CITY OF HOUSTON

John Whitmire
Mayor

Jim Szczesniak
Director of Aviation

Houston Airports
Supply Chain Management
Post Office Box 60106
Houston, Texas 77205-0106
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October 9, 2025

SUBJECT: **Addendum No. 3**

REFERENCE: Invitation To Bid (ITB) for the IAH Subway Efficiency Infrastructure Improvements at George Bush Intercontinental Airport (IAH); Solicitation No. HOA-IAHSEI-2025-005; Project No. 604A

To: All Prospective Bidders:

This Addendum is being issued for the following reasons:

I. **Extend** the questions due date from October 09, 2025, to **October 24, 2025.**
II. **Replace** the following with the attached documents outlined below:
    1- Document 01210 – Revised 09/11/2025
    2- Document 01350 – Revised 09/11/2025
III. **Add** the attached document **Project Manual DIV02-26 Vol.3**

When issued, Addendum shall automatically become part of the solicitation documents and shall supersede any previous specification(s) and/or provision(s) in conflict with this Addendum. Addenda will be incorporated into the Contract as applicable. It is the responsibility of the bidder(s) to ensure that it has obtained all such Addenda. By submitting a bid on this project, bidder(s) shall be deemed to have received all Addenda.

If further clarification is needed regarding this solicitation, please contact Ola Alhammami, Sr. Procurement Specialist, via email at ola.alhamammi@houstontx.gov.

DocuSigned by:
8A20F7A06E224FC...

Cathy Vander Plaats
Aviation Procurement Officer
Houston Airport System

cc: Solicitation file, Andre' Morrow, Ola Alhammami

Attachments:
1- Document 01210
2- Document 01350
3- Project Manual DIV02-26 Vol.3

CITY OF HOUSTON

INTEROFFICE CORRESPONDENCE

TO: Mr. Clint Stephen
Chief Financial Officer
Houston Airport System

FROM: Cathy Vander Plaats
Assistant Director
Houston Airport System

DATE: October 8, 2025

SUBJECT: Signature Authority

I will be out of the office Thursday, October 9, 2025, returning Tuesday, October 14, 2025. During my absence Mr. Andre' Morrow will be acting Aviation Procurement Officer with full signature authority. He can be reached at 281-233-1046 or Andre.Morrow@houstontx.gov.

DocuSigned by:
Cathy Vander Plaats
02232028DE99414...
Cathy Vander Plaats

cc: Catina Chapman
Carla Haseltine
Andre' Morrow

City of Houston – Department of Aviation – Infrastructure Division

PROJECT MANUAL

604A IAH SUBWAY EFFICIENCY INFRASTRUCTURE IMPROVEMENTS

IAH GEORGE BUSH INTERCONTINENTAL AIRPORT

PROJECT NO.: PN-604A

VOLUME 3

DIVISION 02-26

SEPTEMBER 16, 2025

RS&H, Inc.
3200 Southwest Freeway, Suite 3150
Houston, TX 77027
713-914-4455

Document 00010

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SECTION 02 41 19 – SELECTIVE DEMOLITION

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Demolition and removal of selected site elements.
2. Salvage of existing items to be reused or recycled.

1.2 MATERIALS OWNERSHIP

A. Unless otherwise indicated, demolition waste becomes property of Contractor.

B. Historic items, relics, antiques, and similar objects including, but not limited to, cornerstones and their contents, commemorative plaques and tablets, and other items of interest or value to Owner that may be uncovered during demolition remain the property of Owner.

1. Carefully salvage in a manner to prevent damage and promptly return to Owner.

1.3 PREINSTALLATION MEETINGS

A. Predemolition Conference: Conduct conference at Project site.

1.4 INFORMATIONAL SUBMITTALS

A. Engineering Survey: Submit engineering survey of condition of building.

B. Proposed Protection Measures: Submit report, including Drawings, that indicates the measures proposed for protecting individuals and property, for environmental protection, for dust control and, for noise control. Indicate proposed locations and construction of barriers.

C. Schedule of selective demolition activities with starting and ending dates for each activity.

D. Predemolition photographs or video.

1.5 CLOSEOUT SUBMITTALS

A. Inventory of items that have been removed and salvaged.

1.6 FIELD CONDITIONS

A. Owner will occupy portions of building immediately adjacent to selective demolition area. Conduct selective demolition so Owner's operations will not be disrupted.

B. Conditions existing at time of inspection for bidding purpose will be maintained by Owner as far as practical.

C. Notify Architect of discrepancies between existing conditions and Drawings before proceeding with selective demolition.

D. Hazardous Materials: It is not expected that hazardous materials will be encountered in the Work.

1. Hazardous materials will be removed by Owner before start of the Work.
2. If suspected hazardous materials are encountered, do not disturb; immediately notify Architect and Owner. Hazardous materials will be removed by Owner under a separate contract.

E. Storage or sale of removed items or materials on-site is not permitted.

F. Utility Service: Maintain existing utilities indicated to remain in service and protect them against damage during selective demolition operations.

1. Maintain fire-protection facilities in service during selective demolition operations.

G. Arrange selective demolition schedule so as not to interfere with Owner's operations.

1.7 WARRANTY

A. Existing Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during selective demolition, by methods and with materials and using approved contractors so as not to void existing warranties.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Regulatory Requirements: Comply with governing EPA notification regulations before beginning selective demolition. Comply with hauling and disposal regulations of authorities having jurisdiction.

B. Standards: Comply with ASSE A10.6 and NFPA 241.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that utilities have been disconnected and capped before starting selective demolition operations.

B. Perform an engineering survey of condition of building to determine whether removing any element might result in structural deficiency or unplanned collapse of any portion of structure or adjacent structures during selective building demolition operations.

C. Inventory and record the condition of items to be removed and salvaged.

3.2 PREPARATION

A. Refrigerant: Before starting demolition, remove refrigerant from mechanical equipment according to 40 CFR 82 and regulations of authorities having jurisdiction.

3.3 UTILITY SERVICES AND MECHANICAL/ELECTRICAL SYSTEMS

A. Existing Services/Systems to Remain: Maintain services/systems indicated to remain and protect them against damage.

B. Existing Services/Systems to Be Removed, Relocated, or Abandoned: Locate, identify, disconnect, and seal or cap off utility services and mechanical/electrical systems serving areas to be selectively demolished.

1. Owner will arrange to shut off indicated services/systems when requested by Contractor.
2. Arrange to shut off utilities with utility companies.

3. If services/systems are required to be removed, relocated, or abandoned, provide temporary services/systems that bypass area of selective demolition and that maintain continuity of services/systems to other parts of building.
4. Disconnect, demolish, and remove fire-suppression systems, plumbing, and HVAC systems, equipment, and components indicated on Drawings to be removed.

    a. Piping to Be Removed: Remove portion of piping indicated to be removed and cap or plug remaining piping with same or compatible piping material.
    b. Piping to Be Abandoned in Place: Drain piping and cap or plug piping with same or compatible piping material and leave in place.
    c. Equipment to Be Removed: Disconnect and cap services and remove equipment.
    d. Equipment to Be Removed and Reinstalled: Disconnect and cap services and remove, clean, and store equipment; when appropriate, reinstall, reconnect, and make equipment operational.
    e. Equipment to Be Removed and Salvaged: Disconnect and cap services and remove equipment and deliver to Owner.
    f. Ducts to Be Removed: Remove portion of ducts indicated to be removed and plug remaining ducts with same or compatible ductwork material.
    g. Ducts to Be Abandoned in Place: Cap or plug ducts with same or compatible ductwork material and leave in place.

3.4 PROTECTION

A. Temporary Protection: Provide temporary barricades and other protection required to prevent injury to people and damage to adjacent buildings and facilities to remain.

B. Temporary Shoring: Design, provide, and maintain shoring, bracing, and structural supports as required to preserve stability and prevent movement, settlement, or collapse of construction and finishes to remain, and to prevent unexpected or uncontrolled movement or collapse of construction being demolished.

C. Remove temporary barricades and protections where hazards no longer exist.

3.5 SELECTIVE DEMOLITION

A. General: Demolish and remove existing construction only to the extent required by new construction and as indicated. Use methods required to complete the Work within limitations of governing regulations and as follows:

1. Neatly cut openings and holes plumb, square, and true to dimensions required. Use cutting methods least likely to damage construction to remain or adjoining construction. Use hand tools or small power tools designed for sawing or grinding, not hammering and chopping. Temporarily cover openings to remain.
2. Cut or drill from the exposed or finished side into concealed surfaces to avoid marring existing finished surfaces.
3. Do not use cutting torches until work area is cleared of flammable materials. At concealed spaces, such as duct and pipe interiors, verify condition and contents of hidden space before starting flame-cutting operations. Maintain portable fire-suppression devices during flame-cutting operations.
4. Locate selective demolition equipment and remove debris and materials so as not to impose excessive loads on supporting walls, floors, or framing.
5. Dispose of demolished items and materials promptly.

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

C. Removed and Salvaged Items:

1. Clean salvaged items.
2. Pack or crate items after cleaning. Identify contents of containers.
3. Store items in a secure area until delivery to Owner.
4. Transport items to Owner's storage area designated by Owner.
5. Protect items from damage during transport and storage.

D. Removed and Reinstalled Items:

1. Clean and repair items to functional condition adequate for intended reuse.
2. Pack or crate items after cleaning and repairing. Identify contents of containers.
3. Protect items from damage during transport and storage.
4. Reinstall items in locations indicated. Comply with installation requirements for new materials and equipment. Provide connections, supports, and miscellaneous materials necessary to make item functional for use indicated.

E. Existing Items to Remain: Protect construction indicated to remain against damage and soiling during selective demolition. When permitted by Architect, items may be removed to a suitable, protected storage location during selective demolition and reinstalled in their original locations after selective demolition operations are complete.

3.6 CLEANING

A. Remove demolition waste materials from Project site.

1. Do not allow demolished materials to accumulate on-site.
2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.
3. Remove debris from elevated portions of building by chute, hoist, or other device that will convey debris to grade level in a controlled descent.
4. Comply with requirements specified in Section 017419 "Construction Waste Management and Disposal."

B. Burning: Do not burn demolished materials.

C. Clean adjacent structures and improvements of dust, dirt, and debris caused by selective demolition operations. Return adjacent areas to condition existing before selective demolition operations began.

END OF SECTION 02 41 19

SECTION 02 41 26 – SELECTIVE ELECTRICAL DEMOLITION

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
1. Removal of existing electrical equipment, wiring, and conduit in areas to be remodeled; removal of designated construction; dismantling, cutting and alterations for completion of the Work.
2. Disposal of materials.
3. Storage of removed materials.
4. Identification of utilities.
5. Salvaged items.
6. Protection of items to remain as indicated on Drawings.
7. Relocate existing equipment to accommodate construction.

1.2 SUBMITTALS

A. General Conditions: Requirements for submittals.

B. Shop Drawings: Indicate demolition and removal sequence and location of salvageable items; location and construction of temporary work. Describe demolition removal procedures and schedule.

1.3 CLOSEOUT SUBMITTALS

A. General Conditions: Requirements for submittals.

B. Project Record Documents: Record actual locations of capped utilities, conduits and equipment abandoned in place.

1.4 QUALITY ASSURANCE

A. Perform Work in accordance with RTAA standard.

1.5 PRE-INSTALLATION MEETINGS

A. General Conditions: Pre-installation meeting.

B. Convene minimum one week prior to commencing work of this section.

1.6 SEQUENCING

A. General Conditions: Requirements for sequencing.

B. Sequence as requested for project.

1.7 SCHEDULING

A. General Conditions: Requirements for scheduling.

B. Schedule work to coincide with new construction or remodeled/ renovation area.

C. Cease operations immediately when structure appears to be in danger and notify Architect/Engineer. Do not resume operations until directed.

1.8 COORDINATION

A. General Conditions: Requirements for coordination.

B. Conduct demolition to minimize interference with adjacent and occupied building areas.

C. Coordinate demolition work with General Contractor.

D. Coordinate and sequence demolition so as not to cause shutdown of operation of surrounding areas.

E. Shut-down Periods:
1. Arrange timing of shut-down periods of in service panels with Owner. Do not shut down any utility without prior written approval.
2. Keep shut-down period to minimum or use intermittent period as directed by Owner.
3. Maintain life-safety systems in full operation in occupied facilities or provide notice minimum 3 days in advance.

F. Identify salvage items in cooperation with Owner.

1.9 CONTRACTOR’S USE OF PREMISES

A. Confine operations at site to areas and limits permitted by law, ordinances, permits, contract documents, and general conditions.

B. Protection and safekeeping of products stored on premises is responsibility of contractor supplying product.

C. Deliveries and unloading shall be scheduled to prevent traffic congestion blocking of access or interference with work. Arrange deliveries to avoid larger accumulations of materials than can be suitably stored at site.

D. Contractor shall pay for, or satisfactorily repair, all damages incident to their work, to sidewalks, streets, other public or private property, or to any public utilities occurring during period of work under this contract.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

3.1 EXAMINATION

A. General Conditions: Verification of existing conditions before starting work.

B. Visit site and survey existing conditions affecting work prior to bid. Include necessary materials and labor to accomplish the electrical work, including relocation of existing services and utilities on building site in bid. No consideration shall be given to future claims due to existing conditions. Any discrepancies or interference shall be reported immediately to the consultant.

C. Verify wiring and equipment indicated to be demolished serve only abandoned facilities.

D. Verify termination points for demolished services.

3.2 PREPARATION

A. Erect, and maintain temporary safeguards, including warning signs and lights, barricades, and similar measures, for protection of the public, Owner, Contractor’s employees, and existing improvements to remain.

B. Temporary egress signage and emergency lighting

3.3 DEMOLITION

A. Demolition Drawings are based on casual field observation and existing record documents. Report discrepancies to Architect/Engineer before disturbing existing installation. Demolish existing electrical work, including auxiliary systems, in areas of existing building shown reworked. Coordinate removal of electrical systems with General Contractor and Owner.

B. Remove exposed abandoned conduit, including abandoned conduit above accessible ceiling finishes. Cut conduit flush with walls and floors, and patch surfaces.

C. Remove conduit, wire, boxes, and fastening devices to avoid any interference with new installation.

D. Disconnect electrical systems in walls, floors, and ceilings scheduled for removal.

E. Reconnect equipment being disturbed by renovation work and required for continue service to nearest available panel.

F. Disconnect or shut off service to areas where electrical work is to be removed. Remove electrical fixtures, equipment, and related switches, outlets, conduit and wiring which are not part of final project.

G. Install temporary wiring and connections to maintain existing systems in service during construction.

H. Perform work on energized equipment or circuits with experienced and trained personnel.

I. Remove, relocate, and extend existing installations to accommodate new construction.

J. Repair adjacent construction and finishes damaged during demolition and extension work.

K. Remove exposed abandoned grounding and bonding components, fasteners and supports, and electrical identification components, including abandoned components above accessible ceiling finishes. Cut embedded support elements flush with walls and floors.

L. Clean and repair existing equipment to remain or to be reinstalled.

M. Protect and retain power to existing active equipment remaining.

N. Cap abandoned empty conduit at both ends.

O. In reworked areas, remove all electrical equipment; i.e.: Light fixtures, panelboards, switches, receptacles, auxiliary system devices, telephone outlets, etc.; unless otherwise noted. Remove existing branch circuits (conduit, wire, outlet boxes and supports) serving equipment to be removed. Abandon circuits concealed in concrete. Remove conductors from abandoned conduits. Leave existing branch circuits and feeders which run through reworked areas and serve existing equipment to remain in service, continuous and uninterrupted. Repair, re-terminate, re-support, etc., any damaged circuits, feeders or supports.

P. Abandon outlets in existing masonry and brick walls: provide blank stainless steel cover plates.

Q. Cut off abandoned conduits concealed in slab one inch below top of base floor slab and patch slab or floor to match existing.

3.4 EXISTING PANELBOARDS

A. Ring out circuits in existing panel affected by the Work. Where additional circuits are needed, reuse circuits available for reuse. Install new breakers.

B. Tag unused circuits as spare.

C. Where existing circuits are indicated to be reused, use sensing measuring devices to verify circuits feeding Project area or are not in use.

D. Remove existing wire no longer in use from panel to equipment.

E. Provide new updated directories where more than three circuits have been modified or rewired.

3.5 SALVAGE ITEMS

A. Electrical equipment, wiring, etc., removed and not required to be part of new electrical installation is classed as salvage.

B. The Contractor shall submit a list of salvageable equipment and/or parts identified below that are to be removed. Provide list to Owner for review.

C. The list shall contain the following:
1. type of equipment
2. quantity
3. manufacturer
4. model #
5. condition (with explanation if needed)

D. Once the list has been reviewed the Contractor will be notified of any equipment deemed reusable by the Owner.

E. Salvageable equipment not selected to be retained by the Owner becomes property of Contractor. Remove from job site.

3.6 REUSABLE ELECTRICAL EQUIPMENT

A. Carefully remove equipment, materials, or fixtures which are to be reused.

B. Disconnect, remove, or relocate existing electrical material and equipment interfering with new installation.

C. Relocate existing lighting fixtures as indicated on Drawings. Clean fixtures and re-lamp. Test fixture to see if it is in good working condition before installation at new location.

3.7 CUTTING AND REPAIRING

A. Cut and repair walls floors, roof, etc., as required for installation of work in this Division. Employ professional installers of repair materials where repair work is major or aesthetics are of primary importance.

B. Do not pierce exterior walls below grade with hanger bolts. Do not cut building structural members except where accepted by Engineer. Do not use core drilling as a cutting method above telephone, electrical or data equipment. Use hammer drill only (size limited). Contain water below floor at any location of core drilling. Locate final holes to avoid cutting existing rebar as much as possible.

C. Repair work shall be comparable with work cut. New finishes shall match adjacent finishes. Engineer will review repaired work and may reject unsuitable work.

3.8 HAZARDOUS MATERIALS

A. Submit Material Safety Data Sheets for all materials furnished in this project defined as hazardous by NFPA. All requirements of the Material Safety Data Sheets shall be implemented and followed judiciously when hazardous materials are installed or otherwise used.

B. All hazardous materials shall be stored and used (mixed, applied, etc.) in strict accordance with the OSHA Standards, and Safety Data Sheets.

3.9 WELDING AND CUTTING

A. Special precautions shall be taken to reduce fire hazards where electric or gas welding or cutting work or soldering is done and suitable fire extinguishing equipment shall be maintained near such operations.

3.10 CLEANING

A. General Conditions: Requirements for cleaning.

B. Remove demolished materials as work progresses. Legally dispose.

C. Keep workplace neat.

3.11 PROTECTION OF FINISHED WORK

A. General Conditions: Requirements for protecting finished Work.

B. Do not permit traffic over unprotected floor surface.

3.12 DISPOSAL PROCEDURES (FLUORESCENT BULBS, BALLASTS & LIGHT FIXTURES)

A. These materials do not require special training to remove or package.

B. The Contractor shall contract with Waste Management LampTracker to recycle the lamps (fluorescent bulbs) and ballasts removed during the project. The costs to recycle these materials is the responsibility of the contractor. The disposal and costs of non-regulated materials (light fixtures) is the responsibility of the Contractor. The Contractor is required to recycle as much material as possible.

C. LAMPS

1. The lamps contain mercury and are required to be properly recycled. If the lamps were crushed they would no longer be classified as regulated waste but would be hazardous waste which is not permitted.
2. The removed lamps are to be placed into boxes obtained from LampTracker for recycling. The box is to be closed with clear packing tape. The box is required to also meet the following additional requirements.
   a. Each box is to be properly closed with clear tape.
   b. The boxes are to be placed on a pallet and shrink-wrapped.
   c. 4 foot lamps boxes are not to be stacked higher than 66 inches.
   d. 8 foot lambs boxes are not to be stacked higher than 48 inches.
   e. Each box is to be properly labeled per the labeling section in this document.
3. The Contractor is required to protect the boxes from the weather. If the boxes become wet for any reason, the Contractor is required to replace the boxes at no cost to the Owner.
4. The recycling facility will not take boxes that have indications that they may have leaked materials. Water stained boxes cannot be accepted.
5. The Contractor is required to use proper packing and arrange for picking by Waste Management.

D. BROKEN LAMPS

1. The Contractor is to minimize lamp breakage. However, if breakage does occur and the majority (75%) of the bulb is still intact, place this portion in the lamp boxes for recycling. The smaller pieces are to be swept up and placed into a sealable 5 gallon bucket. The pieces are not to be vacuumed.

2. Broken lamp buckets are required to be labeled per the Labeling Section in this document.

E. BALLAST RECYCLING

1. The Contractor is to separate the ballasts into two types: ballasts with the “NO PCBs” label, and ballast that do not contain the label. Contractor shall order the appropriate size containers depending on the quantity of ballasts. The Contractor properly package and arrange for pickup by Waste Management. The containers are required to be properly labeled, placed on pallets, shrink wrapped and cannot exceed 700 pounds.

F. LABELING

1. The Contractor is required to place a label on all containers/boxes. The label must be accurate and visible once placed on the pallet for shipping. The labels can be pre-printed by the Contractor with the date and number of units in each container marked in the field. If the number of units is not correct and the recycling facility determines that the shipment is not acceptable and returns delivery, the Contractor is responsible for all charges to correct.
2. The following are the requirements for all labels.
   a. Lamps
      Universal Waste/Used Mercury Lamps for Recycling
      Date: _____ Number of Units: _____
      Location: Building Name: Street Address, City and State
   b. Broken Lamps
      Broken Universal Waste/Used Mercury Lamps for Recycling
      Date: _____ Number of Units: _____
      Location: Building Name: Street Address, City and State
   c. Non-PCB Ballast
      Non-PCB Ballast for Recycling
      Date: _____ Number of Units: _____
      Location: Building Name: Street Address, City and State
   d. PCB Ballast
      PCB Ballast for Recycling
      Date: _____ Number of Units: _____
      Location: Building Name: Street Address, City and State

END OF SECTION 02 41 26

SECTION 03 01 30 – MAINTENANCE OF CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Epoxy Crack-Injection Materials

1.2 ACTION SUBMITTALS

A. Product Data

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

1.3 INFORMATIONAL SUBMITTALS

A. Material Certificates

B. Product Test Reports

C. Field Quality-Control Reports

1.4 QUALITY ASSURANCE

A. Retain "Testing Agency Qualifications" Paragraph below if Contractor or manufacturer selects testing agency or if Contractor is required to provide services of a qualified testing agency in "Field Quality Control" Article. Qualification requirements are in addition to those specified in Section 01 40 00 "Quality Requirements," which also defines "NRTL" (nationally recognized testing laboratory).

B. Concrete-Maintenance Specialist Qualifications: Engage an experienced concrete-maintenance firm that employs installers and supervisors who are trained and approved by manufacturer to apply crack-injection adhesive when performing the Work of this Section. Firm must have completed work similar in material, design, and extent to that indicated for this Project with a record of successful in-service performance. Experience in only installing or patching new concrete is insufficient experience for concrete-maintenance work.

PART 2 - PRODUCTS

2.1 EPOXY CRACK-INJECTION MATERIALS

A. Epoxy Crack-Injection Adhesive: ASTM C881/C881M, bonding system Type IV at structural locations, Type I at other locations; free of VOCs.

1. Basis of Design: Product by Sika USA or Euclid Chemical.
2. Capping Adhesive: Product manufactured for use with crack-injection adhesive by same manufacturer.
3. Color: Provide epoxy crack-injection adhesive and capping adhesive as selected by Architect from full range of industry colors.

PART 3 - EXECUTION

3.1 CONCRETE MAINTENANCE

A. Have concrete-maintenance work performed only by qualified concrete-maintenance specialist.

B. Comply with manufacturers' written instructions for surface preparation and product application.

3.2 EXAMINATION

A. Notify Architect seven days in advance of dates when areas of deteriorated or delaminated concrete and deteriorated reinforcing bars will be located.

B. Locate areas of deteriorated or delaminated concrete using hammer or chain-drag sounding and mark boundaries. Mark areas for removal by simplifying and squaring off boundaries. At columns and walls, make boundaries level and plumb unless otherwise indicated.

C. Pachometer Testing: Locate at least three reinforcing bars using a pachometer, and drill test holes to determine depth of cover. Calibrate pachometer using depth of cover measurements, and verify depth of cover in removal areas using pachometer.

D. Perform surveys as the Work progresses to detect hazards resulting from concrete-maintenance work.

3.3 PREPARATION

A. Ensure that supervisory personnel are on-site and on duty when concrete-maintenance work begins and during its progress.

B. Protect persons, motor vehicles, surrounding surfaces of building being repaired, building site, plants, and surrounding buildings from harm resulting from concrete-maintenance work.

1. Comply with each product manufacturer's written instructions for protections and precautions.
2. Contain dust and debris generated by concrete-maintenance work and prevent it from reaching the public or adjacent surfaces.
3. Protect floors and other surfaces along haul routes from damage, wear, and staining.
4. Provide supplemental sound-control treatment to isolate removal and dismantling work from other areas of the building.
5. Neutralize and collect alkaline and acid wastes for disposal off Owner's property.

C. Existing Drains: Prior to the start of concrete-maintenance work in an area, test drainage system to ensure that it is functioning properly. Notify Architect immediately of inadequate drainage or blockage. Do not begin concrete-maintenance work in an area until the drainage system is in working order.

1. Prevent solids, such as aggregate or mortar residue, from entering the drainage system. Clean out drains and drain lines that become sluggish or blocked by sand or other materials resulting from concrete-maintenance work.
2. Protect drains from pollutants. Block drains or filter out sediments, allowing only clean water to pass.

D. Preparation for Concrete Removal: Make explorations, probes, and inquiries as necessary to determine condition of construction to be removed in the course of repair.

1. Verify that affected utilities have been disconnected and capped.
2. Provide and maintain shoring, bracing, and temporary structural supports as required to preserve stability and prevent unexpected or uncontrolled movement, settlement, or collapse of construction being demolished and construction and finishes to remain. Strengthen or add new supports when required during progress of removal work.

E. Reinforcing-Bar Preparation: Remove loose and flaking rust from exposed reinforcing bars by wire brushing until only tightly adhered light rust remains.

1. Where section loss of reinforcing bar is more than 25 percent, or 20 percent in two or more adjacent bars, cut bars and remove and replace as indicated on Drawings.
2. Remove additional concrete as necessary to provide at least 3/4-inch clearance at existing and replacement bars.
3. Splice replacement bars to existing bars in accordance with ACI 318 by lapping, welding, or using mechanical couplings.

F. Preparation of Floor Joints for Repair: Saw-cut joints full width to edges and depth of spalls, but not less than 3/4 inch deep. Clean out debris and loose concrete; vacuum or blow clear with compressed air.

3.4REMOVAL OF CONCRETE

A. Do not overload structural elements with debris.

B. Saw-cut perimeter of areas indicated for removal to a depth of at least 1/2 inch. Make cuts perpendicular to concrete surfaces and no deeper than cover on reinforcement.

C. Remove deteriorated and delaminated concrete by breaking up and dislodging from reinforcement.

D. Remove additional concrete if necessary to provide a depth of removal of at least 1/2 inch over entire removal area.

E. Where half or more of the perimeter of reinforcing bar is exposed, bond between reinforcing bar and surrounding concrete is broken, or reinforcing bar is corroded, remove concrete from entire perimeter of bar and to provide at least 3/4-inch clearance around bar.

F. Test areas where concrete has been removed by tapping with hammer, and remove additional concrete until unsound and disbonded concrete is completely removed.

G. Provide surfaces with a fractured profile of at least 1/8 inch that are approximately perpendicular or parallel to original concrete surfaces. At columns and walls, make top and bottom surfaces level unless otherwise directed.

H. Thoroughly clean removal areas of loose concrete, dust, and debris.

3.5APPLICATION OF BONDING AGENTS

A. Epoxy-Modified, Cementitious Bonding and Anticorrosion System: Apply to reinforcing bars and concrete. Apply to reinforcing bars in two coats, allowing first coat to dry two to three hours before applying second coat. Allow to dry before placing patching mortar.

B. Epoxy Bonding System: Apply to reinforcing bars and concrete, leaving no pinholes or other uncoated areas. Apply to reinforcing bars in at least two coats, allowing first coat to dry before applying second coat. Place patching mortar while epoxy is still tacky. If epoxy dries, recoat before placing patching mortar.

C. Latex Bonding Agent, Type I: Apply to concrete by brush roller or spray. Allow to dry before placing patching mortar.

D. Latex Bonding Agent, Type II: Mix with portland cement and scrub into concrete surface. Place patching mortar while bonding agent is still wet. If bonding agent dries, recoat before placing patching mortar.

E. Slurry Coat for Cementitious Patching Mortar: Wet substrate thoroughly and then remove standing water. Scrub a slurry of neat patching mortar mixed with latex bonding agent into substrate, filling pores and voids.

3.6APPLICATION OF EPOXY CRACK-INJECTION MATERIALS

A. Clean cracks with oil-free compressed air or low-pressure water to remove loose particles.

B. Clean areas to receive capping adhesive of oil, dirt, and other substances that would interfere with bond.

C. Place injection ports as recommended by epoxy manufacturer, spacing no farther apart than thickness of member being injected. Seal injection ports in place with capping adhesive.

D. Seal cracks at exposed surfaces with a ribbon of capping adhesive at least 1/4 inch thick by 1 inch wider than crack.

E. Inject cracks wider than 0.003 inch to a depth of 8 inches .

F. Inject epoxy adhesive, beginning at widest part of crack and working toward narrower parts. Inject adhesive into ports to refusal, capping adjacent ports when they extrude epoxy. Cap injected ports and inject through adjacent ports until crack is filled.

G. After epoxy adhesive has set, remove injection ports and grind surfaces smooth.

3.7 FIELD QUALITY CONTROL

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

B. inspections.

C. Tests and Inspections:

1. Epoxy Crack Injection: Core-drilled samples to verify proper installation.

   a. Testing Frequency: one sample for each 100 ft. (30 m) of crack injected.
   b. Where samples are taken, refill holes with epoxy mortar.

D. Product will be considered defective if it does not pass tests and inspections.

E. Prepare test and inspection reports.

END OF SECTION 030130

SECTION 05 40 00 – COLD-FORMED METAL FRAMING

PART 1 - RELATED DOCUMENTS

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This section includes the following:
   1. Interior non-load-bearing wall framing exceeding height limitations of standard, nonstructural metal framing.

B. Shop Drawings:

   1. Include layout, spacings, sizes, thicknesses, and types of cold-formed steel framing; fabrication; and fastening and anchorage details, including mechanical fasteners.
   2. Indicate reinforcing channels, opening framing, supplemental framing, strapping, bracing, bridging, splices, accessories, connection details, and attachment to adjoining work.

C. Delegated-Design Submittal: For cold-formed steel framing.

1.3 PERFORMANCE REQUIREMENTS

A. AISI “Specifications”: Calculate structural characteristics of cold-formed metal framing according to AISI's "Load and Resistance Factor Design Specification for Cold-Formed Steel Structural Members" and the following:

   1. Center for Cold-Formed Steel Structures (CCFSS) Technical Bulletin, Vol. 2, No. 1, February 1993 "AISI Specification Provisions for Screw Connections."

B. The manufacturer of the cold-formed metal framing system shall assume undivided responsibility for design of the system including size, gauge, strength, spacing of members, anchorage to structure, connections, angles, clips, bracing, strapping, bridging, supplementary framing, framing at openings, corners and at control and expansion joints.

C. Design of framing system shall be by a professional engineer, registered in the state where the project is located.

D. Design provisions for movement of the structure and other components, including, but not limited to, Story drift, deflection of primary building structure, construction tolerances, and maintaining clearance at openings, to complete the framing systems indicated.

E. Design framing system to resist the construction loads (if any) and the design horizontal wind/seismic and wind uplift loads noted on the drawings and all other loads as required by applicable building codes.

F. Maximum allowable deflection of the systems under full lateral load shall not be more than L/360. (L/600 for arch. masonry veneer)

G. Design framing systems to provide for movement of framing members without damage or overstressing, sheathing failure, connection failure, undue strain on fasteners and anchors, or other detrimental effects when subject to a maximum ambient temperature change (range) of 120 deg F.

H. Design exterior storefront and metal panel wall framing to accommodate lateral deflection without regard to contribution of sheathing materials.

1.4 SUBMITTALS

A. General: Submit each item in this Article according to the Conditions of the Contract and Division 1 Specification Sections.

B. Product data and installation instructions for each type of cold-formed metal framing, accessory, and product specified.

C. Shop drawings showing layout, spacings, sizes, thicknesses, and types of cold-formed metal framing, fabrication, fastening and anchorage details, including mechanical fasteners. Show reinforcing channels, opening framing, supplemental framing, strapping, bracing, bridging, splices, accessories, connection details, attachments to other units of work and details required for proper installation.

D. Calculations: Submit structural calculations signed and sealed by a professional engineer registered in project state. Indicate all member sizes, spacings, connections and other pertinent design information. Calculations shall include analysis and design of all horizontal and vertical cold-formed metal framing assemblies.

E. Mill certificates signed by manufacturer of cold-formed metal framing certifying that their products comply with requirements, including uncoated steel thickness, yield strength, tensile strength, total elongation, and galvanized-coating thickness.

F. Welder certificates signed by Contractor certifying that welders comply with requirements specified under the "Quality Assurance" Article.

G. Sustainable Designs Submittals:

1. Provide available Environmental Product Declarations (EPDs), Third-party certifications, and/or Third party verified product life cycle assessments which meet the requirements outlined in section 5.1.2 and 5.2.2 of Green Globes for New Construction Technical Reference Manual.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: Engage an experienced Installer who has completed cold-formed metal framing similar in material, design, and extent to that indicated for this Project and with a record of successful in-service performance.

B. Welding Standards: Comply with applicable provisions of AWS D1.1 "Structural Welding Code--Steel" and AWS D1.3 "Structural Welding Code--Sheet Steel."

1. Certify that each welder has satisfactorily passed AWS qualification tests for welding processes involved and, if pertinent, has undergone recertification.

C. Professional Engineer Qualifications: A professional engineer legally authorized to practice in the jurisdiction where Project is located and experienced in providing engineering services of the kind indicated that have resulted in the installation of cold-formed metal framing similar to this Project in material, design, and extent and that have a record of successful in-service performance.

D. Coordinate all metal stud framing with other manufacturers and suppliers of attached components and finishes. Provide and install any additional or supplemental framing that may be required for a complete system.

PART 2 - PRODUCTS

2.1 MATERIALS

A. System Components: With each type of metal framing required, provide manufacturer’s standard steel runners (tracks), blocking, lintels, clip angles, shoes, reinforcements, fasteners, anchorages, accessories, and other components as recommended by manufacturer for applications indicated, as needed to provide a complete metal framing system.

B. Materials and Finishes:

1. For items 0.0598-inch, 16 gage thick and heavier, fabricate metal framing components of structural quality steel sheet with a minimum yield strength

of 40,000 psi and conforming to the requirements of ASTM A446 (ASTM A446M), A570 (A570M) or A611.

2. For items 0.0474-inch, 18 gage thick and lighter, fabricate metal framing components of commercial quality steel sheet with a minimum yield strength of 33,000 psi and conforming to the requirements of ASTM A446 (ASTM A446M), A570 (A570M) or A611.
3. Provide galvanized finish to all metal framing components. For sheet metal components, comply with ASTM A525 (A525M) for minimum G90 (Z275) coating.

C. Steel Studs: Manufacturer's standard "C"-shaped steel studs of size, gage and structural properties required. Provide lipped flanges of proper bearing area and type for attachment of materials.

1. Steel track shall be manufacturer's standard U-shaped, unpunched, with straight flanges. Provide materials meeting size, gage and structural properties required.

D. Furring: Manufacturer's standard hat-shaped steel furring members of gage and structural properties required.

2.2 ANCHORS, CLIPS, AND FASTENERS

A. Steel Shapes and Clips: ASTM A36 (ASTM A36M), zinc coated by the hot-dip process according to ASTM A123.

B. Cast-in-Place Anchor Bolts and Studs: ASTM A307, Grade A (ASTM F568, Property Class 4.6); carbon-steel hex-head bolts and studs; carbon-steel nuts; and flat, unhardened-steel washers. Zinc coated by the hot-dip process according to ASTM A153.

C. Expansion Anchors: Fabricated from corrosion-resistant materials, with capability to sustain, without failure, a load equal to 5 times the design load, as determined by testing per ASTM E488 conducted by a qualified independent testing agency.

D. Powder-Actuated Anchors: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with capability to sustain, without failure, a load equal to 10 times the design load, as determined by testing per ASTM E1190 conducted by a qualified independent testing agency.

E. Mechanical Fasteners: Corrosion-resistant coated, self-drilling, self-threading steel drill screws.

F. Welding Electrodes: Comply with AWS standards.

2.3 MISCELLANEOUS MATERAILS

A. Galvanizing Repair: Where galvanized surfaces are damaged, prepare surfaces and repair in accordance with procedures specified in ASTM A780.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine supporting substrates and abutting structural framing for compliance with requirements, including installation tolerances and other conditions affecting performance of cold-formed metal framing. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Before sprayed-on fireproofing is applied, attach continuous angles, supplementary framing, or tracks to structural members indicated to receive sprayed-on fireproofing.

B. After sprayed-on fireproofing has been applied, remove only as much fireproofing as needed to complete installation of cold-formed framing without reducing thickness of fireproofing below that required to obtain fire-resistance rating indicated. Protect remaining fireproofing from damage. Replace damaged fireproofing to maintain minimum required fire-hour ratings.

3.3 INSTALLATION, GENERAL

A. Cold-formed framing must be field assembled.

B. Install cold-formed metal framing and accessories plumb, square, true to line, and with connections securely fastened, in accordance with approved shop drawings, manufacturer's instructions and recommendations, and the requirements of this Section.

1. Cut framing members by sawing or shearing; do not torch cut.
2. Fasten cold-formed metal framing members by welding or screw fastening, as standard with fabricator and as required by design calculations. Wire tying of framing members is not permitted.
    a. Comply with AWS requirements and procedures for welding, appearance and quality of welds, and methods used in correcting welding work.
    b. Locate mechanical fasteners and install according to cold-framed metal framing manufacturer's instructions with screw penetrating joined members by not less than 3 exposed screw threads.

C. Provide temporary bracing and leave in place until framing is permanently stabilized.

D. Do not bridge building expansion and control joints with cold-formed metal framing. Independently frame both sides of joints

E. Install framing members in one-piece lengths, unless splice connections are indicated for track or tension members.

F. Install insulation in built-up exterior framing members, such as headers, sills, boxed joists, and double studs, inaccessible upon completion of framing work.

G. Fasten reinforcement plate over web penetrations that exceed size of manufacturer's standard punched openings.

H. Erection Tolerances: Install cold-formed metal framing to a maximum allowable tolerance variation from plumb, level, and true to line of 1/8 inch in 10 feet and as follows:

1. Space individual framing members no more than plus or minus 1/8 inch from plan location. Cumulative error shall not exceed minimum fastening requirements of sheathing or other finishing materials.

3.4 WALL INSTALLATION

A. Install continuous top and bottom tracks sized to match studs. Align tracks accurately to layout at base and tops of studs. Securely anchor at corners and ends, and at spacings recommended by the manufacturer for type of construction involved, except do not exceed 24 inch spacing for nail or power-driven fasteners, or 16 inch spacing for other types of attachment.

B. Squarely seat studs against webs of top and bottom tracks. Fasten both flanges of studs to top and bottom track by either welding or screw fastening.

C. Set studs plumb, except as needed for diagonal bracing or required for nonplumb walls or warped surfaces and similar requirements.

D. Align studs vertically where wall-framing continuity is interrupted by floor framing. Where studs cannot be aligned, continuously reinforce track to transfer loads.

E. Anchor studs abutting structural columns or walls, including masonry walls, to supporting structure as indicated.

F. Install headers over wall openings wider than the stud spacing. Locate headers above openings as indicated. Fabricate headers of compound shapes

indicated or required to transfer load to supporting studs, complete with clip-angle connectors, web stiffeners, or gusset plates.

1. Frame wall openings larger than 24 inches square with not less than a double stud at each jamb of frame as indicated or required by manufacturer.
2. Install runner tracks and jack studs above and below wall openings. Anchor tracks to jamb studs with clip angles or by welding, and space jack studs same as full-height wall studs.

G. Install supplementary framing, blocking, and bracing in metal framing indicated to support fixtures, equipment, services, casework, heavy trim, furnishings, and similar work requiring attachment to framing.

1. Where type of supplementary support is not indicated, comply with stud manufacturer's recommendations and industry standards in each case, considering weight or load resulting from item supported.

H. Install horizontal bridging in stud system, spaced in rows not more than 48 inches apart. Fasten at each stud intersection.

I. Where indicated on approved shop drawings, or as otherwise required by manufacturer’s instructions and recommendations, install steel-sheet diagonal bracing straps to both stud flanges, terminate at and fasten to reinforced top and bottom track. Fasten clip-angle connectors to multiple studs at ends of bracing and anchor to structure.

J. Install steel sheet diagonal bracing straps to both stud flanges; terminate at and fasten to reinforced top and bottom tracks. Fasten clip-angle connectors to multiple studs at ends of bracing and anchor to structure.

K. Install miscellaneous framing and connections, including supplementary framing, web stiffeners, clip angles, continuous angles, anchors, and fasteners, to provide a complete and stable wall-framing system.

3.5 FIELD QUALITY CONTROL

A. Testing Agency: A qualified independent testing agency employed and paid by Owner will perform field quality-control testing.

B. Field and shop welds will be subject to testing and inspecting.

C. Testing agency will report test results promptly and in writing to Contractor and Architect.

D. Remove and replace work that does not comply with specified requirements.

E. Additional testing will be performed to determine compliance of corrected work with specified requirements.

3.6 REPAIRS AND PROTECTION

A. Galvanizing Repairs: Prepare and repair damaged galvanized coatings on fabricated and installed cold-formed metal framing with galvanizing repair paint.

B. Provide final protection and maintain conditions in a manner acceptable to manufacturer and Installer to ensure that cold-formed metal framing is without damage or deterioration at the time of Substantial Completion.

END OF SECTION 05 40 00

SECTION 05 50 00 – METAL FABRICATIONS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Miscellaneous steel trim including steel edgings

B. Products furnished, but not installed, under this Section include the following:

   1. Loose steel lintels.
   2. Anchor bolts, steel pipe sleeves, slotted-channel inserts, and wedge-type inserts indicated to be cast into concrete or built into unit masonry.
   3. Steel weld plates and angles for casting into concrete for applications where they are not specified in other Sections.

C. Related Requirements:

   1. Section 042200 "Concrete Unit Masonry" for installing loose lintels, anchor bolts, and other items built into unit masonry.
   2. Section 051200 "Structural Steel Framing" for steel framing, supports, elevator machine beams, hoist beams, divider beams, door frames, and other steel items attached to the structural-steel framing.

1.2 COORDINATION

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

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

1.3 ACTION SUBMITTALS

A. Shop Drawings: Show fabrication and installation details. Include plans, elevations, sections, and details of metal fabrications and their connections.

Show anchorage and accessory items. Provide Shop Drawings for the following:

1. Miscellaneous steel trim including steel edgings.

1.4 INFORMATIONAL SUBMITTALS

A. Qualification Data: For professional engineer's experience with providing delegated-design engineering services of the kind indicated, including documentation that engineer is licensed in the jurisdiction in which Project is located.

B. Mill Certificates: Signed by stainless steel manufacturers, certifying that products furnished comply with requirements.

C. Welding certificates.

D. Research Reports: For post-installed anchors.

1.5 QUALITY ASSURANCE

A. Welding Qualifications: Qualify procedures and personnel in accordance with the following:

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

1.6 FIELD CONDITIONS

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

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Delegated Design: Engage a qualified professional engineer, as defined in Section 014000 "Quality Requirements," to design ladders.

B. Structural Performance of Aluminum Ladders: Ladders, including landings, are to withstand the effects of loads and stresses within limits and under conditions specified in ANSI A14.3.

C. Structural Performance of Alternating Tread Devices: Alternating tread devices are to withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated:

1. Uniform Load: 100 lbf/sq. ft..
2. Concentrated Load: 300 lbf applied on an area of 4 sq. in.
3. Uniform and concentrated loads need not be assumed to act concurrently.

D. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes acting on exterior metal fabrications by preventing buckling, opening of joints, overstressing of components, failure of connections, and other detrimental effects.

1. Temperature Change: 120 deg F, ambient; 180 deg F, material surfaces.

2.2 METALS

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

B. Steel Plates, Shapes, and Bars: ASTM A36/A36M.

C. Stainless Steel Sheet, Strip, and Plate: ASTM A240/A240M or ASTM A666, Type 304.

D. Stainless Steel Bars and Shapes: ASTM A276/A276M, Type 304.

E. Rolled-Steel Floor Plate: ASTM A786/A786M, rolled from plate complying with ASTM A36/A36M or ASTM A283/A283M, Grade C or D.

F. Rolled-Stainless Steel Floor Plate: ASTM A793.

G. Abrasive-Surface Floor Plate: Steel plate with abrasive granules rolled into surface.
1. Source Limitations: Obtain floor plate from single source from single manufacturer.

H. Steel Tubing: ASTM A500/A500M, cold-formed steel tubing.

I. Steel Pipe: ASTM A53/A53M, Standard Weight (Schedule 40) unless otherwise indicated.

J. Zinc-Coated Steel Wire Rope: ASTM A741.

1. Wire Rope Fittings: Hot-dip galvanized-steel connectors with capability to sustain, without failure, a load equal to minimum breaking strength of wire rope with which they are used.

K. Stainless Steel Wire Rope: Wire rope manufactured from stainless steel wire complying with ASTM A492, Type 316.

1. Wire Rope Fittings: Stainless steel connectors, Type 316, with capability to sustain, without failure, a load equal to minimum breaking strength of wire rope with which they are used.

L. Steel Prestressing Strand: ASTM A416/A416M, Grade 270, low-relaxation, seven-wire, with 0.9-lb/sq. ft. zinc coating.

1. Steel Prestressing Strand Fittings: Hot-dip galvanized-steel anchors and connectors with capability to sustain, without failure, a load equal to minimum breaking strength of steel prestressing strand with which they are used.

M. Aluminum Plate and Sheet: ASTM B209, Alloy 6061-T6.

N. Aluminum Extrusions: ASTM B221, Alloy 6063-T6.

O. Aluminum-Alloy Rolled Tread Plate: ASTM B632/B632M, Alloy 6061-T6.

P. Aluminum Castings: ASTM B26/B26M, Alloy 443.0-F.

Q. Bronze Extrusions: ASTM B455, Alloy UNS No. C38500 (extruded architectural bronze).

R. Bronze Castings: ASTM B584, Alloy UNS No. C83600 (leaded red brass) or UNS No. C84400 (leaded semi red brass).

S. Nickel Silver Extrusions: ASTM B151/B151M, Alloy UNS No. C74500.

T. Nickel Silver Castings: ASTM B584, Alloy UNS No. C97600 (20 percent leaded nickel bronze).

2.3 FASTENERS

A. General: Unless otherwise indicated, provide Type 304 stainless steel fasteners for exterior use and zinc-plated fasteners with coating complying with ASTM B633 or ASTM F1941/F1941M, Class Fe/Zn 5, at exterior walls. Select fasteners for type, grade, and class required.

1. Provide stainless steel fasteners for fastening aluminum stainless steel or nickel silver.
2. Provide bronze fasteners for fastening bronze.

B. Steel Bolts and Nuts: Regular hexagon-head bolts, ASTM A307, Grade A with hex nuts, ASTM A563 and, where indicated, flat washers.

C. High-Strength Bolts, Nuts, and Washers: ASTM F3125/F3125M, Grade A325, Type 3, heavy-hex steel structural bolts; ASTM A563, Grade DH3, heavy-hex carbon-steel nuts; and where indicated, flat washers.

D. Stainless Steel Bolts and Nuts: Regular hexagon-head annealed stainless steel bolts, ASTM F593; with hex nuts, ASTM F594; and, where indicated, flat washers; Alloy Group 1 Group 2.

E. Anchor Bolts: ASTM F1554, Grade 36, of dimensions indicated; with nuts, ASTM A563; and, where indicated, flat washers.

1. Hot-dip galvanize or provide mechanically deposited, zinc coating where item being fastened is indicated to be galvanized.

F. Anchors, General: Capable of sustaining, without failure, a load equal to six times the load imposed when installed in unit masonry and four times the load imposed when installed in concrete, as determined by testing in accordance with ASTM E488/E488M, conducted by a qualified independent testing agency.

G. Cast-in-Place Anchors in Concrete: Either threaded or wedge type unless otherwise indicated; galvanized ferrous castings, either ASTM A47/A47M malleable iron or ASTM A27/A27M cast steel. Provide bolts, washers, and shims as needed, all hot-dip galvanized per ASTM F2329/F2329M.

H. Post-Installed Anchors: Torque-controlled expansion anchors or chemical anchors.
1. Material for Exterior Locations and Where Stainless Steel Is Indicated: Alloy Group 1 stainless steel bolts, ASTM F593, and nuts, ASTM F594.

I. Slotted-Channel Inserts: Cold-formed, hot-dip galvanized-steel box channels (struts) complying with MFMA-4, 1-5/8 by 7/8 inches by length indicated with anchor straps or studs not less than 3 inches long at not more than 8 inches o.c. Provide with temporary filler and tee-head bolts, complete with washers and nuts, all zinc-plated to comply with ASTM B633, Class Fe/Zn 5, as needed for fastening to inserts.

2.4 MISCELLANEOUS MATERIALS

A. Shop Primers: Provide primers that comply with Section 099113 "Exterior Painting."

B. Universal Shop Primer: Fast-curing, lead- and chromate-free, universal modified-alkyd primer complying with MPI#79 and compatible with topcoat.

1. Use primer containing pigments that make it easily distinguishable from zinc-rich primer.

C. Water-Based Primer: Emulsion type, anticorrosive primer for mildly corrosive environments that is resistant to flash rusting when applied to cleaned steel, complying with MPI#107 and compatible with topcoat.

D. Epoxy Zinc-Rich Primer: Complying with MPI#20 and compatible with topcoat.

E. Shop Primer for Galvanized Steel: Primer formulated for exterior use over zinc-coated metal and compatible with finish paint systems indicated.

F. Galvanizing Repair Paint: High-zinc-dust-content paint complying with SSPC-Paint 20 and compatible with paints specified to be used over it.

G. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D1187/D1187M.

H. Shrinkage-Resistant Grout: Factory-packaged, nonmetallic, nonstaining, noncorrosive, nongaseous grout complying with ASTM C1107/C1107M. Provide grout specifically recommended by manufacturer for interior and exterior applications.

2.5 FABRICATION, GENERAL

A. Shop Assembly: Preassemble items in the shop to greatest extent possible. Disassemble units only as necessary for shipping and handling limitations. Use connections that maintain structural value of joined pieces. Clearly mark units for reassembly and coordinated installation.

B. Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges to a radius of approximately 1/32 inch unless otherwise indicated. Remove sharp or rough areas on exposed surfaces.

C. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing work.

D. Form exposed work with accurate angles and surfaces and straight edges.

E. Weld corners and seams continuously to comply with the following:

1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
2. Obtain fusion without undercut or overlap.
3. Remove welding flux immediately.
4. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing and contour of welded surface matches that of adjacent surface.

F. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners or welds where possible. Where exposed fasteners are required, use Phillips flat-head (countersunk) fasteners unless otherwise indicated. Locate joints where least conspicuous.

G. Fabricate seams and other connections that are exposed to weather in a manner to exclude water. Provide weep holes where water may accumulate.

H. Cut, reinforce, drill, and tap metal fabrications as indicated to receive finish hardware, screws, and similar items.

I. Provide for anchorage of type indicated; coordinate with supporting structure. Space anchoring devices to secure metal fabrications rigidly in place and to support indicated loads.

MISCELLANEOUS FRAMING AND SUPPORTS

J. General: Provide steel framing and supports not specified in other Sections as needed to complete the Work.

K. Fabricate units from steel shapes, plates, and bars of welded construction unless otherwise indicated. Fabricate to sizes, shapes, and profiles indicated and as necessary to receive adjacent construction.

1. Fabricate units from slotted channel framing where indicated.
2. Furnish inserts for units installed after concrete is placed.

L. Galvanize miscellaneous framing and supports where indicated.

M. Prime miscellaneous framing and supports with zinc-rich primer where indicated.

2.6 SHELF ANGLES

A. Fabricate shelf angles from steel angles of sizes indicated and for attachment to concrete framing. Provide horizontally slotted holes to receive 3/4-inch bolts, spaced not more than 6 inches from ends and 24 inches o.c., unless otherwise indicated.

1. Provide mitered and welded units at corners.
2. Provide open joints in shelf angles at expansion and control joints. Make open joint approximately 2 inches larger than expansion or control joint.

B. For cavity walls, provide vertical channel brackets to support angles from backup masonry and concrete.

C. Galvanize and prime shelf angles located in exterior walls.

D. Prime shelf angles located in exterior walls with zinc-rich primer.

E. Furnish wedge-type concrete inserts, complete with fasteners, to attach shelf angles to cast-in-place concrete.

2.7 METAL SHIPS' LADDERS AND PIPE CROSSOVERS

A. Provide metal ships' ladderswhere indicated. Fabricate of open-type construction with channel or plate stringers and pipe and tube railings unless otherwise indicated. Provide brackets and fittings for installation.

1. Treads are not to be less than 5 inches exclusive of nosing or less than 8-1/2 inches including the nosing, and riser height is not to be more than 9-1/2 inches
2. Fabricate ships' ladders and pipe crossovers, including railings from steel
3. Fabricate treads and platforms from welded or pressure-locked steel bar grating. Limit openings in gratings to no more than 1/2 inch in least dimension.
4. Fabricate treads and platforms from rolled-steel floor plate.
5. Comply with applicable railing requirements in Section 055213 "Pipe and Tube Railings."

B. Galvanize exterior steel ships' ladders and pipe crossovers, including treads, railings, brackets, and fasteners.

C. Provide metal pipe crossovers where indicated. Assemblies, including treads, handrails, and guardrails shall meet OSHA and ANSI requirements. Fabricate of open-type construction with channel or plate stringers and pipe and tube railings unless otherwise indicated. Provide brackets and fittings for installation.

1. 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. Precision Ladders, LLC
   b. FS Industries
   c. PHP Systems/Design
2. Treads shall not be less than 5 inches (127 mm) exclusive of nosing or less than 8-1/2 inches (216mm) including the nosing, and riser height shall not be more than 9-1/2 inches (241mm) or less than 6-1/2 inches (165mm) minimum.
3. Treads shall be 36 inches minimum width.
4. Fabricate pipe crossovers including railings from the same material.
5. Fabricate treads and platforms from welded or pressure-locked steel bar grating. Limit openings in gratings to no more than 1/2 inch (12mm) in least dimension.
6. Galvanize exterior steel pipe crossovers, including treads, railings, brackets and fasteners.
7. Include adequate movement capabilities for pipe crossovers that cross expansion joints.
8. Provide supplemental structural framing where required to support crossover stairs.
9. Fitted Support Pads: Provide with non-penetrating, surface applied rooftop support pads for additional protection to the rooftop envelope as required by loading conditions.
   a. Injection molded high density/high impact polypropylene with UV-inhibitors and antioxidants.

2.8 METAL FLOOR PLATE

A. Fabricate from rolled-steel floor plate of thickness indicated below:

   1. Thickness: As indicated.

B. Provide grating sections where indicated, fabricated from welded or pressure-locked steel bar grating. Limit openings in gratings to no more than 1 inch in least dimension.

C. Provide steel angle supports as indicated.

D. Include steel angle stiffeners, and fixed and removable sections as indicated.

E. Provide flush steel bar drop handles for lifting removable sections, one at each end of each section.

2.9 MISCELLANEOUS STEEL TRIM

A. Unless otherwise indicated, fabricate units from steel shapes, plates, and bars of profiles shown with continuously welded joints and smooth exposed edges. Miter corners and use concealed field splices where possible.

B. Provide cutouts, fittings, and anchorages as needed to coordinate assembly and installation with other work.

1. Provide with integrally welded steel strap anchors for embedding in concrete or masonry construction.

C. Galvanize and prime miscellaneous steel trim.

D. Prime miscellaneous steel trim with zinc-rich primer.

2.10 LOOSE BEARING AND LEVELING PLATES

A. Provide loose bearing and leveling plates for steel items bearing on masonry or concrete construction. Drill plates to receive anchor bolts and for grouting.

B. Galvanize bearing and leveling plates.

C. Prime plates with zinc-rich primer.

2.11 LOOSE STEEL LINTELS

A. Fabricate loose steel lintels from steel angles and shapes of size indicated for openings and recesses in masonry walls and partitions at locations indicated. Fabricate in single lengths for each opening unless otherwise indicated. Weld adjoining members together to form a single unit where indicated.

B. Size loose lintels to provide bearing length at each side of openings equal to 1/12 of clear span, but not less than 8 inches (200 mm) unless otherwise indicated.

C. Galvanize loose steel lintels located in exterior walls.

D. Prime loose steel lintels located in exterior walls with zinc-rich primer

2.12 STEEL WELD PLATES AND ANGLES

A. Provide steel weld plates and angles not specified in other Sections, for items supported from concrete construction as needed to complete the Work. Provide

each unit with no fewer than two integrally welded steel strap anchors for embedding in concrete.

2.13 GENERAL FINISH REQUIREMENTS

A. Finish metal fabrications after assembly.

B. Finish exposed surfaces to remove tool and die marks and stretch lines, and to blend into surrounding surface.

2.14 STEEL AND IRON FINISHES

A. Galvanizing: Hot-dip galvanize items as indicated to comply with ASTM A153/A153M for steel and iron hardware and with ASTM A123/A123M for other steel and iron products.

1. Do not quench or apply post galvanizing treatments that might interfere with paint adhesion.

B. Preparation for Shop Priming Galvanized Items: After galvanizing, thoroughly clean galvanized surfaces of grease, dirt, oil, flux, and other foreign matter, and treat with metallic phosphate process.

C. Shop prime iron and steel items not indicated to be galvanized unless they are to be embedded in concrete, sprayed-on fireproofing, or masonry, or unless otherwise indicated.

1. Shop prime with primers specified in Section 099113 "Exterior Painting" unless zinc-rich primer is indicated.

D. Preparation for Shop Priming: Prepare surfaces to comply with requirements indicated below:

1. Exterior Items: SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
2. Items Indicated to Receive Zinc-Rich Primer: SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
3. Other Steel Items: SSPC-SP 3, "Power Tool Cleaning."
4. Galvanized-Steel Items: SSPC-SP 16, "Brush-off Blast Cleaning of Coated and Uncoated Galvanized Steel, Stainless Steels, and Non-Ferrous Metals."

E. Shop Priming: Apply shop primer to comply with SSPC-PA 1, "Paint Application Specification No. 1: Shop, Field, and Maintenance Painting of Steel," for shop painting.

1. Stripe paint corners, crevices, bolts, welds, and sharp edges.

2.15 ALUMINUM FINISHES

A. As-Fabricated Finish: AA-M12.

B. Clear Anodic Finish: AAMA 611, Class I, AA-M12C22A41.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Cutting, Fitting, and Placement: Perform cutting, drilling, and fitting required for installing metal fabrications. Set metal fabrications accurately in location, alignment, and elevation; with edges and surfaces level, plumb, true, and free of rack; and measured from established lines and levels.

B. Fit exposed connections accurately together to form hairline joints. Weld connections that are not to be left as exposed joints but cannot be shop welded because of shipping size limitations. Do not weld, cut, or abrade surfaces of exterior units that have been hot-dip galvanized after fabrication and are for bolted or screwed field connections.

C. Field Welding: Comply with the following requirements:

1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
2. Obtain fusion without undercut or overlap.
3. Remove welding flux immediately.
4. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing and contour of welded surface matches that of adjacent surface.

D. Fastening to In-Place Construction: Provide anchorage devices and fasteners where metal fabrications are required to be fastened to in-place construction. Provide threaded fasteners for use with concrete and masonry inserts, toggle bolts, through bolts, lag screws, wood screws, and other connectors.

E. Provide temporary bracing or anchors in formwork for items that are to be built into concrete, masonry, or similar construction.

F. Corrosion Protection: Coat concealed surfaces of aluminum that come into contact with grout, concrete, masonry, wood, or dissimilar metals with the following:

1. Cast Aluminum: Heavy coat of bituminous paint.
2. Extruded Aluminum: Two coats of clear lacquer.

3.2 INSTALLATION OF MISCELLANEOUS FRAMING AND SUPPORTS

A. General: Install framing and supports to comply with requirements of items being supported, including manufacturers' written instructions and requirements indicated on Shop Drawings.

B. Anchor shelf angles securely to existing construction with anchor bolts.

3.3 INSTALLATION OF BEARING AND LEVELING PLATES

A. Clean concrete and masonry bearing surfaces of bond-reducing materials, and roughen to improve bond to surfaces. Clean bottom surface of plates.

B. Set bearing and leveling plates on wedges, shims, or leveling nuts. After bearing members have been positioned and plumbed, tighten anchor bolts. Do not remove wedges or shims but, if protruding, cut off flush with edge of bearing plate before packing with shrinkage-resistant grout. Pack grout solidly between bearing surfaces and plates to ensure that no voids remain.

3.4 REPAIRS

A. Touchup Painting:

1. Immediately after erection, clean field welds, bolted connections, and abraded areas. Paint uncoated and abraded areas with same material as used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.

    a. Apply by brush or spray to provide a minimum 2.0-mil dry film thickness.

2. Cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint are specified in Section 099113 "Exterior Painting."

B. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing to comply with ASTM A780/A780M.

END OF SECTION 05 50 00

SECTION 06 10 00 – ROUGH CARPENTRY

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Wood blocking and nailers.
2. Wood furring and grounds.

1.2 DEFINITIONS

A. Boards or Strips: Lumber of less than 2 inches nominal size in least dimension.

B. Dimension Lumber: Lumber of 2 inches nominal size or greater but less than 5 inches nominal size in least dimension.

C. OSB: Oriented strand board.

1.3 ACTION SUBMITTALS

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

1. Include data for wood-preservative treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements. Indicate type of preservative used and net amount of preservative retained.
2. Include data for fire-retardant treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements. Include physical properties of treated materials based on testing by a qualified independent testing agency.
3. For fire-retardant treatments, include physical properties of treated lumber both before and after exposure to elevated temperatures, based on testing by a qualified independent testing agency according to ASTM D 5664.
4. For products receiving a waterborne treatment, include statement that moisture content of treated materials was reduced to levels specified before shipment to Project site.

1.4 INFORMATIONAL SUBMITTALS

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

B. Evaluation Reports: For the following, from ICC-ES:

1. Wood-preservative-treated wood.
2. Fire-retardant-treated wood.
3. Engineered wood products.

1.5 QUALITY ASSURANCE

A. Testing Agency Qualifications: For testing agency providing classification marking for fire-retardant treated material, an inspection agency acceptable to authorities having jurisdiction that periodically performs inspections to verify that the material bearing the classification marking is representative of the material tested.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Stack wood products flat with spacers beneath and between each bundle to provide air circulation. Protect wood products from weather by covering with waterproof sheeting, securely anchored. Provide for air circulation around stacks and under coverings.

PART 2 - PRODUCTS

2.1 WOOD PRODUCTS, GENERAL

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

1. Factory mark each piece of lumber with grade stamp of grading agency.
2. Dress lumber, S4S, unless otherwise indicated.

B. Maximum Moisture Content of Lumber: 15 percent for 2-inch nominal thickness or less; 19 percent for more than 2-inch nominal thickness unless otherwise indicated.

C. Engineered Wood Products: Acceptable to authorities having jurisdiction and for which current model code research or evaluation reports exist that show compliance with building code in effect for Project.

1. Allowable design stresses, as published by manufacturer, shall meet or exceed those indicated. Manufacturer's published values shall be determined from empirical data or by rational engineering analysis and demonstrated by comprehensive testing performed by a qualified independent testing agency.

2.2 WOOD-PRESERVATIVE-TREATED LUMBER

A. Preservative Treatment by Pressure Process: AWPA U1; Use Category UC2 for interior construction not in contact with ground, Use Category UC3b for exterior construction not in contact with ground, and Use Category UC4a for items in contact with ground.

1. Preservative Chemicals: Acceptable to authorities having jurisdiction and containing no arsenic or chromium.

B. Kiln-dry lumber after treatment to a maximum moisture content of 19 percent. Do not use material that is warped or that does not comply with requirements for untreated material.

C. Mark lumber with treatment quality mark of an inspection agency approved by the ALSC Board of Review.

1. For exposed lumber indicated to receive a stained or natural finish, omit marking and provide certificates of treatment compliance issued by inspection agency.

D. Application: Treat all rough carpentry unless otherwise indicated.

2.3 FIRE-RETARDANT-TREATED MATERIALS

A. General: Where fire-retardant-treated materials are indicated, materials shall comply with requirements in this article, that are acceptable to authorities having jurisdiction, and with fire-test-response characteristics specified as determined by testing identical products per test method indicated by a qualified testing agency.

B. Fire-Retardant-Treated Lumber and Plywood by Pressure Process: Products with a flame-spread index of 25 or less when tested according to ASTM E 84, and with no evidence of significant progressive combustion when the test is

extended an additional 20 minutes, and with the flame front not extending more than 10.5 feet beyond the centerline of the burners at any time during the test.

1. Treatment shall not promote corrosion of metal fasteners.
2. Exterior Type: Treated materials shall comply with requirements specified above for fire-retardant-treated lumber and plywood by pressure process after being subjected to accelerated weathering according to ASTM D 2898. Use for exterior locations and where indicated.
3. Interior Type A: Treated materials shall have a moisture content of 28 percent or less when tested according to ASTM D 3201 at 92 percent relative humidity. Use where exterior type is not indicated.
4. Design Value Adjustment Factors: Treated lumber shall be tested according to ASTM D 5664 and design value adjustment factors shall be calculated according to ASTM D 6841.

C. Kiln-dry lumber after treatment to maximum moisture content of 19 percent.

D. Identify fire-retardant-treated wood with appropriate classification marking of qualified testing agency.

1. For exposed lumber indicated to receive a stained or natural finish, omit marking and provide certificates of treatment compliance.

E. For exposed items indicated to receive a stained or natural finish, chemical formulations shall not bleed through, contain colorants, or otherwise adversely affect finishes.

F. Application: Treat all rough carpentry unless otherwise indicated.

G. Adhesives for Gluing Furring to Concrete or Masonry: Formulation complying with ASTM D 3498 that is approved for use indicated by adhesive manufacturer.

H. Water-Repellent Preservative: NWWDA-tested and -accepted formulation containing 3-iodo-2-propynyl butyl carbamate, combined with an insecticide containing chlorpyrifos as its active ingredient.

2.4 MISCELLANEOUS LUMBER

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

1. Blocking.
2. Nailers.
3. Furring.
4. Utility shelving.

B. Dimension Lumber Items: Construction or No. 2 grade lumber of any of the following species:

1. Hem-fir (north); NLGA.
2. Mixed southern pine or southern pine; SPIB.
3. Spruce-pine-fir; NLGA.
4. Hem-fir; WCLIB or WWPA.
5. Spruce-pine-fir (south); NeLMA, WCLIB, or WWPA.
6. Western woods; WCLIB or WWPA.
7. Northern species; NLGA.
8. Eastern softwoods; NeLMA.

C. Concealed Boards: 15 percent maximum moisture content and any of the following species and grades:

1. Mixed southern pine or southern pine; No. 2 grade; SPIB.

D. For blocking not used for attachment of other construction, Utility, Stud, or No. 3 grade lumber of any species may be used provided that it is cut and selected to eliminate defects that will interfere with its attachment and purpose.

E. For blocking and nailers used for attachment of other construction, select and cut lumber to eliminate knots and other defects that will interfere with attachment of other work.

F. For furring strips for installing plywood or hardboard paneling, select boards with no knots capable of producing bent-over nails and damage to paneling.

2.5 PLYWOOD BACKING PANELS

A. Equipment Backing Panels: Plywood, DOC PS 1, Exterior, A-C fire-retardant treated, in thickness indicated or, if not indicated, not less than 3/4-inch nominal thickness.

2.6 FASTENERS

A. General: Fasteners shall be of size and type indicated and shall comply with requirements specified in this article for material and manufacture.

1. Where rough carpentry is exposed to weather, in ground contact, pressure-preservative treated, or in area of high relative humidity, provide fasteners with hot-dip zinc coating complying with ASTM A 153/A 153M.

B. Nails, Brads, and Staples: ASTM F 1667.

C. Power-Driven Fasteners: Fastener systems with an evaluation report acceptable to authorities having jurisdiction, based on ICC-ES AC70.

D. Post-Installed Anchors: Fastener systems with an evaluation report acceptable to authorities having jurisdiction, based on ICC-ES AC01, ICC-ES AC58, ICC-ES AC193, or ICC-ES AC308 as appropriate for the substrate.

1. Material: For interior locations provide carbon-steel components, zinc plated to comply with ASTM B 633, Class Fe/Zn 5.
2. Material: For exterior locations provide stainless steel with bolts and nuts complying with ASTM F 593 and ASTM F 594, Alloy Group 1 or 2.

2.7 METAL FRAMING ANCHORS

A. Allowable design loads, as published by manufacturer, shall meet or exceed those of basis-of-design products. Manufacturer's published values shall be determined from empirical data or by rational engineering analysis and demonstrated by comprehensive testing performed by a qualified independent testing agency. Framing anchors shall be punched for fasteners adequate to withstand same loads as framing anchors.

B. KC Metals Products, Inc.

C. Simpson Strong-Tie Co., Inc.

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

1. Use for interior locations unless otherwise indicated.

E. Hot-Dip, Heavy-Galvanized Steel Sheet: ASTM A 653/A 653M; structural steel (SS), high-strength low-alloy steel Type A (HSLAS Type A), or high-strength low-alloy steel Type B (HSLAS Type B); G185 coating designation; and not less than 0.036 inch thick.

1. Use for wood-preservative-treated lumber and where indicated.

F. Stainless-Steel Sheet: ASTM A 666, Type 316.

1. Use for exterior locations and where indicated.

G. Post Bases: Adjustable-socket type for bolting in place with standoff plate to raise post 1 inch above base and with 2-inch-minimum side cover, socket 0.062 inch thick, and standoff and adjustment plates 0.108 inch thick.

H. Sill-Sealer Gaskets: Closed-cell neoprene foam, 1/4 inch thick, selected from manufacturer's standard widths to suit width of sill members indicated.

I. Adhesives for Gluing Furring to Concrete or Masonry: Formulation complying with ASTM D 3498 that is approved for use indicated by adhesive manufacturer.

J. Water-Repellent Preservative: NWWDA-tested and -accepted formulation containing 3-iodo-2-propynyl butyl carbamate, combined with an insecticide containing chloropyrifos as its active ingredient.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Framing Standard: Comply with AF&PA's WCD 1, "Details for Conventional Wood Frame Construction," unless otherwise indicated.

B. Framing with Engineered Wood Products: Install engineered wood products to comply with manufacturer's written instructions.

C. Set rough carpentry to required levels and lines, with members plumb, true to line, cut, and fitted. Fit rough carpentry accurately to other construction. Locate furring, nailers, blocking, and similar supports to comply with requirements for attaching other construction.

D. Install plywood backing panels by fastening to framing; coordinate locations with utilities requiring backing panels. Install fire-retardant-treated plywood backing panels with classification marking of testing agency exposed to view.

E. Install metal framing anchors to comply with manufacturer's written instructions. Install fasteners through each fastener hole.

F. Provide blocking and framing as indicated and as required to support facing materials, fixtures, specialty items, and trim.

G. Post Bases: Adjustable-socket type for bolting in place with standoff plate to raise post 1 inch above base and with 2-inch-minimum side cover, socket 0.062 inch thick, and standoff and adjustment plates 0.108 inch thick.

H. Sill-Sealer Gaskets: Closed-cell neoprene foam, 1/4 inch thick, selected from manufacturer's standard widths to suit width of sill members indicated.

I. Adhesives for Gluing Furring to Concrete or Masonry: Formulation complying with ASTM D 3498 that is approved for use indicated by adhesive manufacturer.

J. Water-Repellent Preservative: NWWDA-tested and -accepted formulation containing 3-iodo-2-propynyl butyl carbamate, combined with an insecticide containing chlorpyrifos as its active ingredient.

K. Provide fire blocking in furred spaces, stud spaces, and other concealed cavities as indicated and as follows:

1. Fire block furred spaces of walls, at each floor level, at ceiling, and at not more than 96 inches o.c. with solid wood blocking or noncombustible materials accurately fitted to close furred spaces.
2. Fire block concealed spaces of wood-framed walls and partitions at each floor level, at ceiling line of top story, and at not more than 96 inches o.c. Where fire blocking is not inherent in framing system used, provide closely fitted solid wood blocks of same width as framing members and 2-inch nominal thickness.
3. Fire block concealed spaces between floor sleepers with same material as sleepers to limit concealed spaces to not more than 100 sq. ft. and to solidly fill space below partitions.
4. Fire block concealed spaces behind combustible cornices and exterior trim at not more than 20 feet o.c.

L. Sort and select lumber so that natural characteristics do not interfere with installation or with fastening other materials to lumber. Do not use materials with defects that interfere with function of member or pieces that are too small to use with minimum number of joints or optimum joint arrangement.

M. Comply with AWPA M4 for applying field treatment to cut surfaces of preservative-treated lumber.

1. Use inorganic boron for items that are continuously protected from liquid water.
2. Use copper naphthenate for items not continuously protected from liquid water.

N. Where wood-preservative-treated lumber is installed adjacent to metal decking, install continuous flexible flashing separator between wood and metal decking.

O. Securely attach rough carpentry work to substrate by anchoring and fastening as indicated, complying with the following:

1. Table 2304.9.1, "Fastening Schedule," in ICC's International Building Code (IBC).

2. Table R602.3(1), "Fastener Schedule for Structural Members," and Table R602.3(2), "Alternate Attachments," in ICC's International Residential Code for One- and Two-Family Dwellings.
3. ICC-ES evaluation report for fastener.

P. Use steel common nails unless otherwise indicated. Select fasteners of size that will not fully penetrate members where opposite side will be exposed to view or will receive finish materials. Make tight connections between members. Install fasteners without splitting wood. Drive nails snug but do not countersink nail heads unless otherwise indicated.

Q. For exposed work, arrange fasteners in straight rows parallel with edges of members, with fasteners evenly spaced, and with adjacent rows staggered.

1. Comply with approved fastener patterns where applicable. Before fastening, mark fastener locations, using a template made of sheet metal, plastic, or cardboard.
2. Use finishing nails unless otherwise indicated. Countersink nail heads and fill holes with wood filler.
3. Use common nails unless otherwise indicated. Drive nails snug but do not countersink nail heads.

3.2 WOOD BLOCKING, AND NAILER INSTALLATION

A. Install where indicated and where required for screeding or attaching other work. Form to shapes indicated and cut as required for true line and level of attached work. Coordinate locations with other work involved.

B. Attach items to substrates to support applied loading. Recess bolts and nuts flush with surfaces unless otherwise indicated.

3.3 WOOD FURRING INSTALLATION

A. Install level and plumb with closure strips at edges and openings. Shim with wood as required for tolerance of finish work.

B. Furring to Receive Plywood or Hardboard Paneling: Install 1-by-3-inch nominal-size furring horizontally and vertically at 24 inches o.c.

C. Furring to Receive Gypsum Board: Install 1-by-2-inch nominal-size furring vertically at 16 inches o.c.

3.4 PROTECTION

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

B. Protect rough carpentry from weather. If, despite protection, rough carpentry becomes wet enough that moisture content exceeds that specified, apply EPA-registered borate treatment. Apply borate solution by spraying to comply with EPA-registered label.

END OF SECTION 06 10 00

SECTION 09 29 00 – GYPSUM BOARD

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Interior gypsum board.
2. Tile backing panels.

B. Related Requirements:
1. Section 05 40 00 Cold-Formed Metal Framing

1.2 ACTION SUBMITTALS

A. Product Data: For the following:

1. Gypsum wallboard.
2. Gypsum board, Type X.
3. Gypsum ceiling board.
4. Abuse-resistant gypsum board.
5. Mold-resistant gypsum board.
6. Joint treatment materials.
7. Laminating adhesive.
8. Sound-attenuation blankets.
9. Acoustical sealant.

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

1.3 MOCKUPS

A. Build mockups of at least 100 sq. ft. in surface area to demonstrate aesthetic effects and to set quality standards for materials and execution.

1. Build mockups for the following:

a. Each level of gypsum board finish indicated for use in exposed locations.

b. Provide a finished joint between 2 panels.

c. Each texture finish indicated.

2. Apply or install final decoration indicated, including painting and wallcoverings, on exposed surfaces for review of mockups.
3. Simulate finished lighting conditions for review of mockups.
4. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.4 DELIVERY, STORAGE AND HANDLING

A. Store materials inside under cover and keep them dry and protected against weather, condensation, direct sunlight, construction traffic, and other potential causes of damage. Stack panels flat and supported on risers on a flat platform to prevent sagging.

1.5 FIELD CONDITIONS

A. Environmental Limitations: Comply with ASTM C840 requirements or gypsum board manufacturer's written instructions, whichever are more stringent.

B. Do not install paper-faced gypsum panels until installation areas are enclosed and conditioned.

C. Do not install panels that are wet, moisture damaged, and mold damaged.

1. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
2. Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

PART 2 - PRODUCTS

2.1 SOURCE LIMITATIONS

A. Obtain each type of gypsum panel and joint finishing material from single source with resources to provide products of consistent quality in appearance and physical properties.

2.2 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 E119 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 E90 and classified according to ASTM E413 by an independent testing agency.

2.3 GYPSUM BOARD, GENERAL

A. Size: Provide maximum lengths and widths available that will minimize joints in each area and that correspond with support system indicated.

2.4 INTERIOR GYPSUM BOARD

A. Gypsum Wallboard: ASTM C1396/C1396M.

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. Armstrong Ceiling & Wall Solutions.
    b. USG Corporation.
    c. Gold Bond Building Products, LLC provided by National Gypsum Company.

2. Thickness: 5/8 inch.
3. Long Edges: Tapered.

B. Gypsum Board, Type X: ASTM C1396/C1396M.

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. Armstrong Ceiling & Wall Solutions.
    b. USG Corporation.
    c. Gold Bond Building Products, LLC provided by National Gypsum Company.

2. Thickness: 5/8 inch.

3. Long Edges: Tapered.

C. Gypsum Ceiling Board: ASTM C1396/C1396M.

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. Armstrong Ceiling & Wall Solutions.
   b. USG Corporation.
   c. Gold Bond Building Products, LLC provided by National Gypsum Company.

2. Thickness: 1/2 inch.

3. Long Edges: Tapered.

D. Abuse-Resistant Gypsum Board: ASTM C1396/C1396M gypsum board, tested according to ASTM C1629/C1629M.

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. Armstrong Ceiling & Wall Solutions.
   b. USG Corporation.
   c. Gold Bond Building Products, LLC provided by National Gypsum Company.

2. Thickness: 5/8 inch.
3. Core: As indicated on Drawings.
4. Surface Abrasion: ASTM C1629/C1629M, meets or exceeds Level 2 requirements.
5. Indentation: ASTM C1629/C1629M, meets or exceeds Level 2 requirements.
6. Soft-Body Impact: ASTM C1629/C1629M, meets or exceeds Level 2 requirements.
7. Long Edges: Tapered.
8. Mold Resistance: ASTM D3273, score of 10 as rated according to ASTM D3274.

E. Mold-Resistant Gypsum Board: ASTM C1396/C1396M. With moisture- and mold-resistant core and paper surfaces.

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. Armstrong Ceiling & Wall Solutions.
b. USG Corporation.
c. Gold Bond Building Products, LLC provided by National Gypsum Company.

2. Core: 5/8 inch, Type X.
3. Long Edges: Tapered.
4. Mold Resistance: ASTM D3273, score of 10 as rated according to ASTM D3274.

2.5 SPECIALTY GYPSUM BOARD

2.6 TRIM ACCESSORIES

A. Interior Trim: ASTM C1047.

1. Material: Galvanized or aluminum-coated steel sheet, rolled zinc, plastic, or paper-faced galvanized-steel sheet.
2. Shapes:

a. Cornerbead.
b. LC-Bead: J-shaped; exposed long flange receives joint compound.
c. L-Bead: L-shaped; exposed long flange receives joint compound.
d. U-Bead: J-shaped; exposed short flange does not receive joint compound.
e. Expansion (control) joint.
f. Curved-Edge Cornerbead: With notched or flexible flanges.

2.7 JOINT TREATMENT MATERIALS

A. General: Comply with ASTM C475/C475M.

B. Joint Tape:

1. Interior Gypsum Board: Paper.
2. Glass-Mat Gypsum Sheathing Board: 10-by-10 glass mesh.
3. Tile Backing Panels: As recommended by panel manufacturer.

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, rounded or 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 drying-type, all-purpose compound.

    a. Use setting-type compound for installing paper-faced metal trim accessories.

3. Fill Coat: For second coat, use drying-type, all-purpose compound.
4. Finish Coat: For third coat, use drying-type, all-purpose compound.

D. Joint Compound for Exterior soffit Applications:

1. Glass-Mat Gypsum Soffit Board: Use setting-type taping compound and setting-type, sandable topping compound as recommended by gypsum board manufacturer.
2. Glass-Mat Gypsum Sheathing Board: As recommended by sheathing board manufacturer.

E. Joint Compound for Tile Backing Panels:

1. Glass-Mat, Water-Resistant Backing Panel: As recommended by backing panel manufacturer.
2. Cementitious Backer Units: As recommended by backer unit manufacturer.
3. Water-Resistant Gypsum Backing Board: Use setting-type taping compound and setting-type, sandable topping compound.

2.8 AUXILIARY MATERIALS

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

B. Laminating Adhesive: Adhesive or joint compound recommended for directly adhering gypsum panels to continuous substrate.

C. Steel Drill Screws: ASTM C1002 unless otherwise indicated.

1. Use screws complying with ASTM C954 for fastening panels to steel members from 0.033 to 0.112 inch thick.
2. For fastening cementitious backer units, use screws of type and size recommended by panel manufacturer.

D. Sound-Attenuation Blankets: ASTM C665, 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 Section 07 92 19 "Acoustical Joint Sealants."

F. Thermal Insulation: As specified in Section 07 21 00 "Thermal Insulation."

G. Vapor Retarder: As specified in Section 07 26 00 "Vapor Retarders."

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas and substrates including welded hollow-metal frames and support framing, with Installer present, for compliance with requirements and other conditions affecting performance of the Work.

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

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

3.2 INSTALLATION AND FINISHING OF PANELS, GENERAL

A. Comply with ASTM C840.

B. Install ceiling panels across framing to minimize the number of abutting end joints and to avoid abutting end joints in central area of each ceiling. Stagger abutting end joints of adjacent panels not less than one framing member.

C. Install panels with face side out. Butt panels together for a light contact at edges and ends with not more than 1/16 inch of open space between panels. Do not force into place.

D. Locate edge and end joints over supports, except in ceiling applications where intermediate supports or gypsum board back-blocking is provided behind end joints. Do not place tapered edges against cut edges or ends. Stagger vertical joints on opposite sides of partitions. Do not make joints other than control joints at corners of framed openings.

E. Form control and expansion joints with space between edges of adjoining gypsum panels.

F. Cover both faces of support framing with gypsum panels in concealed spaces (above ceilings, etc.), except in chases braced internally.

1. Unless concealed application is indicated or required for sound, fire, air, or smoke ratings, coverage may be accomplished with scraps of not less than 8 sq. ft. in area.
2. Fit gypsum panels around ducts, pipes, and conduits.
3. Where partitions intersect structural members projecting below underside of floor/roof slabs and decks, cut gypsum panels to fit profile formed by structural members; allow 1/4- to 3/8-inch-wide joints to install sealant.

G. Isolate perimeter of gypsum board applied to non-load-bearing partitions at structural abutments. Provide 1/4- to 1/2-inch-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.

H. Attachment to Steel Framing: Attach panels so leading edge or end of each panel is attached to open (unsupported) edges of stud flanges first.

I. STC-Rated Assemblies: Seal construction at perimeters, behind control joints, and at openings and penetrations with a continuous bead of acoustical sealant. Install acoustical sealant at both faces of partitions at perimeters and through penetrations. Comply with ASTM C919 and with manufacturer's written instructions for locating edge trim and closing off sound-flanking paths around or through assemblies, including sealing partitions above acoustical ceilings.

J. Install sound attenuation blankets before installing gypsum panels unless blankets are readily installed after panels have been installed on one side.

3.3 INSTALLATION OF INTERIOR GYPSUM BOARD

A. Install interior gypsum board in the following locations:

1. Wallboard Type: As indicated on Drawings.
2. Type X: As indicated on Drawings.
3. Ceiling Type: As indicated on Drawings.
4. Abuse-Resistant Type: As indicated on Drawings.
5. Mold-Resistant Type: As indicated on Drawings.

B. Single-Layer Application:

1. On ceilings, apply gypsum panels before wall/partition board application to greatest extent possible and at right angles to framing unless otherwise indicated.

2. On partitions/walls, apply gypsum panels vertically (parallel to framing) or horizontally (perpendicular to framing) unless otherwise indicated or required by fire-resistance-rated assembly, and minimize end joints.

    a. Stagger abutting end joints not less than one framing member in alternate courses of panels.
    b. At stairwells and other high walls, install panels horizontally unless otherwise indicated or required by fire-resistance-rated assembly.

3. On Z-shaped furring members, apply gypsum panels vertically (parallel to framing) with no end joints. Locate edge joints over furring members.
4. Fastening Methods: Apply gypsum panels to supports with steel drill screws.

C. Multilayer Application:

1. On ceilings, apply gypsum board indicated for base layers before applying base layers on walls/partitions; apply face layers in same sequence. Apply base layers at right angles to framing members and offset face-layer joints one framing member, 16 inches minimum, from parallel base-layer joints, unless otherwise indicated or required by fire-resistance-rated assembly.
2. On partitions/walls, apply gypsum board indicated for base layers and face layers vertically (parallel to framing) with joints of base layers located over stud or furring member and face-layer joints offset at least one stud or furring member with base-layer joints unless otherwise indicated or required by fire-resistance-rated assembly. Stagger joints on opposite sides of partitions.
3. On Z-shaped furring members, apply base layer vertically (parallel to framing) and face layer either vertically (parallel to framing) or horizontally (perpendicular to framing) with vertical joints offset at least one furring member. Locate edge joints of base layer over furring members.
4. Fastening Methods: Fasten base layers and face layers separately to supports with screws.

D. Laminating to Substrate: Where gypsum panels are indicated as directly adhered to a substrate (other than studs, joists, furring members, or base layer of gypsum board), comply with gypsum board manufacturer's written instructions and temporarily brace or fasten gypsum panels until fastening adhesive has set.

E. Curved Surfaces:

1. Install panels horizontally (perpendicular to supports) and unbroken, to extent possible, across curved surface plus 12-inch-long straight sections at ends of curves and tangent to them.
2. For double-layer construction, fasten base layer to studs with screws 16 inches o.c. Center gypsum board face layer over joints in base layer, and fasten to studs with screws spaced 12 inches o.c.

3.4 INSTALLATION OF EXTERIOR GYPSUM PANELS FOR CEILINGS AND SOFFITS

A. Apply panels perpendicular to supports, with end joints staggered and located over supports.

1. Install with 1/4-inch open space where panels abut other construction or structural penetrations.
2. Fasten with corrosion-resistant screws.

3.5 INSTALLATION OF TILE BACKING PANELS

A. Glass-Mat, Water-Resistant Backing Panels: Comply with manufacturer's written installation instructions and install at locations indicated to receive tile. Install with 1/4-inch gap where panels abut other construction or penetrations.

B. Cementitious Backer Units: ANSI A108.11, at locations indicated to receive tile.

C. Water-Resistant Backing Board: Install where indicated with 1/4-inch gap where panels abut other construction or penetrations.

D. Where tile backing panels abut other types of panels in same plane, shim surfaces to produce a uniform plane across panel surfaces.

3.6 INSTALLATION OF TRIM ACCESSORIES

A. General: For 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.

B. Control Joints: Install control joints according to ASTM C840 and in specific locations approved by Architect for visual effect.

C. Interior Trim: Install in the following locations:

1. Cornerbead: Use at outside corners.
2. LC-Bead: Use at exposed panel edges.

3. L-Bead: Use where indicated on Drawings.
4. U-Bead: Use at exposed panel edges.
5. Curved-Edge Cornerbead: Use at curved openings.

3.7 FINISHING OF GYPSUM BOARD

A. General: Treat gypsum board joints, interior angles, edge trim, control joints, penetrations, fastener heads, surface defects, and elsewhere as required to prepare gypsum board surfaces for decoration. Promptly remove residual joint compound from adjacent surfaces.

B. Prefill open joints and damaged surface areas.

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

D. Gypsum Board Finish Levels: Finish panels to levels indicated below and according to ASTM C840:

1. Level 1: Ceiling plenum areas, concealed areas, and where indicated.
2. Level 2: Panels that are substrate for tile.
3. Level 4: At panel surfaces that will be exposed to view unless otherwise indicated.

    a. Primer and its application to surfaces are specified in Section 09 91 23 "Interior Painting."

4. Level 5: At curved walls and other curved surfaces.

    a. Primer and its application to surfaces are specified in Section 09 91 23 "Interior Painting."

3.8 PROTECTION

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

B. Protect installed products from damage from weather, condensation, direct sunlight, construction, and other causes during remainder of the construction period.

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

1. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
2. Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

END OF SECTION 09 29 00

SECTION 09 30 00 – TILE SETTING MATERIALS AND ACCESSORIES

PART 1 - GENERAL

PART 2 - GENERAL

SCHEDULE 0 - SECTION INCLUDES

PRODUCT DATA SHEET 0 - Finishing and edge-protection profiles for walls and countertops.

SCHEDULE 1 - RELATED SECTIONS

PRODUCT DATA SHEET 0 - Section 05 55 00 - Metal Stair Treads and Nosings.

PRODUCT DATA SHEET 1 - Section 06 10 00 - Rough Carpentry.

PRODUCT DATA SHEET 2 - Section 07 90 00 - Joint Protection.

PRODUCT DATA SHEET 3 - Section 09 28 13 - Cementitious Backing Boards.

PRODUCT DATA SHEET 4 - Section 09 30 00 - Tiling.

PRODUCT DATA SHEET 5 - Section 10 26 13 - Corner Guards.

SCHEDULE 2 - REFERENCES

PRODUCT DATA SHEET 0 - CSA B79-08: Floor, Area, and Shower Drains, and Cleanouts for Residential Construction.

PRODUCT DATA SHEET 1 - IAPMO IGC 195: Interim Guide Criteria for Floor Drain with Integrated Bonding Flange.

PRODUCT DATA SHEET 2 - Tile Council of North America (TCNA) Handbook for Ceramic Tile Installation.

PRODUCT DATA SHEET 3 - Terrazzo, Tile and Marble Association of Canada (TTMAC) Specification Guide 09300 Tile Installation Manual.

PRODUCT DATA SHEET 4 - American National Standard Specifications for the installation of ceramic tile A108 / A118 / A136.1.

SCHEDULE 3 - SUBMITTALS

PRODUCT DATA SHEET 0 - Submit under provisions of Section 01 30 00.

PRODUCT DATA SHEET 1 - Product Data: Manufacturer's data sheets on each product to be used, including:
2.1 Preparation instructions and recommendations.
2.2 Storage and handling requirements and recommendations.
2.3 Installation methods.

PRODUCT DATA SHEET 2 - Verification Samples: For each finish product specified, two samples, minimum size 6 inches (150 mm) long, representing actual product, color, and finish.

PRODUCT DATA SHEET 3 - Manufacturer's Certificates: Certify products meet or exceed specified requirements.

PRODUCT DATA SHEET 4 - Warranty document showing duration and scope to be submitted with product submittals.

SCHEDULE 4 - QUALITY ASSURANCE

PRODUCT DATA SHEET 0 - Installer Qualifications: Company specializing in performing the work of this section with minimum five years' experience.

PRODUCT DATA SHEET 1 - Source Limitations for Setting Materials and Accessories: Obtain product of a uniform quality for each application condition from a single manufacturer.

PRODUCT DATA SHEET 2 - Mock-Up: Provide a mock-up for evaluation of surface preparation techniques and application workmanship.

2.1 Finish areas designated by Architect.

2.2 Do not proceed with remaining work until workmanship, color, and sheen are approved by Architect.

2.3 Refinish mock-up area as required to produce acceptable work.

PRODUCT DATA SHEET 3 - Preinstallation Conference: Conduct conference at the Project site.

2.1 Convene one week prior to commencing work of this section.

2.2 Require attendance of installation material manufacturer, tile supplier, tile installer and installers of related work. Review installation procedures and coordination required with related work.

2.3 Meeting agenda includes but is not limited to:

A. Surface preparation.
B. Tile and installation material compatibility.
C. Manufacturer and installer warranty duration and scope covered by warranty.
D. Edge protection, transition, and pre-fabricated movement joint profiles.
E. Waterproofing techniques.
F. Crack isolation techniques.

SCHEDULE 5 - DELIVERY, STORAGE, AND HANDLING

PRODUCT DATA SHEET 0 - Store products in manufacturer's unopened packaging until ready for installation.

PRODUCT DATA SHEET 1 - Protect materials from exposure to moisture. Do not deliver until after wet work is complete and dry.

PRODUCT DATA SHEET 2 - Store materials in a dry, warm, ventilated weathertight location.

SCHEDULE 6 - PROJECT CONDITIONS

PRODUCT DATA SHEET 0 - Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.

SCHEDULE 7 - WARRANTY

PRODUCT DATA SHEET 0 - Provide sample warranty during submittal process.

PRODUCT DATA SHEET 1 - Acknowledge warranty duration and scope covered by warranty.

PRODUCT DATA SHEET 2 - Coordinate Work with other operations and installation of floor finish materials to avoid damage to installed materials.

PRODUCT DATA SHEET 3 - Obtain products of a uniform quality for each premanufactured tile profile, and mortar and waterproofing and uncoupling membrane from a single manufacturer, to maintain the installation system and provide multi-product warranty from selected manufacturer.

SCHEDULE 8 - COORDINATION

PRODUCT DATA SHEET 0 - Coordinate Work with other operations and installation of floor finish materials to avoid damage to installed materials.

PART 3 - PRODUCTS

SCHEDULE 0 - MANUFACTURERS

PRODUCT DATA SHEET 0 - Acceptable Manufacturer: Schluter Systems L.P., which is located at: 194 Pleasant Ridge Road.; Plattsburgh, NY 12901-5841; ASD Toll Free Tel: 800-472-4588; Fax: 800-477-9783; Email:specassist@schluter.com; Web:www.schluter.com/schluter-us/en_US/.

PRODUCT DATA SHEET 1 - Acceptable Manufacturer: Schluter Systems (Canada) Inc., 21100 Chemin Ste-Marie, Ste-Anne-de-Bellevue, QC H9X 3Y8. Tel: (800) 667-8746. Fax (514) 336-2410. Email:specassist@schluter.com; Web:www.schluter.ca.

PRODUCT DATA SHEET 2 - Requests for substitutions will be considered in accordance with provisions of Section 01 60 00.

SCHEDULE 1 - FINISHING AND EDGE-PROTECTION PROFILES FOR WALLS AND COUNTERTOPS

PRODUCT DATA SHEET 0 - Schluter-QUADEC: Profile with square visible surface, integrated trapezoid-perforated anchoring leg, and integrated grout joint spacer.
3.1 Corners: Matching inside corners.
3.2 Corners: Matching outside corners.
3.3 Corners: Internal connectors.
3.4 Profile Height: As required to coordinate with tile selection and setting system.
3.5 Material and Finish:
A. EB: Brushed Stainless Steel Type 304 equals V2A.

PART 4 - EXECUTION

SCHEDULE 0 - EXAMINATION

PRODUCT DATA SHEET 0 - Do not begin installation until substrates have been properly prepared.

PRODUCT DATA SHEET 1 - If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

SCHEDULE 1 - PREPARATION

PRODUCT DATA SHEET 0 - Clean surfaces thoroughly prior to installation.

PRODUCT DATA SHEET 1 - Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

SCHEDULE 2 - INSTALLATION

PRODUCT DATA SHEET 0 - Install in accordance with manufacturer's instructions.

SCHEDULE 3 - PROTECTION

PRODUCT DATA SHEET 0 - Protect installed products until completion of project.

PRODUCT DATA SHEET 1 - Touch-up, repair or replace damaged products before Substantial Completion.

END OF SECTION

SECTION 09 51 13 – ACOUSTICAL PANEL CEILINGS

PART 1 - GENERAL

1.2 RELATED DOCUMENTS

A. Drawings and general conditions of Contract, including General and Supplementary Conditions and Divisions-1 Specification sections apply to work of this section.

1.3 SUMMARY

A. Section Includes
1. Acoustical ceiling panels
2. Exposed grid suspension system
3. Wire hangers, fasteners, main runners, cross tees, and wall angle moldings
4. Perimeter Trim

B. Related Sections
1. Section 09 50 00 - Ceilings
2. Section 09 51 14 – Acoustical Fabric Faced Panel Ceilings
3. Section 09 51 23 – Acoustical Tile Ceilings
4. Section 09 53 00 - Acoustical Ceiling Suspension Assemblies
5. Section 09 20 00 - Plaster and Gypsum Board
6. Section 01 81 13 - Sustainable Design Requirements
7. Section 01 81 19 - Indoor Air Quality Requirements
8. Section 02 42 00 - Removal and Salvage of Construction Materials
9. Division 23 - HVAC Air Distribution
10. Division 26 - Electrical

C. ALTERNATES
1. Prior Approval: Unless otherwise provided for in the Contract documents, proposed product substitutions may be submitted no later than TEN (10) working days prior to the date established for receipt of bids. Acceptability of a proposed substitution is contingent upon the Architect's review of the proposal for acceptability and approved products will be set forth by the Addenda. If included in a Bid are substitute products that have not been pre-approved by the architect and included in the Addenda, the originally specified products shall be provided without additional compensation.
2. Submittals that do not provide adequate data for the product evaluation will not be considered. The proposed substitution must meet all

requirements of this section, including but not necessarily limited to, the following: Single source materials suppliers; Underwriters' Laboratories Classified Acoustical performance; Panel design, size, composition, color, and finish; Suspension system component profiles and sizes; Compliance with the referenced standards.

1.4 REFERENCES

A. American Society for Testing and Materials (ASTM):
   1. ASTM A 1008 Standard Specification for Steel, Sheet, Cold Rolled, Carbon, Structural, High-Strength Low-Alloy and High-Strength Low-Alloy with Improved Formability
   2. ASTM A 641 Standard Specification for Zinc-Coated (Galvanized) Carbon Steel Wire
   3. ASTM A 653 Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process
   4. ASTM C 423 Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method
   5. ASTM C 635 Standard Specification for Metal Suspension Systems for Acoustical Tile and Lay-in Panel Ceilings
   6. ASTM C 636 Recommended Practice for Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-in Panels
   7. ASTM D 3273 Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber
   8. ASTM E 84 Standard Test Method for Surface Burning Characteristics of Building Materials
   9. ASTM E 580 Installation of Metal Suspension Systems in Areas Requiring Moderate Seismic Restraint
   10. ASTM E 1111 Standard Test Method for Measuring the Interzone Attenuation of Ceilings Systems
   11. ASTM E 1414 Standard Test Method for Airborne Sound Attenuation Between Rooms Sharing a Common Ceiling Plenum
   12. ASTM E 1264 Classification for Acoustical Ceiling Products

B. International Building Code

C. ASHRAE Standard 62.1-2004, Ventilation for Acceptable Indoor Air Quality

D. NFPA 70 National Electrical Code

E. ASCE 7 American Society of Civil Engineers, Minimum Design Loads for Buildings and Other Structures

F. International Code Council-Evaluation Services - AC 156 Acceptance Criteria for Seismic Qualification Testing of Non-structural Components

G. International Code Council-Evaluation Services Report - Seismic Engineer Report
   1. ESR 1308 - Armstrong Suspension Systems

H. International Association of Plumbing and Mechanical Officials - Seismic Engineer Report
   1. 0244 - Armstrong Single Span Suspension System

I. California Department of Public Health CDPH/EHLB/Standard Method v1.2 2017

J. LEED - Leadership in Energy and Environmental Design is a set of rating systems for the design, construction, operation, and maintenance of green buildings.

K. International Well Building Standard

L. Mindful Materials

M. Living Building Challenge

N. U.S. Department of Agriculture BioPreferred program (USDA BioPreferred).

O. Clean Rooms up to ISO Class 5 (Class 100)

1.5 SYSTEM DESCRIPTION

A. Continuous/Wall-to-wall

1.6 SUBMITTALS

A. Product Data: Submit manufacturer's technical data for each type of acoustical ceiling unit and suspension system required.

B. Samples: Minimum 6-inch x 6-inch samples of specified acoustical panel; 8-inch-long samples of exposed wall molding and suspension system, including main runner and 4-foot cross tees.

C. Shop Drawings: Layout and details of acoustical ceilings show locations of items that are to be coordinated with or supported by the ceilings.

D. Acoustical Certifications: Manufacturer's certifications that products comply with specified requirements, including laboratory reports showing compliance with specified tests and standards. For acoustical performance, each carton of material must carry an approved independent laboratory classification, such as Underwriter’s Laboratory (UL), of NRC, CAC, and AC.
   1. If the material supplied by the acoustical subcontractor does not have an independent laboratory classification of acoustical performance on every carton, subcontractor shall be required to send material from every production run appearing on the job to an independent or NVLAP approved laboratory for testing, at the architect's or owner's discretion. All products not conforming to manufacturer's current published values must be removed, disposed of, and replaced with complying product at the expense of the Contractor performing the work.

1.7 SUSTAINABLE MATERIALS

A. Transparency: Manufacturers will be given preference when they provide documentation to support sustainable requirements for the following: Material ingredient transparency, Removal of Red List Ingredients per LBCV3, Life Cycle impact information, Low-Emitting Materials, and Clean Air performance.
   1. Health Product Declaration (HPD). The end use product has a published, complete Health Product Declaration with disclosure at a minimum of 1000ppm of known hazards in compliance with the Health Product Declaration Open Standard.
   2. Declare Label. The end use product has a published Declare label by the International Living Future Institute with disclosure of 100 ppm with a designation of Red List Free or Compliant (less than 1% proprietary ingredients).
   3. Low Emitting products with VOC emissions data. Preference will be given to manufacturers that can provide emissions data showing their products meet any of the following: CDPH/EHLB/Standard Method v1.2-2017; Indoor Air Quality Certified to SCS-105 v4.2-2023.
   4. Life cycle analysis. Products that have communicated lifecycle data through Environmental Product Declarations (EPDs) will be preferred.
   5. Biobased products derived from plants and other renewable materials will be given preference. Provide USDA Certified Biobased Product certification.
   6. End of Life Programs/Recycling: Where applicable, manufacturers that provide the option for recycling of their products into new products at end-of-life through take-back programs will be preferred.
   7. Products meeting LEED V4 requirements including:
      a. Storage & Collection of Recyclables
      b. Construction and Demolition Waste Management Planning
      c. Building Life-Cycle Impact Reduction

d. Building Product Disclosure and Optimization Environmental Product Declarations
e. Building Product Disclosure and Optimization Sourcing of Raw Materials
f. Building Product Disclosure and Optimization Material Ingredients
g. Construction and Demolition Waste Management

1.8 QUALITY ASSURANCE

A. Single-Source Responsibility: Provide acoustical panel units and grid components by a single manufacturer to ensure fit and function.

B. Installer Qualifications: Company specializing in performing specified work type, a minimum of three years of documented experience, and approved by the manufacturer.

C. Fire Performance Characteristics: Identify acoustical ceiling components with appropriate markings of applicable testing and inspecting organization.

D. Surface Burning Characteristics: Tested per ASTM E 84 and complying with ASTM E 1264 Classification.

1.9 DELIVERY, STORAGE, AND HANDLING

A. Deliver acoustical ceiling units to project site in original, unopened packages and store them in a fully enclosed space where they will be protected against damage from moisture, direct sunlight, surface contamination, and other causes.

B. Before installing acoustical ceiling units, permit them to reach room temperature and a stabilized moisture content.

C. Handle acoustical ceiling units carefully to avoid chipping edges or damaging units in any way.

1.10 PROJECT CONDITIONS

A. Space Enclosure:
1. HumiGuard Plus Ceilings: Building areas to receive ceilings shall be free of construction dust and debris. Products with HumiGuard Plus performance and hot dipped galvanized steel, aluminum or stainless-steel suspension systems can be installed up to 120°F (49°C) and in spaces before the building is enclosed, where HVAC systems are cycled or not operating. Cannot be used in exterior applications where standing

water is present or where moisture will come in direct contact with the ceiling.

1.11 ALTERNATE CONSTRUCTION WASTE DISPOSAL

A. Ceiling material being reclaimed must be kept dry and free from debris.

B. Before disposing of ceilings, contact the Armstrong Recycling Center at 877-276-7876, select option #1 then #8 to review with a consultant the condition and location of building where the ceilings will be removed. The consultant will verify the condition of the material and that it meets the Armstrong requirements for recycling. The Armstrong consultant will help facilitate the process to recycle the ceiling.

C. Recycling may qualify for LEED Credits:
   1. LEED 2009 - Category 4: Material and Resources (MR)
      a. Credit MRc2: Construction Waste Management
   2. LEEDv4 - MRp2
      a. Construction Waste Management Planning Qualifies as a material stream (non-structural) targeted for diversion. Ceilings will be source-separated and diverted through the Armstrong Ceiling Recycling Program.
   3. LEEDv4-MRc5
      a. Option 1: Divert ceilings to qualify for one of the 3 material streams (50%)
      b. Option 2: Divert ceilings to qualify for one of the 4 material streams (75%)

1.12 WARRANTY

A. Acoustical Panel: Submit a written warranty executed by the manufacturer, agreeing to repair or replace panels that fail within the warranty period. Failures include, but are not limited to the following:
   1. Acoustical Panels with HumiGuard® Max and HumiGuard® Plus performance: sagging and warping
   2. Acoustical panels with BioBlock® performance: growth of mold and mildew
   3. Grid System: rusting and manufacturer's defects.

B. Warranty Period:
   1. Ceiling System: Thirty (30) years from date of substantial completion

C. The Warranty shall not deprive the Owner of other rights the Owner may have under other provisions of the Contract Documents and will be in addition to and

run concurrent with other warranties made by the Contractor under the requirements of the Contract Documents.

1.13 MAINTENANCE

A. Extra Materials: Deliver extra materials to Owner. Furnish extra materials described below that match products installed. Packaged with protective covering for storage and identified with appropriate labels.
   1. Acoustical Ceiling Units: Furnish quality of full-size units equal to 5.0 percent of amount installed.
   2. Exposed Suspension System Components: Furnish quantity of each exposed suspension component equal to 2.0 percent of amount installed.

PART 2 – PRODUCTS

2.1 MANUFACTURERS

A. Ceiling Panels:
   1. Armstrong World Industries, Inc.

B. Suspension Systems:
   1. Armstrong World Industries, Inc.

2.2 ACOUSTICAL CEILING UNITS

A. Acoustical Panel Ceilings: ACT1
   1. Surface Texture: Smooth Texture
   2. Composition: Mineral Fiber
   3. Color: White
   4. Size: 24 in x 24 in
   5. Thickness: 1”
   6. Edge Profile: Square Tegular 15/16”
   7. Noise Reduction Coefficient (NRC) ASTM C 423 Classified w/ UL label on product carton: 0.85
   8. Ceiling Attenuation Class (CAC): ASTM E1414/E1414M; Classified with UL label on product carton: 35.
   9. Articulation Class (AC): ASTM E 1111; Classified with UL label on product carton: 170.
   10. Flame Spread: ASTM E 1264; Class A
   11. Light Reflectance (LR) White Panel: ASTM E 1477; 0.85
   12. Dimensional Stability: HumiGuard Plus
   13. Recycle Content: Up to 76% total recycled content. (Total recycled content: pre-consumer, post-consumer and post-industrial)

14. Material Ingredient Transparency: Health Product Declaration (HPD); Declare Label
15. Life Cycle Assessment: Third Party Certified Environmental Product Declaration (EPD)
16. Indoor Air Quality Certified to SCS-105 v4.2-2023.
17. USDA Certified Biobased Product
18. Basis of Design: Calla, item number 2822, as manufactured by Armstrong World Industries, Inc.
19. Substitutions: Refer to Alternates in Part 1

B. Acoustical Panel Ceilings: ACT2
1. Surface Texture: Fine Texture
2. Composition: Mineral Fiber
3. Color: White
4. Size: 24 in x 24 in
5. Thickness: 1”
6. Edge Profile: Vector
7. Noise Reduction Coefficient (NRC) ASTM C 423 Classified w/ UL label on product carton: 0.80
8. Ceiling Attenuation Class (CAC): ASTM E1414/E1414M; Classified with UL label on product carton: 33.
9. Articulation Class (AC): ASTM E 1111; Classified with UL label on product carton: 170.
10. Flame Spread: ASTM E 1264; Class A
11. Light Reflectance (LR) White Panel: ASTM E 1477; 0.85
12. Dimensional Stability: HumiGuard Plus
13. Recycle Content: Up to 75% total recycled content. (Total recycled content: pre-consumer, post-consumer and post-industrial)
14. Material Ingredient Transparency: Health Product Declaration (HPD); Declare Label
15. Life Cycle Assessment: Third Party Certified Environmental Product Declaration (EPD)
16. Indoor Air Quality Certified to SCS-105 v4.2-2023.
17. USDA Certified Biobased Product
18. Basis of Design: Calla, item number 2814, as manufactured by Armstrong World Industries, Inc.
19. Substitutions: Refer to Alternates in Part 1

2.3 METAL SUSPENSION SYSTEMS

A. Components: Main beams and cross tees, base metal, and end detail, fabricated from commercial quality hot dipped galvanized steel complying with ASTM A 653. Main beams and cross tees are double-web steel construction exposed flange design. Exposed surfaces chemically cleansed, capping

prefinished galvanized steel in baked polyester paint. Main beams and cross tees shall have rotary stitching.

1. Structural Classification: ASTM C 635 Intermediate or Heavy Duty.
2. Color: White or match the actual color of the selected ceiling tile, unless noted otherwise.
3. Sustainability: Environmental Product Declaration (EPD), Health Product Declaration (HPD)
4. Basis of Design (select one to work with specified ceiling):
   a. Match existing.
5. Substitutions: Refer to Alternates in Part 1.

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

C. Wire for Hangers and Ties: ASTM A 641, Class 1 zinc coating, soft annealed, with a yield stress load of at least time three design load, but not less than 12 gauge.

D. Edge Moldings as manufactured by Armstrong World Industries, Inc.

E. AXIOM Trim & Transitions as manufactured by Armstrong World Industries, Inc. www.armstrongceilings.com/axiom

F. Accessories as manufactured by Armstrong World Industries, Inc.

PART 3 – EXECUTION

3.1 EXAMINATION

A. Do not proceed with installation until all wet work such as concrete, terrazzo, plastering and painting has been completed and thoroughly dried out, unless expressly permitted by manufacturer's printed recommendations. (Exception: HumiGuard Max Ceilings)

3.2 PREPARATION

A. Measure each ceiling area and establish layout of acoustical units to balance border widths at opposite edges of each ceiling. Avoid use of less than half width units at borders and comply with reflected ceiling plans. Coordinate panel layout with mechanical and electrical fixtures.

B. Coordination: Furnish layouts for preset inserts, clips, and other ceiling anchors whose installation is specified in other sections.

1. Furnish concrete inserts and similar devices to other trades for installation well in advance of time needed for coordination of other work.

3.3 INSTALLATION

A. Follow manufacturer installation instructions.

B. Install suspension system and panels in accordance with the manufacturer's instructions, and in compliance with ASTM C 636 and with the authorities having jurisdiction.

C. Suspend main beam from overhead construction with hanger wires spaced 4 feet on center along the length of the main runner. Install hanger wires plumb and straight.

D. Install wall moldings at intersection of suspended ceiling and vertical surfaces. Miter corners where wall moldings intersect or install corner caps.

E. For reveal edge panels: Cut and reveal or rabbet edges of ceiling panels at border areas and vertical surfaces.

F. Install acoustical panels in coordination with suspended system, with edges resting on flanges of main runner and cross tees. Cut and fit panels neatly against abutting surfaces. Support edges by wall moldings.

3.4 ADJUSTING AND CLEANING

A. Replace damaged and broken panels.

B. Clean exposed surfaces of acoustical ceilings, including trim, edge moldings, and suspension members. Comply with manufacturer's instructions for cleaning and touch up of minor finish damage. Remove any ceiling products that cannot be successfully cleaned and or repaired. Replace with attic stock or new product to eliminate evidence of damage.

END OF SECTION 09 51 13

SECTION 09 62 63 – Stainless Steel Wall Base

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

Text. PART 1 – GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

A. This Section includes stainless steel wall base and installation accessories of the following type:
   1. Stainless steel cove base.
   2. Stainless steel straight base.

1.03 SUBMITTALS

A. Product Data: Submit manufacturer's product data for each type of wall base specified, including the following:
   1. Installation accessories.
   2. Installation instructions.

B. Shop Drawings: Submit shop drawings showing mounting details. Include corner details showing pre-formed corners, and end conditions.

C. Samples: Submit samples to the Architect for review prior to [constructing job-site mock-ups,] delivering materials to the site or commencing the work in this Section.
   1. Stainless Steel Base: Submit full size samples, minimum 4 inches in length, of each type of stainless-steel base required with specified finish.

1.04 DELIVERY, STORAGE AND HANDLING

A. Packing and Shipping: Deliver materials to site in manufacturer's original unopened packaging with labels intact. Protect finished surfaces with removable wrapping or protective plastic film which will not bond when exposed to sunlight.

B. Storage: Store wall base in manufacturer’s original packaging, off ground and under cover away from direct sunlight, protected from weather, extreme temperature, moisture or other damage.

C. Handling: Handle materials so that surfaces are protected. Prevent distortion or damage to fabricated pieces.

1.05 PROJECT/SITE CONDITIONS

A. Environmental Requirements: Areas to receive wall base shall be enclosed with HVAC in operation and maintaining temperatures within range expected during building occupancy to avoid thermal dimensional change in lengths of material after installation.

1.06 SCHEDULING AND SEQUENCING

A. Coordination: Coordinate installation of stainless-steel base with associated wall coverings, corner guards, ceramic tile floor and wall finishes and other adjacent floor and wall finishes.

PART 2 – PRODUCTS

2.01 MANUFACTURER

A. Basis-Of-Design Product: Inpro Corporation, IPC Door and Wall Protection Systems PO Box 406 Muskego, WI 53150 USA; Telephone: 800.222.5556, Fax: 888.715.8407, Website: www.inprocorp.com.
   1. Submit comparable products of one the following for approval by architect:
      a. Insert name of manufacture of comparable product
      b. Submit requests for substitution in accordance with Instructions to Bidders and Division 01 General Requirements
      c. Provide specified product; Owner will not consider substitution requests.

2.02 MATERIALS

A. Stainless Steel Sheet: ASTM A240, Type 430 or 304.
   1. Gauge: 18 gauge.
   2. Finish: No. 4 Brushed in accordance with ASTM A480.

2.03 MANAUFACTURED WALL BASE

A. *Stainless Steel Wall Bases - Type 304*
   1. *6-inch Angled Base over Coved curb*
   2. *6-inch Straight Base*
B. *Preformed Corner Units: Provide preformed inside and outside corner units.*

2.04 INSTALLATION ACCESSORIES

A. Adhesive: Manufacturer’s standard polyurethane adhesive supplied in 10.5 oz or 29.0 oz tubes.
B. Adhesive: PL Premium Adhesive

2.05 FABRICATION

A. Stainless steel wall base and corners shall be factory formed from stainless steel sheet with directional polish grain oriented parallel with length.
   1. Edges shall be free of burrs.

2. Standard Length: 8’-0”

3. Fabricate exposed ends with filler to match profile of cover base.
4. Preformed corners shall be 90 degrees, or as otherwise required to suite corner degree indicated on Drawings. Fabricate preformed corners with minimum 4-inch legs.

PART 3 – EXECUTION

3.01 EXAMINATION

A. Verification of Conditions: Examine subsurfaces to receive Work and report detrimental conditions in writing to Architect. Commencement of Work will be construed as acceptance of subsurfaces.
   1. Painted walls shall be dry and thoroughly cured prior to application of stainless-steel wall base.
   2. Perform adhesion test on painted drywall or plaster walls to receive stainless steel wall base in accordance with manufacturer's installation instructions to verify proper adhesion.
   3. Verify floors within areas where stainless steel wall base is to be installed are level to within 1/8 inch in 10'-0".

B. Coordination: Coordinate with other work which affects, connects with, or will be concealed by this Work.
   1. Coordinate installation of base with application of wall finishes.
   2. Where stainless steel base is installed after application of wall finish, verify application is completed and ready for installation of base.
   3. Install wall base prior to application of finishes installed after installation of stainless-steel wall base, such as wall tile, stainless steel wall sheeting, FRP, etc.

3.02 PREPARATION

A. Surface Prep: Prior to installation, clean the substrate to remove dust, debris and loose particles. Ensure the substrate is sound and per project plans.
B. Acclimate product in temperatures between 65°F and 80°F [18°-27°C] and a humidity level less than 80% 24 hours in advance of installation.
C. The area of installation must temperature and humidity controlled for at least 48 hours after installation.

3.03 INSTALLATION

A. Adhesive Installation: Install stainless steel wall base with adhesive in strict accordance with manufacturer's printed installation instructions.
B. Install base accurately placed in proper location, level, and in proper alignment with adjoining work and applied finishes.
   1. Fit field connections accurately together to form hairline joints.
C. Where necessary to provide secure attachment at corners, end terminations,

or where higher abuse is anticipated, supplement adhesive installation with two (2) countersunk #10 stainless steel screws (installer supplied) placed in pre-drilled and countersunk holes located within 1 inch of each exposed end or corner. Set screw heads flush in countersunk hole.

D. Field Fabricated Corners: Where preformed corners are not utilized, field fabricate corners by V-notching back of base to 1/2 depth maximum of thickness of material and bend to form tightly to corner substrate.

3.04 DAMAGE AND REPAIR

A. Upon completion of the installation, visually check exposed surfaces of the work of this Section and touch up scratches and damaged surfaces by field polishing so they are completely invisible to the unaided eye from a distance of five feet.

3.05 CLEANING

A. Upon completion of installation of stainless-steel walls base, promptly clean exposed surfaces in accordance with recommendations of the stainless-steel base manufacturer to remove all traces of dust, dirt, adhesive, and other foreign materials.

B. During the course of the Work and on completion, remove and dispose of excess materials, equipment and debris away from premises. Leave Work in clean condition.

END OF SECTION 09 62 63

SECTION 09 65 00 – RESILIENT FLOORING

PART 1 - GENERAL

1.1 GENERAL PROVISIONS

A. Attention is directed to the CONTRACT AND GENERAL CONDITIONS and all Sections within DIVISION 01 - GENERAL REQUIREMENTS which are hereby made a part of this Section of the Specifications.

1.2 DESCRIPTION OF WORK

A. Work Included: Provide labor, materials, and equipment necessary to complete the work of this Section, including but not limited to the following:
   1. Resilient sheet flooring for commercial traffic.
   2. Resilient sheet flooring for commercial traffic with pre-applied adhesive.
   3. Resilient stair treads (one-piece nosing, tread, and riser).
   4. Resilient stair accessories.
   5. Substrate preparation.

B. Related Work: The following items are not included in this Section and are specified under the designated Sections:

1.	Section 033000	CAST-IN-PLACE CONCRETE for concrete substrate; slab surface tolerances; vapor retarder for applications on or below grade; requirement for 83/90-degree riser and tread edge angle for stair tread and nosings.
2.	Section 055100	METAL STAIRS AND RAILINGS; requirement for 83/90-degree riser and tread edge angle for stair tread and nosings.
3.	Section 061000	ROUGH CARPENTRY for plywood substrate and surface tolerances.

C. References (Industry Standards):
   1. American National Standards Institute (ANSI):

a.	ANSI ESD STM97.2	Floor Materials and Footwear – Voltage Measurement on a Person

   2. ASTM International (ASTM):

a.	ASTM C518	Standard Test Method for Steady State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus
b.	ASTM D412	Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers—Tension
c.	ASTM D2047	Standard Test Method for Static Coefficient of Friction of Polish-Coated Floor Surfaces as Measured by the James Machine
d.	ASTM D2240	Standard Test Method for Rubber Property—Durometer Hardness
e.	ASTM D3389	Standard Test Method for Coated Fabrics Abrasion Resistance (Rotary Platform Abrader)
f.	ASTM D6499	Standard Test Method for the Immunological Measurement of Antigenic Protein in Hevea Natural Rubber (HNR) and its Products

g.	ASTM E84	Standard Test Method for Surface Burning Characteristics of Building Materials
h.	ASTM E492	Standard Test Method for Laboratory Measurement of Impact Sound Transmission Through Floor-Ceiling Assemblies Using the Tapping Machine
i.	ASTM E648	Standard Test Method for Critical Radiant Flux of Floor Covering Systems Using a Radiant Heat Energy Source
j.	ASTM E662	Standard Test Method for Specific Optical Density of Smoke Generated by Solid Materials
k.	ASTM E1745	Standard Specification for Water Vapor Retarders Used in Contact with Soil or Granular Fill under Concrete Slabs
l.	ASTM E2179	Standard Test Method for Laboratory Measurement of the Effectiveness of Floor Coverings in Reducing Impact Sound Transmission Through Concrete Floors
m.	ASTM E2180	Standard Test Method for Determining the Activity of Incorporated Antimicrobial Agent(s) in Polymeric or Hydrophobic Materials
n.	ASTM F386	Standard Test Method for Thickness of Resilient Flooring Materials Having Flat Surfaces
o.	ASTM F710	Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring
p.	ASTM F925	Standard Test Method for Resistance to Chemicals of Resilient Flooring
q.	ASTM F970	Standard Test Method for Measuring Recovery Properties of Floor Coverings after Static Loading
r.	ASTM F1482	Standard Practice for Installation and Preparation of Panel Type Underlayments to Receive Resilient Flooring
s.	ASTM F1514	Standard Test Method for Measuring Heat Stability of Resilient Flooring by Color
v.	ASTM F1515	Standard Test Method for Measuring Light Stability of Resilient Flooring by Color Change
w.	ASTM F1859	Standard Specification for Rubber Sheet Floor Covering Without Backing
x.	ASTM F1860	Standard Specification for Rubber Sheet Floor Covering with Backing
z.	ASTM F2055	Standard Test Method for Size and Squareness of Resilient Floor Tile by Dial Gage Method
aa.	ASTM F2169	Standard Specification for Resilient Stair Treads
bb.	ASTM F2170	Standard Test Method for Determining Relative Humidity in Concrete Floor Slabs Using in situ Probes
cc.	ASTM F2199	Standard Test Method for Determining Dimensional Stability and Curling Properties of Resilient Flooring after Exposure to Heat
dd.	ASTM F2753	Standard Practice to Evaluate the Effect of Dynamic Rolling Load over Resilient Floor Covering System
ee.	ASTM F3010	Standard Practice for Two-Component Resin Based Membrane-Forming Moisture Mitigation Systems for Use Under Resilient Floor Coverings
ff.	ASTM G21	Standard Practice for Determining Resistance of Synthetic Polymeric Materials to Fungi

3. European Standards (EN):

a.	DIN EN 1399	Resilient floor coverings - Determination of resistance to stubbed and burning cigarettes

4. Federal Test Method Standard (FTMS):
   a. FTMS 101C 4046 Electrostatic Decay
5. International Organization for Standardization (ISO):
   a. ISO 10140-3 Laboratory measurement of sound insulation of building elements—Part 3: Measurement of impact sound insulation
   b. ISO 26987 Determination of staining and resistance to chemicals
6. National Fire Protection Association (NFPA):
   a. NFPA 253 Standard Method of Test for Critical Radiant Flux of Floor Covering Systems Using a Radiant Heat Energy Source
7. Standards Council of Canada (SCC):
   a. CAN/ULC-S102.2 Standard Method of Test for Surface Burning Characteristics of Flooring, Floor Coverings, and Miscellaneous Materials and Assemblies

1.3 SUBMITTALS

A. Product Data: Submit manufacturer's product data, installation instructions and maintenance guidelines for each material and accessory proposed for use.

B. Samples: Submit three representative samples of each product specified for verification.

C. Mockup shall be installed in a 20’ long area. Width and location shall be determined by owner/architect. Coordinate a meeting to discuss schedule and location and confirm materials to be installed.

1.4 QUALITY ASSURANCE

A. Manufacturer Qualifications: Provide resilient flooring manufactured by a firm with a minimum of 10 years’ experience with resilient flooring of type equivalent to those specified.

   1. Manufacturer’s quality management system must have ISO 9001:2000 approval.
   2. Provide resilient flooring products and accessories from one manufacturer to ensure compatibility.
   3. Manufacturer shall be capable of providing technical training and technical field service representation.

B. Installer Qualifications: Acceptable to manufacturer of resilient flooring or INSTALL (International Standards & Training Alliance) resilient certified for the requirements of the project with a minimum of 4 years’ experience with resilient flooring of type equivalent to those specified.

   1. It is recommended to have a minimum of one installer per working party with the ability to provide proof of current credentials on request.
   2. Has obtained and maintained current credentials from manufacturer’s training program.
   3. Installers shall be able to exhibit proficient skills with flash cove detailing, both hot and cold-welding techniques, adhesives, specialty adhesive systems and seam cutting.
   4. The installing parties shall provide a submittal of their skills in the form of mock-ups of the specified material. These mock-ups will be accepted as proof of their skills and benchmarking for the proposed project.

C. Sustainable Design Requirements:

   1. ISO 14001 Environmental Management Systems certification.
   2. Construction waste take back program for the purpose of reducing jobsite waste by taking back uninstalled waste flooring. Details of the nora® program are available at www.nora.com.

3. Flooring surfaces that are easily cleaned and do not require coatings, stripping, or use of chemicals that may be hazardous to human health.
4. Supply all required products that are CA 01350 compliant.
5. Flooring that contains no polyvinyl chloride or phthalate plasticizers.
6. Flooring that contains no halogenated polymers.
7. Flooring that contains no asbestos.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials in labeled packages. Store and handle in strict compliance with manufacturer's recommendations. Protect from damage due to weather, excessive temperatures, and construction operations.

B. Deliver materials sufficiently in advance of installation to condition materials to the required temperature for 48-hours prior to installation.

1.6 PROJECT CONDITIONS

A. The installation area must be fully enclosed, weather tight, and climate controlled between 63°F and 75°F and 40% to 60% ambient relative humidity (RH) for at least 48 hours prior, during and 72 hours after installation (do not use gas fueled blowers). Dew point must be avoided. The substrate must be at least 5°F above dew point to be considered acceptable.

1.7 WARRANTY

A. Provide manufacturer’s standard limited warranty for wear, defect, bond, and conductivity. 20 YEAR WARRANTY SHALL BE PROVIDED.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURER

A. Basis-of-Design: nora systems, Inc., 9 Northeastern Blvd., Salem, NH 03079; telephone 800-332-NORA or 603-894-1021.

2.2 RESILIENT SHEET FLOORING FOR COMMERCIAL TRAFFIC

A. Rubber Sheet Floor Covering:

Rubber sheet meets the following product construction specifications:

1.	Product Name:	**noraplan® sentica™ 3 mm and noraplan environcare**
2.	ASTM Specification: ASTM F1859 Standard Specification for Rubber Sheet Floor Covering Without Backing	Type I
3.	Material Composition:	nora vulcanized rubber compound 913 with environmentally compatible color pigments that are free of toxic heavy metals like lead, cadmium, or mercury

4.	Construction:	Homogeneous rubber compound with a tone-on-tone design
5.	Limited Wear Warranty:	20 years
6.	Color:	38 standard colors
7.	Surface:	Smooth

Rubber sheet meets the following performance standards:

1.	Flammability (E648/NFPA 253): ≥ 0.45 watts/sq cm for Class 1 is required	NBSIR 75 950, 0.82
2.	Smoke Density (ASTM E662): < 450 is required	NBS, 282 (flaming) and 155 (non-flaming)
3.	Surface Burning (CAN/ULC-S102.2):	FSC1 of 200 and SD of 1850
4.	Burn Resistance (DIN EN 1399):	Resistant to cigarette and solder burns
5.	Slip Resistance (ASTM D2047): ≥ 0.5 is required	Static coefficient of friction, Neolite dry 0.93, Neolite wet 0.91
6.	Bacteria Resistance (ASTM E2180/ASTM G21):	Resistant to bacteria, fungi, and micro-organism activity
7.	Latex Allergies (ASTM D6499):	Inhibition ELISA, results are below detection level
8.	Sound Absorption (ASTM E2179/ISO 10140-3):	Δ IIC 13, Δ Lw 10 dB (compare only Δ values)
9.	Sound Generation:	67.2 dBA, 68.9 dBC and 20.9 Sones, independently tested
10.	Hardness (ASTM D2240): ≥ 85 is required	Shore type A, 92
11.	Static Load (ASTM F970): ≤ 0.005 in with 250 lbs is required	Residual compression of 0.003 in with 800 lbs
12.	Rolling Load Limit (ASTM F2753):	≤ 550 lbs/sq in, with no forklift traffic
13.	Abrasion Resistance (ASTM D3389): ≤ 0.035 oz (1.0 g) is required	1.1 lbs (500 g) load on H-18 wheel with 1000 cycles, 0.003 oz (0.09 g) weight loss
14.	Elongation (ASTM D412): ≥ 300 lbs per sq in is required	Modulus @ 10% is 1,299.0 lbs per sq in
15.	Oil & Grease Resistance (ISO 26987):	No
16.	Heat Resistance (ASTM F1514): Avg. ΔE ≤ 8.0 is required	Easily achieved with all batches and regular maintenance
17.	Static Generation (AATCC 134):	< 1000 Volts at 20% RH
18.	Thermal Transmission (ASTM C518):	R-value of 0.04
19.	Indoor Air Quality:	GREENGUARD Gold Certified; CDPH 01350 compliant
20.	Disclosure of Environmental Impacts:	Environmental Product Declaration (EPD)
21.	Disclosure of Product Ingredients:	Health Product Declaration (HPD)
22.	Additional Certification and Transparency Documentation:	• Cradle to Cradle Certified® Silver • Greenhealth Approved
23.	LEED v4:	Contributes to multiple IEQ and MR credits

PART 3 - GENERAL

3.1 GENERAL CONTRACTOR RESPONSIBILITIES

A. Supply a safe, climate-controlled building and subfloor as detailed in the nora Installation In-

structions (available at www.nora.com)

B. A subfloor that meets the requirements of ASTM F710 Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring is required, or as detailed in the nora Installation Instructions or nora nTx Installation Instructions as appropriate.

C. A secure storage area that is fully enclosed, weather tight, and climate controlled between 63°F and 75°F and 40% to 60% ambient relative humidity (RH) for at least 48-hours prior and during the installation, so the flooring contractor can acclimate all materials.

D. An installation area that is fully enclosed, weather tight, and climate controlled between 63°F and 75° and 40% to 60% ambient relative humidity (RH) for at least 48-hours prior, during, and 72-hours after installation (do not use gas fueled blowers). If this is not possible, contact the nora Technical Department.

E. Areas with direct prolonged exposure to sunlight should be protected with the use of Low E glass doors, windows or facades that reduce the UV transmissions to less than 1%.

F. Areas of the flooring subjected to direct sunlight, for example through doors or windows, must be covered using blind, curtains, cardboard, or similar materials for 24-hours before, during, and for a period of 72-hours after the
installation to allow nora “wet” adhesives to cure. Do not allow traffic when using wet set adhesives for a minimum of 12-hours and prohibit rolling loads for 72-hours. When using nora® nTx™ or nora dryfix™, the flooring can be trafficked immediately with no restrictions. All flooring must be protected from damage during construction operations using Masonite, plywood, or a similar product. Before laying the panels, the flooring surface must be free of all debris. Lay panels so that they are edge to edge and tape the joints to prevent movement and debris entrapment. Inspect the flooring before covering and after removal for final acceptance.

G. Conduct post-installation cleaning after 72-hours for wet set adhesives. Conduct post-installation cleaning immediately for installations using nora dryfix or nora nTx. Refer to the appropriate nora Maintenance Guidelines for product specific details.

3.2 FLOORING CONTRACTOR RESPONSIBILITIES

A. Provide trained installers that have at least one of the following:

1. Approved by specified manufacturer (nora systems, Inc.) or INSTALL (International Standards & Training Alliance) certified for the requirements of the project.
2. It is recommended to have a minimum of one installer per working party with the ability to provide proof of current credentials on request.
3. An effective installation manager to manage the project, installers, and ensure that all the required procedures are followed as detailed in the nora Installation Instructions (available at www.nora.com).

B. Follow all requirements in the appropriate nora Installation Instructions or nora nTx Installation Instructions.

END OF SECTION 09 65 00

SECTION 09 01 24 – INTERIOR PAINTING (MPI STANDARDS)

PART 1 - GENERAL

PART 2 - GENERAL

2.1 RELATED DOCUMENTS

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

2.2 SUMMARY

A. Section includes surface preparation and the application of paint systems on interior substrates.

B. Related Requirements:
1. Section 051200 "Structural Steel Framing" for shop priming structural steel.
2. Section 051213 “Architecturally Exposed Structural Steel Framing”
3. Section 05 50 00 "Metal Fabrications" for shop priming metal fabrications.

2.3 DEFINITIONS

A. MPI Gloss Level 1: Not more than five units at 60 degrees and 10 units at 85 degrees, according to ASTM D523.

B. MPI Gloss Level 2: Not more than 10 units at 60 degrees and 10 to 35 units at 85 degrees, according to ASTM D523.

C. MPI Gloss Level 3: 10 to 25 units at 60 degrees and 10 to 35 units at 85 degrees, according to ASTM D523.

D. MPI Gloss Level 4: 20 to 35 units at 60 degrees and not less than 35 units at 85 degrees, according to ASTM D523.

E. MPI Gloss Level 5: 35 to 70 units at 60 degrees, according to ASTM D523.

F. MPI Gloss Level 6: 70 to 85 units at 60 degrees, according to ASTM D523.

G. MPI Gloss Level 7: More than 85 units at 60 degrees, according to ASTM D523.

2.4 ACTION SUBMITTALS

A. Product Data: For each type of product. Include preparation requirements and application instructions.
   1. Include printout of current "MPI Approved Products List" for each product category specified, with the proposed product highlighted.
   2. Indicate VOC content.

B. Samples for Initial Selection: For each type of topcoat product.

C. Samples for Verification: For each type of paint system and in each color and gloss of topcoat.
   1. Submit Samples on rigid backing, 8 inches (200 mm) square.
   2. Apply coats on Samples in steps to show each coat required for system.
   3. Label each coat of each Sample.
   4. Label each Sample for location and application area.

D. Product List: Use same designations indicated on Drawings and in the Interior Painting Schedule to cross-reference paint systems specified in this Section. Include color designations.

2.5 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.

2.6 QUALITY ASSURANCE

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

2.7 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.

2.8 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 when relative humidity exceeds 85 percent; at temperatures of less than 5 deg F (3 deg C) above the dew point; or to damp or wet surfaces.

PART 3 - PRODUCTS

3.1 MANUFACTURERS

A. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to products listed in the Interior Painting Schedule for the paint category indicated.

3.2 PAINT, GENERAL

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

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

C. Colors: As indicated in a color schedule.

PART 4 - EXECUTION

4.1 EXAMINATION

A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.

B. Maximum Moisture Content of Substrates: When measured with an electronic moisture meter as follows:
   1. Concrete: 12 percent.
   2. Fiber-Cement Board: 12 percent.
   3. Masonry (Clay and CMUs): 12 percent.
   4. Wood: 15 percent.
   5. Gypsum Board: 12 percent.
   6. Plaster: 12 percent.

C. Gypsum Board Substrates: Verify that finishing compound is sanded smooth.

D. Plaster Substrates: Verify that plaster is fully cured.

E. 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.

4.2 PREPARATION

A. Comply with manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual" applicable to substrates and paint systems indicated.

B. Remove hardware, covers, plates, and similar items already in place that are removable and are not to be painted. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and painting.
   1. After completing painting operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection 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 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.

G. Shop-Primed Steel Substrates: Clean field welds, bolted connections, and areas where shop paint is abraded. Paint exposed areas with the same material as used for shop priming to comply with SSPC-PA 1 for touching up shop-primed surfaces.

H. Galvanized-Metal Substrates: Remove grease and oil residue from galvanized sheet metal by mechanical methods to produce clean, lightly etched surfaces that promote adhesion of subsequently applied paints.

I. Aluminum Substrates: Remove loose surface oxidation.

J. Wood Substrates:
1. Scrape and clean knots, 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.

4.3 INSTALLATION

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. Metal deck.
   g. Plastic conduit.
   h. Duct, equipment, and pipe insulation having cotton or canvas insulation covering or other paintable jacket material.
   i. 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.

4.4 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.

4.5 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.

4.6 INTERIOR PAINTING SCHEDULE

A. Steel Substrates:
   1. High-Performance Architectural Latex System, MPI INT 5.1R:
      a. Prime Coat: Primer, alkyd, quick dry, for metal, MPI #76.
      b. Prime Coat: Shop primer specified in Section where substrate is specified.
      c. Intermediate Coat: Latex, interior, high performance architectural, matching topcoat.
      d. Topcoat: Latex, interior, high performance architectural, semigloss (MPI Gloss Level 5), MPI #141.

B. Galvanized-Metal Substrates:
   1. High-Performance Architectural Latex System, MPI INT 5.3M:
      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, semigloss (MPI Gloss Level 5), MPI #141.

C. Gypsum Board Substrates:
   1. High-Performance Architectural Latex System, MPI INT 9.2B:
      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, semigloss (MPI Gloss Level 5), MPI #141.

END OF SECTION 09 91 24

SECTION 10 22 00 – MODULAR REUSABLE TEMPORARY PARTITIONS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Temporary reusable partitions.

1.2 RELATED SECTIONS

A. Section 05 12 13 - Architecturally-Exposed Structural Steel Framing.

B. Section 06 10 00 - Rough Carpentry.

1.3 REFERENCES

A. Comply with all applicable codes and standards.

1.4 SUBMITTALS

A. Submit under provisions of Section 01 30 00 - Administrative Requirements.

B. Product Data:
1. Manufacturer's data sheets on each product to be used.
2. Preparation instructions and recommendations.
3. Storage and handling requirements and recommendations.
4. Typical installation methods.

C. Verification Samples: Two representative units of each type, size, pattern, and color.

D. Shop Drawings: Include details of materials, construction, and finish.

1.5 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section with a minimum five years documented experience.

B. Installer Qualifications: Company specializing in performing work of this section with basic carpentry skills and experience with projects of similar scope and complexity.

C. Source Limitations: Provide each type of product from a single manufacturing source to ensure uniformity.

D. Mock-Up: Construct a mock-up with actual materials in sufficient time for Architect's review and to not delay construction progress. Locate mock-up as acceptable to Architect and provide temporary foundations and support.
1. Intent of mock-up is to demonstrate quality of workmanship and visual appearance.
2. If mock-up is not acceptable, rebuild mock-up until satisfactory results are achieved.
3. Retain mock-up as a standard for comparison with completed work.
4. Do not alter or remove mock-up until work is completed or removal is authorized.

1.6 PRE-INSTALLATION CONFERENCE

A. Convene a conference approximately two weeks before scheduled commencement of the Work. Attendees shall include Architect, Contractor and trades involved. Agenda shall include schedule, responsibilities, critical path items and approvals.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Store and handle in strict compliance with manufacturer's written instructions and recommendations.

B. Protect from damage due to weather, excessive temperature, and construction operations.

1.8 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.

1.9 WARRANTY

A. Manufacturer's standard limited warranty unless indicated otherwise.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Acceptable Manufacturer: STARC or approved equal.

B. Substitutions: Yes

C. Requests for substitutions will be considered in accordance with provisions of Section 01 60 00 - Product Requirements.

2.2 TEMPORARY PARTITIONS

A. Basis of Design: Provide a temporary, relocatable interior non-load-bearing modular wall system that replicates the look and function of a traditional wall, while meeting performance requirements for sound attenuation, airtight containment, and infection control.

B. Performance Requirements:
1. Fire Rating: ASTM E84 Class A standard
2. Infection control: Exceeds ICRA Class IV requirements for airtight dust containment
3. Installation rate: Minimum 100 linear feet per hour by a two-person crew using lift-and-drop connection
4. Warranty: Minimum 3-year limited warranty
5. Environmental tolerance: up to 90% relative humidity non-condensing, with a maximum 0.25 in. w.c. pressure differential, and up to 1/8″ per foot floor slope, floor flatness ≤ 1/8″ variance

C. Panels: Composite assembly consisting of a core, skins, and joiners.
1. Front face: painted anodized aluminum
2. Core: urethane foam for sound attenuation
3. Back: galvanized steel for durability
4. Panel Sizes.Varies

D. Sealing & Connection Features
   1. Dual top and bottom rubber gaskets forming an airtight seal (ICRA IV)
   2. Lift-and-drop connection with dual slots and flanged stud for quick assembly.
   3. Concealed locks, height adjustment, and safety stops

E. Single Door:
   1. Doors (sliding self-closing, hinged reversible) with adjustable thresholds and gasket seals

PART 3 EXECUTION

3.1 EXAMINATION

A. Do not begin installation until substrates have been properly constructed and prepared.

B. If substrate preparation is the responsibility of another installer, notify Architect in writing of unsatisfactory preparation before proceeding.

3.2 PREPARATION

A. Clean surfaces thoroughly prior to installation.

B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

3.3 INSTALLATION

A. Install in accordance with manufacturer's instructions, approved submittals, and in proper relationship with adjacent construction.

3.4 FIELD QUALITY CONTROL

A. Field Inspection: Coordinate field inspection in accordance with appropriate sections in Division 01.

B. Manufacturer's Services: Coordinate manufacturer's services in accordance with appropriate sections in Division 01.

3.5 CLEANING AND PROTECTION

A. Clean products in accordance with the manufacturer's recommendations.

B. Touch-up, repair or replace damaged products before Substantial Completion.

END OF SECTION

SECTION 10 26 00 – STAINLESS STEEL CORNER GUARDS

PART 1 - GENERAL

1.01 SUMMARY

A. Corner guard system for wall protection:

1.02 SECTION INCLUDES

A. Stainless Steel Corner Guard Systems

1.03 SUBMITTALS

A. Product data for each type of corner guard specified.
B. Detail drawings indicating mounting details with the appropriate fasteners for specific project substrates.
C. Samples for verification purposes of corner guard, 6" (152mm) long, in full size profiles of each type and color indicated.
D. Cleaning and maintenance instructions for door and wall protection systems.
E. Mockup: install one corner guard to verify installation method for approval by owner/architect. Schedule location and time with owner and architect.

1.04 DELIVERY, STORAGE AND HANDLING

A. Deliver materials in unopened factory packaging to the jobsite and store in original packaging in a climate controlled location away from direct sunlight.

1.05 PROJECT CONDITIONS

A. Products must be installed in an interior climate controlled environment.

1.06 WARRANTY

A. Standard IPC Limited Lifetime Warranty against material and manufacturing defects.

PART 2 – PRODUCTS

2.01 MANUFACTURER

A. Basis-Of-Design Product: Inpro Corporation, IPC Door and Wall Protection Systems
PO Box 406 Muskego, WI 53150 USA; Telephone: 800.222.5556, Fax: 888.715.8407,

Website: www.inprocorp.com.

1. Submit comparable products of one the following for approval by architect:
   a. Insert name of manufacture of comparable product
   b. Submit requests for substitution in accordance with Instructions to Bidders and Division 01 General Requirements
   c. Provide specified product; Owner will not consider substitution requests.

2.02 MANUFACTURED UNITS

A. Corner Guards
   1. SS Corner Guards: (Size, Attachment Method, Grade, Thickness - Model)
      a. *2"(51mm) x 2"(51mm) x 96"(2.43m) x 1/8" radius, Cement-on, 304 Stainless Steel, 16 gauge - SAS-1828C-304*
      b. *2"(51mm) x 2"(51mm) x 96"(2.43m) x 1/8" radius, Screw-on, 304 Stainless Steel, 16 gauge - SAS-1828H-304, Concealed fasteners.*

2.03 MATERIALS

A. Stainless Steel: Corner Guards shall be manufactured from Type 430, 16 gauge Stainless Steel, options: Type 430, 14 and 18 gauge; Type 304 (meets NSF Standard 51), 18, 16 and 14 gauge
B. Gold Titanium Stainless Steel: Corner Guards shall be manufactured from Type 304, 20 gauge stainless steel with a titanium gold surface.

2.04 COMPONENTS

A. Attachment
   1. Adhesive: Field applied heavy duty adhesive
   2. Fasteners: Pre-drilled beveled holes and Phillips head screws.

2.05 FINISHES

A. Stainless steel: No. 4 satin finish.

PART 3 – EXECUTION

3.01 EXAMINATION

A. Examine areas and conditions in which the corner guard systems will be installed.
   1. Complete all finishing operations, including painting, before beginning installation of corner guards.
B. Wall surface shall be dry and free from dirt, grease and loose paint.

3.02 PREPARATION

A. Surface Prep: Prior to installation, clean the substrate to remove dust, debris and loose particles. Ensure the substrate is sound and per project plans.
B. Acclimate product in temperatures between 65°F and 80°F [18°-27°C] and a humidity level less than 80% 24 hours in advance of installation.
C. The area of installation must temperature and humidity controlled for at least 48 hours after installation.

3.03 INSTALLATION

A. General: Locate the corner guard as indicated on the approved detail drawing for the appropriate substrate and in compliance with the IPC installation instructions. Install corner guard level and plumb at the height indicated on the drawings.
B. Installation of Stainless Steel Corner Guards:
    1. Surface must be dry, clean and properly sealed.
    2. Cement on: Apply a bead of PL Premium Heavy Duty Adhesive in a zigzag pattern over the back of each wing of the corner guard. Position corner guard on the wall and apply pressure until a tight fit is achieved.
    3. Screw on: Position the corner guard on the wall and attach it using the supplied screws.
    4. Remove the protective plastic covering from the exposed surface of the corner guard.

3.04 CLEANING

A. At completion of the installation, clean surfaces in accordance with the IPC clean up and maintenance instructions.

END OF SECTION 10 26 00

SECTION 10 44 13 – FIRE PROTECTION CABINETS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Fire-protection cabinets for the following:

a. Portable fire extinguisher.
b. Portable fire extinguisher and fire-hose valve.
c. Portable fire extinguisher, fire hose, rack, and fire-hose valve.
d. Fire-hose valve.
e. Fire hose, rack, and fire-hose valve.

B. Related Requirements:

1.2 PREINSTALLATION CONFERENCE

A. Preinstallation Conference: Conduct conference at Project site.

1. Review methods and procedures related to fire-protection cabinets, including, but not limited to, the following:

a. Schedules and coordination requirements.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Show door hardware, cabinet type, trim style, and panel style. Include roughing-in dimensions and details showing recessed-, semi recessed-, or surface-mounting method and relationships of box and trim to surrounding construction.
2. Show location of knockouts for hose valves.

B. Shop Drawings: For fire-protection cabinets.

1. Include plans, elevations, sections, details, and attachments to other work.

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

D. Samples for Initial Selection: For each type of exposed finish required.

E. Samples for Verification: For each type of exposed finish required, prepared on samples 6 by 6 inches square.

F. Product Schedule: For fire-protection cabinets. Indicate whether recessed, semi recessed, or surface mounted. Coordinate final fire-protection cabinet schedule with fire-extinguisher schedule to ensure proper fit and function. Use same designations indicated on Drawings.

1.4 CLOSEOUT SUBMITTALS

A. Maintenance Data: For fire-protection cabinets to include in maintenance manuals.

1.5 COORDINATION

A. Coordinate size of fire-protection cabinets to ensure that type and capacity of fire extinguishers fire hoses, hose valves, and hose racks indicated are accommodated.

B. Coordinate sizes and locations of fire-protection cabinets with wall depths.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Source Limitations: Obtain fire-protection cabinets, accessories, and fire extinguishers from single source from single manufacturer.

2.2 PERFORMANCE REQUIREMENTS

A. Fire-Rated Fire-Protection Cabinets: Listed and labeled to comply with requirements in ASTM E814 for fire-resistance rating of walls where they are installed.

B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

2.3 FIRE-PROTECTION CABINET

A. Cabinet Type: Suitable for fire extinguisher.

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. Larsen's Manufacturing Company
   b. Babcock-Davis.
   c. Guardian Fire Equipment, Inc.
   d. Strike First Corporation of America.

B. Cabinet Construction: One-hour fire rated

1. Fire-Rated Cabinets: Construct fire-rated cabinets with double walls fabricated from 0.043-inch-thick cold-rolled steel sheet lined with minimum 5/8-inch-thick fire-barrier material. Provide factory-drilled mounting holes.

C. Cabinet Material: Stainless steel sheet.

1. Shelf: Same metal and finish as cabinet.

D. Recessed Cabinet:

1. Trimless with Concealed Flange: Surface of surrounding wall finishes flush with exterior finished surface of cabinet frame and door, without overlapping trim attached to cabinet. Provide recessed flange, of same material as box, attached to box, to act as drywall bead.
2. Trimless with Hidden Flange: Flange of same metal and finish as box overlaps surrounding wall finish and is concealed from view by an overlapping door.
3. Exposed Flat Trim: One-piece combination trim and perimeter door frame overlapping surrounding wall surface, with exposed trim face and wall return at outer edge (backbend).

E. Cabinet Trim Material: Stainless steel sheet.

F. Door Material: Stainless steel sheet.

G. Door Style: Vertical duo panel with frame.

H. Door Glazing: Tempered float glass (clear)

I. Door Hardware: Manufacturer's standard door-operating hardware of proper type for cabinet type, trim style, and door material and style indicated.

1. Provide manufacturer's standard.

2. Provide manufacturer's standard hinge, permitting door to open 180 degrees.

J. Accessories:

1. Mounting Bracket: Manufacturer's standard steel, designed to secure fire extinguisher to fire-protection cabinet, of sizes required for types and capacities of fire extinguishers indicated, with plated or baked-enamel finish.
2. Door Lock: Cam lock that allows door to be opened during emergency by pulling sharply on door handle.
3. Identification: Lettering complying with authorities having jurisdiction for letter style, size, spacing, and location. Locate as directed by Architect.

4. Alarm: Manufacturer's standard alarm that actuates when fire-protection cabinet door is opened and that is powered by low voltage, complete with transformer.

K. Materials:

1. Stainless Steel: ASTM A240/A240M or ASTM A666, Type 304.

a. Finish: ASTM A480/A480M No. 4 directional satin finish.
2. Tempered Float Glass: ASTM C1048, Kind FT, Condition A, Type I, Quality q3, 3 mm thick, Class 1 (clear).

2.4 SECURITY FIRE-PROTECTION CABINET

A. Cabinet Type: Suitable for fire extinguisher.

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. Babcock-Davis.
b. Guardian Fire Equipment, Inc.
c. J. L. Industries, Inc.; Activar Construction Products Group, Inc.

B. Cabinet Construction: One-hour fire rated.

1. Fire-Rated Cabinets: Construct fire-rated cabinets with double walls lined with minimum 5/8-inch-thick fire-barrier material.

C. Cabinet Material: 0.078-inch-thick stainless steel sheet.

1. Shelf: Same metal and finish as cabinet.

D. Recessed Cabinet:

1. Exposed Flat Trim: One-piece combination trim and perimeter door frame overlapping surrounding wall surface, with exposed trim face and wall return at outer edge (backbend).

E. Cabinet Trim Material: Stainless steel sheet.

F. Door Material: 0.109-inch-thick stainless steel sheet.

G. Door Style: Solid opaque panel with frame.

H. Door Hardware: Manufacturer's standard door-operating hardware of proper type for cabinet type, trim style, and door material and style indicated, and as follows:

1. Recessed door pull.
2. Continuous Hinge: Same material and finish as trim, permitting door to open 180 degrees.

3. Mechanical Snaplatch:

a. Automatic snaplatch when closed; latchbolt retracted by five-tumbler paracentric cylinder; keyed one side.

1) Lockbolt: 1 inch high by 7/16 inch thick; 5/16-inch throw.

I. Accessories:

1. Mounting Bracket: Manufacturer's standard steel, designed to secure fire extinguisher to security fire-protection cabinet, of sizes required for types and capacities of fire extinguishers indicated, with plated or baked-enamel finish.
2. Identification: Lettering complying with authorities having jurisdiction for letter style, size, spacing, and location. Locate as directed by Architect.

3. Keys: Coordinate with Owner.

J. Materials:

1. Stainless Steel: ASTM A240/A240M or ASTM A666, Type 304.

a. Finish: ASTM A480/A480M No. 4 directional satin finish.

2.5 FABRICATION

A. Fire-Protection Cabinets: Provide manufacturer's standard box (tub) with trim, frame, door, and hardware to suit cabinet type, trim style, and door style indicated.

1. Weld joints and grind smooth.
2. Miter corners and grind smooth.
3. Provide factory-drilled mounting holes.
4. Prepare doors and frames to receive locks.
5. Install door locks at factory.

B. Cabinet Doors: Fabricate doors according to manufacturer's standards, from materials indicated and coordinated with cabinet types and trim styles.

1. Fabricate door frames with tubular stiles and rails and hollow-metal design, minimum 1/2 inch thick.
2. Fabricate door frames of one-piece construction with edges flanged.
3. Miter and weld perimeter door frames and grind smooth.

C. Cabinet Trim: Fabricate cabinet trim in one piece with corners mitered, welded, and ground smooth.

2.6 GENERAL FINISH REQUIREMENTS

A. Comply with NAAMM's AMP 500, "Metal Finishes Manual for Architectural and Metal Products," for recommendations for applying and designating finishes.

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

C. Finish fire-protection cabinets after assembly.

D. Appearance of Finished Work: Noticeable variations in same piece are unacceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine roughing-in for hose valves and racks and cabinets to verify actual locations of piping connections before cabinet installation.

B. Examine walls and partitions for suitable framing depth and blocking where recessed and semi recessed cabinets will be installed.

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

3.2 PREPARATION

A. Prepare recesses for recessed and semi recessed fire-protection cabinets as required by type and size of cabinet and trim style.

3.3 INSTALLATION

A. General: Install fire-protection cabinets in locations and at mounting heights indicated or, if not indicated, at heights acceptable to authorities having jurisdiction.

B. Fire-Protection Cabinets: Fasten cabinets to structure, square and plumb.

1. Unless otherwise indicated, provide recessed fire-protection cabinets. If wall thickness is inadequate for recessed cabinets, provide semi recessed fire-protection cabinets.
2. Provide inside latch and lock for break-glass panels.
3. Fasten mounting brackets to inside surface of fire-protection cabinets, square and plumb.

C. Identification:

1. Apply vinyl lettering at locations indicated.
2. Apply vinyl lettering on field-painted fire-protection cabinets after painting is complete.

3.4 ADJUSTING AND CLEANING

A. Remove temporary protective coverings and strippable films, if any, as fire-protection cabinets are installed unless otherwise indicated in manufacturer's written installation instructions.

B. Adjust fire-protection cabinet doors to operate easily without binding. Verify that integral locking devices operate properly.

C. On completion of fire-protection cabinet installation, clean interior and exterior surfaces as recommended by manufacturer.

D. Touch up marred finishes, or replace fire-protection cabinets that cannot be restored to factory-finished appearance. Use only materials and procedures recommended or furnished by fire-protection cabinet and mounting bracket manufacturers.

E. Replace fire-protection cabinets that have been damaged or have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

END OF SECTION 10 44 13

SECTION 10 44 16 – FIRE EXTINGUISHERS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes portable, hand-carried fire extinguishers and mounting brackets for fire extinguishers.

B. Related Requirements:

1. Section 104413 "Fire Protection Cabinets."

1.2 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.

1.3 INFORMATIONAL SUBMITTALS

A. Warranty: Sample of special warranty.

1.4 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For fire extinguishers to include in maintenance manuals.

1.5 COORDINATION

A. Coordinate type and capacity of fire extinguishers with fire-protection cabinets to ensure fit and function.

1.6 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 when testing interval required by NFPA 10 is within the warranty period.
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. Place in compliance with NFPA 1, NFPA 101 and 29 CFR 1910.157

C. 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 indicated.

1. Source Limitations: Obtain fire extinguishers, fire-protection cabinets, and accessories, from single source from single manufacturer.
2. Valves: Manufacturer's standard.
3. Handles and Levers: Stainless steel.
4. Instruction Labels: Include pictorial marking system complying with NFPA 10, Appendix B.

B. Multipurpose Dry-Chemical Type in Steel Container: UL-299 3-A:40-B:C, 5-lb nominal capacity, with monoammonium phosphate-based dry chemical in enameled-steel container.

C. Clean-Agent Type in Steel Container: UL-2129 2-A:10-B:C, 14-lb nominal capacity, with HFC blend agent and inert material in enameled-steel container; with pressure-indicating gage.

D. Mounting Brackets: Manufacturer's standard 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** baked-enamel finish.
   1. Source Limitations: Obtain mounting brackets and fire extinguishers from single source from single manufacturer.

E. 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.

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.

B. Mounting Brackets: Fasten mounting brackets to surfaces, square and plumb, at locations indicated.

   1. Mounting Height: Top of fire extinguisher to be at 42 inches above finished floor.

END OF SECTION 10 44 16

SECTION 12 36 61.16 – SOLID SURFACING COUNTERTOPS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Solid surface material countertops/top cap on low wall.

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.
   1. Show locations and details of joints.
   2. Show direction of directional pattern, if any.

C. Samples for Initial Selection: For each type of material exposed to view.

D. Samples for Verification: For the following products:
   1. Countertop material, 6 inches square.

1.3 CLOSEOUT SUBMITTALS

A. Maintenance Data: For solid surface material countertops to include in maintenance manuals. Include Product Data for care products used or recommended by Installer and names, addresses, and telephone numbers of local sources for products.

1.4 QUALITY ASSURANCE

A. Fabricator Qualifications: Shop that employs skilled workers who custom-fabricate countertops similar to that required for this Project, and whose products have a record of successful in-service performance.

B. Installer Qualifications: Fabricator of countertops.

C. Mockups: Build mockups to demonstrate aesthetic effects and to set quality standards for fabrication and execution.
   1. Build mockup of countertops as indicated on Drawings.

2. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.5 FIELD CONDITIONS

A. Field Measurements: Verify dimensions of countertops by field measurements after base cabinets are installed but before countertop fabrication is complete.

1.6 COORDINATION

A. Coordinate locations of utilities that will penetrate countertops or backsplashes.

PART 2 - PRODUCTS

2.1 SOLID SURFACE COUNTERTOP MATERIALS

A. Solid Surface Material: Homogeneous-filled plastic resin complying with ISFA 2-01.

B. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product. Provide See drawing Finish Legend for Basis of Design
1. Type: Provide Standard type unless Special Purpose type is indicated.
2. Colors and Patterns: As indicated on the Drawing Finish Legend.

C. Plywood: Exterior softwood plywood complying with DOC PS 1, Grade C-C Plugged, touch sanded.

2.2 FABRICATION

A. Fabricate countertops according to solid surface material manufacturer's written instructions and to the AWI/AWMAC/WI's "Architectural Woodwork Standards."
1. Grade: Premium.

B. Countertop/Top Cap on low wall:
1. 1/2-inch- thick, solid surface material with front miter edge built up with same material.

C. Fabricate tops with shop-applied edges unless otherwise indicated. Comply with solid surface material manufacturer's written instructions for adhesives, sealers, fabrication, and finishing.

D. Joints:
   1. Fabricate countertops without joints where possible.
   2. Fabricate countertops in sections for joining in field.
      a. Joint Locations: Not within 18 inches of a sink or cooktop and not where a countertop section less than 36 inches long would result, unless unavoidable.
      b. Splined Joints: Accurately cut kerfs in edges at joints for insertion of metal splines to maintain alignment of surfaces at joints. Make width of cuts slightly more than thickness of splines to provide snug fit. Provide at least three splines in each joint.

E. Cutouts and Holes:
   1. Undercounter Plumbing Fixtures: Make cutouts for fixtures in shop using template or pattern furnished by fixture manufacturer. Form cutouts to smooth, even curves.
   2. Counter-Mounted Electrical or Plumbing 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.

INSTALLATION MATERIALS

F. Adhesive: Product recommended by solid surface material manufacturer.

G. Sealant for Countertops: Comply with applicable requirements in Section 07 92 00 "Joint Sealants."

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates to receive solid surface material countertops and conditions under which countertops will be installed, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of countertops.

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

3.2 INSTALLATION

A. Install countertops level to a tolerance of 1/8 inch in 8 feet, 1/4 inch maximum. Do not exceed 1/64-inch difference between planes of adjacent units.

B. Fasten countertops by screwing through corner blocks of base units into underside of countertop. Predrill holes for screws as recommended by manufacturer. 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.

C. Fasten subtops to cabinets by screwing through subtops into cornerblocks of base cabinets. Shim as needed to align subtops in a level plane.

D. Secure countertops to subtops with adhesive according to solid surface material manufacturer's written instructions. 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.

E. Bond joints with adhesive and draw tight as countertops are set. Mask areas of countertops adjacent to joints to prevent adhesive smears.
   1. Install metal splines in kerfs in countertop edges at joints. Fill kerfs with adhesive before inserting splines and remove excess immediately after adjoining units are drawn into position.
   2. Clamp units to temporary bracing, supports, or each other to ensure that countertops are properly aligned and joints are of specified width.

F. Complete cutouts not finished in shop. Mask areas of countertops adjacent to cutouts to prevent damage while cutting. 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.
   1. Seal edges of cutouts in particleboard subtops by saturating with varnish.

G. Apply sealant to gaps at walls; comply with Section 07 92 00 "Joint Sealants."

END OF SECTION 12 36 61.16

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes general requirements for single-phase and polyphase, general-purpose, horizontal, small and medium, squirrel-cage induction motors for use on alternating-current power systems up to 600 V and installed at equipment manufacturer's factory or shipped separately by equipment manufacturer for field installation.

1.3 COORDINATION

A. Coordinate features of motors, installed units, and accessory devices to be compatible with the following:
   1. Motor controllers.
   2. Torque, speed, and horsepower requirements of the load.
   3. Ratings and characteristics of supply circuit and required control sequence.
   4. Ambient and environmental conditions of installation location.

PART 2 - PRODUCTS

2.1 GENERAL MOTOR REQUIREMENTS

A. Comply with NEMA MG 1 unless otherwise indicated.

B. Comply with IEEE 841 for severe-duty motors.

2.2 MOTOR CHARACTERISTICS

A. Duty: Continuous duty at ambient temperature of 40 deg C and at altitude of 3300 feet above sea level.

B. Capacity and Torque Characteristics: Sufficient to start, accelerate, and operate connected loads at designated speeds, at installed altitude and environment, with

indicated operating sequence, and without exceeding nameplate ratings or considering service factor.

2.3 POLYPHASE MOTORS

A. Description: NEMA MG 1, Design B, medium induction motor.

B. Efficiency: Premium efficient, as defined in NEMA MG 1.

C. Service Factor: 1.15.

D. Multispeed Motors: Variable torque.
   1. For motors with 2:1 speed ratio, consequent pole, single winding.
   2. For motors with other than 2:1 speed ratio, separate winding for each speed.

E. Multispeed Motors: Separate winding for each speed.

F. Rotor: Random-wound, squirrel cage.

G. Bearings: Regreasable, shielded, antifriction ball bearings suitable for radial and thrust loading.

H. Temperature Rise: Match insulation rating.

I. Insulation: Class F.

J. Code Letter Designation:
   1. Motors 15 HP and Larger: NEMA starting Code F or Code G.
   2. Motors Smaller Than 15 HP: Manufacturer's standard starting characteristic.

K. Enclosure Material: Cast iron for motor frame sizes 324T and larger; rolled steel for motor frame sizes smaller than 324T.

2.4 ADDITIONAL REQUIREMENTS FOR POLYPHASE MOTORS

A. Motors Used with Reduced-Voltage and Multispeed Controllers: Match wiring connection requirements for controller with required motor leads. Provide terminals in motor terminal box, suited to control method.

B. Motors Used with Variable-Frequency Controllers: Ratings, characteristics, and features coordinated with and approved by controller manufacturer.
   1. Windings: Copper magnet wire with moisture-resistant insulation varnish, designed and tested to resist transient spikes, high frequencies, and short time rise pulses produced by pulse-width-modulated inverters.
   2. Inverter-Duty Motors: Class F temperature rise; Class H insulation.
   3. Thermal Protection: Comply with NEMA MG 1 requirements for thermally protected motors.

2.5 SINGLE-PHASE MOTORS

A. Motors larger than 1/20 hp shall be one of the following, to suit starting torque and requirements of specific motor application:
   1. Permanent-split capacitor.
   2. Split phase.
   3. Capacitor start, inductor run.
   4. Capacitor start, capacitor run.

B. Multispeed Motors: Variable-torque, permanent-split-capacitor type.

C. Bearings: Prelubricated, antifriction ball bearings or sleeve bearings suitable for radial and thrust loading.

D. Motors 1/20 HP and Smaller: Shaded-pole type.

E. Thermal Protection: Internal protection to automatically open power supply circuit to motor when winding temperature exceeds a safe value calibrated to temperature rating of motor insulation. Thermal-protection device shall automatically reset when motor temperature returns to normal range.

PART 3 - EXECUTION (Not Applicable)

END OF SECTION 220513

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. Pipe materials
   2. Specialty pipe fittings.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

1.4 INFORMATIONAL SUBMITTALS

A. Field quality-control reports.

1.5 FIELD CONDITIONS

A. Interruption of Existing Sanitary Waste Service: Do not interrupt service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary service according to requirements indicated:

1. Notify Owner no fewer than two days in advance of proposed interruption of sanitary waste service.
2. Do not proceed with interruption of sanitary waste service without Owner's written permission.

1.6 WARRANTY

A. Listed manufacturers to provide labeling and warranty of their respective products.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Components and installation shall be capable of withstanding the following minimum working pressure unless otherwise indicated:

1. Soil, Waste, and Vent Piping: 10-foot head of water.

2.2 PIPING MATERIALS

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

B. Comply with requirements in "Piping Schedule" Article for applications of pipe, tube, fitting materials, and joining methods for specific services, service locations, and pipe sizes.

2.3 HUB-AND-SPIGOT, CAST-IRON SOIL PIPE AND FITTINGS; indoor, above grade

A. Pipe and Fittings: ASTM A 74, Service and Extra Heavy class(es).

B. Gaskets: ASTM C 564, rubber.

C. Caulking Materials: ASTM B 29, pure lead and oakum or hemp fiber.

2.4 HUBLESS, CAST-IRON SOIL PIPE AND FITTINGS; Indoor, Above grade

A. Pipe and Fittings: ASTM A 888 or CISPI 301.

B. Heavy-Duty, Hubless-Piping Couplings:
   1. Standards: ASTM C 1277 and ASTM C 1540.
   2. Description: Stainless-steel shield with stainless-steel bands and tightening devices; and ASTM C 564, rubber sleeve with integral, center pipe stop.

2.5 PVC PIPE AND FITTINGS; Indoor, below grade, all subsoil drainage system piping

A. Comply with NSF 14 for plastic piping components. Include "NSF-dwv" marking for plastic drain, waste, and vent piping and "NSF-sewer" marking for plastic sewer piping.

B. Solid-Wall PVC Pipe: ASTM D2665 drain, waste, and vent.

C. Cellular-Core PVC Pipe: ASTM F891, Schedule 40.

D. PVC Socket Fittings: ASTM D2665, made in accordance with ASTM D3311, drain, waste, and vent patterns and to fit Schedule 40 pipe.

E. Adhesive Primer: ASTM F 656.
   1. Verify adhesive primer has a VOC content of 550 g/L or less.

F. Solvent Cement: ASTM D 2564.
   1. Verify solvent cement has a VOC content of 510 g/L or less.

2.6 SPECIALTY PIPE FITTINGS

A. Transition Couplings:

   1. Fitting-Type Transition Couplings: Manufactured piping coupling or specified piping system fitting.
   2. Unshielded, Nonpressure Transition Couplings:
      a. Standard: ASTM C 1173.
      b. Description: Elastomeric, sleeve-type, reducing or transition pattern. Include shear ring and corrosion-resistant-metal tension band and tightening mechanism on each end.
      c. End Connections: Same size as and compatible with pipes to be joined.
      d. Sleeve Materials:

         1) For Cast-Iron Soil Pipes: ASTM C 564, rubber.

2) For Dissimilar Pipes: ASTM D 5926, PVC or other material compatible with pipe materials being joined.

3. Shielded, Nonpressure Transition Couplings:
   a. Standard: ASTM C 1460.
   b. Description: Elastomeric or rubber sleeve with full-length, corrosion-resistant outer shield and corrosion-resistant-metal tension band and tightening mechanism on each end.
   c. End Connections: Same size as and compatible with pipes to be joined.

PART 3 - EXECUTION

3.1 PIPING INSTALLATION

A. Drawing plans, schematics, and diagrams indicate general location and arrangement of piping systems.

1. Indicated locations and arrangements were used to size pipe and calculate friction loss, expansion, pump sizing, and other design considerations.
2. Install piping as indicated unless deviations to layout are approved on coordination drawings.

B. Install piping in concealed locations unless otherwise indicated and except in equipment rooms and service areas.

C. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.

D. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal.

E. Install piping to permit valve servicing.

F. Install piping at indicated slopes.

G. Install piping free of sags and bends.

H. Install fittings for changes in direction and branch connections.

I. Install piping to allow application of insulation.

J. Make changes in direction for soil and waste drainage and vent piping using appropriate branches, bends, and long-sweep bends.

1. Sanitary tees and short-sweep 1/4 bends may be used on vertical stacks if change in direction of flow is from horizontal to vertical.
2. Use long-turn, double Y-branch and 1/8-bend fittings if two fixtures are installed back to back or side by side with common drain pipe.

    a. Straight tees, elbows, and crosses may be used on vent lines.

3. Do not change direction of flow more than 90 degrees.
4. Use proper size of standard increasers and reducers if pipes of different sizes are connected.

    a. Reducing size of waste piping in direction of flow is prohibited.

K. Install soil and waste and vent piping at the following minimum slopes unless otherwise indicated:

1. Building Sanitary Waste: 2 percent downward in direction of flow for piping NPS 3 and smaller; 1 percent downward in direction of flow for piping NPS 4 and larger.
2. Horizontal Sanitary Waste Piping: 2 percent downward in direction of flow.
3. Vent Piping: 1 percent down toward vertical fixture vent or toward vent stack.

L. Install cast-iron soil piping according to CISPI's "Cast Iron Soil Pipe and Fittings Handbook," Chapter IV, "Installation of Cast Iron Soil Pipe and Fittings."

1. Install encasement on underground piping according to ASTM A 674 or AWWA C105/A 21.5.

M. Plumbing Specialties:

1. Install cleanouts at grade and extend to where building sanitary drains connect to building sanitary sewers in sanitary waste gravity-flow piping.

    a. Install cleanout fitting with closure plug inside the building in sanitary drainage force-main piping.

b. Comply with requirements for cleanouts specified in Section 221319 "Sanitary Waste Piping Specialties."

2. Install drains in sanitary waste gravity-flow piping.

a. Comply with requirements for drains specified in Section 221319 "Sanitary Waste Piping Specialties."

N. Do not enclose, cover, or put piping into operation until it is inspected and approved by authorities having jurisdiction.

O. Install sleeves for piping penetrations of walls, ceilings, and floors.

1. Comply with requirements for sleeves specified in Section 220517 "Sleeves and Sleeve Seals for Plumbing Piping."

P. Install sleeve seals for piping penetrations of concrete walls and slabs.

1. Comply with requirements for sleeve seals specified in Section 220517 "Sleeves and Sleeve Seals for Plumbing Piping."

Q. Install escutcheons for piping penetrations of walls, ceilings, and floors.

1. Comply with requirements for escutcheons specified in Section 220518 "Escutcheons for Plumbing Piping."

3.2 JOINT CONSTRUCTION

A. Join hub-and-spigot, cast-iron soil piping with gasket joints according to CISPI's "Cast Iron Soil Pipe and Fittings Handbook" for compression joints.

B. Join hubless, cast-iron soil piping according to CISPI 310 and CISPI's "Cast Iron Soil Pipe and Fittings Handbook" for hubless-piping coupling joints.

C. Threaded Joints: Thread pipe with tapered pipe threads according to ASME B1.20.1.

1. Cut threads full and clean using sharp dies.
2. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows:

a. Apply appropriate tape or thread compound to external pipe threads unless dry seal threading is specified.
b. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged.
c. Do not use pipe sections that have cracked or open welds.

3.3 SPECIALTY PIPE FITTING INSTALLATION

A. Transition Couplings:

1. Install transition couplings at joints of piping with small differences in ODs.
2. In Waste Drainage Piping: Unshielded or Shielded, nonpressure transition couplings.

3.4 INSTALLATION OF HANGERS AND SUPPORTS

A. Comply with requirements for pipe hanger and support devices and installation specified in Section 220529 "Hangers and Supports for Plumbing Piping and Equipment."

1. Install carbon-steel pipe hangers for horizontal piping in noncorrosive environments.
2. Install carbon-steel pipe support clamps for vertical piping in noncorrosive environments.
3. Vertical Piping: MSS Type 8 or Type 42, clamps.
4. Install individual, straight, horizontal piping runs:

    a. 100 Feet and Less: MSS Type 1, adjustable, steel clevis hangers.
    b. Longer Than 100 Feet: MSS Type 43, adjustable roller hangers.
    c. Longer Than 100 Feet if Indicated: MSS Type 49, spring cushion rolls.

5. Multiple, Straight, Horizontal Piping Runs 100 Feet or Longer: MSS Type 44, pipe rolls. Support pipe rolls on trapeze.
6. Base of Vertical Piping: MSS Type 52, spring hangers.

B. Install hangers for cast-iron soil piping, with maximum horizontal spacing and minimum rod diameters, to comply with MSS-58, locally enforced codes, and authorities having jurisdiction requirements, whichever are most stringent.

C. Support horizontal piping and tubing within 12 inches of each fitting and coupling.

D. Support vertical runs of cast iron soil piping to comply with MSS-58, locally enforced codes, and authorities having jurisdiction requirements, whichever are most stringent.

3.5 CONNECTIONS

A. Drawings indicate general arrangement of piping, fittings, and specialties.

B. Connect soil and waste piping to exterior sanitary sewerage piping. Use transition fitting to join dissimilar piping materials.

C. Connect waste and vent piping to the following:

1. Plumbing Fixtures: Connect waste piping in sizes indicated, but not smaller than required by plumbing code.
2. Plumbing Fixtures and Equipment: Connect atmospheric vent piping in sizes indicated, but not smaller than required by authorities having jurisdiction.
3. Plumbing Specialties: Connect waste and vent piping in sizes indicated, but not smaller than required by plumbing code.
4. Install test tees (wall cleanouts) in conductors near floor and floor cleanouts with cover flush with floor.
5. Equipment: Connect waste piping as indicated.

    a. Provide shutoff valve if indicated and union for each connection.
    b. Use flanges instead of unions for connections NPS 2-1/2 and larger.

D. Where installing piping adjacent to equipment, allow space for service and maintenance of equipment.

E. Make connections according to the following unless otherwise indicated:

1. Install unions, in piping NPS 2 and smaller, adjacent to each valve and at final connection to each piece of equipment.
2. Install flanges, in piping NPS 2-1/2 and larger, adjacent to flanged valves and at final connection to each piece of equipment.

3.6 IDENTIFICATION

A. Identify exposed sanitary waste and vent piping.

B. Comply with requirements for identification specified in Section 220553 "Identification for Plumbing Piping and Equipment."

3.7 FIELD QUALITY CONTROL

A. During installation, notify authorities having jurisdiction at least 24 hours before inspection must be made. Perform tests specified below in presence of authorities having jurisdiction.

1. Roughing-in Inspection: Arrange for inspection of piping before concealing or closing-in after roughing-in and before setting fixtures.
2. Final Inspection: Arrange for final inspection by authorities having jurisdiction to observe tests specified below and to ensure compliance with requirements.

B. Reinspection: If authorities having jurisdiction find that piping will not pass test or inspection, make required corrections and arrange for reinspection.

C. Reports: Prepare inspection reports and have them signed by authorities having jurisdiction.

D. Test sanitary waste and vent piping according to procedures of authorities having jurisdiction or, in absence of published procedures, as follows:

1. Test for leaks and defects in new piping and parts of existing piping that have been altered, extended, or repaired.

    a. If testing is performed in segments, submit separate report for each test, complete with diagram of portion of piping tested.

2. Leave uncovered and unconcealed new, altered, extended, or replaced waste and vent piping until it has been tested and approved.

    a. Expose work that was covered or concealed before it was tested.

3. Roughing-in Plumbing Test Procedure: Test waste and vent piping except outside leaders on completion of roughing-in.

    a. Close openings in piping system and fill with water to point of overflow, but not less than 10-foot head of water.
    b. From 15 minutes before inspection starts to completion of inspection, water level must not drop.
    c. Inspect joints for leaks.

4. Finished Plumbing Test Procedure: After plumbing fixtures have been set and traps filled with water, test connections and prove they are gastight and watertight.

    a. Plug vent-stack openings on roof and building drains where they leave building. Introduce air into piping system equal to pressure of 1-inch wg.
    b. Use U-tube or manometer inserted in trap of water closet to measure this pressure.
    c. Air pressure must remain constant without introducing additional air throughout period of inspection.
    d. Inspect plumbing fixture connections for gas and water leaks.

5. Repair leaks and defects with new materials and retest piping, or portion thereof, until satisfactory results are obtained.

6. Prepare reports for tests and required corrective action.

3.8 CLEANING AND PROTECTION

A. Clean interior of piping. Remove dirt and debris as work progresses.

B. Protect sanitary waste and vent piping during remainder of construction period to avoid clogging with dirt and debris and to prevent damage from traffic and construction work.

C. Place plugs in ends of uncompleted piping at end of day and when work stops.

D. Repair damage to adjacent materials caused by waste and vent piping installation.

3.9 PIPING SCHEDULE

A. Aboveground, soil and waste piping shall be any of the following:
   1. Hubless, cast-iron soil pipe and fittings; heavy-duty hubless-piping couplings; and coupled joints.
   2. Dissimilar Pipe-Material Couplings: Unshielded or Shielded, nonpressure transition couplings.

B. Aboveground, vent piping shall be any of the following:
   1. Hubless, cast-iron soil pipe and fittings; heavy-duty hubless-piping couplings; and coupled joints.

2. Dissimilar Pipe-Material Couplings: Unshielded or Shielded, nonpressure transition couplings.

C. Underground, soil, waste, and vent piping shall be the following:
1. Hub and Spigot, cast-iron soil pipe and fittings; heavy-duty cast-iron hub and spigot couplings; and coupled joints.

PART 4 - MEASUREMENT AND PAYMENT

4.1 MEASUREMENT AND PAYMENT

A. This item will not be measured for separate payment but will instead be considered incidental to other work items of the project. This includes all operations required as described herein, for furnishing all materials, for all preparation, delivering, and placing of the material, and for all labor, equipment tools, and incidentals necessary to complete the item.

END OF SECTION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:
   1. Miscellaneous sanitary drainage piping specialties.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

1.4 INFORMATIONAL SUBMITTALS

A. Field quality-control reports.

1.5 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For sanitary waste piping specialties to include in emergency, operation, and maintenance manuals.

PART 2 - PRODUCTS

2.1 ASSEMBLY DESCRIPTIONS

A. Sanitary waste piping specialties shall bear label, stamp, or other markings of specified testing agency.

B. Comply with NSF 14 for plastic sanitary waste piping specialty components.

2.2 CLEANOUTS

A. Cast-Iron Exposed Cleanouts: Refer to fixture schedule on plumbing plans for cleanout descriptions and requirements.

2.3 MISCELLANEOUS SANITARY DRAINAGE PIPING SPECIALTIES

A. Floor-Drain, Trap-Seal Primer Fittings: Refer to fixture schedule on plumbing plans for floor drain descriptions and requirements.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install cleanouts in aboveground piping and building drain piping according to the following, unless otherwise indicated:

1. Size same as drainage piping up to NPS 4. Use NPS 4 for larger drainage piping unless larger cleanout is indicated.
2. Locate at each change in direction of piping greater than 45 degrees.
3. Locate at minimum intervals of 50 feet for piping NPS 4 and smaller and 100 feet for larger piping.
4. Locate at base of each vertical soil and waste stack.

B. For floor cleanouts for piping below floors, install cleanout deck plates with top flush with finished floor.

C. For cleanouts located in concealed piping, install cleanout wall access covers, of types indicated, with frame and cover flush with finished wall.

D. Assemble open drain fittings and install with top of hub 1 inch above floor.

E. Install deep-seal traps on floor drains and other waste outlets, if indicated.

F. Install floor-drain, trap-seal primer fittings on inlet to floor drains that require trap-seal primer connection.

1. Exception: Fitting may be omitted if trap has trap-seal primer connection.
2. Size: Same as floor drain inlet.

G. Install air-gap fittings on draining-type backflow preventers and on indirect-waste piping discharge into sanitary drainage system.

H. Install wood-blocking reinforcement for wall-mounting-type specialties.

I. Install traps on plumbing specialty drain outlets. Omit traps on indirect wastes unless trap is indicated.

3.2 PIPING CONNECTIONS

A. Comply with requirements in Section 221316 "Sanitary Waste and Vent Piping" for piping installation requirements. Drawings indicate general arrangement of piping, fittings, and specialties.

B. Install piping adjacent to equipment, to allow service and maintenance.

3.3 LABELING AND IDENTIFYING

A. Distinguish among multiple units, inform operator of operational requirements, indicate safety and emergency precautions, and warn of hazards and improper operations, in addition to identifying unit.

1. Nameplates and signs are specified in Section 220553 "Identification for Plumbing Piping and Equipment."

3.4 PROTECTION

A. Protect drains during remainder of construction period to avoid clogging with dirt or debris and to prevent damage from traffic or construction work.

B. Place plugs in ends of uncompleted piping at end of each day or when work stops.

PART 4 - MEASUREMENT AND PAYMENT

4.1 MEASUREMENT AND PAYMENT

A. This item will not be measured for separate payment but will instead be considered incidental to other work items of the project. This includes all operations required as described herein, for furnishing all materials, for all preparation, delivering, and placing of the material, and for all labor, equipment tools, and incidentals necessary to complete the item.

END OF SECTION

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Submersible sewage pumps.
2. Sewage-pump basins and basin covers.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings:

1. Provide separate submittal with testing for existing pumps prior to ordering new. Include at minimum: operating flow, operating pressure, pump runtime.

2. Include plans, elevations, sections, and mounting attachment details.
3. Include details of equipment assemblies. Indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
4. Vibration Isolation Base Details: Detail fabrication including anchorages and attachments to structure and to supported equipment. Include adjustable motor bases, rails, and frames for equipment mounting.
5. Include diagrams for power, signal, and control wiring.

1.3 CLOSEOUT SUBMITTALS

A. Operation and maintenance data.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

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. UL Compliance: Comply with UL 778 for motor-operated water pumps.

2.2 SUBMERSIBLE SEWAGE PUMPS

A. Submersible, Fixed-Position, Single-Seal Sewage Pumps
   1. Description: Factory-assembled and -tested sewage-pump unit.
   2. Pump Type: Submersible, end-suction, single-stage, close-coupled, overhung-impeller, centrifugal sewage pump as defined in HI 1.1-1.2 and HI 1.3.
   3. Pump Casing: Cast iron, with open inlet, legs that elevate pump to permit flow into impeller, and vertical discharge for piping connection.
   4. Impeller: Statically and dynamically balanced, ASTM A48/A48M, Class No. 25 A cast iron, nonclog, open, or semiopen design for solids handling, and keyed and secured to shaft.
   5. Pump and Motor Shaft: Stainless steel, with factory-sealed, grease-lubricated ball bearings.
   6. Seal: Mechanical.
   7. Motor: Hermetically sealed, capacitor-start type; with built-in overload protection; lifting eye or lug; and three-conductor, waterproof power cable of length required and with grounding plug and cable-sealing assembly for connection at pump.

   8. Controls:

      a. Enclosure: NEMA 250 (Type based on location).
      b. Switch Type: Mechanical-float type, in NEMA 250, Type 6 enclosures with mounting rod and electric cables.
      c. High-Water Alarm: Rod-mounted, NEMA 250, Type 6 enclosure with mechanical-float, mercury-float, or pressure switch matching control and electric bell; 120 V ac, with transformer and contacts for remote alarm bell.

   9. Control-Interface Features:

      a. Remote Alarm Contacts: For remote alarm interface.
      b. Building Automation System Interface: Auxiliary contacts in pump controls for interface to building automation system and capable of providing the following:

         1) On-off status of pump.
         2) Alarm status.

2.3 VERTICAL WET-PIT-VOLUTE SEWAGE PUMPS

A. Fixed-Position, Vertical pump with shaft
   1. Description: Factory-assembled and -tested sewage-pump unit.
   2. Pump Type: Vertical shaft, end-suction, single-stage, close-coupled, overhung-impeller, centrifugal sewage pump as defined in HI 1.1-1.2 and HI 1.3.
   3. Pump Casing: Cast iron, stainless steel shaft
   4. Impeller: Statically and dynamically balanced, ASTM A48/A48M, Class No. 25 A cast iron, nonclog, open, or semiopen design for solids handling, and keyed and secured to shaft.
   5. Pump and Motor Shaft: Stainless steel, with factory-sealed, grease-lubricated ball bearings.

6. Seal: Mechanical.
7. Motor: Hermetically sealed, capacitor-start type; with built-in overload protection; lifting eye or lug; and three-conductor, waterproof power cable of length required and with grounding plug and cable-sealing assembly for connection at pump.

8. Controls:

    a. Enclosure: NEMA 250 (Type based on location).
    b. Switch Type: Mechanical-float type, in NEMA 250, Type 6 enclosures with mounting rod and electric cables.
    c. High-Water Alarm: Rod-mounted, NEMA 250, Type 6 enclosure with mechanical-float, mercury-float, or pressure switch matching control and electric bell; 120 V ac, with transformer and contacts for remote alarm bell.

9. Control-Interface Features:

    a. Remote Alarm Contacts: For remote alarm interface.
    b. Building Automation System Interface: Auxiliary contacts in pump controls for interface to building automation system and capable of providing the following:

        1) On-off status of pump.
        2) Alarm status.

2.4 SELF-PRIMING SEWAGE PUMPS

A. Floor mounted, Fixed-Position, Single-Seal Sewage Pumps
1. Description: Factory-assembled and -tested self-priming sewage-pump unit.
2. Pump Type: Floor mounted, self-priming, single-stage, close-coupled, overhung-impeller, centrifugal sewage pump as defined in HI 1.1-1.2 and HI 1.3.
3. Pump Casing: Cast iron, with open inlet, legs that elevate pump to permit flow into impeller, and vertical discharge for piping connection.
4. Impeller: Statically and dynamically balanced, ASTM A48/A48M, Class No. 25 A cast iron, nonclog, open, or semiopen design for solids handling, and keyed and secured to shaft.
5. Pump and Motor Shaft: Stainless steel, with factory-sealed, grease-lubricated ball bearings.
6. Seal: Mechanical.
7. Motor: Hermetically sealed, capacitor-start type; with built-in overload protection; lifting eye or lug; and three-conductor, waterproof power cable of length required and with grounding plug and cable-sealing assembly for connection at pump.
8. Drive: Single speed direct drive

9. Controls:

    a. Enclosure: NEMA 250 (Type based on location).
    b. Switch Type: Mechanical-float type, in NEMA 250, Type 6 enclosures with mounting rod and electric cables.

c. High-Water Alarm: Rod-mounted, NEMA 250, Type 6 enclosure with mechanical-float, mercury-float, or pressure switch matching control and electric bell; 120 V ac, with transformer and contacts for remote alarm bell.

10. Control-Interface Features:

a. Remote Alarm Contacts: For remote alarm interface.
b. Building Automation System Interface: Auxiliary contacts in pump controls for interface to building automation system and capable of providing the following:

1) On-off status of pump.
2) Alarm status.
3)

2.5 SEWAGE-PUMP BASINS AND BASIN COVERS

A. Basin Covers: Fabricate metal cover with openings having gaskets, seals, and bushings; for access to pumps, pump shafts, control rods, discharge piping, vent connections, and power cables.

1. Reinforcement: Steel or cast iron, capable of supporting foot traffic for basins installed in foot-traffic areas.

2.6 MOTORS

A. Comply with NEMA designation, temperature rating, service factor, enclosure type, and efficiency requirements for motors specified in Section 220513 "Common Motor Requirements for Plumbing Equipment."

1. Motor Sizes: Minimum size as indicated. If not indicated, large enough so driven load will not require motor to operate in service factor range above 1.0.

B. Motors for submersible pumps shall be hermetically sealed.

C. Motors for submersible pumps shall be explosion proof.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Pump Installation Standards:

1. Comply with HI 1.4 for installation of centrifugal pumps.
2. Comply with HI 3.1-3.5 for installation of progressing-cavity sewage pumps.

B. Equipment Mounting:

1. Install progressing-cavity sewage pumps on cast-in-place concrete equipment base(s).

C. Wiring Method: Comply with requirements in Section 260519 "Low-Voltage Electrical Power Conductors and Cables."

D. Wiring within Enclosures: Bundle, lace, and train conductors to terminal points with no excess and without exceeding manufacturer's limitations on bending radii. Provide and use lacing bars and distribution spools.

3.2 CONNECTIONS

A. Comply with requirements for piping specified in Section 221316 "Sanitary Waste and Vent Piping." Drawings indicate general arrangement of piping, fittings, and specialties.

B. Where installing piping adjacent to equipment, allow space for service and maintenance.

3.3 FIELD QUALITY CONTROL

A. Perform the following 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 motor rotation and unit operation.
4. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

B. Pumps and controls will be considered defective if they do not pass tests and inspections.

C. Prepare test and inspection reports.

END OF SECTION

SECTION 260519 - LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Copper building wire.
2. Connectors and splices.

B. Related Requirements:
1. Houston Airport System Design Standards Manual, 2023 (HAS Manual).

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Field quality-control reports.

C. Test reports.

PART 2 - PRODUCTS

2.1 COPPER BUILDING WIRE

A. Description: Flexible, insulated and uninsulated, drawn copper current-carrying conductor with an overall insulation layer or jacket, or both, rated 600 V or less.

B. Provide products meeting these specifications by the following manufacturers, or approved equal:
1. General Cable
2. Southwire
3. Rome Cable

C. Standards:

1. Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and use.
2. Conductor and Cable Marking: Comply with wire and cable marking according to UL's "Wire and Cable Marking and Application Guide."

D. Conductors: Copper, complying with ASTM B3 for bare annealed copper and with ASTM B8.

E. Conductor Insulation:
1. Type THWN-2. Comply with UL 83.

2.2 CONNECTORS AND SPLICES

A. Description: Factory-fabricated connectors, splices, and lugs of size, ampacity rating, material, type, and class for application and service indicated; listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and use.

B. Comply with HAS Manual: Low-Voltage Electrical Power Conductors and Cables, Section 3.2.

PART 3 - EXECUTION

3.1 CONDUCTOR MATERIAL APPLICATIONS

A. Feeders and Branch Circuits:

1. Copper; solid for No. 10 AWG and smaller; stranded for No. 8 AWG and larger.

3.2 CONDUCTOR INSULATION AND WIRING METHODS

A. Feeders and Branch Circuits: Single conductors in raceway.

3.3 INSTALLATION OF CONDUCTORS AND CABLES

A. Conceal cables in finished walls, ceilings, and floors unless otherwise indicated.

B. Complete raceway installation between conductor and cable termination points according to Section 260533.13 "Conduits for Electrical Systems" prior to pulling conductors and cables.

C. Use manufacturer-approved pulling compound or lubricant where necessary; compound used must not deteriorate conductor or insulation. Do not exceed manufacturer's recommended maximum pulling tensions and sidewall pressure values.

D. Use pulling means, including fish tape, cable, rope, and basket-weave wire/cable grips, that will not damage cables or raceway.

E. Install exposed cables parallel and perpendicular to surfaces of exposed structural members, and follow surface contours where possible.

F. Support cables according to Section 260529 "Hangers and Supports for Electrical Systems."

3.4 CONNECTIONS

A. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A-486B.

B. Make splices, terminations, and taps that are compatible with conductor material and that possess equivalent or better mechanical strength and insulation ratings than unspliced conductors.

C. Wiring at Outlets: Install conductor at each outlet, with at least 6 inches of slack.

D. Comply with HAS Manual: Low-Voltage Electrical Power Conductors and Cables, Section 3.2.

3.5 IDENTIFICATION

A. Identify and color-code conductors and cables according to Section 260553 "Identification for Electrical Systems."

B. Identify each spare conductor at each end with identity number and location of other end of conductor, and identify as spare conductor.

3.6 SLEEVE AND SLEEVE-SEAL INSTALLATION FOR ELECTRICAL PENETRATIONS

A. Install sleeves and sleeve seals at penetrations of exterior floor and wall assemblies. Comply with requirements in Section 260544 "Sleeves and Sleeve Seals for Electrical Raceways and Cabling."

3.7 FIRESTOPPING

A. Apply firestopping to electrical penetrations of fire-rated floor and wall assemblies to restore original fire-resistance rating of assembly according to Section 078413 "Penetration Firestopping."

3.8 TESTING

A. Conduct testing per NETA ATS 2025 – 7.3.2.
   1. Exceptions. The following tests are not required:
      a. Thermographic survey per 7.3.2.A.8 and 7.3.2.C.2.

B. Coordinate for all tests to be witnessed by Building Standards Group Electrical Inspector and the HAS Commissioning Authority.

C. Nonconforming Work:

   1. System(s) will be considered defective if it does not pass tests and inspections.
   2. Remove and replace defective components and retest.

D. Collect, assemble, and submit test and inspection reports.

END OF SECTION 26 05 19

SECTION 260526 - GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Grounding and bonding conductors.
2. Grounding and bonding clamps.
3. Grounding and bonding bushings.
4. Grounding and bonding hubs.
5. Grounding and bonding connectors.

B. Related Requirements:
1. Houston Airport System Design Standards Manual, 2023 (HAS Manual).

1.2 ACTION SUBMITTALS

A. Product Data:

1. Grounding and bonding conductors.
2. Grounding and bonding clamps.
3. Grounding and bonding bushings.
4. Grounding and bonding hubs.
5. Grounding and bonding connectors.

B. Field quality-control reports.

C. Test reports.

PART 2 - PRODUCTS

2.1 GROUNDING AND BONDING CONDUCTORS

A. Equipment Grounding Conductor:

1. As specified in Section 260519 “Low-Voltage Electrical Power Conductros and Cable.”

B. ASTM - Bare Copper Grounding and Bonding Conductor:
   1. Referenced Standards: Complying with one or more of the following:

      a. Soft or Annealed Copper Wire: ASTM B3.
      b. Concentric-Lay Stranded Copper Conductor: ASTM B8.
      c. Tin-Coated Soft or Annealed Copper Wire: ASTM B33.
      d. 19-Wire Combination Unilay-Stranded Copper Conductor: ASTM B787/B787M.

2.2 GROUNDING AND BONDING CLAMPS

A. Description: Clamps suitable for attachment of grounding and bonding conductors to grounding electrodes, pipes, tubing, and rebar. Grounding and bonding clamps specified in this article are also suitable for use with communications applications.

B. Performance Criteria:

   1. Regulatory Requirements:

      a. Listed and labeled in accordance with NFPA 70, by qualified electrical testing laboratory recognized by authorities having jurisdiction, and marked for intended location and application.

   2. Listing Criteria:

      a. Grounding and Bonding Equipment: UL CCN KDER; including UL 467.
      b. Grounding and Bonding Equipment for Communications: UL CCN KDSH; including UL 467.

2.3 GROUNDING AND BONDING BUSHINGS

A. Description: Bonding bushings connect conduit fittings, tubing fittings, threaded metal conduit, and unthreaded metal conduit to metal boxes and equipment enclosures, and have one or more bonding screws intended to provide electrical continuity between bushing and enclosure. Grounding bushings have provision for connection of bonding or grounding conductor and may or may not also have bonding screws.

B. Performance Criteria:

   1. Regulatory Requirements:

a. Listed and labeled in accordance with NFPA 70, by qualified electrical testing laboratory recognized by authorities having jurisdiction, and marked for intended location and application.

2. Listing Criteria:

a. Grounding and Bonding Equipment: UL CCN KDER; including UL 467.

2.4 GROUNDING AND BONDING HUBS

A. Description: Hubs with certified grounding or bonding locknut.

B. Performance Criteria:

1. Regulatory Requirements:

a. Listed and labeled in accordance with NFPA 70, by qualified electrical testing laboratory recognized by authorities having jurisdiction, and marked for intended location and application.

2. Listing Criteria:

a. Grounding and Bonding Equipment: UL CCN KDER; including UL 467.

2.5 GROUNDING AND BONDING CONNECTORS

A. Performance Criteria:

1. Regulatory Requirements:

a. Listed and labeled in accordance with NFPA 70, by qualified electrical testing laboratory recognized by authorities having jurisdiction, and marked for intended location and application.

2. Listing Criteria:

a. Grounding and Bonding Equipment: UL CCN KDER; including UL 467.

PART 3 - EXECUTION

3.1 SELECTION OF GROUNDING AND BONDING PRODUCTS FOR ELECTRICAL POWER

A. Grounding and Bonding Conductors:

1. As specified in Section 260519 “Low-Voltage Electrical Power Conductors and Cable.”

B. Grounding and Bonding Connectors:

1. Pipe and Equipment Grounding Conductor Terminations: Bolted connectors.

3.2 INSTALLATION OF GROUNDING AND BONDING FOR ELECTRICAL POWER

A. Comply with manufacturer's published instructions.

B. Special Techniques:

1. Grounding and Bonding Conductors:

2. Route along shortest and straightest paths possible unless otherwise indicated or required by Code. Avoid obstructing access or placing conductors where they may Equipment Grounding:

a. Install insulated equipment grounding conductors with feeders and branch circuits.

3.3 TESTING

A. Conduct testing per NETA ATS 2025 – 7.13.
1. Exceptions. The following tests are not required:
a. 7.13.B.2
b. 7.13.B.3.
c. 7.13.D.2
d. 7.13.D.3.

B. Coordinate for all tests to be witnessed by Building Standards Group Electrical Inspector and the HAS Commissioning Authority.

C. Nonconforming Work:

1. System(s) will be considered defective if it does not pass tests and inspections.
2. Remove and replace defective components and retest.

D. Collect, assemble, and submit test and inspection reports.

3.4 PROTECTION

A. After installation, protect grounding and bonding cables and equipment from construction activities. Remove and replace items that are contaminated, defaced, damaged, or otherwise caused to be unfit for use prior to acceptance by Owner.

END OF SECTION 26 05 26

SECTION 260529 - HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Support, anchorage, and attachment components.

B. Related Requirements:
1. Houston Airport System Design Standards Manual, 2023 (HAS Manual).

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Hangers. Include product data for components.
2. Slotted support systems.
3. Equipment supports.
4. Vibration Isolation Base Details: Detail fabrication including anchorages and attachments to structure and to supported equipment. Include adjustable motor bases, rails, and frames for equipment mounting.

PART 2 - PRODUCTS

2.1 SUPPORT, ANCHORAGE, AND ATTACHMENT COMPONENTS

A. Steel Slotted Support Systems: Preformed steel channels and angles with minimum 13/32 inch diameter holes at a maximum of 8 inch on center in at least one surface.
1. Standard: Comply with MFMA-4 factory-fabricated components for field assembly.
2. Material for Channel, Fittings, and Accessories: Galvanized steel
3. Channel Width: 1-5/8 inch.
4. Metallic Coatings: Hot-dip galvanized after fabrication and applied according to MFMA-4.

B. Conduit and Cable Support Devices: Steel and malleable-iron hangers, clamps, and associated fittings, designed for types and sizes of raceway or cable to be supported.

C. Support for Conductors in Vertical Conduit: Factory-fabricated assembly consisting of threaded body and insulating wedging plug or plugs for nonarmored electrical conductors or cables in riser conduits. Plugs must have number, size, and shape of conductor gripping pieces as required to suit individual conductors or cables supported. Body must be made of malleable iron.

D. Structural Steel for Fabricated Supports and Restraints: ASTM A36/A36M steel plates, shapes, and bars; black and galvanized.

E. Mounting, Anchoring, and Attachment Components: Items for fastening electrical items or their supports to building surfaces include the following:

1. Powder-Actuated Fasteners: Not allowed.

2. Mechanical-Expansion Anchors: Insert-wedge-type, stainless steel, for use in hardened portland cement concrete, with tension, shear, and pullout capacities appropriate for supported loads and building materials where used.

3. Concrete Inserts: Steel or malleable-iron, slotted support system units are similar to MSS Type 18 units and comply with MFMA-4 or MSS SP-58.
4. Clamps for Attachment to Steel Structural Elements: MSS SP-58 units are suitable for attached structural element.
5. Through Bolts: Structural type, hex head, and high strength. Comply with ASTM F3125/F3125M, Grade A325 (Grade A325M).
6. Toggle Bolts: Stainless steel springhead type.
7. Hanger Rods: Threaded steel.

PART 3 - EXECUTION

3.1 SELECTION

A. Comply with the following standards for selection and installation of hangers and supports, except where requirements on Drawings or in this Section are stricter:

1. NECA NEIS 101

B. Comply with requirements in Section 078413 "Penetration Firestopping" for firestopping materials and installation for penetrations through fire-rated walls, ceilings, and assemblies.

C. Comply with requirements for raceways specified in Section 260533.13 "Conduits for Electrical Systems."

D. Comply with requirements for boxes specified in Section 260533.16 "Boxes and Covers for Electrical Systems."

E. Maximum Support Spacing and Minimum Hanger Rod Size for Raceways: Space supports for raceway as required by NFPA 70. Minimum rod size must be 1/4 inch in diameter.

F. Multiple Raceways or Cables: Install trapeze-type supports fabricated with steel slotted support system, sized so capacity can be increased by at least 25 percent in future without exceeding specified design load limits.

1. Secure raceways and cables to these supports with two-bolt conduit clamps, single-bolt conduit clamps, or single-bolt conduit clamps using spring friction action for retention in support channel.

3.2 INSTALLATION OF SUPPORTS

A. Comply with NECA NEIS 101 for installation requirements except as specified in this article.

B. Raceway Support Methods: support by openings through structure members is note allowed.

C. Strength of Support Assemblies: Where not indicated, select sizes of components so strength will be adequate to carry present and future static loads within specified loading limits. Minimum static design load used for strength determination must be weight of supported components plus 200 lb.

D. Mounting and Anchorage of Surface-Mounted Equipment and Components: Anchor and fasten electrical items and their supports to building structural elements by the following methods unless otherwise indicated by code:

1. To Wood: Fasten with lag screws or through bolts.
2. To New Concrete: Bolt to concrete inserts.
3. To Masonry: Approved toggle-type bolts on hollow masonry units and expansion anchor fasteners on solid masonry units.

4. To Existing Concrete: Expansion anchor fasteners.
5. To Steel: Welded threaded studs complying with AWS D1.1/D1.1M, with lock washers and nuts, beam clamps (MSS SP-58, Type 19, 21, 23, 25, or 27), complying with MSS SP-69, or Spring-tension clamps.
6. To Light Steel: Sheet metal screws.
7. Items Mounted on Hollow Walls and Nonstructural Building Surfaces: Mount cabinets, panelboards, disconnect switches, control enclosures, pull and junction boxes, transformers, and other devices on slotted-channel racks attached to substrate.

E. Drill holes for expansion anchors in concrete at locations and to depths that avoid the need for reinforcing bars.

F. Comply with HAS Manual: Hangars and Supports, Section 3.1.

END OF SECTION 26 05 29

SECTION 26 05 33.13 - CONDUITS FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

A. Products Installed, but Not Furnished, under This Section:

1. See Section 260553 "Identification for Electrical Systems" for electrical equipment labels.

B. Related Requirements:
1. Houston Airport System Design Standards Manual, 2023 (HAS Manual).
2. Section 260519 "Low-Voltage for Electrical Power Conductors and Cables."
3. Section 260533.16 “Boxes and Coves for Electrical Systems.”

C. Comply with HAS Manual: Raceways and Boxes for Electrical Systems.

1.2 ACTION SUBMITTALS

A. Product Data:

1. Conduit types supplied.
2. Fittings for conduit, tubing, and cable.
3. Electrically conductive corrosion-resistant compounds for threaded conduit.

PART 2 - PRODUCTS

2.1 TYPE EMT – Electrical Metallic Tubing

A. Performance Criteria:

1. Regulatory Requirements: Listed and labeled in accordance with NFPA 70, by qualified electrical testing laboratory recognized by authorities having jurisdiction, and marked for intended location and application.

2. Steel.
3. Listing Criteria: UL CCN FJMX; including UL 797A.
4. Minimum Trade Size: 3/4 inch.

B. Source Quality Control:

1. Product Data: Prepare and submit catalog cuts, brochures, and performance data illustrating size, physical appearance, and other characteristics of product.
2. Manufacturer's Published Instructions: Prepare and submit installation, testing, and operating instructions for product.

2.2 TYPE LFMC – Liquid-Tight Flexible Metal Conduit.

A. Performance Criteria:

1. Regulatory Requirements: Listed and labeled in accordance with NFPA 70, by qualified electrical testing laboratory recognized by authorities having jurisdiction, and marked for intended location and application.
2. Steel.
3. Listing Criteria: UL CCN DXHR; including UL 360.
4. Minimum Trade Size: 3/4 inch.

B. Source Quality Control:

1. Product Data: Prepare and submit catalog cuts, brochures, and performance data illustrating size, physical appearance, and other characteristics of product.
2. Manufacturer's Published Instructions: Prepare and submit installation, testing, and operating instructions for product.

2.3 FITTINGS FOR CONDUIT, TUBING, AND CABLE

A. Performance Criteria:

1. Regulatory Requirements: Listed and labeled in accordance with NFPA 70, by qualified electrical testing laboratory recognized by authorities having jurisdiction, and marked for intended location and application.

B. Source Quality Control:

1. Product Data: Prepare and submit catalog cuts, brochures, and performance data illustrating size, physical appearance, and other characteristics of product.
2. Manufacturer's Published Instructions: Prepare and submit installation, testing, and operating instructions for product.

C. UL FKAV - Fittings for Type EMT Duct Raceways:
1. Listing Criteria: UL CCN FKAV; including UL 514B.
2. Options:

a. Material: **Stee**l.
b. Coupling Methods:
1) Compression coupling
2) Myers hubs for connection to equipment..
c. Expansion and Deflection Fittings: UL 651 with flexible bonding jumper.

PART 3 - EXECUTION

3.1 SELECTION OF CONDUITS FOR ELECTRICAL SYSTEMS

A. Unless more stringent requirements are specified in Contract Documents or manufacturers' published instructions, comply with NFPA 70 for selection of duct raceways. Consult Architect for resolution of conflicting requirements.

B. Indoors:

1. Type EMT.
2. Connection to Vibrating Equipment (Including Transformers and Hydraulic, Pneumatic, Electric Solenoid, or Motor-Driven Equipment): LFMC.

3.2 INSTALLATION OF CONDUITS FOR ELECTRICAL SYSTEMS

A. Comply with manufacturer's published instructions.

B. Special Installation Techniques:

1. General Requirements for Installation of Duct Raceways:

a. Complete duct raceway installation before starting conductor installation.

b. Provide stub-ups through floors with coupling threaded inside for plugs, set flush with finished floor. Plug coupling until conduit is extended above floor to final destination or a minimum of 2 ft above finished floor.
c. Install no more than equivalent of three 90-degree bends in conduit run. Support within 12 inch of changes in direction.
d. Conceal conduit within finished walls, ceilings, and floors unless otherwise indicated. Install conduits parallel or perpendicular to building lines.
e. Support conduit within 12 inch of enclosures to which attached.
f. Install duct sealing fittings at accessible locations in accordance with NFPA 70 and fill them with listed sealing compound. For concealed duct raceways, install fitting in flush steel box with blank cover plate having finish similar to that of adjacent plates or surfaces. Install duct sealing fittings in accordance with NFPA 70.
g. lates or surfaces. Install duct sealing fittings in accordance with NFPA 70.
h. Do not install duct raceways or electrical items on rotating or vibrating equipment.
i. Do not install conduits within 2 inch of the bottom side of a metal deck roof.
j. Keep duct raceways at least 6 inch away from parallel runs of flues and steam or hot-water pipes. Install horizontal duct raceway runs above water and steam piping.
k. Cut conduit perpendicular to the length. For conduits metric designator 53 (trade size 2) and larger, use roll cutter or a guide to make cut straight and perpendicular to the length. Ream inside of conduit to remove burrs.
l. Install pull wires in empty duct raceways. Provide polypropylene or monofilament plastic line with not less than 200 lb tensile strength. Leave at least 12 inch of slack at both ends of pull wire. Cap underground duct raceways designated as spare above grade alongside duct raceways in use.
m. Install duct raceways square to the enclosure and terminate at enclosures without hubs with locknuts on both sides of enclosure wall. Install locknuts hand tight, plus one-quarter turn more.

    1) Termination fittings with shoulders do not require two locknuts.

n. Terminate threaded conduits into threaded hubs or with locknuts on inside and outside of boxes or cabinets. Install bushings on conduits

up to trade size 1-1/4 inch and insulated throat metal bushings on trade size 1-1/2 inch and larger conduits terminated with locknuts.

2. Types LFMC:

   a. Provide a maximum of 36 inch of flexible conduit for equipment subject to vibration, noise transmission, or movement; and for transformers and motors.

3. Expansion-Joint Fittings:
   a. Install type and quantity of fittings that accommodate temperature change listed for their locations.

   b. Install fitting(s) that provide expansion and contraction for at least 0.000078 inch per foot of length of straight run per deg F of temperature change for metal conduits.
   c. Install expansion fittings at locations where conduits cross building or structure expansion joints.
   d. Install expansion-joint fitting with position, mounting, and piston setting selected in accordance with manufacturer's published instructions for conditions at specific location at time of installation. Install conduit supports to allow for expansion movement.
4. Identification: Provide labels for conduit assemblies, duct raceways, and associated electrical equipment.

   a. Provide warning signs.

C. Interfaces with Other Work:

1. Coordinate with Section 078413 "Penetration Firestopping" for installation of firestopping at penetrations of fire-rated floor and wall assemblies.
2. Coordinate with Section 260529 "Hangers and Supports for Electrical Systems" for installation of conduit hangers and supports.

3.3 PROTECTION

A. Protect coatings, finishes, and cabinets from damage and deterioration.

1. Repair damage to galvanized finishes with zinc-rich paint recommended by manufacturer.

END OF SECTION 26 05 33.13

SECTION 26 05 33.16 - BOXES AND COVERS FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Metallic outlet boxes, device boxes, rings, and covers.
2. Junction boxes and pull boxes.

B. Products Installed, but Not Furnished, under This Section:

1. See Section 260553 "Identification for Electrical Systems" for electrical equipment labels.

C. Related Requirements:
1. Houston Airport System Design Standards Manual, 2023 (HAS Manual).
2. Section 260533.13 “Conduits for Electrical Systems.”

D. Comply with HAS Manual: Raceways and Boxes for Electrical Systems.

1.2 ACTION SUBMITTALS

A. Product Data:

1. Metallic outlet boxes, device boxes, rings, and covers.
2. Junction boxes and pull boxes.

PART 2 - PRODUCTS

2.1 METALLIC OUTLET BOXES, DEVICE BOXES, RINGS, AND COVERS

A. Performance Criteria:

1. Regulatory Requirements: Listed and labeled in accordance with NFPA 70, by qualified electrical testing laboratory recognized by authorities having jurisdiction, and marked for intended location and application.

2. Listing Criteria: UL CCN QCIT; including UL 514A.

B. Source Quality Control:

1. Product Data: Prepare and submit catalog cuts, brochures, and performance data illustrating size, physical appearance, and other characteristics of product.
2. Manufacturer's Published Instructions: Prepare and submit installation, testing, and operating instructions for product.
3. Match conduit types.

C. UL QCIT - Metallic Outlet Boxes and Covers:

1. Description: Box having pry-out openings, knockouts, threaded entries, or hubs in either the sides of the back, or both, for entrance of conduit, conduit or cable fittings, or cables, with provisions for mounting outlet box cover, but without provisions for mounting wiring device directly to box.
2. Options:

a. Material: Sheet steel.

D. UL QCIT - Metallic Device Boxes:

1. Description: Box with provisions for mounting wiring device directly to box.
2. Options:

a. Material: Sheet steel.

E. UL QCIT - Metallic Extension Rings:

1. Description: Ring intended to extend sides of outlet box or device box to increase box depth, volume, or both.

2.2 JUNCTION BOXES AND PULL BOXES

A. Performance Criteria:

1. Regulatory Requirements: Listed and labeled in accordance with NFPA 70 and marked for intended location and use.
2. Listing Criteria: UL CCN BGUZ; including UL 50 and UL 50E.

B. Source Quality Control:

1. Product Data: Prepare and submit catalog cuts, brochures, and performance data illustrating size, physical appearance, and other characteristics of product.
2. Sustainable Design Submittals: Prepare and submit the following documentation for adhesive solvents:

3. Manufacturer's Published Instructions: Prepare and submit installation, testing, and operating instructions for product.

C. UL BGUZ - Indoor Sheet Metal Junction and Pull Boxes:

1. Description: Box with a blank cover that serves the purpose of joining different runs of raceway or cable.
2. Options:

a. Degree of Protection: Type 12.

2.3 COVER PLATES FOR DEVICES BOXES

A. Performance Criteria:

1. Regulatory Requirements: Listed and labeled in accordance with NFPA 70 and marked for intended location and use.
2. Listing Criteria: UL CCN QCIT or UL CCN QCMZ; including UL 514D.
3. Wallplate-Securing Screws: Metal with head color to match wallplate finish.

B. Source Quality Control:

1. Product Data: Prepare and submit catalog cuts, brochures, and performance data illustrating size, physical appearance, and other characteristics of product.
2. Sustainable Design Submittals: Prepare and submit the following documentation for adhesive solvents:

3. Manufacturer's Published Instructions: Prepare and submit installation, testing, and operating instructions for product.

C. UL QCIT or QCMZ - Metallic Cover Plates for Device Boxes:
1. Options:

a. Damp and Wet Locations: Listed, labeled, and marked for location and use. Provide gaskets and accessories necessary for compliance with listing.
b. Wallplate Material: Galvanized steel.

PART 3 - EXECUTION

3.1 PREPARATION

A. Shop Drawings: Prepare and submit the following:

3.2 SELECTION OF BOXES AND COVERS FOR ELECTRICAL SYSTEMS

A. Unless more stringent requirements are specified in Contract Documents or manufacturers' published instructions, comply with NFPA 70 for selection of boxes and enclosures. Consult Architect for resolution of conflicting requirements.

B. Degree of Protection:

1. Indoors:

a. Type 12 unless otherwise indicated.

3.3 INSTALLATION OF BOXES AND COVERS FOR ELECTRICAL SYSTEMS

A. Comply with manufacturer's published instructions.

B. Reference Standards for Installation: Unless more stringent installation requirements are specified in Contract Documents or manufacturers' published instructions, comply with the following:

1. Outlet, Device, Pull, and Junction Boxes: Article 314 of NFPA 70.

C. Special Installation Techniques:

1. Provide boxes in wiring and raceway systems wherever required for pulling of wires, making connections, and mounting of devices or fixtures.
2. Horizontally separate boxes mounted on opposite sides of walls so they are not in the same vertical channel.

3. Locate boxes so that cover or plate will not span different building finishes.
4. Support boxes in recessed ceilings independent of ceiling tiles and ceiling grid.
5. Support boxes of three gangs or more from more than one side by spanning two framing members or mounting on brackets specifically designed for purpose.
6. Fasten junction and pull boxes to, or support from, building structure. Do not support boxes by conduits.
7. Do not rely on locknuts to penetrate nonconductive coatings on enclosures. Remove coatings in the locknut area prior to assembling conduit to enclosure to ensure a continuous ground path.

8. Identification: Provide labels for boxes and associated electrical equipment.

    a. Identify field-installed conductors, interconnecting wiring, and components.
    b. Provide warning signs.
    c. Label each box with engraved metal or laminated-plastic nameplate.

3.4 PROTECTION

A. After installation, protect boxes from construction activities. Remove and replace items that are contaminated, defaced, damaged, or otherwise caused to be unfit for use prior to acceptance by Owner.

END OF SECTION 26 05 33.16

SECTION 26 05 44 - SLEEVES AND SLEEVE SEALS FOR ELECTRICAL RACEWAYS AND CABLING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Round sleeves.
2. Rectangular sleeves.
3. Grout.
4. Pourable sealants.
5. Foam sealants.

B. Related Requirements:
1. Houston Airport System Design Standards Manual, 2023 (HAS Manual).

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

PART 2 - PRODUCTS

2.1 ROUND SLEEVES

A. Steel Wall Sleeves:
1. General Characteristics: ASTM A53/A53M, Type E, Grade B, Schedule 40, zinc coated, plain ends and integral waterstop.

B. Round, Galvanized-Steel, Sheet Metal Sleeves:
1. General Characteristics: Galvanized-steel sheet; thickness not less than 0.0239 inch; round tube closed with welded longitudinal joint, with tabs for screw-fastening the sleeve to the board.

2.2 RECTANGULAR SLEEVES

A. Rectangular, Galvanized-Steel, Sheet Metal Sleeves:

1. General Characteristics:

    a. Material: Galvanized sheet steel.
    b. Minimum Metal Thickness:

        1) For sleeve cross-section rectangle perimeter less than 50 inch with no side larger than 16 inch, thickness must be 0.052 inch.

2.3 GROUT

A. General Characteristics: Nonshrink; recommended for interior and exterior sealing openings in non-fire-rated walls or floors.

1. Standard: ASTM C1107/C1107M, Grade B, post-hardening and volume-adjusting, dry, hydraulic-cement grout.
2. Design Mix: 5000 psi, 28-day compressive strength.
3. Packaging: Premixed and factory packaged.

2.4 POURABLE SEALANTS

A. Performance Criteria:

1. General Characteristics: Single-component, neutral-curing elastomeric sealants of grade indicated below.

    a. Grade: Pourable (self-leveling) formulation for openings in floors and other horizontal surfaces that are not fire rated.

2.5 FOAM SEALANTS

A. Performance Criteria:

1. General Characteristics: Multicomponent, liquid elastomers that, when mixed, expand and cure in place to produce a flexible, nonshrinking foam. Foam expansion must not damage cables or crack penetrated structure.
2. Sustainability Characteristics:

PART 3 - EXECUTION

3.1 INSTALLATION OF SLEEVES FOR NON-FIRE-RATED ELECTRICAL PENETRATIONS

A. Sleeves for Conduits Penetrating Above-Grade, Non-Fire-Rated, Concrete and Masonry-Unit Floors and Walls:

1. Interior Penetrations of Non-Fire-Rated Walls and Floors:

    a. Seal space outside of sleeves with mortar or grout. Pack sealing material solidly between sleeve and wall or floor so no voids remain. Tool exposed surfaces smooth; protect material while curing.
    b. Seal annular space between sleeve and raceway or cable, using joint sealant appropriate for size, depth, and location of joint. Comply with requirements in Section 079200 "Joint Sealants."

2. Use pipe sleeves unless penetration arrangement requires rectangular sleeved opening.
3. Size pipe sleeves to provide **1/4 inch** annular clear space between sleeve and raceway or cable, unless sleeve-seal system is to be installed.
4. Install sleeves for wall penetrations unless core-drilled holes or formed openings are used. Install sleeves during erection of walls. Cut sleeves to length for mounting flush with both surfaces of walls. Deburr after cutting.
5. Install sleeves for floor penetrations. Extend sleeves installed in floors **2 inch** above finished floor level. Install sleeves during erection of floors.

B. Sleeves for Conduits Penetrating Non-Fire-Rated Wall Assemblies:

1. Use circular metal sleeves unless penetration arrangement requires rectangular sleeved opening.
2. Seal space outside of sleeves with approved joint compound for wall assemblies.

3.2 INSTALLATION OF RECTANGULAR SLEEVES AND SLEEVE SEALS

A. Install sleeves in existing walls without compromising structural integrity of walls. Do not cut structural elements without reinforcing the wall to maintain the designed weight bearing and wall stiffness.

B. wall stiffness.

C. Install conduits and cable with no crossings within the sleeve.

D. Fill opening around conduits and cables with expanding foam without leaving voids.

E. Provide metal sheet covering at both wall surfaces and finish to match surrounding surfaces. Metal sheet must be same material as sleeve.

END OF SECTION 26 05 44

SECTION 26 05 53 - IDENTIFICATION FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Labels.
2. Bands.
3. Tags.
4. Cable ties.

B. Related Requirements:
1. Houston Airport System Design Standards Manual, 2023 (HAS Manual).

C. Comply with HAS Manual: Identification for Electrical Systems.

1.2 ACTION SUBMITTALS

A. Product data.

B. Identification Schedule: For each piece of electrical equipment and electrical system components to be index of nomenclature for electrical equipment and system components used in identification signs and labels. Use same designations indicated on Drawings.

PART 2 - PRODUCTS

2.1 LABELS

A. Performance Criteria:

1. Regulatory Requirements: Listed and labeled in accordance with NFPA 70, by qualified electrical testing laboratory recognized by authorities having jurisdiction, and marked for intended location and application.
2. Listing Criteria: UL CCN PGDQ2 for components; including UL 969.

B. UL PGDQ2 - Self-Adhesive Wraparound Labels: Preprinted, 3 mil thick, **polyester or vinyl** flexible label with acrylic pressure-sensitive adhesive.
   1. Self-Lamination: Clear; UV-, weather-, and chemical-resistant; self-laminating, with protective shield over legend. Size labels such that clear shield overlaps entire printed legend.
   2. Marker for Labels:
      a. Machine-printed, permanent, waterproof, black ink recommended by printer manufacturer.

2.2 BANDS

A. Snap-Around Labels: Slit, pretensioned, flexible, preprinted, color-coded acrylic sleeves, with diameters sized to suit diameters and that stay in place by gripping action.

B. Snap-Around, Color-Coding Bands: Slit, pretensioned, flexible, solid-colored acrylic sleeves, 2 inch long, with diameters sized to suit diameters and that stay in place by gripping action.

2.3 CABLE TIES

A. Performance Criteria:

   1. Regulatory Requirements: Listed and labeled in accordance with NFPA 70, by qualified electrical testing laboratory recognized by authorities having jurisdiction, and marked for intended location and application.
   2. Listing Criteria: UL CCN ZODZ; including UL 1565 or UL 62275.

B. UL ZODZ - Plenum-Rated Cable Ties: Self-extinguishing, UV stabilized, one piece, and self-locking.

   1. Minimum Width: 3/16 inch.
   2. Tensile Strength at 73 deg F in accordance with ASTM D638: 7000 psi.
   3. UL 94 Flame Rating: 94V-0.
   4. Temperature Range: Minus 50 to plus 284 deg F.
   5. Color: Black.

PART 3 - EXECUTION

3.1 PREPARATION

A. Self-Adhesive Identification Products: Before applying electrical identification products, clean substrates of substances that could impair bond, using materials and methods recommended by manufacturer of identification product.

3.2 SELECTION OF COLORS AND IDENTIFICATION MARKINGS

A. Comply with 29 CFR 1910.144 for color identification of hazards, and the following:
   1. Ceiling-mounted hangers, supports, cable trays, and raceways must be finished, painted, or suitably marked safety yellow where less than 7.7 ft above finished floor.

B. Color-Coding for Phase- and Voltage-Level Identification, 1000 V or Less: Use colors listed below for ungrounded feeder and branch-circuit conductors.

   1. Color must be factory applied or field applied for sizes larger than 6 AWG when permitted by authorities having jurisdiction.
   2. Colors for 208Y/120 V Circuits:

      a. Phase A: Black.
      b. Phase B: Red.
      c. Phase C: Blue.
      d. Neutral: White.

   3. Colors for 240 V Circuits:

      a. Phase A: Black.
      b. Phase B: Red.

   4. Colors for 480Y/277 V Circuits:

      a. Phase A: Brown.
      b. Phase B: Purple.
      c. Phase C: Yellow.
      d. Neutral: Grey.
   5. Color for Equipment Ground: Green.
   6. Color for Isolated Ground: Green with two or more yellow stripes.

C. Accessible Fittings for Raceways: Identify cover of junction and pull box of the following systems with wiring system legend and system voltage. System legends must be as follows:

1. "EMERGENCY POWER."
2. "POWER."
3. "UPS."

D. Identify conductors, cables, and terminals in enclosures and at junctions, terminals, pull points, and locations of high visibility. Identify by system and circuit designation.

E. Accessible Raceways, 1000 V or Less, for Feeder, and Branch Circuits, More Than 120 V to Ground: Identify with self-adhesive raceway labels.

1. Locate identification at changes in direction, at penetrations of walls and floors, at 50 ft maximum intervals in straight runs, and at 25 ft maximum intervals in congested areas.
2. Identify system voltage and system or service type with black letters on orange field.

F. Control-Circuit Conductor Identification: For conductors and cables in pull and junction boxes, manholes, and handholes, use self-adhesive labels with conductor or cable designation, origin, and destination.

G. Control-Circuit Conductor Termination Identification: For identification at terminations, provide self-adhesive labels with conductor designation.

3.3 SELECTION OF SIGNS AND HAZARD MARKINGS

A. Comply with 29 CFR 1910.145 for danger, caution, warning, and safety instruction signs.

B. Signs, labels, and tags required for personnel safety must comply with the following standards:

1. Safety Colors: NEMA Z535.1.
2. Facility Safety Signs: NEMA Z535.2.
3. Safety Symbols: NEMA Z535.3.
4. Product Safety Signs and Labels: NEMA Z535.4.
5. Safety Tags and Barricade Tapes for Temporary Hazards: NEMA Z535.5.

C. Electrical Hazard Warnings:

1. Arc-Flash Hazard Warning: Self-adhesive labels. Comply with NFPA 70E requirements for arc-flash hazard warning labels.

2. Multiple Power Sources Warning Legend: "DANGER - ELECTRICAL SHOCK HAZARD - EQUIPMENT HAS MULTIPLE POWER SOURCES."
3. OSHA Workspace Clearance Warning Legend: "WARNING - OSHA REGULATION - AREA IN FRONT OF ELECTRICAL EQUIPMENT MUST BE KEPT CLEAR FOR 3 FEET MINIMUM."

D. Warning Labels for Indoor Cabinets, Boxes, and Enclosures for Power and Lighting: Baked-enamel warning signs.

1. Apply to exterior of door, cover, or other access.

2. For equipment with multiple power or control sources, apply to door or cover of equipment.

E. Operating Instruction Signs: Baked-enamel warning signs.

3.4 INSTALLATION

A. Install identification materials and devices at locations for most convenient viewing without interference with operation and maintenance of equipment. Install access doors or panels to provide view of identifying devices.

B. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes typical for electrical equipment environments specified in Section 260011 "Facility Performance Requirements for Electrical."

C. Paint: Comply with requirements in painting Sections for paint materials and application requirements. Retain paint system applicable for surface material and location (exterior or interior).

D. Fasteners for Labels and Signs: Self-tapping, stainless steel screws or stainless steel machine screws with nuts and flat and lock washers.

E. Verify and coordinate identification names, abbreviations, colors, and other features with requirements in other Sections requiring identification applications, Drawings, Shop Drawings, manufacturer's wiring diagrams, and operation and maintenance manual. Use consistent designations throughout Project.

F. Install identifying devices before installing acoustical ceilings and similar concealment.

G. Verify identity of item before installing identification products.

H. Coordinate identification with Project Drawings, manufacturer's wiring diagrams, and operation and maintenance manual.

I. Apply identification devices to surfaces that require finish after completing finish work.

J. Install signs with approved legend to facilitate proper identification, operation, and maintenance of electrical systems and connected items.

K. System Identification for Raceways and Cables under 1000 V: Identification must completely encircle cable or conduit. Place identification of two-color markings in contact, side by side.

1. Secure tight to surface of conductor, cable, or raceway.

L. Auxiliary Electrical Systems Conductor Identification: Identify field-installed alarm, control, and signal connections.

M. Elevated Components: Increase sizes of labels, signs, and letters to those appropriate for viewing from floor.

N. Snap-Around Labels: Secure tight to surface at location with high visibility and accessibility.

O. Self-Adhesive Wraparound Labels: Secure tight to surface at location with high visibility and accessibility.

P. Self-Adhesive Labels:

1. Install unique designation label that is consistent with wiring diagrams, schedules, and operation and maintenance manual.
2. Unless otherwise indicated, provide single line of text with 1/2 inch high letters on 1-1/2 inch high label; where two lines of text are required, use labels 2 inch high.

Q. Snap-Around Color-Coding Bands: Secure tight to surface at location with high visibility and accessibility.

R. Heat-Shrink, Preprinted Tubes: Secure tight to surface at location with high visibility and accessibility.

S. Marker Tapes: Secure tight to surface at location with high visibility and accessibility.

T. Self-Adhesive Vinyl Tape: Secure tight to surface at location with high visibility and accessibility.

1. Field-Applied, Color-Coding Conductor Tape: Apply in half-lapped turns for minimum distance of 6 inch where splices or taps are made. Apply last two turns of tape with no tension to prevent possible unwinding.

U. Baked-Enamel Signs:

1. Attach signs that are not self-adhesive type with mechanical fasteners appropriate to location and substrate.
2. Unless otherwise indicated, provide single line of text with 1/2 inch high letters on minimum 1-1/2 inch high sign; where two lines of text are required, use signs minimum 2 inch high.

END OF SECTION 26 05 53

SECTION 26 22 13 - LOW-VOLTAGE DISTRIBUTION TRANSFORMERS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Distribution, dry-type transformers with nominal primary and secondary rating of 600 V and less, with capacities up to 1500 kVA.

B. Related Requirements:
1. Houston Airport System Design Standards Manual, 2023 (HAS Manual).

C. Comply with HAS Manual: Low-Voltage Transformers.

1.2 ACTION SUBMITTALS

A. Product Data:

1. For each type of product.

B. Shop Drawings:

1. Detail equipment assemblies and indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of field connections.
2. Vibration Isolation Base Details: Detail fabrication including anchorages and attachments to structure and to supported equipment.
3. Include diagrams for power, signal, and control wiring.

C. Field Quality-Control Submittals:

1. Field quality-control reports.

2. Test reports.

1.3 INFORMATIONAL SUBMITTALS

A. Manufacturers' Published Instructions: Record copy of official installation and testing instructions issued to Installer by manufacturer for the following:

1. Transformer working clearances, anchoring, torque values, and insulation-resistance testing.

B. Source quality-control reports.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Provide Schneider Electric (Square D) or HAS pre-approved equal.

2.2 GENERAL TRANSFORMER REQUIREMENTS

A. Description: Factory-assembled and -tested, air-cooled units for 60 Hz service.

B. Electrical Components, Devices, and Accessories: Listed and labeled in accordance with NFPA 70, by qualified electrical testing laboratory recognized by authorities having jurisdiction, and marked for intended location and application.

C. Transformers Rated 15 kVA and Larger:

1. Comply with 10 CFR 431 (DOE 2016) efficiency levels.
2. Marked as compliant with DOE 2016 efficiency levels by qualified electrical testing laboratory recognized by authorities having jurisdiction.

2.3 DISTRIBUTION TRANSFORMERS

A. Comply with NFPA 70 and list and label as complying with UL 1561.

B. Cores: Electrical grade, non-aging silicon steel with high permeability and low hysteresis losses.

1. One leg per phase.

C. Coils: Continuous windings without splices except for taps.

1. Coil Material: Copper.
2. Internal Coil Connections: Brazed or pressure type.
3. Terminal Connections: Bolted.

D. Encapsulation: Transformers smaller than 30 kVA must have core and coils completely resin encapsulated.

E. Enclosure: Ventilated.

1. Core and coil must be encapsulated within resin compound using vacuum-pressure impregnation process to seal out moisture and air.
2. KVA Ratings: Based on convection cooling only and not relying on auxiliary fans.
3. Wiring Compartment: Sized for conduit entry and wiring installation.
4. Environmental Protection:

a. Indoor: UL 50E, Type 2.

F. Taps for Transformers 7.5 to 24 kVA: One 5 percent tap above and one 5 percent tap below normal full capacity.

G. Taps for Transformers 25 kVA and Larger: Two 2.5 percent taps above and two 2.5 percent taps below normal full capacity.

H. Insulation Class, Smaller Than 30 kVA: 180 deg C, UL-component-recognized insulation system with maximum of 115 deg C rise above 40 deg C ambient temperature.

I. Insulation Class, 30 kVA and Larger: 220 deg C, UL-component-recognized insulation system with maximum of 115 deg C rise above 40 deg C ambient temperature.

J. Grounding: Provide ground-bar kit or ground bar installed on inside of transformer enclosure.

K. Wall Brackets: Manufacturer's standard brackets.

2.4 IDENTIFICATION

A. Nameplates:

1. Engraved, laminated-acrylic or melamine plastic signs for distribution transformers, mounted with corrosion-resistant screws. Nameplates and

label products are specified in Section 260553 "Identification for Electrical Systems."

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine conditions for compliance with enclosure- and ambient-temperature requirements for transformers.

B. Verify that field measurements are as needed to maintain working clearances required by NFPA 70 and manufacturer's published instructions.

C. Examine walls, floors, roofs, and concrete bases for suitable mounting conditions where transformers will be installed.

D. Verify that ground connections are in place and requirements in Section 260526 "Grounding and Bonding for Electrical Systems" have been met. Maximum ground resistance must be 5 Ω at location of transformer.

E. Environment: Enclosures must be rated for environment in which they are located. Covers for UL 50E, Type 4X enclosures may not cause accessibility problems.

3.2 INSTALLATION

A. Install wall-mounted transformers level and plumb with wall brackets fabricated by transformer manufacturer.

1. Coordinate installation of wall-mounted and structure-hanging supports with actual transformer provided.

B. Secure transformer to concrete base in accordance with manufacturer's published instructions.

C. Secure covers to enclosure and tighten bolts to manufacturer-recommended torques to reduce noise generation.

D. Remove shipping bolts, blocking, and wedges.

3.3 CONNECTIONS

A. Ground equipment in accordance with Section 260526 "Grounding and Bonding for Electrical Systems."

B. Connect wiring in accordance with Section 260519 "Low-Voltage Electrical Power Conductors and Cables."

C. Tighten electrical connectors and terminals in accordance with manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A-486B.

D. Provide flexible connections at conduit and conductor terminations and supports to eliminate sound and vibration transmission to building structure.

3.4 TESTING

A. Conduct testing per NETA ATS 2025 – 7.2.1.1.
   1. Exceptions. The following tests are not required:
      a. 7.2.1.1.A.8
      b. 7.2.1.1.C.2.

B. Coordinate for all tests to be witnessed by Building Standards Group Electrical Inspector and the HAS Commissioning Authority.

C. Nonconforming Work:

   1. System(s) will be considered defective if it does not pass tests and inspections.
   2. Remove and replace defective components and retest.

D. Collect, assemble, and submit test and inspection reports.

3.5 CLEANING

A. Vacuum dirt and debris; do not use compressed air to assist in cleaning.

END OF SECTION 26 22 13

SECTION 26 24 16 - PANELBOARDS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Lighting and appliance branch-circuit panelboards.
2. Disconnecting and overcurrent protective devices.

B. Related Requirements:
1. Houston Airport System Design Standards Manual, 2023 (HAS Manual).

C. Comply with HAS Manual: Panelboards.
1. Exception: 3.1.2 empty conduits for surface mounted panels is not required.

1.2 ACTION SUBMITTALS

A. Product Data:
1. Lighting and appliance branch-circuit panelboards.
2. Disconnecting and overcurrent protective devices.
3. Include materials, switching and overcurrent protective devices, accessories, and components indicated.
4. Include dimensions and manufacturers' technical data on features, performance, electrical characteristics, ratings, and finishes.

B. Shop Drawings: For each panelboard and related equipment.

1. Include dimensioned plans, elevations, sections, and details.
2. Show tabulations of installed devices with nameplates, conductor termination sizes, equipment features, and ratings.
3. Detail enclosure types including mounting and anchorage, environmental protection, knockouts, corner treatments, covers and doors, gaskets, hinges, and locks.
4. Detail bus configuration, current, and voltage ratings.
5. Short-circuit current rating of panelboards and overcurrent protective devices.
6. Detail features, characteristics, ratings, and factory settings of individual overcurrent protective devices and auxiliary components.

7. Include wiring diagrams for power, signal, and control wiring.
8. Key interlock scheme drawing and sequence of operations.

C. Field Quality-Control Submittals:

1. Field quality-control reports.

2. Test reports.

1.3 INFORMATIONAL SUBMITTALS

A. Panelboard Schedules: For installation in panelboards.

B. Manufacturers' Published Instructions: Record copy of official installation and testing instructions issued to Installer by manufacturer for the following:

1. Recommended procedures for installing panelboards.
2. Recommended torque settings for bolted connections on panelboards.
3. Recommended temperature range for energizing panelboards.

C. Sample warranties.

1.4 CLOSEOUT SUBMITTALS

A. Warranty documentation.

1.5 MAINTENANCE MATERIAL SUBMITTALS

A. Special Tools: Furnish to Owner proprietary equipment, keys, and software required to operate, maintain, repair, adjust, or implement future changes to panelboards, that are packaged with protective covering for storage on-site and identified with labels describing contents.

PART 2 - PRODUCTS

2.1 EXISTING PRODUCTS TO BE MODIFIED

A. Existing panelboards indicated on the Drawings to receive new circuit breakers and accessories shall be per panelboard manufacturer’s recommendations. New products shall be of same manufacturer and compatible with existing

panelboards. New breakers shall be fully rated to match the existing panelboard interrupting current.

2.2 LIGHTING AND APPLIANCE BRANCH-CIRCUIT PANELBOARDS

A. Electrical Components, Devices, and Accessories: Listed and labeled in accordance with NFPA 70, by qualified electrical testing agency recognized by authorities having jurisdiction, and marked for intended location and application.

B. Manufacturers of new panelboards: Schneider Electric (Square D) or HAS pre-approved equal.

C. Comply with NEMA PB 1.

D. Comply with NFPA 70.

E. Enclosures: Surface-mounted, dead-front cabinets.
   1. Indoor Locations: UL 50E, Type 12.
   2. Front: Secured to box with concealed trim clamps. For surface-mounted fronts, match box dimensions; for flush-mounted fronts, overlap box. Trims must cover live parts and may have no exposed hardware.

F. Incoming Mains:

   1. Location: As indicated on Drawings.

G. Branch Overcurrent Protective Devices: Bolt-on circuit breakers, replaceable without disturbing adjacent units.

H. Doors: Full length hinges, keyed.

I. Phase, Neutral, and Ground Buses:

   1. Material: Hard-drawn copper, 98 percent conductivity.

J. Conductor Connectors: Suitable for use with conductor material and sizes.

   1. Material: Hard-drawn copper, 98 percent conductivity.
   2. Main and Neutral Lugs: Mechanical type, with lug on neutral bar for each pole in panelboard.
   3. Ground Lugs and Bus-Configured Terminators: Mechanical type, with lug on bar for each pole in panelboard.

K. Future Devices: Panelboards or load centers must have mounting brackets, bus connections, filler plates, and necessary appurtenances required for future installation of devices.

L. Panelboard Short-Circuit Current Rating:
1. Fully rated to interrupt symmetrical short-circuit current available at terminals. Assembly listed, by qualified electrical testing laboratory recognized by authorities having jurisdiction, for 100 percent interrupting capacity.

2.3 DISCONNECTING AND OVERCURRENT PROTECTIVE DEVICES

A. MCCB: Comply with UL 489, full rated to match new or existing panelboard.

1. Thermal-Magnetic Circuit Breakers:

a. Inverse time-current element for low-level overloads.
b. Instantaneous magnetic trip element for short circuits.

2. MCCB Features and Accessories:

a. Standard frame sizes, trip ratings, and number of poles.
b. Breaker handle indicates tripped status.
c. Lugs: Mechanical style, suitable for number, size, trip ratings, and conductor materials.
d. Handle Padlocking Device: Fixed attachment, for locking circuit-breaker handle in off position.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Comply with manufacturer's published instructions.

B. Reference Standards:

1. Panelboards: Unless more stringent requirements are specified in Contract Documents or manufacturers' published instructions, comply with NEMA PB 1.1.
2. Consult Architect for resolution of conflicting requirements.

C. Special Techniques:

1. Mount so top-most device is 79 inch max above finished floor.
2. Mount panelboard cabinet plumb and rigid without distortion of box.
3. Install overcurrent protective devices and controllers not already factory installed.

4. Make grounding connections and bond neutral for services and separately derived systems to ground. Make connections to grounding electrodes, separate grounds for isolated ground bars, and connections to separate ground bars.
5. Install filler plates in unused spaces.

3.2 IDENTIFICATION

A. Identify field-installed conductors, interconnecting wiring, and components; install warning signs complying with requirements in Section 260553 "Identification for Electrical Systems."

B. Panelboard Nameplates: Label each panelboard with nameplate complying with requirements for identification specified in Section 260553 "Identification for Electrical Systems."

C. Install warning signs complying with requirements in Section 260553 "Identification for Electrical Systems" identifying source of remote circuit.

D. Panelboard Label: Manufacturer's name and trademark, voltage, amperage, number of phases, and number of poles must be located on interior of panelboard door.

E. Breaker Labels: Faceplate must list current rating, UL and IEC certification standards, and AIC rating.

F. Circuit Directory:

1. Provide type-written directory card inside panelboard door, mounted in transparent card holder. Include new and existing circuits.

2. Create directory to indicate installed circuit loads; incorporate Owner's final room designations. Obtain approval before installing. Handwritten directories are not acceptable. Install directory inside panelboard door.

3.3 TESTING

A. Perform testing on new and existing panelboards.

B. Conduct testing per NETA ATS 2025 – 7.1.2 “Panelboard Assemblies.”
   1. Exceptions. The following tests are not required:
      a. 7.1.2.A.12.

C. Conduct testing per NETA ATS 2025 – 7.6.1.1.1 “Circuit Breakers, Low-Voltage, Molded-Case.”
   1. Exceptions. The following tests are not required:
      a. 7.6.1.1.1.A.7
      b. 7.6.1.1.1.C.2
      c. Tests involving device settings and pick-ups.

D. Coordinate for all tests to be witnessed by Building Standards Group Electrical Inspector and the HAS Commissioning Authority.

E. Nonconforming Work:

   1. System(s) will be considered defective if it does not pass tests and inspections.
   2. Remove and replace defective components and retest.

F. Collect, assemble, and submit test and inspection reports.

END OF SECTION 26 24 16

SECTION 26 28 16 - ENCLOSED SWITCHES AND CIRCUIT BREAKERS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Nonfusible switches.
2. Enclosures.

1.2 ACTION SUBMITTALS

A. Product Data:

1. For each type of enclosed switch, circuit breaker, accessory, and component indicated. Include nameplate ratings, dimensioned elevations, sections, weights, and manufacturers' technical data on features, performance, electrical characteristics, ratings, accessories, and finishes.
2. Enclosure types and details.
3. Current and voltage ratings.
4. Short-circuit current ratings (interrupting and withstand, as appropriate).
5. Detail features, characteristics, ratings, and factory settings of individual overcurrent protective devices, accessories, and auxiliary components.

B. Shop Drawings: For enclosed switches and circuit breakers.

1. Include plans, elevations, sections, details, and attachments to other work.
2. Include wiring diagrams for power, signal, and control wiring.

C. Field Quality-Control Submittals:
1. Field quality-control reports.
2. Test Reports.

1.3 CLOSEOUT SUBMITTALS

A. Warranty documentation.

PART 2 - PRODUCTS

2.1 GENERAL REQUIREMENTS

A. Product Selection for Restricted Space: Drawings indicate maximum dimensions for enclosed switches and circuit breakers, including clearances between enclosures, and adjacent surfaces and other items. Comply with indicated maximum dimensions.

B. Electrical Components, Devices, and Accessories: Listed and labeled in accordance with NFPA 70, by qualified electrical testing laboratory recognized by authorities having jurisdiction, and marked for intended location and application.

2.2 NONFUSIBLE SWITCHES

A. Manufacturers: Schneider Electric (Square D) or HAS pre-approved equal.

B. Type HD, Heavy Duty, Three Pole, Single Throw, 240 or 600 V(ac), 1200 A and Smaller: UL 98 and NEMA KS 1, horsepower rated, lockable handle with capability to accept three padlocks, and interlocked with cover in closed position.

C. Accessories:

1. Equipment Ground Kit: Internally mounted and labeled for copper and aluminum ground conductors.
2. Neutral Kit: Internally mounted; insulated, capable of being grounded and bonded; labeled for copper and aluminum neutral conductors.

2.3 ENCLOSURES

A. Enclosed Switches and Circuit Breakers: UL 489, NEMA KS 1, UL 50E, and UL 50, to comply with environmental conditions at installed location.

B. Enclosure Finish: Enclosure must be gray baked enamel paint, electrodeposited on cleaned, phosphatized galvannealed steel (UL 50E Type 12).

C. Operating Mechanism: Cover interlock mechanism must have externally operated override. Override may not permanently disable interlock mechanism, which must return to locked position once override is released. Tool used to

override cover interlock mechanism must not be required to enter enclosure in order to override interlock.

D. Enclosures must have dual cover interlock mechanism to prevent unintentional opening of enclosure cover when circuit breaker is ON and to prevent turning circuit breaker ON when enclosure cover is open.

PART 3 - EXECUTION

3.1 SELECTION OF ENCLOSURES

A. Indoor Locations: UL 50E, Type 12.

3.2 INSTALLATION

A. Comply with manufacturer's published instructions.

B. Special Techniques:

1. Coordinate layout and installation of switches, circuit breakers, and components with equipment served and adjacent surfaces. Maintain required workspace clearances and required clearances for equipment access doors and panels.

3.3 IDENTIFICATION

A. Comply with requirements in Section 260553 "Identification for Electrical Systems."

1. Identify field-installed conductors, interconnecting wiring, and components; provide warning signs.
2. Label each enclosure with engraved metal or laminated-plastic nameplate.

3.4 TESTING

A. Perform testing on new and existing panelboards.

B. Conduct testing per NETA ATS 2025 – 7.5.1.1 “Switches, Air, Low-Voltage.”
1. Exceptions. The following tests are not required:
a. 7.5.1.1.A.13.

b. 7.5.1.1.C.2.

C. Coordinate for all tests to be witnessed by Building Standards Group Electrical Inspector and the HAS Commissioning Authority.

D. Nonconforming Work:

1. System(s) will be considered defective if it does not pass tests and inspections.
2. Remove and replace defective components and retest.

E. Collect, assemble, and submit test and inspection reports.

3.5 ADJUSTING

A. Adjust moving parts and operable components to function smoothly, and lubricate as recommended by manufacturer.

END OF SECTION 26 28 16

END OF SPECIFICATIONS

SECTION 01210
CASH ALLOWANCES

Revised 09.16.2025

PART 1 GENERAL

1.01 SECTION INCLUDES

A. City's allowances, allocated to the items of work listed or as directed.

B. See Document 00700 – General Conditions, Paragraph 3.11 for costs included and excluded from cash allowance values listed in 1.02 below.

C. Follow Section 01255 – Modification Procedures for processing allowance expenditures. Cash Allowance sums remaining at Final Completion belong to the City, creditable by Change Order.

1.02 SCHEDULE OF CASH ALLOWANCES (TOTAL $960,000 VALUE)

Allowance Item 1 - $660,000 for the following:

A. Allowance for Building Permit: For obtaining the Building Permit from the City of Houston.

B. Allowance for Asbestos, Lead, and Mold Removal & Disposal.

Allowance Item 2 - $300,000 for the following:

A. Allowance for Graphics and Temporary Signage for Wayfinding.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 01350 **Revised 09.16.2025**

MOCK-UPS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Control sample mock-ups of following to demonstrate finished visual and other aesthetic qualities of completed work. If approved, these mock-ups may be built as part of the completed work.

B. Systems integration mock-ups of following to demonstrate dimensional or ergonomic qualities. These mock-ups are not permitted as final work.

C. Provide required mock-ups after award of contract(s) for each section of work affected by this Section.

D. Provide full-size mock-ups.

E. Refer to the construction documents for additional mock-ups and information.

1.02 QUALITY ASSURANCE

A. Provide joinery, attachments, same generic materials, and other components to comply with requirements of final construction.

1. By way of example only, if transparent finished wood material is required in completed construction, the Contractor may substitute a lower "visual" quality wood of compressive and yield strength equal to the finished product for systems integration mockups but use of actual products is required for control sample mockups.

B. Reduction of quality, specified in applicable Sections, for control sample mock-ups is not permitted.

1.03 SITE CONDITIONS

A. Protect from damage until directed to remove mock-ups.

1.04 COORDINATION WITH SECTION 01340- SHOP DRAWINGS, PRODUCT DATA AND SAMPLES

A. Mock-ups are specialized submittal data in the form of full-sized "samples".

B. Provide mock-ups after processing of shop drawings, product data and hand-held-size samples specified in applicable Sections is complete.

C. If changes are required as a result of fabrication or installation processes, or as a result of review and demonstration results, modify submittal data and fabrication and installation processes accordingly. Submit revised submittals following Section 01340 - Shop Drawings, Product Data and Samples.

1. Refer to Parts 2 and 3 herein for relationship of changes to Section 01610- Basic Product Requirements.

PART 2 PRODUCTS

2.01 GENERAL

A. Fabricate mock-ups by same techniques and sequencing as expected for completed work.

1. Use fabrication of mock-ups to validate shop techniques and sequencing.

2. If, due to fabrication of mock-ups, changes required for proper function or are recommended by Contractor, follow Section 01610 - Basic Product Requirements for both work of this Section and of other Sections.

PART 3 EXECUTION

3.01 GENERAL

A. Install products for mock-ups following applicable Sections.

B. Install mock-ups where shown on Drawings. See sheet MU1 – Mockup Locations exhibit for locations and sizes of required mock-ups.

C. Install temporary or supplementary bracing or framing following Section 01505 - Temporary Facilities.

D. Install mock-ups by same techniques and sequencing as expected for completed work.

1. Validate field techniques and sequencing, interface at mating surfaces and other aspects of coordination between Sections and applicable Separate Contracts.

2. If, due to installation of mock-ups, Contractor recommends changes, follow Section 01610 - Basic Product Requirements for both work of this Section and other Sections.

3.02 REVIEW AND DEMONSTRATIONS

A. Notify City Engineer and Designer of date when mock-ups are ready for review and demonstration.

B. Administer demonstrations of mock-ups. Include fabricator and installer.

C. Take notes of review results and publish to City Engineer, Designer and attendees. Describe changes in construction resulting from discoveries during review and tests.

D. Minimum review and proper demonstration of mock-ups:

1. Effectiveness of light, water, sound and air seals, as applicable.

2. Accessibility for maintenance of concealed or semi-exposed moving parts.

3. Uniform of joint tolerances and visible treatment within individual or "panelized" items and between separate "panelized" components, and between substrates and completed work.

4. Compliance of constructed sight lines and profiles with Drawings.

F. Leave mock-ups in place until removal is authorized, but prior to the date of Substantial Completion.

END OF SECTION