    a. Gypsum board.
    b. Steel hollow-metal [doors] [and] [door frames].
    c. Wood doors.
    d. Observation-window frames.

4. Informational signs.

1.2 DEFINITIONS

A. Lead Equivalence: The thickness of lead that provides the same attenuation (reduction of radiation passing through) as the material in question under the specified conditions.

1. Lead equivalence specified for materials used in diagnostic x-ray rooms is as measured at 100 kV unless otherwise indicated.

1.3 PERFORMANCE REQUIREMENTS

A. Provide materials and workmanship, including joints and fasteners, that maintain continuity of radiation protection at all points and in all directions equivalent to materials specified in thicknesses and locations indicated.

1. Materials, thicknesses, and configurations indicated are based on radiation protection design prepared by Owner's radiation health physicist. This design is available to Contractor on request.

B. Lead-Lined Assemblies: Unless otherwise indicated, provide lead thickness in doors, door frames, window frames, penetration shielding, joint strips, film transfer cabinets, and other items located in lead-lined assemblies not less than that indicated for assemblies in which they are installed.

C. Lead Glazing: Unless otherwise indicated, provide lead equivalence not less than that indicated for assembly in which glazing is installed.

1.4 ACTION SUBMITTALS

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

B. Shop Drawings: Show layout of radiation-protected areas. Indicate lead thickness or lead equivalence of components. Show components and installation conditions not fully dimensioned or detailed in product data.

1. Show ducts, pipes, conduit, and other objects that penetrate radiation protection; include details of penetrations.

C. Samples: For each exposed product and for each color and texture specified.

1.5 INFORMATIONAL SUBMITTALS

A. Field quality-control reports.

B. Warranty: Sample of special warranty.

1.6 QUALITY ASSURANCE

A. Fire-Rated[ and Smoke-Control] Door and Frame Assemblies: Comply with [Division 08 Section "Hollow Metal Doors and Frames"] [and] [Division 08 Section "Flush Wood Doors"]

B. Glazing: Comply with requirements in Division 08 Section "Glazing."

C. Preinstallation Conference: Conduct conference at [Project site] <Insert location>.

1.7 WARRANTY

A. Comply with requirements in Division 08 Section "Flush Wood Doors."

PART 2 - PRODUCTS

2.1 MATERIALS

A. Lead Sheet, Strip, and Plate: ASTM B 749, alloy UNS No. L51121 (chemical-copper lead).

B. Lead Glass: Lead-barium, polished float glass containing not less than 60 percent heavy metal oxides, including not less than 48 percent lead oxide by weight.

1. Safety Glass: Laminated float glass.

a. Outer Lite: Clear float glass; thickness as indicated
b. Interlayer: Clear polyvinyl butyral or cured resin of manufacturer's standard thickness indicated with a proven record of no tendency to bubble, discolor, or lose physical and mechanical properties after laminating glass lites and installation.
c. Inner Lite: Lead-barium, polished float glass; thickness as indicated

C. Grout: ASTM C 476, with a slump of 8 to 11 inches (200 to 280 mm) as measured according to ASTM C 143/C 143M.

D. Lead-Lined Gypsum Board: [1/2-inch- (12.7-mm-)] [5/8-inch- (16-mm-)] thick gypsum board complying with Division 09 Section " Gypsum Board," of width and length required for support spacing

and to prevent cracking during handling, and with a single sheet of lead laminated to the back of the board. (Subject to requirements of Equipment Vendor and Biomedical Head of the Hospital)

1. Provide lead sheet lining the full width [and length of board] [of board and length necessary to extend from floor to 84 inches (2133 mm) above floor] [of board and height as indicated on Drawings].
2. Provide 3-inch- (75-mm-) wide lead strips for wrapping metal stud flanges.
3. Provide 2-inch- (50-mm-) wide lead strips for backing joints.
4. Provide [5/16-inch (8-mm)] [5/8-inch (16-mm)] <Insert dimension> lead disks for covering screw heads.
5. Provide lead-headed nails for fastening gypsum board, accessories, and trim to wood members.

E. Accessories and Fasteners: Provide manufacturer's standard fasteners and accessories as required for installation, maintaining same lead equivalence as rest of system.

F. Asphalt Coating: Cold-applied asphalt emulsion complying with ASTM D 1187.

G. Asphalt Felt: ASTM D 226.

## 2.2 LEAD-LINED STEEL HOLLOW-METAL DOORS

A. General: Steel doors complying with ANSI/NAAMM-HMMA 861, except with a single continuous sheet of lead of thickness [not less than that required for partition in which door is installed] [as indicated on Drawings] and extending from top to bottom and edge to edge, installed either between back-to-back stiffeners or between stiffeners and stop face of door.

1. Line inverted channels at top and bottom of doors with lead sheet of same thickness used in door and close with filler channels to provide flush top and bottom edges.
2. Shield cutouts for locksets with lead sheet of same thickness used in door. Lap lining of cutouts with door lining 1 inch (25 mm).
3. Prepare doors to receive [observation windows] [and] [louvers]; cut and trim openings through doors in factory. Provide removable stops for glazed openings.
4. Provide lead-lined astragals for pairs of doors.
5. Factory fit doors to suit frame-opening sizes indicated with [1/16-inch (1.5-mm)] clearance at heads and jambs and minimum clearance at bottom.
6. Finish: Apply manufacturer's factory-applied paint.

    a. Color and Gloss: As selected by Architect from manufacturer's full range

B. Lead Door Louvers: Provide louvers with free area as required by the Mechanical Consultant, of sizes and types indicated. Fabricate from formed-lead sheet or lead extrusions of not less than lead thickness required for door in which louver is installed. Fabricate louvers to be lightproof with fixed maze-type blades that maintain required lead equivalence at all points and in all directions. Factory fit and assemble louvers in doors before shipping to Project site.

## 2.3 LEAD-LINED STEEL HOLLOW-METAL DOOR FRAMES

A. General: Steel door frames complying with ANSI/NAAMM-HMMA 861, [except 0.0667 inch (1.7 mm) thick, ]and lined with lead sheet of thickness not less than that required for doors and walls where frames are used.

1. Provide additional reinforcements and internal supports to adequately carry the weight of lead-lined doors. Install reinforcements and supports before installing lead lining.
2. Form lead sheet to match frame contour, continuous in each jamb and across the head, lapping the stops. Form lead shields around areas prepared to receive hardware. Fabricate lead lining wide enough to maintain an effective lap with lead of adjacent shielding.
3. Hardware Preparation: Factory prepare doors and frames to receive templated mortised hardware; include cutouts, reinforcement, mortising, drilling, and tapping according to the Door Hardware Schedule and templates furnished as specified in Division 08 Section "Door Hardware."
4. Finish: Apply manufacturer's factory-applied paint.

    a. Color and Gloss: As selected by Architect from manufacturer's full range

## 2.4 LEAD-LINED WOOD DOORS

A. Wood Door Manufacturer Qualifications: A qualified manufacturer that is certified for chain of custody by an FSC-accredited certification body.

B. General: Flush solid-core wood doors with lead lining, thickness not less than that required for partition in which door is installed] [as indicated on Drawings.

1. Door Construction: Plastic-laminate face, 5 ply, bonded particleboard core.
2. Lead Lining: One or more continuous sheets of lead extending from top to bottom and edge to edge, constructed either in the core or between the core and faces, at manufacturer's option.
3. Lead Lining: One continuous sheet of lead extending from top to bottom and edge to edge, constructed in the core. Assemble lead lining and core with poured lead fasteners or steel bolts. Space fasteners not more than 1-1/2 inches (38 mm) from door edge and about 8 inches (200 mm) o.c. Countersink bolt heads and cover with lead.
4. Comply with Division 08 Section "Flush Wood Doors" for grade, faces, veneer matching, fabrication, finishing, and other requirements unless otherwise indicated.
5. Quality Standard: [AWI's "Architectural Woodwork Quality Standards Illustrated."] [WDMA I.S.1-A, "Architectural Wood Flush Doors."] [WI's "Manual of Millwork."]
6. Grade: Premium
7. Faces: Plastic laminate complying with NEMA LD 3, Grade HGS.

    a. Color, Patterns, and Finishes: As selected by Architect from manufacturer's full range

8. Shield cutouts for locksets with lead sheet of same thickness used in door. Lap lining of cutouts with door lining.
9. Prepare doors to receive [observation windows] [and] [louvers]; cut and trim openings through doors in factory. Provide removable wood stops for glazed openings.
10. Provide lead-lined astragals for pairs of doors.
11. Factory fit doors to suit frame openings indicated with [1/16-inch (1.5-mm)] clearance at heads and jambs and minimum clearance at bottom. Factory machine doors for hardware not surface applied.

C. Low-Emitting Materials: Fabricate doors with adhesives and composite wood products that do not contain urea formaldehyde.

D. Low-Emitting Materials: Fabricate doors with [adhesives] [and] [composite wood products] that comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

E. Lead Door Louvers: Provide louvers with free area as required by the Mechanical Consultant, of sizes and types indicated. Fabricate from formed-lead sheet or lead extrusions of not less than lead thickness required for door in which louver is installed. Fabricate louvers to be lightproof with fixed maze-type blades that maintain required lead equivalence at all points and in all directions. Factory fit and assemble louvers in doors before shipping to Project site.

## 2.5 LEAD-LINED OBSERVATION-WINDOW FRAMES

A. General: Fabricate from 0.043-inch- (1.1-mm-) thick, formed-steel sheet or 0.064-inch- (1.6-mm-) thick aluminum extrusions with mitered corners, welded or bolted with concealed fasteners.

1. Line with lead sheet formed to match frame contour, continuous in each jamb and across head and sill, lapping the stops, and fabricated wide enough to maintain an effective lap with lead of adjoining assemblies.
2. Construct so lead lining overlaps glazing material perimeter by at least 3/8 inch (9.5 mm) and provide removable stops.
3. Form sill with an opening for sound transmission. Offset sound passage to make opening lightproof and to maintain required lead equivalence at all points and in all directions.

## 2.6 INFORMATIONAL SIGNS

A. Informational Signs, General: Fabricate signs by engraving lettering in high-pressure-laminate engraving stock with contrasting face and core. Machine engrave copy using high-speed cutters mechanically positioned by master templates for accurately formed letters, numbers, and symbols.

1. Color: As selected by Architect from manufacturer's full range of colors.
2. Provide copy indicated or as directed. Provide signs of sufficient size to contain required information.
3. Indicate lead equivalence in millimeters and heights of radiation protection in inches (millimeters).

B. Rooms Where the Level of Protection Is Uniform Throughout: Provide one sign for each room indicating lead equivalence of partitions, ceilings, floors, doors, and other portions of radiation protection enclosure. Indicate height of radiation protection above floor or indicate that partitions are radiation protected to full height.

C. Rooms Where the Level of Protection Is Not Uniform Throughout: Provide one sign for each room with different lead equivalences in different locations. Indicate, in tabular form, lead equivalence of each wall, partition, ceiling, floor, door, and window. Indicate height of radiation protection above floor or indicate that partitions are radiation protected to full height. Indicate where lead equivalence changes or is not continuous.

D. Rooms Where Some Partitions Are without Radiation Protection: Provide one sign for each partition that contains radiation protection and indicate its lead equivalence. Indicate height of radiation protection above floor or indicate that partitions are radiation protected to full height.

E. Rooms Where Only the Door Has Radiation Protection: Provide one sign for each door indicating its lead equivalence.

PART 3 - EXECUTION

3.1 INSTALLATION OF LEAD SHEETS IN CONCRETE FLOOR SLABS

A. Concrete Surfaces: Proceed with installation only after surfaces are clean, dry, and free of depressions and sharp projections that could damage or penetrate lead sheet.

B. Apply a coat of asphalt mastic or paint to concrete surfaces before installing lead sheet.

C. Before installing floor lead sheet, place lead strips not less than 7 inches (175 mm) wide under the base of vertical wall protection. Extend lead strips approximately 3 inches (75 mm) into the shielded room area.

D. Lead Sheet, 1/8 Inch (3 mm) Thick or Less: Install in a single layer with a 2-inch (50-mm) minimum lap at joints.

E. Lead Sheet More Than 1/8 Inch (3 mm) Thick: Install in two or more layers with a 2-inch (50-mm) minimum lap at joints, or in a single layer with joints butted and covered with a 4-inch- (100-mm-) wide lead strip of same thickness.

F. Extend lead sheet at least 12 inches (300 mm) beyond radiation protection in walls of room.

G. In floor slabs above shielded rooms where lead sheet is indicated, extend lead sheet at least 12 inches (300 mm) beyond radiation protection in walls of room below.

H. At door openings, extend lead sheet at least 12 inches (300 mm) beyond radiation protection in walls and at least 12 inches (300 mm) beyond door opening on both sides[ except where lead-lined thresholds are provided].

I. After installation, apply two of asphalt coating on top surface of lead sheet and protect from damage until concrete topping is placed.

3.2 INSTALLATION OF LEAD-LINED GYPSUM BOARD

A. Install with long edge parallel to supports and lead lining facing supports. Provide blocking at end joints.[ Install using construction adhesive and supplementary fasteners.]

B. Fastening to Metal Supports: Use steel drill screws spaced as recommended in writing by gypsum board manufacturer. Install lead strips covering face of framing and wrap around flange to cover points of screws.

1. Where possible, install lead-lined gypsum board before installing gypsum board on other side of partition, and do not fold lead strips back over inside of flange until after lead-lined gypsum board is applied.
2. Apply lead disks recessed flush with surface of board over heads of screws securing trim.

C. Fastening to [Metal] [and] [Wood] Supports: Use steel drill screws spaced as recommended in writing by gypsum board manufacturer. Apply lead disks over screw heads and recess flush with surface of board.

1. Install lead strips, 1-1/2 inches (38 mm) wide minimum and same thickness as lead lining, to face of supports and blocking where joints occur. Secure lead strips with construction adhesive. Provide shims at intermediate supports.

2. Apply lead disks recessed flush with surface of board over heads of screws securing trim.

D. Fastening to Wood Supports: Use lead-headed nails spaced as recommended in writing by gypsum board manufacturer. Drill pilot holes to prevent deforming nails or distorting board. Drive nail heads slightly below exposed surface.

1. Install lead strips, 1-1/2 inches (38 mm) wide minimum and same thickness as lead lining, to face of supports and blocking where joints occur. Secure lead strips with construction adhesive. Provide shims at intermediate supports.
2. Fasten accessories and trim to wood supports with lead-headed nails as specified above for fastening gypsum board.

E. Two-Layer System: Apply a facing sheet of gypsum board vertically over base sheet using laminating adhesive recommended in writing by gypsum board manufacturer. Offset joints in finish layer from joints in base layer and fasten at top and bottom of sheet to support finish panel until adhesive has set.

1. Locate fasteners above ceiling or behind wall base and cover fasteners with lead disks recessed flush with surface of board.

F. Openings: Extend lead-lined gypsum board into frames of openings, lapping lead lining with lead frames or frame linings at least 1 inch (25 mm). Arrange board around openings so neither horizontal nor vertical joints occur at corners of openings.

G. Install control and expansion joints where indicated, with appropriate trim accessories. Install lead strip on face of framing, extending across joint, and lap with lead lining of gypsum board.

## 3.3 INSTALLATION OF LEAD-LINED DOORS AND DOOR FRAMES

A. Install lead-lined steel [doors] [and] [door frames] according to Division 08 Section "Hollow Metal Doors and Frames."

1. Apply a coat of asphalt mastic or paint to lead lining in door frames where lead will come in contact with masonry or grout.

B. Install lead-lined wood doors according to Division 08 Section "Flush Wood Doors."

C. Glazing: Comply with installation requirements in Division 08 Section "Glazing" and with door manufacturer's written instructions.

D. Lap lead lining of frames over lining in walls at least 1 inch (25 mm).

E. Line astragals with lead sheet.

F. Hardware: Line covers, escutcheons, and plates to provide effective shielding at cutouts and penetrations of frames and doors. See Division 08 Section "Door Hardware" for other installation requirements.

## 3.4 INSTALLATION OF LEAD-LINED OBSERVATION WINDOWS

A. Install observation windows according to manufacturer's written installation instructions.

1. Apply a coat of asphalt mastic or paint to lead lining in frames where lead will come in contact with masonry or grout.

B. Install windows level, plumb, square, true to line, and anchored securely in place to structural support.

C. Install leaded side of frame on radiation side of wall. Lap lead lining of frames over lining in walls at least 1 inch (25 mm).

D. Glazing: Comply with installation requirements in Division 08 Section "Glazing" and with manufacturer's written instructions.

## 3.5 INSTALLATION OF PENETRATING ITEMS

A. At penetrations of lead linings, provide lead shields to maintain continuity of protection.

B. Provide lead linings, sleeves, shields, and other protection in thickness not less than that required in assembly being penetrated.

C. Secure shields at penetrations using adhesive or wire ties but not penetrating fasteners unless indicated on Drawings.

D. Outlet Boxes and Conduit: Cover or line with lead sheet lapped over adjacent lead lining at least 1 inch (25 mm). Wrap conduit with lead sheet for a distance of not less than 10 inches (250 mm) from box.

E. Duct Openings: Unless otherwise indicated, line or wrap ducts with lead sheet for distance from partition/ceiling equal to three times the largest opening dimension. Lap lead sheet with adjacent lead lining at least 1 inch (25 mm).

F. Piping: Unless otherwise indicated, wrap piping with lead sheet for a distance of not less than 10 inches (250 mm) from point of penetration.

## 3.6 FIELD QUALITY CONTROL

A. Testing Agency: Engage a qualified testing agency to perform tests and inspections after radiology equipment has been installed and placed in operating condition.

B. Correct deficiencies in or remove and replace radiation protection that inspection reports indicate does not comply with specified requirements.

END OF SECTION 134900

**SECTION 142100**

**ELECTRIC TRACTION ELEVATORS**

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes electric traction passenger and service elevators.

1.2 ACTION SUBMITTALS

A. Product Data: Include capacities, sizes, performances, operations, safety features, finishes, and similar information.

B. Shop Drawings:

1. Include plans, elevations, sections, and large-scale details indicating service at each landing, machine room layout, coordination with building structure, relationships with other construction, and locations of equipment.
2. Indicate maximum dynamic and static loads imposed on building structure at points of support, and maximum and average power demands.

C. Samples: For exposed finishes.

1.3 INFORMATIONAL SUBMITTALS

A. Seismic Qualification Certificates: For elevator equipment, accessories, and components, from manufacturer.

B. Manufacturer Certificates: Signed by elevator manufacturer certifying that hoist way, pit, and machine room, control closet layout and dimensions, as shown on Drawings, and electrical service including standby power generator, as shown and specified, are adequate for elevator system being provided.

1.4 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For elevators to include in emergency, operation, and maintenance manuals.

B. Inspection and Acceptance Certificates and Operating Permits: As required by authorities having jurisdiction for normal, unrestricted elevator use.

C. Continuing Maintenance Proposal: Submit a continuing maintenance proposal from Installer to Owner, in the form of a standard FIVE (5) year maintenance agreement, starting on date initial maintenance service is concluded.

1.5 WARRANTY

A. Manufacturer's Special Warranty: Manufacturer agrees to repair, restore, or replace elevator work that fails in materials or workmanship within specified warranty period.

1. Warranty Period: 2 year(s) from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Regulatory Requirements: Comply with ASME A17.1/CSA B44.

B. Accessibility Requirements: Comply with Section 407 in the U.S. Architectural & Transportation Barriers Compliance Board's ADA-ABA Accessibility Guidelines and with ICC A117.1.

C. Seismic Performance: Elevator system shall withstand the effects of earthquake motions determined according to ASCE/SEI 7, National Structural Code of the Philippines and shall comply with elevator safety requirements for seismic risk Zone 2 or greater in ASME A17.1/CSA B44.

1. Affected peak velocity acceleration (Av) for Project's location is greater than or equal to 0.20 (seismic risk Zones 3 and 4)]
2. Provide earthquake equipment required by ASME A17.1/CSA B44.
3. Provide seismic switch required by ASCE/SEI 7.
4. Design earthquake fundamental time period for Project is 0.8sec (Verify with Engineering Specification)
5. Project Seismic Design Category: A
6. Elevator Component Importance Factor: 1.5

2.2 ELEVATORS

A. Elevator System, General: Manufacturer's standard elevator systems. Unless otherwise indicated, manufacturer's standard components shall be used, as included in standard elevator systems and as required for complete system.

B. Elevator Description:

1. Elevators: PE-1, PE-2, PE-3 (Passenger Elevators), BE-1, BE-2, BE-3/FE-1, BE4/FE-2 (Service/ Bed Elevators)
2. Machine Location: Machine room above hoist way
3. Machine Type: Gearless traction.
4. Rated Load: 3000 lb (1362 kg) 20 passengers unless otherwise indicated on plans (Verify with Mechanical Engineering Specifications)
5. Freight Loading Class for Service Elevator(s): Class A.
6. Rated Speed: 2.5 m/sec for Passenger Elevators and Service Elevators
7. Operation System: Group automatic operation with demand-based dispatching
8. Auxiliary Operations:

a. Standby power operation.
b. Battery-powered lowering.
c. Automatic dispatching of loaded car.
d. Nuisance call cancel.
e. Emergency hospital, Priority service at all floors.

f. Loaded-car bypass.
g. Distributed parking.

9. Security Feature: Card-reader operation.
10. Dual Car-Control Stations: Provide two car-control stations in each elevator; equip only one with required key switches if any.
11. Car Enclosures (Verify with Architectural Plans):

a. Inside Width:
b. Inside Depth:
c. Inside Height:
d. Front Walls (Return Panels): Satin stainless steel, No. 4 finish.
e. Interior Finishes: Refer to Architectural Details Series 900
f. Car Fixtures: Satin stainless steel, No. 4 finish.
g. Side and Rear Wall Panels: Satin stainless steel, No. 4 finish.
h. Door Faces (Interior): Satin stainless steel, No. 4 finish
i. Ceiling: Luminous ceiling (soft illumination) for PE, Satin stainless steel, No. 4 finish for SE
j. Handrails: Satin stainless solid bar 100mm H at sides and rear of car
k. Bumper rails (for SE): 100mm above cab floor
l. Floor prepared to receive stone finish same as lobby floor.

12. Hoist way Entrances (Verify with Architectural Plans):

a. Width:
b. Height:
c. Type: Two-speed center opening
d. Frames All floors: Satin stainless steel, No. 4 finish.
e. Doors: All floors: Satin stainless steel, No. 4 finish

13. Hall Fixtures: Satin stainless steel, No. 4 finish.
14. Additional Requirements:

a. Provide inspection certificate in each car, mounted under acrylic cover with frame made from satin stainless steel, No. 4 finish.
b. Provide hooks for protective pads in SE-3 car and two complete set(s) of full-height protective pads.

## 2.3 TRACTION SYSTEMS

A. Elevator Machines: Variable-voltage, variable-frequency, ac-type hoisting machines or variable-voltage dc-type hoisting machines and solid-state power converters.

1. Limit total harmonic distortion of regenerated power to 5 percent per IEEE 519.
2. Provide means for absorbing regenerated power when elevator system is operating on standby power.

B. Fluid for Hydraulic Buffers: If using hydraulic buffers, use only fire-resistant fluid.

C. Machine Beams: Provide framing to support elevator hoisting machine and deflector sheaves from the building structure. Comply with Division 05 Section "Metal Fabrications" for materials and fabrication.

D. Guides: Roller guides or polymer-coated, nonlubricated sliding guides. Provide guides at top and bottom of car and counterweight frames.

## 2.4 OPERATION SYSTEMS

A. General: Provide manufacturer's standard microprocessor operation systems as required to provide type of operation indicated.

B. Group Automatic Operation with Demand-Based Dispatching: Provide reprogrammable group automatic system that assigns cars to hall calls based on a dispatching program designed to minimize passenger waiting time. System automatically adjusts to demand changes for different traffic conditions including heavy incoming, heavy two-way, heavy outgoing, and light off-hours as variations of normal two-way traffic.

C. Auxiliary Operations: In addition to primary operation system features, provide the following operational features for elevators where indicated:

1.

2. Group Standby Power Operation: On activation of standby power, cars are returned, one at a time, to a designated floor and parked with doors open. If a car cannot be returned, it is removed from the system. When all cars have been returned or removed from the system, one car can be put in service on standby power by a selector switch in control panel located at fire command station.
3. Group Battery-Powered Lowering: If power fails, cars that are at a floor remain at that floor, open their doors, and shut down. Cars that are between floors are lowered one at a time to the next floor below, open their doors, and shut down. System includes rechargeable battery and automatic recharging system.
4. Independent Service: Keyswitch in car-control station removes car from group operation and allows it to respond only to car calls.
5. Emergency Hospital/Priority Service: Service is initiated by a keyswitch or card reader at designated floors. One elevator is removed from group operation and directed to the floor where service was initiated. Car is placed in operation by selecting a floor and pressing door close button or by operating keyswitch to put car in independent service. After responding to floor selected or being removed from independent service, car is returned to group operation.

6. Keyswitch Operation: Push buttons are activated and deactivated by security keyswitches at car-control stations.

## 2.5 DOOR REOPENING DEVICES

A. Infrared Array: Provide door reopening device with uniform array of 36 or more microprocessor-controlled, infrared light beams projecting across car entrance. Interruption of one or more light beams shall cause doors to stop and reopen.

B. Nudging Feature: After car doors are prevented from closing for predetermined adjustable time, through activating door reopening device, a loud buzzer shall sound and doors shall begin to close at reduced kinetic energy.

## 2.6 CAR ENCLOSURES

A. General: Provide enameled-steel car enclosures to receive removable wall panels, with removable car roof, access doors, power door operators, and ventilation.

1. Provide standard railings complying with ASME A17.1/CSA B44 on car tops where required by ASME A17.1/CSA B44.

B. Materials and Finishes: Manufacturer's standards, but not less than the following:

1. Stainless-Steel Wall Panels: Flush, hollow-metal construction; fabricated from stainless-steel sheet.
2. Stainless-Steel Doors: Flush, hollow-metal construction; fabricated from stainless-steel sheet.
3. Sight Guards: Provide sight guards on car doors.
4. Sills: Extruded aluminum, with grooved surface, 1/4 inch (6.4 mm) thick.
5. Luminous Ceiling: Fluorescent light fixtures and ceiling panels of translucent acrylic or other permanent rigid plastic.
6. Metal Ceiling: Flush panels, with standard manufacturer's lighting fixtures. Align ceiling panel joints with joints between wall panels.
7. Handrails: Manufacturer's standard handrails, of shape, metal, and finish indicated.

## 2.7 HOISTWAY ENTRANCES

A. Hoistway Entrance Assemblies: Manufacturer's standard horizontal-sliding, door-and-frame hoistway entrances complete with track systems, hardware, sills, and accessories. Frame size and profile shall accommodate hoistway wall construction.

1. Where gypsum board wall construction is indicated, frames shall be self-supporting with reinforced head sections.

B. Fire-Rated Hoistway Entrance Assemblies: Door and frame assemblies shall comply with NFPA 80 and be listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction based on testing at as close-to-neutral pressure as possible according to NFPA 252 or UL 10B.

1. Fire-Protection Rating: 1-1/2 hours with 30-minute temperature rise of 450 deg F (250 deg C)].

C. Materials and Fabrication: Manufacturer's standards, but not less than the following:

1. Enameled-Steel Frames: Formed from cold- or hot-rolled steel sheet. Provide with factory-applied enamel finish; colors as selected by Architect from manufacturer's full range.
2. Stainless-Steel Frames: Formed from stainless-steel sheet.
3. Star of Life Symbol: Identify emergency elevators with star of life symbol, not less than 3 inches (76 mm) high, on both inside surfaces of hoistway door frames.
4. Stainless-Steel Doors and Transoms: Flush, hollow-metal construction; fabricated from stainless-steel sheet
5. Sight Guards: Provide sight guards on doors matching door edges.
6. Sills: Extruded aluminum, with grooved surface, 1/4 inch (6.4 mm) thick.
7. Nonshrink, Nonmetallic Grout: Factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C 1107/C 1107M.

## 2.8 SIGNAL EQUIPMENT

A. General: Provide hall-call and car-call buttons that light when activated and remain lit until call has been fulfilled. Fabricate lighted elements with LEDs.

B. Car-Control Stations: Provide manufacturer's standard car-control stations. Mount in return panel adjacent to car door unless otherwise indicated.

1. Provide "No Smoking" sign matching car-control station, with text and graphics as required by authorities having jurisdiction.

C. Emergency Communication System: Two-way voice communication system, with visible signal, which dials preprogrammed number of monitoring station and does not require handset use. System is contained in flush-mounted cabinet, with identification, instructions for use, and battery backup power supply.

D. Firefighters' Two-Way Telephone Communication Service: Provide flush-mounted cabinet telephone jack in each car and required conductors in traveling cable for firefighters' two-way telephone communication service specified in MEPF Specs “Fire-Alarm System."

E. Car Position Indicator: Provide illuminated, digital-type car position indicator, located above car door or above car-control station. Also, provide audible signal to indicate to passengers that car is either stopping at or passing each of the floors served. Include travel direction arrows if not provided in car-control station.

F. Hall Push-Button Stations: Provide hall push-button stations at each landing as indicated.

G. Hall Lanterns: Units with illuminated arrows; but provide single arrow at terminal landings. Provide the following:

1. Manufacturer's standard wall-mounted units, for mounting above entrance frames.

H. Hall Annunciator: With each hall lantern, provide audible signals indicating car arrival and direction of travel. Signals sound once for up and twice for down.

I. Fire-Command-Center Annunciator Panel: Provide panel containing illuminated position indicators for each elevator, clearly labeled with elevator designation; include illuminated signal that indicates when elevator is operational and when it is at the designated emergency return level with doors open. Provide standby power elevator selector switch(es), as required by ASME A17.1/CSA B44, adjacent to position indicators. Provide illuminated signal that indicates when normal power supply has failed.

J. Emergency Pictorial Signs: Fabricate from materials matching hall push-button stations, with text and graphics as required by authorities having jurisdiction. Provide one sign at each hall push-button station unless otherwise indicated.

## 2.9 FINISH MATERIALS

A. Cold-Rolled Steel Sheet: ASTM A 1008/A 1008M, commercial steel, Type B, exposed, matte finish.

B. Hot-Rolled Steel Sheet: ASTM A 1011/A 1011M, commercial steel, Type B, pickled.

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

D. Stainless-Steel Bars: ASTM A 276, Type 304.

E. Stainless-Steel Tubing: ASTM A 554, Grade MT 304.

F. Aluminum Extrusions: ASTM B 221 (ASTM B 221M), Alloy 6063.

G. Plastic Laminate: High-pressure type complying with NEMA LD 3, Type HGS or Type HGL.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Sound Isolation: Mount rotating and vibrating equipment on vibration-isolating mounts to minimize vibration transmission to structure and structure-borne noise due to elevator system.

B. Lubricate operating parts of systems, including ropes, as recommended by manufacturers.

C. Leveling Tolerance: 1/8 inch (3 mm), up or down, regardless of load and travel direction.

D. Set sills flush with finished floor surface at landing. Fill space under sill solidly with nonshrink, nonmetallic grout.

E. Locate hall signal equipment for elevators as follows unless otherwise indicated:

1. For groups of elevators, locate hall push-button stations between two elevators at center of group or at location most convenient for approaching passengers.
2. Place hall lanterns either above or beside each hoistway entrance.
3. Mount hall lanterns at a minimum of 72 inches (1829 mm) above finished floor.

3.2 FIELD QUALITY CONTROL

A. Acceptance Testing: On completion of elevator installation and before permitting elevator use (either temporary or permanent), perform acceptance tests as required and recommended by ASME A17.1/CSA B44 and by governing regulations and agencies.

3.3 PROTECTION

A. Temporary Use: Limit temporary use for construction purposes to one elevator. Comply with the following requirements for the elevator used for construction purposes:

1. Provide car with temporary enclosure, either within finished car or in place of finished car, to protect finishes from damage.
2. Provide other protective coverings, barriers, devices, signs, and procedures as needed to protect elevator and elevator equipment.
3. Engage elevator Installer to provide full maintenance service.
4. Engage elevator Installer to restore damaged work, if any, so no evidence remains of correction. Return items that cannot be refinished in the field to the shop, make required repairs and refinish entire unit, or provide new units as required.

3.4 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to operate, adjust, and maintain elevator(s).

3.5 MAINTENANCE

A. Initial Maintenance Service: Beginning at Substantial Completion, maintenance service shall include 12 months' full maintenance by skilled employees of elevator Installer. Include monthly preventive

maintenance, repair or replacement of worn or defective components, lubrication, cleaning, and adjusting as required for proper elevator operation at rated speed and capacity.

END OF SECTION 142100

**SECTION 224000**

**PLUMBING FIXTURES**

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes the following conventional plumbing fixtures and related components:

1. Water closets.
2. Urinals.
3. Flushometers.
4. Lavatories.
5. Kitchen sinks.
6. Faucets for lavatories, showers and sinks.

1.3 DEFINITIONS

A. Accessible Fixture: Plumbing fixture that can be approached, entered, and used by people with disabilities.

B. Fitting: Device that controls the flow of water into or out of the plumbing fixture. Fittings specified in this Section include supplies and stops, faucets and spouts, shower heads and tub spouts, drains and tailpieces, and traps and waste pipes. Piping and general-duty valves are included where indicated.

1.4 SUBMITTALS

A. Product Data: For each type of plumbing fixture indicated. Include selected fixture and trim, fittings, accessories, appliances, appurtenances, equipment, and supports. Indicate materials and finishes, dimensions, construction details, and flow-control rates.

B. Operation and Maintenance Data: For plumbing fixtures to include in emergency, operation, and maintenance manuals.

C. Warranty: Special warranty specified in this Section.

1.5 QUALITY ASSURANCE

A. Source Limitations: Obtain plumbing fixtures, faucets, and other components of each category through one source from a single manufacturer.

1. Exception: If fixtures, faucets, or other components are not available from a single manufacturer, obtain similar products from other manufacturers specified for that category.

B. Regulatory Requirements: Comply with requirements in ICC A117.1, "Accessible and Usable Buildings and Facilities" and “BP344: An Act to Enhance the Mobility of Disabled Persons by Requiring Certain Buildings, Institutions, Establishment & Other Public Utilities to Install Facilities & Other Devices or otherwise known as Accessibility Law” for plumbing fixtures for people with disabilities.

C. Select combinations of fixtures and trim, faucets, fittings, and other components that are compatible.

D. Comply with the following applicable standards and other requirements specified for plumbing fixtures:

1. Stainless-Steel Residential Sinks: ASME A112.19.3.
2. Vitreous-China Fixtures: ASME A112.19.2M.
3. Water-Closet, Flush Valve, Tank Trim: ASME A112.19.5.
4. Water-Closet, Flushometer Tank Trim: ASSE 1037.

E. Comply with the following applicable standards and other requirements specified for lavatory and sink faucets:

1. Faucets: ASME A112.18.1.
2. NSF Potable-Water Materials: NSF 61.
3. Pipe Threads: ASME B1.20.1.
4. Supply Fittings: ASME A112.18.1.
5. Brass Waste Fittings: ASME A112.18.2.

F. Comply with the following applicable standards and other requirements specified for shower faucets:

1. Backflow Protection Devices for Hand-Held Showers: ASME A112.18.3M.
2. Deck-Mounted Bath/Shower Transfer Valves: ASME 18.7.
3. Faucets: ASME A112.18.1.
4. Hand-Held Showers: ASSE 1014.
5. Hose-Coupling Threads: ASME B1.20.7.
6. Manual-Control Antiscald Faucets: ASTM F 444.
7. Pipe Threads: ASME B1.20.1.

G. Comply with the following applicable standards and other requirements specified for miscellaneous fittings:

1. Brass and Copper Supplies: ASME A112.18.1.
2. Manual-Operation Flushometers: ASSE 1037.

H. Comply with the following applicable standards and other requirements specified for miscellaneous components:

1. Flexible Water Connectors: ASME A112.18.6.
2. Floor Drains: ASME A112.6.3.
3. Grab Bars: ASTM F 446.
4. Hose-Coupling Threads: ASME B1.20.7.
5. Off-Floor Fixture Supports: ASME A112.6.1M.
6. Pipe Threads: ASME B1.20.1.

1.6 WARRANTY

A. Special Warranties: Manufacturer's standard form in which manufacturer agrees to repair or replace components of whirlpools that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:

a. Structural failures of unit shell.
b. Faulty operation of controls, blowers, pumps, heaters, and timers.
c. Deterioration of metals, metal finishes, and other materials beyond normal use.

2. Warranty Period: Three (3) years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 Refer to Architect’s selection from manufacturer’s range of products.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine roughing-in of water supply and sanitary drainage and vent piping systems to verify actual locations of piping connections before plumbing fixture installation.

B. Examine cabinets, counters, floors, and walls for suitable conditions where fixtures will be installed.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Assemble plumbing fixtures, trim, fittings, and other components according to manufacturers' written instructions.

B. Install off-floor supports, affixed to building substrate, for wall-mounting fixtures.

C. Install back-outlet, wall-mounting fixtures onto waste fitting seals and attach to supports.

D. Install floor-mounting fixtures on closet flanges or other attachments to piping or building substrate.

E. Install wall-mounting fixtures with tubular waste piping attached to supports.

F. Install floor-mounting, back-outlet water closets attached to building floor substrate and wall bracket and onto waste fitting seals.

G. Install counter-mounting fixtures in and attached to casework.

H. Install fixtures level and plumb according to roughing-in drawings.

I. Install water-supply piping with stop on each supply to each fixture to be connected to water distribution piping. Attach supplies to supports or substrate within pipe spaces behind fixtures. Install stops in locations where they can be easily reached for operation.

J. Install trap and tubular waste piping on drain outlet of each fixture to be directly connected to sanitary drainage system.

K. Install tubular waste piping on drain outlet of each fixture to be indirectly connected to drainage system.

L. Install flushometer valves for accessible water closets and urinals with handle mounted on wide side of compartment. Install other actuators in locations that are easy for people with disabilities to reach.

M. Install tanks for accessible, tank-type water closets with lever handle mounted on wide side of compartment.

N. Install toilet seats on water closets.

O. Install faucet-spout fittings with specified flow rates and patterns in faucet spouts if faucets are not available with required rates and patterns. Include adapters if required.

P. Install water-supply flow-control fittings with specified flow rates in fixture supplies at stop valves.

Q. Install faucet flow-control fittings with specified flow rates and patterns in faucet spouts if faucets are not available with required rates and patterns. Include adapters if required.

R. Install shower flow-control fittings with specified maximum flow rates in shower arms.

S. Install traps on fixture outlets.

1. Exception: Omit trap on fixtures with integral traps.
2. Exception: Omit trap on indirect wastes, unless otherwise indicated.

T. Install disposer in outlet of each sink indicated to have disposer. Install switch where indicated or in wall adjacent to sink if location is not indicated.

U. Seal joints between fixtures and walls, floors, and countertops using sanitary-type, one-part, mildew-resistant silicone sealant. Match sealant color to fixture color. Sealants are specified in Section "Joint Sealants."

## 3.3 CONNECTIONS

A. Connect fixtures with water supplies, stops, and risers, and with traps, soil, waste, and vent piping. Use size fittings required to match fixtures.

## 3.4 FIELD QUALITY CONTROL

A. Verify that installed plumbing fixtures are categories and types specified for locations where installed.

B. Check that plumbing fixtures are complete with trim, faucets, fittings, and other specified components.

C. Inspect installed plumbing fixtures for damage. Replace damaged fixtures and components.

D. Test installed fixtures after water systems are pressurized for proper operation. Replace malfunctioning fixtures and components, then retest. Repeat procedure until units operate properly.

## 3.5 ADJUSTING

A. Operate and adjust faucets and controls. Replace damaged and malfunctioning fixtures, fittings, and controls.

B. Adjust water pressure at faucets and flushometer valves to produce proper flow and stream.

C. Replace washers and seals of leaking and dripping faucets and stops.

## 3.6 CLEANING

A. Clean fixtures, faucets, and other fittings with manufacturers' recommended cleaning methods and materials. Do the following:

1. Remove faucet spouts and strainers, remove sediment and debris, and reinstall strainers and spouts.
2. Remove sediment and debris from drains.

B. After completing installation of exposed, factory-finished fixtures, faucets, and fittings, inspect exposed finishes and repair damaged finishes.

## 3.7 PROTECTION

A. Provide protective covering for installed fixtures and fittings.

B. Do not allow use of plumbing fixtures for temporary facilities unless approved in writing by Owner.

END OF SECTION 224000

**SECTION 224500**

**EMERGENCY PLUMBING FIXTURES**

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Emergency showers.
2. Eyewash equipment.
3. Eye/face wash equipment.
4. Combination units.
5. Water-tempering equipment.

1.2 ACTION SUBMITTALS

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

B. Shop Drawings: Diagram power, signal, and control wiring.

1.3 INFORMATIONAL SUBMITTALS

A. Field quality-control test reports.

1.4 CLOSEOUT SUBMITTALS

A. Operation and maintenance data.

1.5 QUALITY ASSURANCE

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. ANSI Standard: Comply with ANSI Z358.1, "Emergency Eyewash and Shower Equipment."

C. NSF Standard: Comply with NSF 61, "Drinking Water System Components - Health Effects," for fixture materials that will be in contact with potable water.

D. Regulatory Requirements: Comply with requirements in ICC/ANSI A117.1, "Accessible and Usable Buildings and Facilities"[; Public Law 90-480, "Architectural Barriers Act"; and Public Law 101-336, "Americans with Disabilities Act";] for plumbing fixtures for people with disabilities.

PART 2 - PRODUCTS

2.1 EMERGENCY SHOWERS

A. Freestanding, Plumbed Emergency Showers:

1. Capacity: Not less than 20 gpm (76 L/min.) for at least 15 minutes.
2. Supply Piping: [NPS 1 (DN 25)] [NPS 1-1/4 (DN 32)] [galvanized steel] [chrome-plated brass or stainless steel] [PVC] with flow regulator and stay-open control valve.
3. Control-Valve Actuator: [Pull rod] [Foot treadle] <Insert actuator>.
4. Shower Head: 8-inch- (200-mm-) minimum diameter, [chrome-plated brass, stainless steel, or plastic] <Insert material>.
5. Mounting: Pedestal.

B. Freeze-Protected, Plumbed Emergency Showers:

1. Capacity: Not less than 20 gpm (76 L/min.) for at least 15 minutes.
2. Supply Piping: NPS 1-1/4 (DN 32) galvanized steel with flow regulator and stay-open control valve.
3. Control-Valve Actuator: Pull rod.
4. Shower Head: 8-inch- (200-mm-) minimum diameter, [chrome-plated brass, stainless steel, or plastic] <Insert material>.
5. Heating System: [120] [240]-V ac electric, and insulation with protective jacket.
6. Mounting: Pedestal.

2.2 EYEWASH EQUIPMENT

A. Standard, Freestanding, Plumbed Eyewash Units:

1. Capacity: Not less than 0.4 gpm (1.5 L/min.) for at least 15 minutes.
2. Supply Piping: NPS 1/2 (DN 15) chrome-plated brass or stainless steel with flow regulator and stay-open control valve.
3. Control-Valve Actuator: [Paddle] [Treadle] <Insert actuator>.
4. Spray-Head Assembly: Two receptor-mounted spray heads.
5. Receptor: [Chrome-plated brass or stainless-steel] [Plastic] bowl.
6. Drain Piping: [NPS 1-1/4 (DN 32) minimum, chrome-plated brass, receptor drain, P-trap, waste to wall, and wall flange complying with ASME A112.18.2/CSA B125.2] [Include galvanized-steel indirect connection to drainage system].
7. Mounting: Pedestal.

B. Accessible, Freestanding, Plumbed Eyewash Units, <Insert drawing designation>:

1. Manufacturers: Subject to compliance with requirements, [provide products by one of the following] [available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following]:
2. Basis-of-Design Product: Subject to compliance with requirements, provide [product indicated on Drawings] <Insert manufacturer's name; product name or designation> or comparable product by one of the following:

    a. Acorn Safety; a division of Acorn Engineering Company.
    b. Bradley Corporation.
    c. Encon Safety Products.

d. Guardian Equipment Co.
e. WaterSaver Faucet Co.
f. <Insert manufacturer's name>.

3. Capacity: Not less than 0.4 gpm (1.5 L/min.) for at least 15 minutes.
4. Supply Piping: NPS 1/2 (DN 15) chrome-plated brass or stainless steel with flow regulator and stay-open control valve.
5. Control-Valve Actuator: [Paddle] <Insert actuator>.
6. Spray-Head Assembly: Two receptor-mounted spray heads.
7. Receptor: [Chrome-plated brass or stainless-steel] [Plastic] bowl.
8. Drain Piping: [NPS 1-1/4 (DN 32) minimum, chrome-plated brass, receptor drain, P-trap, waste to wall, and wall flange complying with ASME A112.18.2/CSA B125.2] [Include galvanized-steel indirect connection to drainage system].
9. Mounting: Offset pedestal.
10. Special Construction: Comply with ICC/ANSI A117.1.

## 2.3 EYE/FACE WASH EQUIPMENT

A. Standard, Freestanding, Plumbed, Eye/Face Wash Units:

1. Capacity: Not less than 3.0 gpm (11.4 L/min.) for at least 15 minutes.
2. Supply Piping: NPS 1/2 (DN 15) chrome-plated brass or stainless steel with flow regulator and stay-open control valve.
3. Control-Valve Actuator: [Paddle] [Treadle] <Insert actuator>.
4. Spray-Head Assembly: Two or four receptor-mounted spray heads.
5. Receptor: [Chrome-plated brass or stainless-steel] [Plastic] bowl.
6. Drain Piping: [NPS 1-1/4 (DN 32) minimum, chrome-plated brass, receptor drain, P-trap, waste to wall, and wall flange complying with ASME A112.18.2/CSA B125.2] [Include galvanized-steel indirect connection to drainage system].
7. Mounting: Pedestal.

B. Accessible, Freestanding, Plumbed, Eye/Face Wash Units:

1. Capacity: Not less than 3 gpm (11.4 L/min.) for at least 15 minutes.
2. Supply Piping: NPS 1/2 (DN 15) chrome-plated brass or stainless steel with flow regulator and stay-open control valve.
3. Control-Valve Actuator: [Paddle] <Insert actuator>.
4. Spray-Head Assembly: Two or four receptor-mounted spray heads.
5. Receptor: [Chrome-plated brass or stainless-steel] [Plastic] bowl.
6. Drain Piping: [NPS 1-1/4 (DN 32) minimum, chrome-plated brass, receptor drain, P-trap, waste to wall, and wall flange complying with ASME A112.18.2/CSA B125.2] [Include galvanized-steel indirect connection to drainage system].
7. Mounting: Offset pedestal.
8. Special Construction: Comply with ICC/ANSI A117.1.

## 2.4 COMBINATION UNITS

A. Standard, Plumbed Emergency Shower with Eyewash Combination Units

1. Piping:

a. Material: Galvanized steel,PVC.

b. Unit Supply: [NPS 1-1/4 (DN 32) minimum] [NPS 1-1/2 (DN 40)].
c. Unit Drain: Outlet at back or side near bottom.

2. Shower:

a. Capacity: Not less than 20 gpm (76 L/min.) for at least 15 minutes.
b. Supply Piping: NPS 1 (DN 25) with flow regulator and stay-open control valve.
c. Control-Valve Actuator: [Pull rod] [Treadle] <Insert actuator>.
d. Shower Head: 8-inch- (200-mm-) minimum diameter, [chrome-plated brass or stainless steel] [plastic].
e. Mounting: Pedestal.

3. Eyewash Unit:

a. Capacity: Not less than 0.4 gpm (1.5 L/min.) for at least 15 minutes.
b. Supply Piping: NPS 1/2 (DN 15) with flow regulator and stay-open control valve.
c. Control-Valve Actuator: Paddle.
d. Spray-Head Assembly: Two receptor-mounted spray heads.
e. Receptor: [Chrome-plated brass or stainless-steel] [Plastic] bowl.
f. Mounting: Attached shower pedestal.
g. Drench-Hose Option: May be provided instead of eyewash unit.

1) Capacity: Not less than 0.4 gpm (1.5 L/min.) for at least 15 minutes.
2) Drench Hose: Hand-held spray head with squeeze-handle actuator and hose.
3) Mounting: Bracket on shower pedestal.

B. Accessible, Plumbed Emergency Shower with Eyewash Combination Units:

1. Piping:

a. Material: [Galvanized steel] [Chrome-plated brass or stainless steel] [PVC].
b. Unit Supply: [NPS 1-1/4 (DN 32) minimum] [NPS 1-1/2 (DN 40)].
c. Unit Drain: Outlet at back or side near bottom.

2. Shower:

a. Capacity: Not less than 20 gpm (76 L/min.) for at least 15 minutes.
b. Supply Piping: NPS 1 (DN 25) with flow regulator and stay-open control valve.
c. Control-Valve Actuator: [Pull rod] <Insert actuator>.
d. Shower Head: 8-inch- (200-mm-) minimum diameter, [chrome-plated brass or stainless steel] [plastic].
e. Mounting: Pedestal.

3. Eyewash Unit:

a. Capacity: Not less than 0.4 gpm (1.5 L/min.) for at least 15 minutes.
b. Supply Piping: NPS 1/2 (DN 15) with flow regulator and stay-open control valve.
c. Control-Valve Actuator: Paddle.
d. Spray-Head Assembly: Two receptor-mounted spray heads.
e. Receptor: [Chrome-plated brass or stainless-steel] [Plastic] bowl.
f. Mounting: Attached shower pedestal.
g. Drench-Hose Option: May be provided instead of eyewash unit.

1) Capacity: Not less than 0.4 gpm (1.5 L/min.) for at least 15 minutes.

2) Drench Hose: Hand-held spray head with squeeze-handle actuator and hose.
3) Mounting: Bracket on shower pedestal.

C. Standard, Plumbed Emergency Shower with Eye/Face Wash Combination Units:

1. Piping:

a. Material: [Galvanized steel] [Chrome-plated brass or stainless steel] [PVC].
b. Unit Supply: [NPS 1-1/4 (DN 32) minimum] [NPS 1-1/2 (DN 40)].
c. Unit Drain: Outlet at back or side near bottom.

2. Shower:

a. Capacity: Not less than 20 gpm (76 L/min.) for at least 15 minutes.
b. Supply Piping: NPS 1 (DN 25) with flow regulator and stay-open control valve.
c. Control-Valve Actuator: [Pull rod] [Treadle] <Insert actuator>.
d. Shower Head: 8-inch- (200-mm-) minimum diameter, [chrome-plated brass or stainless steel] [plastic].
e. Mounting: Pedestal.

3. Eye/Face Wash Unit:

a. Capacity: Not less than 3 gpm (11.4 L/min.) for at least 15 minutes.
b. Supply Piping: NPS 1/2 (DN 15) with flow regulator and stay-open control valve.
c. Control-Valve Actuator: Paddle.
d. Spray-Head Assembly: Two or four receptor-mounted spray heads.
e. Receptor: [Chrome-plated brass or stainless-steel] [Plastic] bowl.
f. Mounting: Attached shower pedestal.
g. Drench-Hose Option: May be provided instead of eye/face wash unit.

1) Capacity: Not less than 3 gpm (11.4 L/min.) for at least 15 minutes.
2) Drench Hose: Hand-held spray head with squeeze-handle actuator and hose.
3) Mounting: Bracket on shower pedestal.

D. Accessible, Plumbed Emergency Shower with Eye/Face Wash Combination Units:

1. Piping:

a. Material: [Galvanized steel] [Chrome-plated brass or stainless steel] [PVC].
b. Unit Supply: [NPS 1-1/4 (DN 32) minimum] [NPS 1-1/2 (DN 40)].
c. Unit Drain: Outlet at back or side near bottom.

2. Shower:

a. Capacity: Not less than 20 gpm (76 L/min.) for at least 15 minutes.
b. Supply Piping: NPS 1 (DN 25) with flow regulator and stay-open control valve.
c. Control-Valve Actuator: [Pull rod] <Insert actuator>.
d. Shower Head: 8-inch- (200-mm-) minimum diameter, [chrome-plated brass or stainless steel] [plastic].
e. Mounting: Pedestal.

3. Eye/Face Wash Unit:

a. Capacity: Not less than 3 gpm (11.4 L/min.) for at least 15 minutes.

b. Supply Piping: NPS 1/2 (DN 15) with flow regulator and stay-open control valve.
c. Control-Valve Actuator: Paddle.
d. Spray-Head Assembly: Two or four receptor-mounted spray heads.
e. Receptor: [Chrome-plated brass or stainless-steel] [Plastic] bowl.
f. Mounting: Attached to shower pedestal.
g. Drench-Hose Option: May be provided instead of eye/face wash unit.

1) Capacity: Not less than 3 gpm (11.4 L/min.) for at least 15 minutes.
2) Drench Hose: Hand-held spray head with squeeze-handle actuator and hose.
3) Mounting: Bracket on shower pedestal.

E. Freeze-Protected, Plumbed Emergency Shower with Eyewash Combination Units:

1. Piping: Galvanized steel.

a. Unit Supply: [NPS 1-1/4 (DN 32) minimum] [NPS 1-1/2 (DN 40)] from bottom.

2. Heating System: Electric, [120] [240]-V ac; and insulation with protective jacket and thermometer.

a. Heating Capacity: [10 deg F (6 deg C)] <Insert temperature> minimum above ambient temperature.
b. Design Ambient Temperature: <Insert temperature>.

3. Shower:

a. Shower Capacity: Not less than 20 gpm (76 L/min.) for at least 15 minutes.
b. Supply Piping: NPS 1 (DN 25) with flow regulator and stay-open control valve.
c. Control-Valve Actuator: [Pull rod] <Insert actuator>.
d. Shower Head: 8-inch- (200-mm-) minimum diameter, [chrome-plated brass or stainless steel] [plastic].
e. Mounting: Pedestal.

4. Eyewash Unit:

a. Capacity: Not less than 0.4 gpm (1.5 L/min.) for at least 15 minutes.
b. Supply Piping: NPS 1/2 (DN 15) with flow regulator and stay-open control valve.
c. Control-Valve Actuator: [Paddle] <Insert actuator>.

5. Eye/Face Wash Unit:

a. Capacity: Not less than 3 gpm (11.4 L/min.) for at least 15 minutes.
b. Control-Valve Actuator: [Paddle] <Insert actuator>.

6. Appurtenances:

a. <Insert appurtenances>.

## 2.5 WATER-TEMPERING EQUIPMENT

A. Hot- and Cold-Water, Water-Tempering Equipment:

1. Description: Factory-fabricated equipment with thermostatic mixing valve.

a. Thermostatic Mixing Valve: Designed to provide [85 deg F (29 deg C)] <Insert temperature> tepid, potable water at emergency plumbing fixtures, to maintain temperature at plus or minus [5 deg F (3 deg C)] <Insert temperature> throughout required 15-minute test period, and in case of unit failure to continue cold-water flow, with union connections, controls, metal piping, and corrosion-resistant enclosure.
b. Supply Connections: For hot and cold water.

2.6 SOURCE QUALITY CONTROL

A. Certify performance of emergency plumbing fixtures by independent testing organization acceptable to authorities having jurisdiction.

1. Exception: <Insert manufacturer's name>.

PART 3 - EXECUTION

3.1 EMERGENCY PLUMBING FIXTURE INSTALLATION

A. Assemble emergency plumbing fixture piping, fittings, control valves, and other components.

B. Install fixtures level and plumb.

C. Fasten fixtures to substrate.

D. Install shutoff valves in water-supply piping to fixtures. Use ball, gate, or globe valve if specific type valve is not indicated. Install valves chained or locked in open position if permitted. Install valves in locations where they can easily be reached for operation. Comply with requirements for valves specified in Division 22 Section "General-Duty Valves for Plumbing Piping."

1. Exception: Omit shutoff valve on supply to group of plumbing fixtures that includes emergency equipment.
2. Exception: Omit shutoff valve on supply to emergency equipment if prohibited by authorities having jurisdiction.

E. Install shutoff valve and strainer in steam piping and shutoff valve in condensate return piping. Comply with requirements for steam and condensate piping specified in Division 23 Section "Steam and Condensate Heating Piping."

F. Install dielectric fitting in supply piping to emergency equipment if piping and equipment connections are made of different metals. Comply with requirements for dielectric fittings specified in Division 22 Section "Domestic Water Piping."

G. Install thermometers in supply and outlet piping connections to water-tempering equipment. Comply with requirements for thermometers specified in Division 22 Section "Meters and Gages for Plumbing Piping."

H. Install trap and waste piping on drain outlet of emergency equipment receptors that are indicated to be directly connected to drainage system. Comply with requirements for waste piping specified in Division 22 Section "Sanitary Waste and Vent Piping."

I. Install indirect waste piping on drain outlet of emergency equipment receptors that are indicated to be indirectly connected to drainage system. Comply with requirements for waste piping specified in Division 22 Section "Sanitary Waste and Vent Piping."

J. Install escutcheons on piping wall and ceiling penetrations in exposed, finished locations. Comply with requirements for escutcheons specified in Division 22 Section "Escutcheons for Plumbing Piping."

K. Fill self-contained fixtures with flushing fluid.

## 3.2 CONNECTIONS

A. Connect cold-water-supply piping to plumbed emergency plumbing fixtures not having water-tempering equipment. Comply with requirements for cold-water piping specified in Division 22 Section "Domestic Water Piping."

B. Connect hot- and cold-water-supply piping to hot- and cold-water, water-tempering equipment. Connect output from water-tempering equipment to emergency plumbing fixtures. Comply with requirements for hot- and cold-water piping specified in Division 22 Section "Domestic Water Piping."

C. Connect steam and cold-water-supply and condensate return piping to steam and cold water-tempering equipment. Connect output from water-tempering equipment to emergency plumbing fixtures. Comply with requirements for cold-water piping specified in Division 22 Section "Domestic Water Piping" and comply with requirements for steam and condensate piping specified in Division 23 Section "Steam and Condensate Heating Piping."

D. Connect cold water and electrical power to electric heating water-tempering equipment. Comply with requirements for cold-water piping specified in Division 22 Section "Domestic Water Piping."

E. Directly connect emergency plumbing fixture receptors with trapped drain outlet to sanitary waste and vent piping. Comply with requirements for waste piping specified in Division 22 Section "Sanitary Waste and Vent Piping."

F. Indirectly connect emergency plumbing fixture receptors without trapped drain outlet to sanitary waste or storm drainage piping.

G. Where installing piping adjacent to emergency plumbing fixtures, allow space for service and maintenance of fixtures.

## 3.3 IDENTIFICATION

A. Install equipment nameplates or equipment markers on emergency plumbing fixtures and equipment and equipment signs on water-tempering equipment. Comply with requirements for identification materials specified in Division 22 Section "Identification for Plumbing Piping and Equipment."

## 3.4 FIELD QUALITY CONTROL

A. Mechanical-Component Testing: After plumbing connections have been made, test for compliance with requirements. Verify ability to achieve indicated capacities.

B. Tests and Inspections:

1. Perform each visual and mechanical inspection.

2. Leak Test: After installation, charge system and test for leaks. Repair leaks and retest until no leaks exist.
3. Operational Test: After electrical circuitry has been energized, start units to confirm proper unit operation.
4. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

C. Emergency plumbing fixtures[ and water-tempering equipment] will be considered defective if they do not pass tests and inspections.

D. Prepare test and inspection reports.

3.5 ADJUSTING

A. Adjust or replace fixture flow regulators for proper flow.

B. Adjust equipment temperature settings.

END OF SECTION 224500

**SECTION 265100**

**INTERIOR LIGHTING**

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. Interior lighting fixtures, lamps, and ballasts.
2. Emergency lighting units.
3. Exit signs.
4. Lighting fixture supports.

1.3 DEFINITIONS

A. BF: Ballast factor.

B. CCT: Correlated color temperature.

C. CRI: Color-rendering index.

D. LER: Luminaire efficacy rating.

E. Lumen: Measured output of lamp and luminaire, or both.

F. Luminaire: Complete lighting fixture, including ballast housing if provided.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of lighting fixture, arranged in order of fixture designation. Include data on features, accessories, finishes, and the following:

1. Physical description of lighting fixture including dimensions.
2. Emergency lighting units including battery and charger.
3. Ballast, including BF.
4. Energy-efficiency data.
5. Life, output (lumens, CCT, and CRI), and energy-efficiency data for lamps.
6. Photometric data and adjustment factors based on laboratory tests

a. Testing Agency Certified Data: For indicated fixtures, photometric data shall be certified by a qualified independent testing agency. Photometric data for remaining fixtures shall be certified by manufacturer.

B. Shop Drawings: For nonstandard or custom lighting fixtures. Include plans, elevations, sections, details, and attachments to other work.

1. Detail equipment assemblies and indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
2. Wiring Diagrams: For power, signal, and control wiring.

C. Samples: For each lighting fixture indicated in the Interior Lighting Fixture Schedule. Each Sample shall include the following:

1. Lamps and ballasts, installed.
2. Cords and plugs.
3. Pendant support system.

D. Installation instructions.

## 1.5 INFORMATIONAL SUBMITTALS

A. Coordination Drawings: Reflected ceiling plan(s) and other details, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of the items involved:

1. Lighting fixtures.
2. Suspended ceiling components.
3. Partitions and millwork that penetrate the ceiling or extends to within 12 inches (305 mm) of the plane of the luminaires.
4. Ceiling-mounted projectors.
5. Structural members to which suspension systems for lighting fixtures will be attached.
6. Other items in finished ceiling including the following:

    a. Air outlets and inlets.
    b. Speakers.
    c. Sprinklers.
    d. Smoke and fire detectors.
    e. Occupancy sensors.
    f. Access panels.

7. Perimeter moldings.

B. Qualification Data: For qualified agencies providing photometric data for lighting fixtures.

C. Product Certificates: For each type of ballast for bi-level and dimmer-controlled fixtures, from manufacturer.

D. Field quality-control reports.

E. Warranty: Sample of special warranty.

## 1.6 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For lighting equipment and fixtures to include in emergency, operation, and maintenance manuals.

1. Provide a list of all lamp types used on Project; use ANSI and manufacturers' codes.

1.7 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Lamps: 10 for every 500 of each type and rating installed. Furnish at least one of each type.
2. Plastic Diffusers and Lenses: One for every 100 of each type and rating installed. Furnish at least one of each type.
3. Fluorescent-fixture-mounted, emergency battery pack: One for every 50 emergency lighting unit.
4. Ballasts: One for every 100 of each type and rating installed. Furnish at least one of each type.
5. Globes and Guards: One for every 20 of each type and rating installed. Furnish at least one of each type.

1.8 QUALITY ASSURANCE

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. Comply with NFPA 70.

C. FM Global Compliance: Lighting fixtures for hazardous locations shall be listed and labeled for indicated class and division of hazard by FM Global.

D. Mockups: Provide interior lighting fixtures for room or module mockups, complete with power and control connections.

1. Obtain Architect's approval of fixtures for mockups before starting installations.
2. Maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work.
3. Approved fixtures in mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.9 COORDINATION

A. Coordinate layout and installation of lighting fixtures and suspension system with other construction that penetrates ceilings or is supported by them, including HVAC equipment, fire-suppression system, and partition assemblies.

1.10 WARRANTY

A. Special Warranty for Emergency Lighting Batteries: Manufacturer's standard form in which manufacturer of battery-powered emergency lighting unit agrees to repair or replace components of rechargeable batteries that fail in materials or workmanship within specified warranty period.

1. Warranty Period for Emergency Lighting Unit Batteries: 10 years from date of Substantial Completion. Full warranty shall apply for first year, and prorated warranty for the remaining nine years.

2. Warranty Period Self-Powered Exit Sign Batteries: Seven years from date of Substantial Completion. Full warranty shall apply for first year, and prorated warranty for the remaining six years.

PART 2 - PRODUCTS

2.1 GENERAL REQUIREMENTS FOR LIGHTING FIXTURES AND COMPONENTS

A. Recessed Fixtures: Comply with NEMA LE 4 for ceiling compatibility for recessed fixtures.

B. Incandescent Fixtures: Comply with UL 1598. Where LER is specified, test according to NEMA LE 5A.

C. Fluorescent Fixtures: Comply with UL 1598. Where LER is specified, test according to NEMA LE 5 and NEMA LE 5A as applicable.

D. HID Fixtures: Comply with UL 1598. Where LER is specified, test according to NEMA LE 5B.

E. Metal Parts: Free of burrs and sharp corners and edges.

F. Sheet Metal Components: Steel unless otherwise indicated. Form and support to prevent warping and sagging.

G. Doors, Frames, and Other Internal Access: Smooth operating, free of light leakage under operating conditions, and designed to permit relamping without use of tools. Designed to prevent doors, frames, lenses, diffusers, and other components from falling accidentally during relamping and when secured in operating position.

H. Diffusers and Globes:

1. Acrylic Lighting Diffusers: 100 percent virgin acrylic plastic. High resistance to yellowing and other changes due to aging, exposure to heat, and UV radiation.

a. Lens Thickness: At least 0.125 inch (3.175 mm) minimum unless otherwise indicated.
b. UV stabilized.

2. Glass: Annealed crystal glass unless otherwise indicated.

I. Factory-Applied Labels: Comply with UL 1598. Include recommended lamps and ballasts. Labels shall be located where they will be readily visible to service personnel, but not seen from normal viewing angles when lamps are in place.

1. Label shall include the following lamp and ballast characteristics:

a. "USE ONLY" and include specific lamp type.
b. Lamp diameter code (T-4, T-5, T-8, T-12, etc.), tube configuration (twin, quad, triple, etc.), base type, and nominal wattage for fluorescent and compact fluorescent luminaires.
c. Lamp type, wattage, bulb type (ED17, BD56, etc.) and coating (clear or coated) for HID luminaires.
d. Start type (preheat, rapid start, instant start, etc.) for fluorescent and compact fluorescent luminaires.
e. ANSI ballast type (M98, M57, etc.) for HID luminaires.
f. CCT and CRI for all luminaires.

J. Electromagnetic-Interference Filters: Factory installed to suppress conducted electromagnetic interference as required by MIL-STD-461E. Fabricate lighting fixtures with one filter on each ballast indicated to require a filter.

K. Air-Handling Fluorescent Fixtures: For use with plenum ceiling for air return and heat extraction and for attaching an air-diffuser-boot assembly specified in Section 233713 "Diffusers, Registers, and Grilles."

1. Air-Supply Units: Slots in one or both side trims join with air-diffuser-boot assemblies.
2. Heat-Removal Units: Air path leads through lamp cavity.
3. Combination Heat-Removal and Air-Supply Unit: Heat is removed through lamp cavity at both ends of the fixture door with air supply same as for air-supply units.
4. Dampers: Operable from outside fixture for control of return-air volume.
5. Static Fixture: Air-supply slots are blanked off, and fixture appearance matches active units.

## 2.2 BALLASTS FOR LINEAR FLUORESCENT LAMPS

A. General Requirements for Electronic Ballasts:

1. Comply with UL 935 and with ANSI C82.11.
2. Designed for type and quantity of lamps served.
3. Ballasts shall be designed for full light output unless another BF, dimmer, or bi-level control is indicated.
4. Sound Rating: Class A.
5. Total Harmonic Distortion Rating: Less than 20 percent.
6. Transient Voltage Protection: IEEE C62.41.1 and IEEE C62.41.2, Category A or better.
7. Operating Frequency: 42 kHz or higher.
8. Lamp Current Crest Factor: 1.7 or less.
9. BF: 0.88 or higher.
10. Power Factor: 0.95 or higher.
11. Parallel Lamp Circuits: Multiple lamp ballasts shall comply with ANSI C82.11 and shall be connected to maintain full light output on surviving lamps if one or more lamps fail.

B. luminaires controlled by occupancy sensors shall have programmed-start ballasts.

C. Electronic Programmed-Start Ballasts for Lamps: Comply with ANSI C82.11 and the following:

1. Lamp end-of-life detection and shutdown circuit for T5 diameter lamps.
2. Automatic lamp starting after lamp replacement.

D. Electromagnetic Ballasts: Comply with ANSI C82.1; energy saving, high-power factor, Class P, and having automatic-reset thermal protection.

1. Ballast Manufacturer Certification: Indicated by label.

E. Single Ballasts for Multiple Lighting Fixtures: Factory wired with ballast arrangements and bundled extension wiring to suit final installation conditions without modification or rewiring in the field.

F. Ballasts for Low-Temperature Environments:

1. Temperatures 0 Deg F (Minus 17 Deg C) and Higher: Electronic or electromagnetic type rated for 0 deg F (minus 17 deg C) starting and operating temperature with indicated lamp types.

2. Temperatures Minus 20 Deg F (Minus 29 Deg C) and Higher: Electromagnetic type designed for use with indicated lamp types.

G. Ballasts for Residential Applications: Fixtures designated as "Residential" may use low-power-factor electronic ballasts having a Class B sound rating and total harmonic distortion of approximately 30 percent.

H. Ballasts for Low Electromagnetic-Interference Environments: Comply with 47 CFR 18, Ch. 1, Subpart C, for limitations on electromagnetic and radio-frequency interference for consumer equipment.

I. Ballasts for Dimmer-Controlled Lighting Fixtures: Electronic type.

1. Dimming Range: 100 to 5 percent of rated lamp lumens.
2. Ballast Input Watts: Can be reduced to 20 percent of normal.
3. Compatibility: Certified by manufacturer for use with specific dimming control system and lamp type indicated.
4. Control: Coordinate wiring from ballast to control device to ensure that the ballast, controller, and connecting wiring are compatible.

J. Ballasts for Bi-Level Controlled Lighting Fixtures: Electronic type.

1. Operating Modes: Ballast circuit and leads provide for remote control of the light output of the associated lamp between high- and low-level and off.

a. High-Level Operation: 100 percent of rated lamp lumens.
b. Low-Level Operation: 30 percent of rated lamp lumens.

2. Ballast shall provide equal current to each lamp in each operating mode.
3. Compatibility: Certified by manufacturer for use with specific bi-level control system and lamp type indicated.

K. Ballasts for Tri-Level Controlled Lighting Fixtures: Electronic type.

1. Operating Modes: Ballast circuit and leads provide for remote control of the light output of the associated lamp between high- and low-level and off.

a. High-Level Operation: 100 percent of rated lamp lumens.
b. Low-Level Operation: 30 and 50 percent of rated lamp lumens.

2. Ballast shall provide equal current to each lamp in each operating mode.
3. Compatibility: Certified by manufacturer for use with specific tri-level control system and lamp type indicated.

## 2.3 BALLASTS FOR COMPACT FLUORESCENT LAMPS

A. Description: Electronic-programmed rapid-start type, complying with UL 935 and with ANSI C 82.11, designed for type and quantity of lamps indicated. Ballast shall be designed for full light output unless dimmer or bi-level control is indicated:

1. Lamp end-of-life detection and shutdown circuit.
2. Automatic lamp starting after lamp replacement.
3. Sound Rating: Class A.

4. Total Harmonic Distortion Rating: Less than 20 percent.
5. Transient Voltage Protection: IEEE C62.41.1 and IEEE C62.41.2, Category A or better.
6. Operating Frequency: 20 kHz or higher.
7. Lamp Current Crest Factor: 1.7 or less.
8. BF: 0.95 or higher unless otherwise indicated.
9. Power Factor: 0.95 or higher.
10. Interference: Comply with 47 CFR 18, Ch. 1, Subpart C, for limitations on electromagnetic and radio-frequency interference for nonconsumer equipment.

## 2.4 EMERGENCY FLUORESCENT POWER UNIT

A. Internal Type: Self-contained, modular, battery-inverter unit, factory mounted within lighting fixture body and compatible with ballast. Comply with UL 924.

1. Emergency Connection: Operate one fluorescent lamp(s) continuously at an output of 1100 lumens each. Connect unswitched circuit to battery-inverter unit and switched circuit to fixture ballast.
2. Nightlight Connection: Operate one fluorescent lamp continuously.
3. Test Push Button and Indicator Light: Visible and accessible without opening fixture or entering ceiling space.

    a. Push Button: Push-to-test type, in unit housing, simulates loss of normal power and demonstrates unit operability.
    b. Indicator Light: LED indicates normal power on. Normal glow indicates trickle charge; bright glow indicates charging at end of discharge cycle.

4. Battery: Sealed, maintenance-free, nickel-cadmium type.
5. Charger: Fully automatic, solid-state, constant-current type with sealed power transfer relay.
6. Remote Test: Switch in hand-held remote device aimed in direction of tested unit initiates coded infrared signal. Signal reception by factory-installed infrared receiver in tested unit triggers simulation of loss of its normal power supply, providing visual confirmation of either proper or failed emergency response.
7. Integral Self-Test: Factory-installed electronic device automatically initiates code-required test of unit emergency operation at required intervals. Test failure is annunciated by an integral audible alarm and a flashing red LED.

B. External Type: Self-contained, modular, battery-inverter unit, suitable for powering one or more fluorescent lamps, remote mounted from lighting fixture. Comply with UL 924.

1. Emergency Connection: Operate one fluorescent lamp continuously. Connect unswitched circuit to battery-inverter unit and switched circuit to fixture ballast.
2. Nightlight Connection: Operate one fluorescent lamp in a remote fixture continuously.
3. Battery: Sealed, maintenance-free, nickel-cadmium type.
4. Charger: Fully automatic, solid-state, constant-current type.
5. Housing: NEMA 250, Type 1 enclosure.
6. Test Push Button: Push-to-test type, in unit housing, simulates loss of normal power and demonstrates unit operability.
7. LED Indicator Light: Indicates normal power on. Normal glow indicates trickle charge; bright glow indicates charging at end of discharge cycle.
8. Remote Test: Switch in hand-held remote device aimed in direction of tested unit initiates coded infrared signal. Signal reception by factory-installed infrared receiver in tested unit triggers simulation of loss of its normal power supply, providing visual confirmation of either proper or failed emergency response.

9. Integral Self-Test: Factory-installed electronic device automatically initiates code-required test of unit emergency operation at required intervals. Test failure is annunciated by an integral audible alarm and a flashing red LED.

2.5 EXIT SIGNS

A. General Requirements for Exit Signs: Comply with UL 924; for sign colors, visibility, luminance, and lettering size, comply with authorities having jurisdiction.

B. Internally Lighted Signs:

1. Lamps for AC Operation: Fluorescent, two for each fixture, 20,000 hours of rated lamp life.
2. Lamps for AC Operation: LEDs, 50,000 hours minimum rated lamp life.
3. Self-Powered Exit Signs (Battery Type): Integral automatic charger in a self-contained power pack.

    a. Battery: Sealed, maintenance-free, nickel-cadmium type.
    b. Charger: Fully automatic, solid-state type with sealed transfer relay.
    c. Operation: Relay automatically energizes lamp from battery when circuit voltage drops to 80 percent of nominal voltage or below. When normal voltage is restored, relay disconnects lamps from battery, and battery is automatically recharged and floated on charger.
    d. Test Push Button: Push-to-test type, in unit housing, simulates loss of normal power and demonstrates unit operability.
    e. LED Indicator Light: Indicates normal power on. Normal glow indicates trickle charge; bright glow indicates charging at end of discharge cycle.
    f. Remote Test: Switch in hand-held remote device aimed in direction of tested unit initiates coded infrared signal. Signal reception by factory-installed infrared receiver in tested unit triggers simulation of loss of its normal power supply, providing visual confirmation of either proper or failed emergency response.
    g. Integral Self-Test: Factory-installed electronic device automatically initiates code-required test of unit emergency operation at required intervals. Test failure is annunciated by an integral audible alarm and a flashing red LED.

4. Master/Remote Sign Configurations:

    a. Master Unit: Comply with requirements above for self-powered exit signs, and provide additional capacity in LED power supply for power connection to remote unit.
    b. Remote Unit: Comply with requirements above for self-powered exit signs, except omit power supply, battery, and test features. Arrange to receive full power requirements from master unit. Connect for testing concurrently with master unit as a unified system.

C. Self-Luminous Signs: Powered by tritium gas, with universal bracket for flush-ceiling, wall, or end mounting. Signs shall be guaranteed by manufacturer to maintain the minimum brightness requirements in UL 924 for 10 years.

D. Self-Luminous Signs: Using strontium oxide aluminate compound to store ambient light and release the stored energy when the light is removed. Provide with universal bracket for flush-ceiling, wall, or end mounting.

## 2.6 EMERGENCY LIGHTING UNITS

A. General Requirements for Emergency Lighting Units: Self-contained units complying with UL 924.

1. Battery: Sealed, maintenance-free, lead-acid type.
2. Charger: Fully automatic, solid-state type with sealed transfer relay.
3. Operation: Relay automatically turns lamp on when power-supply circuit voltage drops to 80 percent of nominal voltage or below. Lamp automatically disconnects from battery when voltage approaches deep-discharge level. When normal voltage is restored, relay disconnects lamps from battery, and battery is automatically recharged and floated on charger.
4. Test Push Button: Push-to-test type, in unit housing, simulates loss of normal power and demonstrates unit operability.
5. LED Indicator Light: Indicates normal power on. Normal glow indicates trickle charge; bright glow indicates charging at end of discharge cycle.
6. Wire Guard: Heavy-chrome-plated wire guard protects lamp heads or fixtures.
7. Integral Time-Delay Relay: Holds unit on for fixed interval of 15 minutes when power is restored after an outage.
8. Remote Test: Switch in hand-held remote device aimed in direction of tested unit initiates coded infrared signal. Signal reception by factory-installed infrared receiver in tested unit triggers simulation of loss of its normal power supply, providing visual confirmation of either proper or failed emergency response.
9. Integral Self-Test: Factory-installed electronic device automatically initiates code-required test of unit emergency operation at required intervals. Test failure is annunciated by an integral audible alarm and a flashing red LED.

## 2.7 LIGHTING FIXTURE SUPPORT COMPONENTS

A. Single-Stem Hangers: 1/2-inch (13-mm) steel tubing with swivel ball fittings and ceiling canopy. Finish same as fixture.

B. Twin-Stem Hangers: Two, 1/2-inch (13-mm) steel tubes with single canopy designed to mount a single fixture. Finish same as fixture.

C. Wires: ASTM A 641/A 641M, Class 3, soft temper, zinc-coated steel, 12 gage (2.68 mm).

D. Wires for Humid Spaces: ASTM A 580/A 580M, Composition 302 or 304, annealed stainless steel, 12 gage (2.68 mm) .

E. Rod Hangers: 3/16-inch (5-mm) minimum diameter, cadmium-plated, threaded steel rod.

F. Hook Hangers: Integrated assembly matched to fixture and line voltage and equipped with threaded attachment, cord, and locking-type plug.

## 2.8 RETROFIT KITS FOR FLUORESCENT LIGHTING FIXTURES

A. Reflector Kit: UL 1598, Type I. Suitable for two- to four-lamp, surface-mounted or recessed lighting fixtures by improving reflectivity of fixture surfaces.

B. Ballast and Lamp Change Kit: UL 1598, Type II. Suitable for changing existing ballast, lamps, and sockets.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Lighting fixtures:

1. Set level, plumb, and square with ceilings and walls unless otherwise indicated.
2. Install lamps in each luminaire.

B. Temporary Lighting: If it is necessary, and approved by Architect, to use permanent luminaires for temporary lighting, install and energize the minimum number of luminaires necessary. When construction is sufficiently complete, remove the temporary luminaires, disassemble, clean thoroughly, install new lamps, and reinstall.

C. Remote Mounting of Ballasts: Distance between the ballast and fixture shall not exceed that recommended by ballast manufacturer. Verify, with ballast manufacturers, maximum distance between ballast and luminaire.

D. Lay-in Ceiling Lighting Fixtures Supports: Use grid as a support element.

1. Install ceiling support system rods or wires, independent of the ceiling suspension devices, for each fixture. Locate not more than 6 inches (150 mm) from lighting fixture corners.
2. Support Clips: Fasten to lighting fixtures and to ceiling grid members at or near each fixture corner with clips that are UL listed for the application.
3. Fixtures of Sizes Less Than Ceiling Grid: Install as indicated on reflected ceiling plans or center in acoustical panel, and support fixtures independently with at least two 3/4-inch (20-mm) metal channels spanning and secured to ceiling tees.
4. Install at least one independent support rod or wire from structure to a tab on lighting fixture. Wire or rod shall have breaking strength of the weight of fixture at a safety factor of 3.

E. Suspended Lighting Fixture Support:

1. Pendants and Rods: Where longer than 48 inches (1200 mm), brace to limit swinging.
2. Stem-Mounted, Single-Unit Fixtures: Suspend with twin-stem hangers.
3. Continuous Rows: Use tubing or stem for wiring at one point and tubing or rod for suspension for each unit length of fixture chassis, including one at each end.
4. Do not use grid as support for pendant luminaires. Connect support wires or rods to building structure.

F. Air-Handling Lighting Fixtures: Install with dampers closed and ready for adjustment.

G. Connect wiring according to Section 260519 "Low-Voltage Electrical Power Conductors and Cables."

3.2 IDENTIFICATION

A. Install labels with panel and circuit numbers on concealed junction and outlet boxes. Comply with requirements for identification specified in Section 260553 "Identification for Electrical Systems."

3.3 FIELD QUALITY CONTROL

A. Test for Emergency Lighting: Interrupt power supply to demonstrate proper operation. Verify transfer from normal power to battery and retransfer to normal.

B. Verify that self-luminous exit signs are installed according to their listing and the requirements in NFPA 101.

C. Prepare a written report of tests, inspections, observations, and verifications indicating and interpreting results. If adjustments are made to lighting system, retest to demonstrate compliance with standards.

## 3.4 STARTUP SERVICE

A. Burn-in all lamps that require specific aging period to operate properly, prior to occupancy by Owner. Burn-in fluorescent and compact fluorescent lamps intended to be dimmed, for at least 100 hours at full voltage.

## 3.5 ADJUSTING

A. Occupancy Adjustments: When requested within 12 Insert number months of date of Substantial Completion, provide on-site assistance in adjusting aimable luminaires to suit actual occupied conditions. Provide up to [two] <Insert number> visits to Project during other-than-normal occupancy hours for this purpose. Some of this work may be required after dark.

1. Adjust aimable luminaires in the presence of Architect.

END OF SECTION 265100

**SECTION 313116**

**TERMITE CONTROL**

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. Soil and wood treatment with termiticide.
2. Bait-station system.
3. Metal mesh barrier system.
4. Polymer sheet barrier system with termiticide.
5. Polymer barrier fittings with termiticide for installation around utility penetrations.

1.3 UNIT PRICES

A. Work of this Section is affected by unit price for additional polymer barrier fittings with termiticide at utility penetration(s).

1.4 ACTION SUBMITTALS

A. Product Data: For each type of termite control product.

1. Include the EPA-Registered Label for termiticide products.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For qualified Installer.

B. Product Certificates: For termite control products, from manufacturer.

C. Soil Treatment Application Report: After application of termiticide is completed, submit report for Owner's records and include the following:

1. Date and time of application.
2. Moisture content of soil before application.
3. Termiticide brand name and manufacturer.
4. Quantity of undiluted termiticide used.
5. Dilutions, methods, volumes used, and rates of application.
6. Areas of application.
7. Water source for application.

D. Wood Treatment Application Report: After application of termiticide is completed, submit report for Owner's records and include the following:

1. Date and time of application.
2. Termiticide brand name and manufacturer.
3. Quantity of undiluted termiticide used.
4. Dilutions, methods, volumes used, and rates of application.
5. Areas of application.

E. Bait-Station System Application Report: After installation of bait-station system is completed, submit report for Owner's records and include the following:

1. Location of areas and sites conducive to termite feeding and activity.
2. Plan drawing showing number and locations of bait stations.
3. Dated report for each monitoring and inspection occurrence indicating level of termite activity, procedure, and treatment applied before time of Substantial Completion.
4. Termiticide brand name and manufacturer.
5. Quantities of termiticide and nontoxic termite bait used.
6. Schedule of inspections for one year from date of Substantial Completion.

F. Polymer Sheet Barrier System with Termiticide Application Report: After installation of polymer sheet barrier system with termiticide is completed, submit report for Owner's records and include the following:

1. Plan drawing showing extent of sheet barrier and number and locations of each type of polymer barrier fitting.
2. Termiticide brand name and manufacturer.
3. Schedule of inspections for one year from date of Substantial Completion.

G. Polymer Barrier Fittings with Termiticide Application Report: After installation of polymer barrier fittings with termiticide is completed, submit report for Owner's records and include the following:

1. Plan drawing showing number and locations of each type of polymer barrier fitting with termiticide.
2. Termiticide brand name and manufacturer.
3. Schedule of inspections for one year from date of Substantial Completion.

H. Warranties: Sample of special warranties.

## 1.6 QUALITY ASSURANCE

A. Installer Qualifications: A specialist who is licensed according to regulations of authorities having jurisdiction to apply termite control treatment and products in jurisdiction where Project is located, and who employs workers trained and approved by manufacturer to install manufacturer's products , and who is accredited by manufacturer.

B. Regulatory Requirements: Formulate and apply termiticides and termiticide devices according to the EPA-Registered Label.

C. Source Limitations: Obtain termite control products from single source from single manufacturer.

D. Preinstallation Conference: Conduct conference at Project site.

1.7 PROJECT CONDITIONS

A. Environmental Limitations: To ensure penetration, do not treat soil that is water saturated or frozen. Do not treat soil while precipitation is occurring. Comply with requirements of the EPA-Registered Label and requirements of authorities having jurisdiction.

B. Coordinate soil treatment application with excavating, filling, grading, and concreting operations. Treat soil under footings, grade beams, and ground-supported slabs before construction.

C. Apply wood treatment after framing, sheathing, and exterior weather protection is completed but before electrical and mechanical systems are installed.

D. Install bait-station system during construction to determine areas of termite activity and after construction, including landscaping, is completed.

E. Install polymer sheet barrier system with termiticide prior to placing concrete slab reinforcement and pouring concrete and after installation and inspection of footings, foundations, and plumbing and electrical pipes and conduits.

F. Install polymer barrier fittings with termiticide around utility penetrations prior to pouring concrete and after installation and inspection of plumbing and electrical pipes and conduits, slab vapor barrier, and concrete slab reinforcement.

1.8 WARRANTY

A. Soil Treatment Special Warranty: Manufacturer's standard form, signed by Applicator and Contractor, certifying that termite control work, consisting of applied soil termiticide treatment, will prevent infestation of subterranean termites. If subterranean termite activity or damage is discovered during warranty period, re-treat soil and repair or replace damage caused by termite infestation.

1. Warranty Period: Three years from date of Substantial Completion.

B. Wood Treatment Special Warranty: Manufacturer's standard form, signed by Applicator and Contractor, certifying that termite control work, consisting of applied wood termiticide treatment, will prevent infestation of subterranean termites. If subterranean termite damage is discovered during warranty period, repair or replace damage caused by termite infestation and treat replacement wood.

1. Warranty Period: 12 years from date of Substantial Completion.

C. Polymer Sheet Barrier System with Termiticide Special Warranty: Manufacturer's standard form, signed by Applicator and Contractor, certifying that termite control work, consisting of installation of polymer sheet barrier system with termiticide, will prevent infestation of subterranean termites. If subterranean termite activity or damage is discovered during warranty period, re-treat and repair or replace damage caused by termite infestation.

1. Warranty Period: 10 years from date of Substantial Completion.

D. Polymer Barrier Fittings with Termiticide Special Warranty: Manufacturer's standard form, signed by Applicator and Contractor, certifying that termite control work, consisting of installation of polymer barrier fittings with termiticide, will prevent infestation of subterranean termites. If subterranean termite activity or damage is discovered during warranty period, re-treat and repair or replace damage caused by termite infestation.

1. Warranty Period: Five years from date of Substantial Completion.

1.9 MAINTENANCE SERVICE

A. Continuing Service: Beginning at Substantial Completion, provide 12 months' continuing service including monitoring, inspection, and re-treatment for occurrences of termite activity. Provide a standard continuing service agreement. State services, obligations, conditions, terms for agreement period, and terms for future renewal options.

PART 2 - PRODUCTS

2.1 SOIL TREATMENT

A. Termiticide: Provide an EPA-Registered termiticide, complying with requirements of authorities having jurisdiction, in an aqueous solution formulated to prevent termite infestation. Provide quantity required for application at the label volume and rate for the maximum termiticide concentration allowed for each specific use, according to product's EPA-Registered Label.

1. Provide Anti Termite Reticulation System

2.2 BAIT-STATION SYSTEM

A. Provide bait stations based on the dimensions of building perimeter indicated on Drawings, according to manufacturer's EPA-Registered Label for product, manufacturer's written instructions

2.3 METAL MESH BARRIER SYSTEM

A. Stainless-Steel Mesh: 0.025-by-0.018-inch (0.64-by-0.45-mm) mesh of 0.08-inch- (2.0-mm-) diameter, stainless-steel wire, Type 316.

2.4 POLYMER SHEET BARRIER SYSTEM

A. Polymer Sheet: 16-mil- (0.40-mm-) thick, multilayered, laminated, polymer sheet with lambda-cyhalothrin termiticide sealed between two outer polymer layers.

2.5 POLYMER BARRIER FITTINGS

A. Pipe/Conduit Fitting: Integral 2-1/2-inch- (65-mm-) long polymer sleeve and 1-inch- (25-mm-) wide circular flange with lambda-cyhalothrin termiticide sealed between two outer polymer layers; with fasteners.

B. Tub Trap Fitting: Integral polymer boot and 23-by-23-inch (585-by-585-mm) flange with lambda-cyhalothrin termiticide sealed between two outer polymer layers; with fasteners.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Applicator present, for compliance with requirements for moisture content of soil per termiticide label requirements, interfaces with earthwork, slab and foundation work, landscaping, utility installation, and other conditions affecting performance of termite control.

B. Proceed with application only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. General: Comply with the most stringent requirements of authorities having jurisdiction and with manufacturer's written instructions for preparation before beginning application of termite control treatment. Remove all extraneous sources of wood cellulose and other edible materials such as wood debris, tree stumps and roots, stakes, formwork, and construction waste wood from soil within and around foundations.

B. Soil Treatment Preparation: Remove foreign matter and impermeable soil materials that could decrease treatment effectiveness on areas to be treated. Loosen, rake, and level soil to be treated except previously compacted areas under slabs and footings. Termiticides may be applied before placing compacted fill under slabs if recommended in writing by termiticide manufacturer.

1. Fit filling hose connected to water source at the site with a backflow preventer, complying with requirements of authorities having jurisdiction.

3.3 APPLICATION, GENERAL

A. General: Comply with the most stringent requirements of authorities having jurisdiction and with manufacturer's EPA-Registered Label for products.

3.4 APPLYING SOIL TREATMENT

A. Application: Mix soil treatment termiticide solution to a uniform consistency. Provide quantity required for application at the label volume and rate for the maximum specified concentration of termiticide, according to manufacturer's EPA-Registered Label, to the following so that a continuous horizontal and vertical termiticidal barrier or treated zone is established around and under building construction. Distribute treatment evenly.

1. Slabs-on-Grade and Basement Slabs: Under ground-supported slab construction, including footings, building slabs, and attached slabs as an overall treatment. Treat soil materials before concrete footings and slabs are placed.
2. Foundations: Adjacent soil, including soil along the entire inside perimeter of foundation walls; along both sides of interior partition walls; around plumbing pipes and electric conduit penetrating the slab; around interior column footers, piers, and chimney bases; and along the entire outside perimeter, from grade to bottom of footing. Avoid soil washout around footings.
3. Crawlspaces: Soil under and adjacent to foundations as previously indicated. Treat adjacent areas including around entrance platform, porches, and equipment bases. Apply overall treatment only where attached concrete platform and porches are on fill or ground.

4. Masonry: Treat voids.
5. Penetrations: At expansion joints, control joints, and areas where slabs will be penetrated.

B. Avoid disturbance of treated soil after application. Keep off treated areas until completely dry.

C. Protect termiticide solution, dispersed in treated soils and fills, from being diluted until ground-supported slabs are installed. Use waterproof barrier according to EPA-Registered Label instructions.

D. Post warning signs in areas of application.

E. Reapply soil treatment solution to areas disturbed by subsequent excavation, grading, landscaping, or other construction activities following application.

## 3.5 INSTALLING BAIT-STATION SYSTEM

A. Place bait stations according to the EPA-Registered Label for the product and manufacturer's written instructions, in the following areas that are conducive to termite feeding and activity:

1. Conducive sites and locations indicated on Drawings.
2. In and around infested trees and stumps.
3. In mulch beds.
4. Where wood directly contacts soil.
5. Areas of high soil moisture.
6. Near irrigation sprinkler heads.
7. Each area where roof drainage system, including downspouts and scuppers, drains to soil.
8. Along driplines of roof overhangs without gutters.
9. Where condensate lines from mechanical equipment drip or drain to soil.
10. At plumbing penetrations through ground-supported slabs.
11. Other sites and locations as determined by licensed Installer.

B. Inspect and service bait stations from time of their application until Substantial Completion unless extended by continuing service agreement, according to the EPA-Registered Label for product and manufacturer's written instructions for termite management system and bait products.

1. Service Frequency: Inspect bait stations not less than once every three month(s).

## 3.6 INSTALLING METAL MESH BARRIER SYSTEM

A. Install metal mesh barrier system where indicated to provide a continuous barrier to entry of subterranean termites according to manufacturer's written instructions.

1. Fit mesh tightly around pipe or other penetrations, and terminate at slab and foundation perimeters.
2. Install mesh under the perimeter of concrete slab edges and joints after vapor barrier and reinforcing steel are in place, and comply with manufacturer's written installation methods.

B. Inspect annually for termite activity and effectiveness of metal mesh barrier system according to manufacturer's written instructions.

3.7 INSTALLING POLYMER SHEET BARRIER SYSTEM

A. Install polymer sheet barrier system according to manufacturer's EPA-Registered Label to provide a complete and continuous barrier to entry of subterranean termites.

B. Remove any pipe wrap material so that the polymer sheet barrier system and fittings can be applied directly to the pipe or conduit. After installing the barrier, reapply pipe wrap material both below and above the blocker to protect the pipe from contact with concrete.

C. Install polymer barrier fittings around each utility pipe and conduit penetrating concrete slab, foundation walls according to the EPA-Registered Label for the product and manufacturer's written instructions.

3.8 INSTALLING POLYMER BARRIER FITTINGS

A. Remove any pipe wrap material so that the polymer barrier fittings can be applied directly to the pipe or conduit. After installing the barrier, reapply pipe wrap material both below and above the blocker to protect the pipe from contact with concrete.

B. Install polymer barrier fittings around each utility pipe and conduit penetrating concrete slab, foundation walls according to the EPA-Registered Label for the product and manufacturer's written instructions.

END OF SECTION 313116