3.3 CLEANING AND PROTECTION

A. Clean exposed metal surf aces, r emoving substances that might cause corrosion of m etal or deterioration of finishes.

B. Provide final protection and maintain conditions that ensure sheet metal flashing and trim Work during construction is without damage or deterioration other than natural weathering at the time of Substantial Completion.

END OF SECTION

SECTION 07920 - JOINT SEALERS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS: Drawings and general provisions of Contract, including General and Supplementary Conditions and other Division-1 Specification sections, apply to work of this section.

1.02 DESCRIPTION OF WORK: Extent of each form and type of joint sealer is scheduled at end of this section.

1.03 SYSTEM PERFORMANCES: Provide joint sealers that have been produced and installed to establish and maintain watertight and airtight continuous seals.

1.04 QUALITY ASSURANCE:

A. Single Source Responsibility for Joint Sealer Materials: Obtain joint sealer materials from a single manufacturer for each different product required.

B. Installer Qualifications: Engage an Installer who has successfuly completed within the last 3 years at least 3 joint sealer applications similar in type and size to that of this project and who will assign mechanics from these earlier applications to this project, of which one will serve as lead mechanic.

1.05 SUBMITTALS:

A. Product Data: Submit manufacturer's technical data for each joint sealer product required, including instructions for joint preparation and joint sealer application.

1.06 DELIVERY, STORAGE, AND HANDLING: Deliver materials to project site in original unopened containers or bundles with labels informing about manufacturer, product name and designation, color, expiration period for use, pot life, curing time and mixing instructions for multicomponent materials. Store and handle materials to prevent their deterioration or damage due to moisture, temperature changes, contaminants, or other causes.

1.07 PROJECT CONDITIONS:

A. Environmental Conditions: Do not proceed with installation of joint sealers under the following conditions:
   1] When ambient and substrate temperature conditions are outside the limits permitted by joint sealer manufacturers.
   2] When joint substrates are wet due to rain, frost, condensation, or other causes.

B. Joint Width Conditions: Do not proceed with installation of joint sealers when joint widths are less than allowed by joint sealer manufacturer for application indicated.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Materials, General:
1] Compatibility: Provide joint sealers, joint fillers and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by testing and field experience.
2] Colors: Provide colors of exposed joint sealers as selected by Architect from manufacturer's standard colors.
3] Elastomeric Sealant Standard: Provide manufacturer's standard chemically curing elastomeric sealant of base polymer indicated which complies with ASTM C-920 requirements, including those for Type, Grade, Class, and Uses.

B. Elastomeric Joint Sealers:

1] ONE-COMPONENT, GUN GRADE, POLYURETHANE SEALANT:
Bostik Chem-Calk 900 or approved equal.

2] ONE-COMPONENT, SELF-LEVELING, TRAFFIC GRADE, POLYURETHANE SEALANT:
Bostik Chem-Calk 950 or approved equal.

3] ONE-COMPONENT, SILICONE SEALANT:
Bostik Chem-Calk 1200 or approved equal.

C. Joint Fillers:
1] Bituminous Fiber Joint Filler: Preformed strips of asphalt saturated fiberboard, complying with ASTM D-1751:

D. Joint Sealant Backing:
1] General: Provide sealant backings of material and type which are nonstaining; are compatible with joint substrates, sealants, primers and other joint fillers; and are approved for applications indicated by sealant manufacturer based on field experience and laboratory testing.
2] Plastic Foam Joint-Fillers: Preformed, compressible, resilient, nonwaxing, nonextruding strips of plastic foam of material indicated below and of size, shape, and density to control sealant depth and otherwise contribute to producing optimum sealant performance.
3] Either flexible, open-cell polyurethane foam or nongassing, closed-cell polyethylene foam, unless otherwise indicated, subject to approval of sealant manufacturer.
4] Bond-Breaker Tape: Polyethylene tape or other plastic tape as recommended by sealant manufacturer for preventing bond between sealant and joint filler or other materials at back (3rd) surface of joint. Provide self-adhesive tape where applicable.

E. Miscellaneous Materials:
1] Primer: Provide type recommended by joint sealer manufacturer where required for adhesion of sealant to joint substrates indicated, as determined from preconstruction joint sealer-substrate and field tests.
2] Cleaners for Nonporous Surfaces: Provide nonstaining, chemical cleaner of type acceptable to manufacturer of sealant and sealant backing materials which are not harmful to substrates and adjacent nonporous materials.

3] Masking Tape: Provide nonstaining, nonabsorbent ty pe com patible with joint sealant and to surfaces adjacent to joints.

PART 3 - EXECUTION

3.01 INSPECTION:

A. General: Inspect all joints that should receive joint sealers for compliance with requirements for joint configuration, installation tolera nces and other conditions affecting joint sealer perform ance. Repair any conditions detrim ental to performance of joint sealer work. Do not allow joint sealer work to proceed until unsatisfactory conditions have been corrected.

3.02 PREPARATION:

A. Before proceeding with any joint sealer work, verify that such work is coordinated with all other trades.

B. Surface Cleaning of Joints: Clean out joints i mmediately before installing joint sealers to com ply with recommendations of joint sealer manufacturers and the following requirements:
1] Remove all foreign m aterial from joint substr ates which could interfere with adhesion of joint sealer, including dust; paints, except for perm anent, protective coatings tested and approved for sealant adhesion and com patibility by sealant m anufacturer; oil; grease; waterproofing; water repellants; water; surface dirt and frost.
2] Clean concrete, m asonry, unglazed surfaces of ceramic tile and sim ilar porous joint substrate surfaces, by brushing, grinding, blast cleaning, m echanical abrading, acid washing or a combination of these methods to produce a clean, sound substrate capable of developing optimum bond with joint sealers. Rem ove loose particles rem aining from above cleaning operations by vacuuming or blowing out joints with oil-free compressed air.
3] Remove laitance and form -release agent from concrete. Clean metal, glass, porcelain enamel, glazed surfaces of ceramic tile and other nonporous surfaces by chemical cleaners or other means which are not harmful to substrates or leave residues capable of interfering with adhesion of joint sealers.

C. Joint Prim ing: Prim e joint substrates where indicated or where recom mended by joint sealer manufacturer based on preconstruction joint sealer-substr ate tests or prior experience. Apply primer to comply with joint sealer manufacturer's recommendations. Confine primers to areas of joint sealer bond, do not allow spillage or migration onto adjoining surfaces.

D. Masking Tape: Use m asking tape where require d to prevent contact of sealant with adjoining surfaces which otherwise would be perm anently stained or dam aged by such contact or by cleaning methods required to rem ove sealant smears. Remove tape im mediately after tooling without disturbing joint seal.

3.03 INSTALLATION OF JOINT SEALERS:

A. General: Com ply with joint sealer manufacturer's printed installation instructions applicable to products and applications indicated, except where more stringent requirements apply.

B. Elastomeric Sealant Installation Standard: Comply with recommendations of ASTM C-962 for use of joint sealants as applicable to materials, applications and conditions indicated.

C. Installation of Sealant Backings: Install sealant backings to comply with the following requirements:
   1] Install joint-fillers of ty pe indicated to provide support of sealants during application and at position required to produce the cross-sectional shapes and depths of installed sealants relative to joint widths which allow optimum sealant movement capability.
   2] Do not leave gaps between ends of joint-fille rs. Do not stretch, twist, puncture or tear joint-fillers. Rem ove absorbent joint-fillers which have becom e wet prior to sealant application and replace with dry material.
   3] Install bond breaker tape between sealants and jo int-fillers, com pression seals or back of joints where required to prevent third-side adhesion of sealant to back of joint.
   4] Install com pressible seals serving as sealant back ings to com ply with requirements indicated above for joint fillers.

D. Installation of Sealants: Install sealants by proven techniques that result in sealants directly contacting and fully wetting joint substrates, completely filling recesses provided for each joint configuration and providing uniform, cross-sectional shapes and depths relative to joint widths which allow optimum sealant movement capability.

E. Tooling of Nonsag Sealants: Im mediately after sealant application and prior to time skinning or curing begins, tool sealants to form smooth, uniform beads of concave configuration, to elim inate air pockets and to ensure contact and adhesion of seal ant with sides of joint. Rem ove excess sealants from surfaces adjacent to joint. Do not use tooling agents which discolor sealants or adjacent surfaces or are not approved by sealant manufacturer.

3.04 PROTECTION AND CLEANING:

A. General: Protect joint sealers during and afte r curing period from contact with contam inating substances or from dam age resulting from constructi on operations or other causes so that they are without deterioration or damage at time of substantial completion.
   If, despite such protection, dam age or deteri oration occurs, cut out and rem ove dam aged or deteriorated joint sealers im mediately and reseal joints with new m aterials to produce joint sealer installations with repaired areas indistinguishable from original work.

B. Clean off excess sealants or sealant smears adjacent to joints as work progresses by methods and with cleaning materials approved by manufacturers of joint sealers and of products in which joints occur.

PART 4 - JOINT SEALANT SCHEDULE

APPLICATIONS	**SEALANT TYPE**

Perimeter Caulking Interior and Exterior Frames-Type A or B

Perimeter Caulking of Sanitary Fixtures-Type A

Sealing Around Entrances-Type A, B or D

Electrical & Mechanical Fixtures-Type A, B or C

Flashing-Type A, B or D

Lap Joints-Type A or C

END OF SECTION

SECTION 081110 - STEEL DOORS AND FRAMES

PART 1 - GENERAL

1.01 RELATED DOCUMENTS: Drawings and general provisions of Contract, including General and Supplementary Conditions and other Division-1 Specification sections, apply to work of this section.

1.02 DESCRIPTION OF WORK

A. Extent of standard steel doors and frames is indicated on drawings.

B. Finish hardware is specified elsewhere in Division- 8.

1.03 QUALITY ASSURANCE:

A. Provide Doors and Frames complying with Steel Door Institute "Recommended Specifications: Standard Steel Doors and Frames" (SDI-100) and as herein specified.

1.04 SUBMITTALS

A. Product Data: Submit manufacturer's technical product data substantiating that products comply with requirements.

B. Shop Drawings: Submit for fabrication and installation of steel doors and frames. Include details of each frame type, elevations of door design types, conditions at openings, details of construction, location and installation requirements of finish hardware and reinforcements and details of joints and connections. Show anchorage and accessory items.

1.05 DELIVERY, STORAGE, AND HANDLING:

A. Deliver steel products cartoned or crated to provide protection during transit and job storage. Provide additional sealed plastic wrapping for factory-finished doors.

B. Inspect hollow metal work upon delivery for damage. Minor damages may be repaired provided refinished items are equal in all respects to new work and acceptable to Architect; otherwise, remove and replace damaged items as directed.

C. Store doors and frames at building site under cover. Place units on minimum 4" high wood blocking. Avoid use of nonvented plastic or canvas shelters which could create humidity chamber. If cardboard wrapper on door becomes wet, remove carton immediately. Provide 1/4" spaces between stacked doors to promote air circulation.

PART 2 - PRODUCTS

2.01 MANUFACTURERS: Subject to compliance with requirements, provide products by one of the following:

A. Steel Doors and Frames:
   1] Amweld Building Products, Inc.
   2] Ceco Door Products; a United Dominion Company.
   3] Copco Door Co.
   4] Curries Company.
   5] Kewanee Corporation (The).
   6] Steelcraft; a division of Ingersoll-Rand.

2.02 MATERIALS:

A. Hot-Rolled Steel Sheets and Strips: Commercial quality carbon steel, pickled and oiled, com plying with ASTM A-569 and ASTM A-568.

B. Cold-Rolled Steel Sheets: Com mercial quality carbon steel, com plying with ASTM A-366 and ASTM A-568.

C. Galvanized Steel Sheets: Zinc-coated carbon steel sheets of com mercial quality , com plying with ASTM A 526, with ASTM A 525, G60 zinc coating, mill phosphatized.

D. Supports and Anchors: Fabricate of not less than 18-gage galvanized sheet steel.

E. Inserts, Bolts and Fasteners: Manufacturer's sta ndard units, except hot-dip galvanized item s to be built into exterior walls, complying with ASTM A 153, Class C or D as applicable.

F. Shop Applied Prim er: For prim er, use rust-inhibitive enam el or paint, either air-dry ing or baking, suitable as a base for specified finish paints.

2.03 FABRICATION:

A. General: Fabricate steel door and frame units to be rigid, neat in appearance and free from defects, warp or buckle. Wherever practicable, fit and assem ble units in m anufacturer's plant. Clearly identify work that cannot be perm anently fact ory-assembled before shipm ent, to assure proper assembly at project site. Comply with SDI-100 requirements as follows:
   1] All doors to be exterior, SDI-100, Grade III, extra heavy-duty, Model 2, minimum 16-gage faces.
   2] Fabricate exposed faces of doors and panels, including stiles and rails of nonflush units, from only cold-rolled steel.
   3] Fabricate frames, concealed stiffeners, reinforcement, edge channels, louvers, and m oldings from either cold- rolled or hot-rolled steel (at fabricator's option).
   4] Fabricate doors, panels, and fram es from galvanized sheet steel. Close top and bottom edges of exterior doors as integral part of door constructi on or by addition of m inimum 16-gage inverted steel channels.

B. Exposed Fasteners: Unless otherwise indicated, provide countersunk flat Phillips heads for exposed screws and bolts.

C. Thermal-Rated (Insulating) Assem blies: For all doors indicated provide doors which have been fabricated as thermal insulating door and fram e assemblies and tested in accordance with ASTM C-236. Unless otherwise indicated, provide therm al-rated assem blies with U factor of 0.24 BTU/(hr-ft^2-`F) or better.

D. Finish Hardware Preparation: Prepare doors and frames to receive mortised and concealed finish hardware in accordance with final Finish Hardware Schedule and templates provided by hardware supplier. Comply with applicable requirements of ANSI A115 series specifications for door and frame preparation for hardware.

E. Reinforce doors and frames to receive surface-applied hardware. Drilling and tapping for surface-applied finish hardware may be done at project site.

F. Locate finish hardware as indicated on final shop drawings or if not indicated, in accordance with "Recommended Locations Builder's Hardware", published by Door and Hardware Institute.

G. Shop Priming: Clean, treat, and prime exposed surfaces of steel door and frame units, including galvanized surfaces. Clean steel surfaces of mill scale, rust, oil, grease, dirt, and other foreign materials before application of paint. Apply shop coat of prime paint of even consistency to provide a uniformly finished surface ready to receive finish paint.

2.04 STANDARD STEEL DOORS: Provide metal doors of types and styles indicated on drawings or schedules.

A. All doors to be exterior, SDI-100-83, Grade III, heavy-duty, galvanized, Model 2, minimum 16-gage faces.

B. Provide manufacturer's standard exterior, galvanized, sightproof, stationary louver where indicated, constructed of inverted V-shaped or Y-shaped blades formed of 24-gage cold-rolled steel set into 20-gage steel frame.

2.05 STANDARD STEEL FRAMES:

A. Provide metal frames for doors of type and style as shown on drawings and schedules. Conceal fastenings, unless otherwise indicated. Fabricate frames of minimum 16-gage, cold-rolled furniture steel.

B. Fabricate frames with mitered corners, welded construction for exterior applications.

C. Fabricate exterior frames of hot-dip galvanized steel.

D. Door Silencers: Except on weatherstripped frames, drill stops to receive 3 silencers on strike jambs of single-swing frames and 2 silencers on heads of double-swing frames.

PART 3 - EXECUTION

3.01 INSTALLATION:

A. General: Install steel doors, frames, and accessories in accordance with final shop drawings, manufacturer's data, and as herein specified.

B. Placing Frames: Comply with provisions of SDI-105 "Recommended Erection Instructions for Steel Frames", unless otherwise indicated.

C. Except for frames located at in-place concrete, place frames prior to construction of enclosing walls and ceilings. Set frames accurately in position, plumbed, aligned and braced securely until permanent anchors are set. After wall construction is completed, remove temporary braces and spreaders leaving surfaces smooth and undamaged.

D. In masonry construction, locate 3 wall anchors per jamb at hinge and strike levels.

E. Door Installation: Fit hollow metal doors accurately in frames, within clearances specified in SDI-100.

3.02 ADJUST AND CLEAN

A. Prime Coat Touchup: Immediately after erection, sand smooth any rusted or damaged areas of prime coat and apply touchup of compatible air-drying primer.

B. Protection Removal: Immediately prior to final inspection, remove protective plastic wrappings from prefinished doors.

C. Final Adjustments: Check and readjust operating finish hardware items, leaving steel doors and frames undamaged and in complete and proper operating condition.

END OF SECTION

SECTION 08 52 00 - ALUMINUM WINDOWS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes the following types of aluminum-framed windows:

1. Fixed
2. Casement
3. Awning
4. Slider

B. Related Sections include the following:

1. Division 8 Section "Glazing" for glazing requirements for aluminum windows, including those specified to be factory glazed.

1.3 DEFINITIONS

A. AW: Architectural.

B. Performance grade number, included as part of the AAMA/NWWDA product designation code, is actual design pressure in pounds force per square foot (pascals) used to determine structural test pressure and water test pressure.

C. Structural test pressure, for uniform load structural test, is equivalent to 150 percent of design pressure.

D. Minimum test size is smallest size permitted for performance class (gateway test size). Products must be tested at minimum test size or at a size larger than minimum test size to comply with requirements for performance class.

1.4 PERFORMANCE REQUIREMENTS

A. General: Provide aluminum windows capable of complying with performance requirements indicated, based on testing manufacturer's windows that are representative of those specified and that are of test size indicated below:

1. Size indicated.

B. AAMA/NWWDA Performance Requirements: Provide aluminum windows of the performance class and grade indicated that comply with AAMA/NWWDA 101/I.S.2.

1. Performance Class: AW.

2. Performance Grade: 40.
3. Exception to AAMA/NWWDA 101/I.S.2: In addition to requirements for performance class and performance grade, design glass framing system to limit lateral deflections of glass edges to less than 1/175 of glass-edge length[**or** 3/4 inch, whichever is less, at design pressure based on the following:
   a. Testing performed according to AAMA/NWWDA 101/I.S.2, Uniform Load Deflection Test.

C. Structural Performance: Provide aluminum windows capable of withstanding the following, including wind loads based on passing AAMA/NWWDA 101/I.S.2, Uniform Load Structural Test, at basic wind speed indicated:

1. Deflection: Based on passing AAMA/NWWDA 101/I.S.2, Uniform Load Deflection Test.
2. Basic Wind Speed: As indicated in miles per hour at 33 feet above grade. Determine wind loads and resulting design pressures applicable to Project according to the following, based on mean roof heights above grade as indicated on Drawings:
   a. Appendix B in AAMA/NWWDA 101/I.S.2.
3. Design Pressure: 30 lbf/sq. ft.

D. Air Infiltration: Maximum rate not more than indicated when tested according to AAMA/NWWDA 101/I.S.2, Air Infiltration Test.

1. Maximum Rate: 0.3 cfm/sq. ft. of area at an inward test pressure of 1.57 lbf/sq. ft..

E. Water Resistance: No water leakage as defined in AAMA/NWWDA referenced test methods at a water test pressure equaling that indicated, when tested according to AAMA/NWWDA 101/I.S.2, Water Resistance Test.

1. Test Pressure: 20 percent of positive design pressure, but not more than 12 lbf/sq. ft.

F. Forced-Entry Resistance: Comply with Performance Level 10 requirements when tested according to ASTM F 588.

G. Condensation-Resistance Factor: Provide aluminum windows tested for thermal performance according to AAMA 1503, showing a CRF of 45, where windows are indicated to be "thermally improved."

H. Thermal Transmittance: Provide aluminum windows with a whole-window U-value maximum indicated at 15-mph exterior wind velocity and winter condition temperatures when tested according to AAMA 1503.

1. U-Value: Btu/sq. ft. x h x deg F.

I. Thermal Movements: Provide aluminum windows, including anchorage, that accommodate thermal movements of units resulting from the following maximum change (range) in ambient and surface temperatures without buckling, distortion, opening of joints, failure of joint sealants, damaging loads and stresses on glazing and connections, and other detrimental effects. Base engineering calculation on actual surface temperatures of materials due to solar heat gain and nighttime-sky heat loss.

1. Temperature Change (Range): [120 deg F, ambient; 180 deg F material surfaces.

J. Each Window Type: Comply with AAMA/NWWDA 101/I.S.2 for the following tests:

1. Operating Force.
2. Deglazing: When tested according to ASTM E 987.

1.5 SUBMITTALS

A. Product Data: Include construction details, material descriptions, fabrication methods, dimensions of individual components and profiles, hardware, finishes, and operating instructions for each type of aluminum window indicated.

B. Samples for Initial Selection: For units with factory-applied color finishes.

C. Samples for Verification: For aluminum window components required, prepared on Samples of size indicated below.

1. Main Framing Member: 12-inch long, full-size sections of extrusions with factory-applied color finish.
2. Hardware: Full-size units with factory-applied finish.
3. Weather Stripping: 12-inch long sections.

D. Qualification Data: For Installer.

1.6 QUALITY ASSURANCE

A. Installer Qualifications: An installer acceptable to aluminum window manufacturer for installation of units required for this Project.

B. Source Limitations: Obtain aluminum windows through one source from a single manufacturer.

C. Product Options: Drawings indicate size, profiles, and dimensional requirements of aluminum windows and are based on the specific system indicated.

1. Do not modify intended aesthetic effects, as judged solely by Architect, except with Architect's approval. If modifications are proposed, submit comprehensive explanatory data to Architect for review.

1.7 PROJECT CONDITIONS

A. Field Measurements: Verify aluminum window openings by field measurements before fabrication and indicate measurements on Shop Drawings.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

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

1. Windows:
   a. Rhino-Gerkin Windows
   b. EFCO Corporation.

c. Peerless Products, Inc.
d. Alenco Windows

2.2 MATERIALS, GENERAL

A. Aluminum Extrusions: Alloy and temper recommended by aluminum window manufacturer for strength, corrosion resistance, and application of required finish, but not less than 22,000-psi ultimate tensile strength, not less than 16,000-psi minimum yield strength, and not less than 0.062-inch thickness at any location for the main frame and sash members.

B. Fasteners: Aluminum, nonmagnetic stainless steel, epoxy adhesive, or other materials warranted by manufacturer to be noncorrosive and compatible with aluminum window members, trim, hardware, anchors, and other components. Cadmium-plated steel anchors, clips, and accessories are not permitted.

1. Reinforcement: Where fasteners screw-anchor into aluminum less than 0.125 inch thick, reinforce interior with aluminum or nonmagnetic stainless steel to receive screw threads, or provide standard, noncorrosive, pressed-in, splined grommet nuts.
2. Exposed Fasteners: Unless unavoidable for applying hardware, do not use exposed fasteners. For application of hardware, use fasteners that match finish of member or hardware being fastened, as appropriate.

C. Anchors, Clips, and Accessories: Aluminum, nonmagnetic stainless steel, or zinc-coated steel or iron complying with ASTM B 633 for SC 3 severe service conditions; provide sufficient strength to withstand design pressure indicated. Cadmium-plated steel anchors, clips, and accessories are not permitted.

D. Reinforcing Members: Aluminum, nonmagnetic stainless steel, nickel/chrome-plated steel complying with ASTM B 456 for Type SC 3 severe service conditions, or zinc-coated steel or iron complying with ASTM B 633 for SC 3 severe service conditions; provide sufficient strength to withstand design pressure indicated. Cadmium-plated steel reinforcing members are not permitted.

E. Compression-Type Weather Stripping: Provide compressible weather stripping designed for permanently resilient sealing under bumper or wiper action, and completely concealed when aluminum window is closed.

1. Weather-Stripping Material: Elastomeric cellular preformed gaskets complying with ASTM C 509.

F. Sliding-Type Weather Stripping: Provide woven-pile weather stripping of wool, polypropylene, or nylon pile and resin-impregnated backing fabric. Comply with AAMA 701/702.

1. Weather Seals: Provide weather stripping with integral barrier fin or fins of semirigid, polypropylene sheet or polypropylene-coated material.

G. Replaceable Weather Seals: Comply with AAMA 701/702.

H. Sealant: For sealants required within fabricated windows, provide window manufacturer's standard, permanently elastic, nonshrinking, and nonmigrating type recommended by sealant manufacturer for joint size and movement.

2.3 GLAZING

A. Glass: Low-E, insulated double-pane.

B. Glazing System: Manufacturer's standard factory-glazing system that produces weather-tight seal.

2.4 HARDWARE

A. General: Provide manufacturer's standard hardware fabricated from aluminum, stainless steel, carbon steel complying with AAMA 907, or other corrosion-resistant material compatible with aluminum; designed to smoothly operate, tightly close, and securely lock aluminum windows and sized to accommodate sash or ventilator weight and dimensions. Cadmium-plated hardware is not permitted. Do not use aluminum in frictional contact with other metals. Where exposed, provide solid bronze.

B. Counterbalancing Mechanism: Comply with AAMA 902.

C. Casement, Awning and Slider Windows: Provide the following operating hardware:

1. Crank (on awning and casement) or Handle (slider)
2. Lock
3. Hinges (on awning and casement)

2.5 INSECT SCREENS

A. General: Design operable windows and hardware to accommodate screens in a tight-fitting, removable arrangement, with a minimum of exposed fasteners and latches. Locate screens on outside of window and provide for each operable exterior sash or ventilator.

1. Comply with SMA 1004, "Specifications for Aluminum Tubular Frame Screens for Windows," for minimum standards of appearance, fabrication, attachment of screen fabric, hardware, and accessories unless more stringent requirements are indicated.

B. Aluminum Insect Screen Frames: Manufacturer's standard aluminum alloy complying with SMA 1004. Fabricate frames with mitered or coped joints, concealed fasteners and removable PVC spline/anchor concealing edge of frame.

1. Extruded-Aluminum or Aluminum Tubular Framing Sections and Cross Braces: Not less than 0.040-inch wall thickness.
2. Finish: Match aluminum window members.

C. Solar Screening Mesh Fabric: 17-by-15 (opening dimension) mesh of PVC-coated, glass-fiber threads; woven and fused to form a fabric mesh resistant to corrosion, shrinkage, stretch, impact damage, and weather deterioration. Comply with ASTM D 3656.

2.6 FABRICATION

A. General: Fabricate aluminum windows, in sizes indicated, that comply with requirements and that meet or exceed AAMA/NWWDA 101/I.S.2 performance requirements for the following window type and performance class. Include a complete system for assembling components and anchoring windows.

1. Fixed
2. Casement
3. Awning
4. Slider

B. Fabricate aluminum windows that are re-glazable without dismantling sash or ventilator framing.

C. Thermally Improved Construction: Fabricate aluminum windows with an integral, concealed, low-conductance thermal barrier; located between exterior materials and window members exposed on interior side; in a manner that eliminates direct metal-to-metal contact.

1. Provide thermal barriers tested according to AAMA 505; determine the allowable design shear flow per the appendix in AAMA 505.
2. Provide hardware with low conductivity or nonmetallic material for hardware bridging thermal breaks at frame or vent sash.

D. Weather Stripping: Provide full-perimeter weather stripping for each operable sash and ventilator.

E. Weep Holes: Provide weep holes and internal passages to conduct infiltrating water to exterior.

F. Mullions: Provide mullions and cover plates as shown, matching window units, complete with anchors for support to structure and installation of window units. Allow for erection tolerances and provide for movement of window units due to thermal expansion and building deflections, as indicated. Provide mullions and cover plates capable of withstanding design loads of window units.

G. Factory-Glazed Fabrication: Glaze aluminum windows in the factory where practical and possible for applications indicated. Comply with requirements in Division 8 Section "Glazing" and with AAMA/NWWDA 101/I.S.2.

2.7 FINISHES

A. General: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

B. Finish designations prefixed by AA comply with the system established by the Aluminum Association for designating aluminum finishes.
1. Color: Anodized

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine openings, substrates, structural support, anchorage, and conditions, with Installer present, for compliance with requirements for installation tolerances; rough opening dimensions; levelness of sill plate; coordination with wall flashings, vapor retarders, and other built-in components; operational clearances; and other conditions affecting performance of work.

1. Masonry Surfaces: Visibly dry and free of excess mortar, sand, and other construction debris.
2. Metal Surfaces: Dry; clean; free of grease, oil, dirt, rust, corrosion, and welding slag; without sharp edges or offsets at joints.

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

3.2 INSTALLATION

A. General: Comply with manufacturer's written instructions for installing windows, hardware, accessories, and other components; Drawings; and Shop Drawings.

B. Install windows level, plumb, square, true to line, without distortion or impeding thermal movement, anchored securely in place to structural support, and in proper relation to wall flashing and other adjacent construction.

C. Set sill members in bed of sealant or with gaskets, as indicated, for weather-tight construction.

D. Install windows and components to drain condensation, water penetrating joints, and moisture migrating within windows to the exterior.

E. Metal Protection: Separate aluminum and other corrodible surfaces from sources of corrosion or electrolytic action at points of contact with other materials by complying with requirements specified in "Dissimilar Materials" Paragraph in Appendix B in AAMA/NWWDA 101/I.S.2.

3.3 ADJUSTING

A. Adjust operating sashes and ventilators, screens, hardware and accessories for a tight fit at contact points and weather stripping for smooth operation and weather-tight closure. Lubricate hardware and moving parts.

3.4 PROTECTION AND CLEANING

A. Protect window surfaces from contact with contaminating substances resulting from construction operations. In addition, monitor window surfaces adjacent to and below exterior concrete and masonry surfaces during construction for presence of dirt, scum, alkaline deposits, stains, or other contaminants. If contaminating substances do contact window surfaces, remove contaminants immediately according to manufacturer's written recommendations.

B. Clean aluminum surfaces immediately after installing windows. Avoid damaging protective coatings and finishes. Remove excess sealants, glazing materials, dirt, and other substances.

C. Clean factory-glazed glass immediately after installing windows. Comply with manufacturer's written recommendations for final cleaning and maintenance. Remove nonpermanent labels and clean surfaces.

D. Remove and replace glass that has been broken, chipped, cracked, abraded, or damaged during construction period.

END OF SECTION

SECTION 08 71 00 - FINISH HARDWARE

PART 1 - GENERAL

1.01 RELATED DOCUMENTS: Drawings and general provisions of Contract, including General and Supplementary Conditions and other Division-1 Specification sections, apply to work of this section.

1.02 DESCRIPTION OF WORK:

A. Definition: "Finish Hardware" includes items known commercially as finish hardware which are required for swing, sliding and folding doors, except special types of unique and nonmatching hardware specified in the same section as the door and door frame.

B. Extent of finish hardware required is indicated on drawings and in schedules.

C. Types of finish hardware required include the following:

1] Hinges
2] Lock cylinders and keys
3] Lock and latch sets
4] Push and pull plates
5] Door stops and silencers
6] Closers
7] Weatherstripping for exterior doors

D. Silencers included integral with hollow metal frames are specified with door frames elsewhere in Division 8.

E. Weatherstripping included integral with hollow metal frames are specified with door frames elsewhere in Division 8.

1.03 QUALITY ASSURANCE:

A. Manufacturer: Obtain each type of hardware (latch and lock sets, hinges, closers, etc.) from a manufacturer listed on hardware schedule of this section.

B. Supplier: A recognized architectural finish hardware supplier, with warehousing facilities, who has been furnishing hardware in the project's vicinity for a period of not less than 2 years, and who is or who employs an experienced architectural hardware consultant who is available, at reasonable times during the course of the work, for consultation about project's hardware requirements, to Owner, Architect and Contractor.

1.04 SUBMITTALS:

A. Product Data: Submit manufacturer's technical product data for each item of hardware in accordance with Division-1 section "Submittals". Include whatever information may be necessary to show compliance with requirements and include instructions for installation and for maintenance of operating parts and finish.

B. Hardware Schedule: Submit final hardware schedule in manner indicated below. Coordinate hardware with doors, frames, and related work to ensure proper size, thickness, hand, function, and finish of hardware.

C. Final Hardware Schedule Content: Based on finish hardware indicated, organize hardware schedule into "hardware sets" indicating complete designations of every item required for each door or opening. Include the following information:
   1] Type, style, function, size, and finish of each hardware item.
   2] Name and manufacturer of each item.
   3] Fastenings and other pertinent information.
   4] Location of hardware set cross-referenced to indications on drawings both on floor plans and in door and frame schedule.
   5] Explanation of all abbreviations, symbols, codes, etc. contained in schedule.
   6] Mounting locations for hardware.
   7] Door and frame sizes and materials.
   8] Keying information.

D. Submittal Sequence: Submit schedule at earliest possible date particularly where acceptance of hardware schedule must precede fabrication of other work (e.g., hollow metal frame) which is critical in the project construction schedule. Include with schedule the product data, samples, shop drawings of other work affected by finish hardware, and other information essential to the coordinated review of hardware schedule.

E. Templates: Furnish hardware templates to each fabricator of doors, frames, and other work to be factory-prepared for the installation of hardware. Upon request, check shop drawings of such other work, to confirm that adequate provisions are made for proper location and installation of hardware.

1.05 PRODUCT HANDLING:

A. Packaging of hardware is responsibility of supplier. As material is received by hardware supplier from various manufacturers, sort and repackage in containers clearly marked with appropriate hardware set number to match set numbers of approved hardware schedule. Two or more identical sets mays be packed in same container.

B. Inventory hardware jointly with representatives of hardware supplier and hardware installer until each is satisfied that count is correct.

C. Deliver individually packaged hardware items at the proper times to the proper locations (shop or project site) for installation.

D. Provide secure lockup for hardware delivered to the project, but not yet installed. Control handling and installation of hardware items which are not immediately replaceable so that completion of the work will not be delayed by hardware losses, both before and after installation.

PART 2 - PRODUCTS

2.01 SCHEDULED HARDWARE:

A. Requirements for design, grade, function, finish, size and other distinctive qualities of each type of finish hardware is indicated in the Hardware Schedule at the end of this section. Products are identified by using hardware designation numbers of the following:

B. Manufacturer's Product Designations: One manufacturer is listed for each hardware ty pe required in the hardware schedule for purposes of establishing m inimum requirem ents. Provide either the product designated, or the com parable product of another m anufacturer which com plies with requirements, including those specified elsewhere in this section.

2.02 MATERIALS AND FABRICATION:

A. Hand of Door: Drawings show direction of slid e, swing, or hand of each door leaf. Furnish each item of hardware for proper installation and operation of door movement as shown.

B. Manufacturer's Name Plate: Do not use m anufacturer's products which have m anufacturer's name or trade nam e displayed in a visible location (om it removable nameplates), except in conjunction with required UL labels and as otherwise acceptable to Architect. Manufacturer' s identification will be permitted on rim of lock cylinders only.

C. Base Metals: Produce hardware units of b asic metal and form ing m ethod indicated, using manufacturer's standard metal alloy, composition, temper and hardness, but in no case of lesser (comercially recognized) quality than specified for applicable hardware units by applicable ANSI A156 series standard for each ty pe hardware item and with ANSI A156.18 for finish designations indicated. Do not furnish "optional" m aterials or form ing m ethods for those indicated, except as otherwise specified.

D. Fasteners: Provide hardware manufactured to conform to published templates, generally prepared for machine screw installation. Do not provide hardwa re which has been prepared for self-tapping sheet metal screws, except as specifically indicated.

Furnish screws for installation, with each hardware item. Provide Phillips flat-head screws except as otherwise indicated. Finish exposed (exposed under any condition) screws to m atch hardware finish or, if exposed in surfaces of other work, to m atch finish of such other work as closely as possible, including "prepared for paint" in surfaces to receive painted finish.

Provide concealed fasteners for hardware units wh ich are exposed when door is closed, except to extent no standard units of ty pe specified are available with concealed fasteners. Do not use thru-bolts for installation where bolt head or nut on opposite face is exposed in other work, except where it is not feasible to adequately reinforce the work. In such cases, provide sleeves for each thru-bolt or use sex screw fasteners.

E. Tools and Maintenance Instructions: Furnish a complete set of specialized tools and m aintenance instructions as needed for Owner's continued adju stment, maintenance, and removal and replacement of finish hardware.

2.03 HINGES AND BUTTS:

A. Templates: Except for hinges and pivots to be installed entirely (both leaves) into wood doors and frames, provide only template-produced units.

B. Screws: Furnish Phillips flat-head or machine screws for installation of units, except furnish Phillips flat-head or wood screws for installation of units into wood. Finish screw heads to match surface of hinges or pivots.

C. Hinge Pins: Provide stainless steel nonremovable hinge pins.

2.04 LOCK CYLINDERS AND KEYING:

A. General: Supplier will meet with Owner's Representative to finalize keying requirements and obtain final instructions in writing.

B. System: Provide new grandmasterkey system for project.

C. Equip locks with manufacturer's standard 6-pin tumbler cylinder.

D. Metals: Construct lock cylinder parts from brass/bronze, stainless steel, or nickel silver.

E. Key Material: Provide keys of nickel silver only.

F. Key Quantity: Furnish 3 change of keys for each lock; 3 master keys for each master system; and 3 grandmaster keys.

G. Deliver keys to Owner's Representative.

2.05 LOCKS AND LATCHES:

A. Strikes: Provide manufacturer's standard wrought box strike for each latch or lock bolt, with curved lip extended to protect frame, finished to match hardware set.

B. Provide 1/2" minimum throw on other latch and deadlock bolts.

2.06 CLOSERS AND DOOR CONTROL DEVICES:

A. Size of Units: Except as otherwise specifically indicated, comply with the manufacturer's recommendations for size of door control unit, depending upon size of door, exposure to weather and anticipated frequency of use.

B. Provide grey resilient parts for exposed bumpers.

2.07 PUSH PLATES, PULLS AND KICKPLATES:

A. Push Plates: No. 1001-2, stainless steel, by Trimco.

B. Decorative Pull: Zinc, matt chrome, by Hafele (#117.25.401).

2.08 WEATHERSTRIPPING:

A. General: Except as otherwise indicated, provide continuous weatherstripping at each edge of every exterior door leaf. Provide ty pe, sizes and prof iles shown or scheduled. Provide noncorrosive fasteners as recommended by manufacturer for application indicated.

B. Replaceable Seal Strips: Provide only those units where resilient or flexible seal strip is easily replaceable and readily available from stocks maintained by manufacturer.

C. Weatherstripping at Jambs and Heads: Provide bum per-type resilient insert and m etal retainer strips, surface-applied unless shown as m ortised or sem imortised, of following m etal, finish, and resilient bumper material:

Extruded alum inum with natural anodized fini sh; 0.062" m inimum thickness of m ain wall and flanges.
Closed-cell sponge neoprene insert, conforming to MIL R 6130A Type II, Grade C, 3/16" x 5/8".

2.09 HARDWARE FINISHES:

A. Provide matching finishes for hardware units at each door or opening, to the greatest extent possible, and except as otherwise indicated. Reduce differen ces in color and textures as m uch as commercially possible where the base m etal or m etal form ing pro cess is different for individual units of hardware exposed at the sam e door or opening. In general, match item s to the m anufacturer's standard finish for the latch and lock set (or push-pull units if no latch-lock sets) for color and texture.

B. All finish hardware to be stainless steel unless otherwise indicated. Provide finishes which m atch those established by BHMA or, if none established, match the Architect's sample.

C. Provide quality of finish, including thickness of plating or coating (if any), composition, hardness and other qualities com plying with m anufacturer's standa rds, but in no case less than specified for the applicable units of hardware by referenced standards.

D. Provide protective lacquer coating on all exposed hardware finishes of brass, bronze, bronze, and aluminum, except as otherwise indicated. The suffix "- NL" is used with standard finish designations to indicate "no lacquer".

E. The designation used in schedules and elsewhere to indicate hardware finishes are those listed in ANSI A 156.18 "Materials and Finishes Standard", including coordination with the traditional U.S. finishes shown by certain manufacturers for their products.

PART 3 - EXECUTION

3.01 INSTALLATION:

A. Mount hardware units at heights indicated in "Recommended Locations for Builders Hardware for Standard Steel Doors and Fram es" by the Door and Hardware Institute, except as specifically indicated or required to com ply with governing re gulations, and except as m ay be otherwise directed by Architect.

B. Install each hardware item in compliance with the manufacturer's instructions and recommendations. Wherever cutting and fitting is required to install hardware onto or into surfaces which are later to be painted or finished in another way, coordinate removal, storage and reinstallation or application of surface protections with finishing work specified in the Division-9 sections. Do not install surface-mounted items until finishes have been completed on the substrate.

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

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

E. Set thresholds for exterior doors in full bed of butyl-rubber or polyisobutylene mastic sealant.

3.02 ADJUST AND CLEAN:

A. Adjust and check each operating item of hardware and each door, to ensure proper operation or function of every unit. Replace units which cannot be adjusted to operate freely and smoothly as intended for the application made.

B. Clean adjacent surfaces soiled by hardware installation.

C. Final Adjustment: Wherever hardware installation is made more than one month prior to acceptance or occupancy of a space or area, return to the work during the week prior to acceptance or occupancy, and make final check and adjustment of all hardware items in such space or area. Clean operating items as necessary to restore proper function and finish of hardware and doors. Adjust door control devices to compensate for final operation of heating and ventilating equipment.

D. Instruct Owner's personnel in proper adjustment and maintenance of hardware and hardware finishes, during the final adjustment of hardware.

PART 4 - FINISH HARDWARE SCHEDULE

HARDWARE SET 1
1-1/2 pair butts TA- 2314 4.5 x 4.5 NRP32D Mc
1 lockset 23-8106 KL32D SA
1 stop 252F32D HA
1 set weatherstrip 790AALUM MAY
1 threshold 1050-AVALUM MAY

HARDWARE SET 2
1-1/2 pair butts TA- 2314 4.5 x 4.5 NRP32D Mc
1 Lock 8205-LNB-613-NG SA
1 stop 252F32D HA

HARDWARE SET 3

1-1/2 pair butts	TA-	2314 4.5 x 4.5	NRP32D	Mc	
1 closer	1231	UOEN	SA		
1 deadbolt	487732D		SA		
1 push plate	No.	1001-2	32D	TR	
1 decorative pull	#117.25.401		Hafele		(zinc, matt chrome)
1 stop	252F32D		HA		
1 set weatherstrip	790AALUM		MAY		
1 threshold	1050-AVALUM		MAY		

HARDWARE SET 4

1-1/2 pair butts	TA-	2314 4.5 x 4.5	NRP32D	Mc	
1 lockset	23-8106	KL32D	SA		
1 stop	252F32D		HA		
1 set weatherstrip	790AALUM		MAY		
1 threshold	1050-AVALUM		MAY		

END OF SECTION

SECTION 09 21 16 - GYPSUM BOARD ASSEMBLIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes the following:
   1. Interior gypsum wallboard.
   2. Steel suspended furrdown framing.

1.3 DEFINITIONS

A. Gypsum Board Terminology: Refer to ASTM C 11 for definitions of terms for gypsum board assemblies not defined in this Section or in other referenced standards.

1.4 SUBMITTALS

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

1.5 QUALITY ASSURANCE

A. Sound Transmission Characteristics: For gypsum board assemblies with STC ratings, provide materials and construction identical to those tested in assembly indicated according to ASTM E 90 and classified according to ASTM E 413 by a qualified independent testing agency.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials in original packages, containers, or bundles bearing brand name and identification of manufacturer or supplier.

B. Store materials inside under cover and keep them dry and protected against damage from weather, direct sunlight, surface contamination, corrosion, construction traffic, and other causes. Stack gypsum panels flat to prevent sagging.

1.7 PROJECT CONDITIONS

A. Environmental Limitations: Comply with ASTM C 840 requirements or gypsum board manufacturer's written recommendations, whichever are more stringent.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

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

1. Steel Framing and Furring:
   a. Clark Steel Framing Systems.
   b. Dale Industries, Inc. - Dale/Incor.
   c. Dietrich Industries, Inc.
   d. National Gypsum Company.

2. Gypsum Board and Related Products:
   a. American Gypsum Co.
   b. G-P Gypsum Corp.
   c. National Gypsum Company.
   d. United States Gypsum Co.

2.2 STEEL SUSPENDED FURRDOWN FRAMING

A. Components, General: Comply with ASTM C 754 for conditions indicated.

B. Tie Wire: ASTM A 641/A 641M, Class 1 zinc coating, soft temper, 0.0625-inch- (1.59-mm-) diameter wire, or double strand of 0.0475-inch- (1.21-mm-) diameter wire.

C. Hanger Attachments to Concrete: As follows:
1. Powder-Actuated Fasteners: Suitable for application indicated, fabricated from corrosion-resistant materials, with clips or other devices for attaching hangers of type indicated, and capable of sustaining, without failure, a load equal to 10 times that imposed by construction as determined by testing according to ASTM E 1190 by a qualified independent testing agency.

D. Hangers: As follows:
1. Rod Hangers: ASTM A 510 (ASTM A 510M), mild carbon steel.
   a. Diameter: 1/4-inch.
   b. Protective Coating: ASTM A 153/A 153M, hot-dip galvanized.

E. Carrying Channels: Cold-rolled, commercial-steel sheet with a base metal thickness of 0.0538 inch (1.37 mm), a minimum 1/2-inch- (12.7-mm-) wide flange, with manufacturer's standard corrosion-resistant zinc coating.
1. Depth: 2 inches.

F. Furring Channels (Furring Members): Commercial-steel sheet with manufacturer's standard corrosion-resistant zinc coating.
1. Hat-Shaped, Rigid Furring Channels: ASTM C 645, 7/8 inch (22.2 mm) deep.
   a. Minimum Base Metal Thickness: 0.0179 inch (0.45 mm).

G. Grid Suspension System for Interior Ceilings: ASTM C 645, direct-hung system composed of main beams and cross-furring members that interlock.
1. Products: Subject to compliance with requirements, provide [one of] the following:
   a. Armstrong World Industries, Inc.; Furring Systems/Drywall.
   b. Chicago Metallic Corporation; Drywall Furring 660.
   c. USG Interiors, Inc.; Drywall Suspension System.

2.3 INTERIOR GYPSUM WALLBOARD

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

B. Gypsum Wallboard: ASTM C 36.
1. Type X:
a. Thickness: 5/8 inch.
b. Long Edges: Tapered.
c. Location: Vertical surfaces, unless otherwise indicated.
2. Products: Subject to compliance with requirements, provide one of the following:
a. American Gypsum Co.; FireBloc Type C.
b. G-P Gypsum Corp.; Firestop Type C.
c. National Gypsum Company; Gold Bond Fire-Shield G.
d. United States Gypsum Co.; SHEETROCK Brand Gypsum Panels, FIRECODE C Core.

2.4 TRIM ACCESSORIES

A. Interior Trim: ASTM C 1047.
1. Material: Galvanized or aluminum-coated steel sheet, rolled zinc.
2. Shapes:
a. Cornerbead: Use at outside corners, unless otherwise indicated.
b. Bullnose Bead: Use where indicated.
c. LC-Bead: J-shaped; exposed long flange receives joint compound; use at exposed panel edges.
d. L-Bead: L-shaped; exposed long leg receives joint compound; use where indicated.
e. U-Bead: J-shaped; exposed short flange does not receive joint compound; use at exposed panel edges.
f. Expansion (Control) Joint: Use where indicated.
g. Curved-Edge Cornerbead: With notched or flexible flanges; use at curved openings.
h. Expansion (Control) Joint: One-piece, rolled zinc with V-shaped slot and removable strip covering slot opening. Use where indicated.

2.5 JOINT TREATMENT MATERIALS

A. General: Comply with ASTM C 475.

B. Joint Tape:
1. Interior Gypsum Wallboard: Paper.

C. Joint Compound for Interior Gypsum Wallboard: 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 setting-type taping compound.
3. Fill Coat: For second coat, use setting-type, sandable topping compound.
4. Finish Coat: For third coat, use drying-type, all-purpose compound.
5. Skim Coat: For final coat of Level 5 finish, use drying-type, all-purpose compound].

2.6 AUXILIARY MATERIALS

A. General: Provide auxilia ry m aterials that co mply with referenced installation standards and manufacturer's written recommendations.

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

C. Sound Attenuation Blank ets: ASTM C 665, T ype I (blankets without m embrane facin g) produced by combining thermosetting resins with mineral fibers manufactured from glass, slag wool, or rock wool.

2.7 TEXTURE FINISHES

A. Available Products: Subject to co mpliance with requirem ents, products that may be incorporated into the Work include, but are not limited to, the following:
1. Aggregate Finish:
a. G-P Gypsum Corp.; GyProc Vermiculite Ceiling Texture.
b. United States Gy psum Co.; SHEETROCK Wall and Ceiling Spra y Texture (Aggregated).

B. Primer: As recommended by textured finish manufacturer.

C. Aggregate Fi nish: Water -based, job-mixed, aggr egated, dry ing-type texture finish for s pray application.
1. Texture: Light-spatter.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas and substrates, with Installer present, and including welded hollow-metal frames, cast-in anchors, and structural fram ing, for com pliance with requirem ents and other condit ions affecting performance. Proceed with installati on only after unsatisfactor y conditions have been corrected.

3.2 PREPARATION

A. Suspended Ceilings: Inspect existing overhead structure to ensure that it will acco mmodate new suspension s ystem and report any problems to Owner before proceeding with work. Also confirm clearances with new MEP equipment before proceeding with work.
1. Furnish conc rete inserts and other devises i ndicated to other trades for installation in advance of time needed for coordination and construction.

3.3 INSTALLING STEEL FRAMING, GENERAL

A. Installation Standards: ASTM C 754, and A STM C 840 require ments that apply to framing installation.

B. Install supplem entary framing, blocki ng, a nd bracing at terminations in gypsum board assemblies to suppor t fixt ures, equipment services, heavy trim , grab bars, toilet accessories, furnishings, or sim ilar construction. Co mply with details indicated and with g ypsum board

manufacturer's written recommendations or, if none available, with United States Gypsum's "Gypsum Construction Handbook."

C. Isolate steel framing from building structure to prevent transfer of loading imposed by structural movement.
   1. Isolate ceiling assemblies where they abut or are penetrated by building structure.
   2. Isolate partition framing and wall furring where it abuts structure, except at floor. Install slip-type joints at he ad of assemblies that avoid axial loading of asse mbly and laterally support assembly.
      a. Use deep-leg deflection track where indicated.

3.4 INSTALLING STEEL SUSPENDED FURRDOWN FRAMING

A. Suspend ceiling hangers from building structure as follows:
   1. Install hangers plumb and free from contact with insulation or other objects within ceiling plenum that are not part of supporti ng structural or ceiling suspension sy stem. Splay hangers only where required to miss obstructions and offset resulting horizontal forces by bracing, countersplaying, or other equally effective means.
   2. Where width of ducts an d other construc tion within ceiling plenum produces hanger spacings that interfere with the locat ion of hangers required to supp ort standard suspension sy stem members, install supplem ental suspension mem bers and hangers in form of trap ezes or equivalent devices. Size supplem ental su spension m embers and hangers to support ceiling loads within perfo rmance lim its established by referenced standards.
   3. Secure rod hangers to structure, including intermediat e framing members, by attaching to inserts, ey escrews, or other device s a nd fasteners that are secure and appropriate for structure and hanger, and in a manner that will not cause hangers to deteriorate or otherwise fail.
   4. Do not support ceilings directly from permanent metal for ms. Furnish cast-in-plac e hanger inserts that extend through forms.
   5. Do not attach hangers to steel deck tabs.
   6. Do not attach hangers to steel roof deck. Attach hangers to structural members.
   7. Do not connect or suspend steel framing from ducts, pipes, or conduit.

B. Installation Tolerances: I nstall steel fr aming co mponents for suspended ceilings so m embers for panel attach ment a re level to within 1/8 inch in 10 feet measured lengt hwise on ea ch member and transversely between parallel members.

C. Wire-tie or clip furrin g channels to supports , as r equired to c omply with requirements for assemblies indicated.

D. Install suspended steel fram ing co mponents in sizes and spacin gs indicated, but not less than that required by the referenced steel framing and installation standards.
   1. Hangers: 48 inches (1219 mm) o.c.
   2. Carrying Channels (Main Runners): 48 inches (1219 mm) o.c.
   3. Furring Channels (Furring Members): 16 inches (406 mm) o.c.

E. Grid Suspension Sy stem: Attach peri meter wall track or angle w here grid sus pension sy stem meets vertical surfaces. Mechanically join main beam and cross-furring members to each other and butt-cut to fit into wall track.

3.5 APPLYING AND FINISHING PANELS, GENERAL

A. Gypsum Board Application and Finishing Standards: ASTM C 840 and GA-216.

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

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

D. Install gypsum panels with face side out. Butt panels together for a light contact at edges and ends with not more than 1/16 inch (1.5 mm) of open space between panels. Do not force into place.

E. 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.

F. Attach gypsum panels to steel studs so leading edge or end of each panel is attached to open (unsupported) edges of stud flanges first.

G. Attach gypsum panels to framing provided at openings and cutouts.

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

I. Cover both faces of steel stud partition 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. (0.7 sq. m) in area.
   2. Fit gypsum panels around ducts, pipes, and conduits.
   3. Where partitions intersect open concrete coffers, concrete joists, and other structural members projecting below underside of floor/roof slabs and decks, cut gypsum panels to fit profile formed by coffers, joists, and other structural members; allow 1/4- to 3/8-inch- (6.4- to 9.5-mm-) wide joints to install sealant.

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

K. Space fasteners in gypsum panels according to referenced gypsum board application and finishing standard and manufacturer's written recommendations.
   1. Space screws a maximum of 12 inches (304.8 mm) o.c. for vertical applications.

3.6 PANEL APPLICATION METHODS

A. Single-Layer Application:

1. On ceilings, apply gypsum panels before wall/partition board application to the greatest extent possible and at right angles to framing, unless otherwise indicated.
2. On partitions/walls, apply gypsum panels vertically (parallel 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 board.
   b. At stair wells and other high walls, install panels horizontally, unless otherwise indicated or required by fire-resistance-rated assembly.
3. On Z-furring members, apply gypsum panels vertically (parallel to framing) with no end joints. Locate edge joints over furring members.

B. Single-Layer Fastening Methods: Apply gypsum panels to supports with steel drill screws.

3.7 INSTALLING 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 C 840 and in specific locations approved by Architect for visual effect.

3.8 FINISHING GYPSUM BOARD ASSEMBLIES

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, rounded or beveled edges, and damaged surface areas.

C. Apply joint tape over gypsum board joints, except those with trim having flanges not intended for tape.

D. Gypsum Board Finish Levels: Finish panels to levels indicated below, according to ASTM C 840, for locations indicated:
1. Level 4: Embed tape and apply separate first, fill, and finish coats of joint compound to tape, fasteners, and trim flanges at panel surfaces that will be exposed to view, unless otherwise indicated.

3.9 APPLYING TEXTURE FINISHES

A. Surface Preparation and Primer: Prepare and apply primer to gypsum panels and other surfaces receiving texture finishes. Apply primer to surfaces that are clean, dry, and smooth.

B. Texture Finish Application: Mix and apply finish using sprayer or paint roller, to produce a uniform texture free of starved spots or other evidence of thin application or of application patterns.

C. Prevent texture finishes from coming into contact with surfaces not indicated to receive texture finish by covering them with masking agents, polyethylene film, or other means. If, despite these precautions, texture finishes contact these surfaces, immediately remove droppings and

unwanted texture to prevent dam age accordi ng to texture finish manufacturer's written recommendations.

3.10 FIELD QUALITY CONTROL

A. Above-Ceiling Observation: Before Contractor installs gy psum board ceilings, Architect will conduct an a bove-ceiling observation a nd report deficiencies in the Work observed. Do not proceed with installation of gy psum board to ceiling support framing until deficiencies h ave been corrected.
   1. Notify Owne r seven day s in advance of date and time when Pro ject, or part of Project, will be ready for above-ceiling observation.
   2. Before notifying Architect, co mplete t he following in areas to receive gy psum board ceilings:
      a. Installation of 80 percent of lighting fixtures, powered for operation.
      b. Installation, insulation, and leak and pressure testing of water piping systems.
      c. Installation of air-duct systems.
      d. Installation of air devices.
      e. Installation of mechanical system control-air tubing.
      f. Installation of ceiling support framing.

END OF SECTION

SECTION 09910 - PAINTING

PART 1 - GENERAL

1.01 RELATED DOCUMENTS: Drawings and general provisions of Contract, including General and Supplementary Conditions and other Division-1 Specification sections, apply to work of this section.

1.02 DESCRIPTION OF WORK:

A. Extent of painting work is indicated on drawings and schedules and as herein specified.

B. Work includes painting and finishing of interi or and exterior exposed item s and surfaces throughout project, except as otherwise indicated. Surface preparation, priming and coats of paint specified are in addition to shop- priming and surface treatment specified under other sections of work.

C. "Paint" as used herein m eans all coating systems m aterials, including prim ers, em ulsions, enam els, stains, sealers and fillers, and other applied m aterials whether used as prim e, intermediate, or finish coats.

D. Surfaces to be Painted: Except where natural finish of m aterial is specifically noted as a surface not to be painted, paint exposed surfaces whether or not colors are designated in "schedules". Where items or surfaces are not specifically mentioned, paint the same as similar adjacent materials or areas. If color or finish is not designated, Architect will select these from standard colors or finishes available.

E. Following categories of work are not included as part of field-applied finish work.

1] Prefinished Items: Unless otherwise indicated, do not include painting when factory -finishing or installer-finishing is specified for such items as (but not lim ited to) plastic toilet enclosures, acoustical m aterials and finished m echanical and electrical equipm ent, including light fixtures, switchgear and distribution cabinets.
2] Concealed Surfaces: Unless otherwise indicat ed, painting is not required on surfaces such as walls or ceilings in concealed areas and generally inaccessible areas, foundation spaces, furred areas, utility tunnels, pipe spaces, duct shafts and elevator shafts.
3] Finished Metal Surfaces: Unless otherwise indicated, m etal surfaces of anodized alum inum, stainless steel, chrom ium plate, copper, bronze, and sim ilar finished m aterials will not require finish painting.
4] Operating Parts: Unless otherwise indicated, m oving parts of operating units, m echanical and electrical parts, such as valve and dam per operators, linkages, sinkages, sensing devices, motor, and fan shafts will not require finish painting.

F. Following categories of work are included under other sections of these specifications.
1] Shop Priming: Unless otherwise specified, shop priming of ferrous metal items is included under various sections for structural steel, m etal fabr ications, hollow m etal work and sim ilar items. Unless otherwise specified, shop priming of fabricated com ponents such as architectural woodwork, wood casework and shop-fabricated or factory -built m echanical and electrical equipment or accessories is included under other sections of these specifications.
2] Mechanical and Electrical Work: Painting of mechanical and electrical work is specified in Divisions 15 and 16 respectively.

G. Do not paint over any code-required labels, such as Underwriters Laboratories and Factory Mutual, or any equipment identification, performance rating, name, or nomenclature plates.

1.03 QUALITY ASSURANCE:

A. Single Source Responsibility: Provide primers and other undercoat paint produced by same manufacturer as finish coats. Use only thinners approved by paint manufacturer, and use only within recommended limits.

B. Coordination of Work: Review other sections of these specifications in which prime paints are to be provided to ensure compatibility of total coatings system for various substrates. Upon request from other trades, furnish information or characteristics of finish materials provided for use, to ensure compatible prime coats are used.

1.04 SUBMITTALS:

A. Product Data: Submit manufacturer's technical information including paint label analysis and application instructions for each material proposed for use. Include a full set of proposed manufacturer's color chips for selection by Architect.

B. Samples: Prior to beginning work, Architect will furnish color chips for surfaces to be painted. Use representative colors when preparing samples for review. Submit samples for Architect's review of color and texture of all natural and stained wood finishes only.

1] On actual wood surfaces, provide two 4" x 8" samples of natural and stained wood finish. Label and identify each as to location and application.
2] Final acceptance of colors for natural and stained wood finishes will be from samples applied on the job.

1.05 DELIVERY AND STORAGE:

A. Deliver materials to job site in original, new and unopened packages and containers bearing manufacturer's name and label, and following information:

1] Name or title of material.
2] Fed. Spec. number, if applicable.
3] Manufacturer's stock number and date of manufacturer.
4] Manufacturer's name.
5] Contents by volume, for major pigment and vehicle constituents.
6] Thinning instructions.
7] Application instructions.
8] Color name and number.

B. Store materials not in actual use in tightly covered containers. Maintain containers used in storage of paint in a clean condition, free of foreign materials and residue.

C. Protect from freezing when necessary. Keep storage areas neat and orderly. Remove oily rags and waste daily. Take all precautions to ensure that workmen and work areas are adequately protected from fire hazards and health hazards resulting from handling, mixing, and application of paints.

1.06 JOB CONDITIONS:

A. Apply water-based paints only when temperature of surfaces to be painted and surrounding air temperatures are between 50`F (10`C) and 90` F (32`C), unless otherwise permitted by paint manufacturer's printed instructions.

B. Apply Solvent-Thinned Paints: only when temperature of surfaces to be painted and surrounding air temperatures are between 45`F (7`C) and 95`F (35`C), unless otherwise permitted by paint manufacturer's printed instructions.

C. Do not apply paint in snow, rain, fog or mist, or when relative humidity exceeds 85%, or to damp or wet surfaces, unless otherwise permitted by paint manufacturer's printed instructions. Painting may be continued during inclement weather if areas and surfaces to be painted are enclosed and heated within temperature limits specified by paint manufacturer during application and drying period.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS:

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

Benjamin Moore and Co. (Moore)
PPG Industries, Pittsburgh Paints (Pittsburgh)
The Sherwin-Williams Company (S-W)

2.02 MATERIALS:

A. Material Quality: Provide best quality grade of various types of coatings as regularly manufactured by acceptable paint materials manufacturers. Materials not displaying manufacturer's identification as a standard best-grade product will not be acceptable.

B. Proprietary names used to designate colors or materials are not intended to imply that products of named manufacturers are required to exclusion of equivalent products of other manufacturers.

C. Federal Specifications establish minimum acceptable quality for paint materials. Provide written certification from paint manufacturer that materials provided meet or exceed these minimums.

D. Manufacturer's products which comply with coating qualitative requirements of applicable Federal Specifications, yet differ in quantitative requirements, may be considered for use when acceptable to Architect. Furnish material data and manufacturer's certificate of performance to Architect for any proposed substitutions.

E. Color Pigments: Pure, nonfading, applicable types to suit substrates and service indicated.
Lead content in pigment, if any, is limited to contain not more than 0.06% lead, as lead metal based on the total nonvolatile (dry-film) of paint by weight. This limitation is extended to interior surfaces and those exterior surfaces such as stairs, decks, porches, railings, windows, and doors which are readily accessible to children under seven years of age.

PART 3 - EXECUTION

3.01 INSPECTION

A. General: Applicator must examine areas and conditions under which painting work is to be applied and notify Contractor in writing of conditions detrimental to proper and timely completion of work. Do not proceed with work until unsatisfactory conditions have been corrected in a manner acceptable to Applicator.

1] Starting of painting work will be construed as Applicator's acceptance of surfaces and conditions within any particular area.
2] Do not paint over dirt, rust, scale, grease, moisture, scuffed surfaces, or conditions otherwise detrimental to formation of a durable paint film.

3.02 SURFACE PREPARATION:

A. General: Perform preparation and cleaning procedures in accordance with paint manufacturer's instructions and as herein specified, for each particular substrate condition.

1] Provide barrier coats over incompatible primers or remove and reprime as required. Notify Architect in writing of any anticipated problems in using the specified coating systems with substrates primed by others.
2] Remove hardware, hardware accessories, machined surfaces, plates, lighting fixtures, and similar items in place and not to be finished-painted, or provide surface-applied protection prior to surface preparation and painting operations. Remove, if necessary, for complete painting of items and adjacent surfaces. Following completion of painting of each space or area, reinstall removed items.
3] Clean surfaces to be painted before applying paint or surface treatments. Remove oil and grease prior to mechanical cleaning. Program cleaning and painting so that contaminants from cleaning process will not fall onto wet, newly painted surfaces.

B. Cementitious Materials: Prepare cementitious surfaces of concrete, concrete block, cement plaster, and cement-asbestos board to be painted by removing efflorescence, chalk, dust, dirt, grease, oils, and by roughening as required to remove glaze.

Determine alkalinity and moisture content of surfaces to be painted by performing appropriate tests. If surfaces are found to be sufficiently alkaline to cause blistering and burning of finish paint, correct this condition before application of paint. Do not paint over surfaces where moisture content exceeds that permitted in manufacturer's printed directions.

C. Wood: Clean wood surfaces to be painted of dirt, oil, or other foreign substances with scrapers, mineral spirits, and sandpaper, as required. Sandpaper smooth those finished surfaces exposed to view, and dust off. Scrape and clean small, dry, seasoned knots and apply a thin coat white shellac or other recommended knot sealer, before application of priming coat. After priming, fill holes and imperfections in finish surfaces with putty or plastic wood-filler. Sandpaper smooth when dried. Prime, stain, or seal wood required to be job-painted immediately upon delivery to job. Prime edges, ends, faces, undersides, and backsides of such wood, including cabinets, counters, cases, paneling.

D. Ferrous Metal: Clean ferrous surfaces, which are not galvanized or shop- coated, of oil, grease, dirt, loose mill scale and other foreign substances by solvent or mechanical cleaning.

Touch-up shop-applied prime coats wherever damaged or bare where required by other sections of these specifications. Clean and touch-up with same type shop primer.

E. Galvanized Surfaces: Clean free of oil and surface contaminants with nonpetroleum based solvent.

3.03 MATERIALS PREPARATION:

A. General: Mix and prepare painting materials in accordance with manufacturer's directions. Maintain containers used in mixing and application of paint in a clean condition, free of foreign materials and residue. Stir materials before application to produce a mixture of uniform density, and stir as required during application. Do not stir surface film into material. Remove film and, if necessary, strain material before using.

3.04 APPLICATION:

A. General: Apply paint in accordance with manufacturer's directions. Use applicators and techniques best suited for substrate and type of material being applied.

B. Paint colors, surface treatments, and finishes, are indicated in "schedules" of the contract documents.

C. Provide finish coats which are compatible with prime paints used.

D. Apply additional coats when undercoats, stains or other conditions show through final coat of paint, until paint film is of uniform finish, color and appearance. Give special attention to ensure that surfaces, including edges, corners, crevices, welds, and exposed fasteners receive a dry film thickness equivalent to that of flat surfaces.

E. Paint surfaces behind movable equipment and furniture same as similar exposed surfaces. Paint surfaces behind permanently fixed equipment or furniture with prime coat only before final installation of equipment.

F. Finish exterior doors on tops, bottoms, and side edges same as exterior faces, unless otherwise indicated.

G. Sand lightly between each succeeding enamel or varnish coat.

H. Omit first coat (primer) on metal surfaces which have been shop-primed and touch-up painted, unless otherwise indicated.

I. Scheduling Painting: Apply first-coat material to surfaces that have been cleaned, pretreated or otherwise prepared for painting as soon as practicable after preparation and before subsequent surface deterioration. Allow sufficient time between successive coatings to permit proper drying. Do not recoat until paint has dried to where it feels firm, does not deform or feel sticky under moderate thumb pressure, and application of another coat of paint does not cause lifting or loss of adhesion of the undercoat.

J. Minimum Coating Thickness: Apply materials at not less than manufacturer's recommended spreading rate, to establish a total dry film thickness as indicated or, if not indicated, as recommended by coating manufacturer.

K. Prime Coats: Apply prime coat of material which is required to be painted or finished, and which has not been prim e coated by others. Recoat prim ed and sealed surfaces wher e there is evidence of suction spots or unsealed areas in first coat, to assure a finish coat with no burn-through or other defects due to insufficient sealing.

L. Pigmented (Opaque) Finishes: Com pletely cover to provide an opaque, sm ooth surface of uniform finish, color, appearance and coverage. Cloudiness s potting, holidays, laps, brush marks, runs, sags, ropiness or other surface imperfections will not be acceptable.

M. Transparent (Clear) Finishes: Use multiple coats to produce glass-smooth surface film of even luster. Provide a finish free of laps, cloudiness, color irregularity, runs, brush marks, orange, peel, nail holes, or other surface imperfections. Provide satin finish for final coats, unless otherwise indicated.

N. Completed Work: Match approved sam ples for colo r, texture and coverage. Rem ove, refinish or repaint work not in compliance with specified requirements.

3.05 CLEANUP AND PROTECTION:

A. Cleanup: During progress of work, remove from site discarded paint materials, rubbish, cans and rags at end of each work day.

B. Upon completion of painting work, clean window glass and other paint-spattered surfaces. Rem ove spattered paint by proper m ethods of washing and scraping, using care not to scratch or otherwise damage finished surfaces.

C. Protection: Protect work of other trades, whether to be painted or not, against dam age by painting and finishing work. Correct any dam age by clean ing, repairing or replacing, and repainting, as acceptable to Architect.

D. Provide "WET PAINT" signs as required to prot ect newly-painted finishes. Rem ove tem porary protective wrappings provided by others for protection of their work, after com pletion of painting operations.

E. At completion of work of other trades, touchup and restore all damaged or defaced painted surfaces.

PART 4 - PAINT SCHEDULE

4.01 EXTERIOR PAINT SCHEDULE FOR FERROUS METAL:
Full Gloss Alkyd Resin: 1 finish coat over primer.

Prime Coat: Red Lead Pigm ented Prim er FS TT-P-86. Primer is not required on item s delivered shop primed.
Pittsburgh: Speedhide Inhibitive Red Primer, 6-208. MWF 3.6 mils, MDF 1.6 mils per coat.
First Coat: High Gloss Alkyd Enamel FS TT-E-489.
Pittsburgh: Fast-Dry Alkyd Industrial Gloss Enam el, 97-600 Series. Spray Application: MWF 3.0 mils, MDF 1.0 mil per coat. Brush: MWF 3.5 mils, MDF 1.2 mils per coat.

4.02 EXTERIOR PAINT SCHEDULE FOR ZINC-COATED METAL:
High Gloss Alkyd Resin: 2 finish coats over primer.

Prime Coat: Zinc Dust-Zinc Oxide Primer FS TT-P-641.
Pittsburgh: Speedhide Galvanized Steel Primer 6-209. MWF 3.6 mils, MDF 2.0 mils per coat.
First and Second Finish Coats: High Gloss Alkyd Enamel FS TT-E-489.
Pittsburgh: Speedhide Quick-Dry Alkyd Gloss Enamel, 54 line. MWF 3.6 mils, MDF 1.5 mils per coat.

4.03 EXTERIOR/INTERIOR PAINT SCHEDULE FOR CONCRETE MASONRY UNITS (CMU):
Semi-Gloss Solvent Base Polyester-Epoxy: 2 finish coats over block filler.

Filler Coat: Acrylic-Epoxy Block Filler for Porous Surfaces.
Pittsburgh: Pitt-Glaze Acrylic-Epoxy Block Filler, 16-85/86. MWF 25.0 mils, MDF 12.5 mils per coat.
First and Second Finish Coats: Semi-Gloss Polyester-Epoxy.
Pittsburgh: Pitt-Glaze Polyester-Epoxy Semi-Gloss Coating, 16 line. MWF 6.0 mils, MDF 3.0 mils per coat.

4.04 EXTERIOR PAINT SCHEDULE FOR PLYWOOD/HARDIPANEL:
Lo-Lustre Vinyl Acrylic Latex Finish: 2 finish coats over primer.

Prime Coat: Interior Latex Base Primer Coat FS TT-P-650.
Pittsburgh: Speedhide Quick-Drying Exterior Latex Primer-Sealer, 6-2. MWF 3.0 mils, MDF 1.0 mil per coat.
Second and Third Coats: Odorless Exterior Semigloss Alkyd Enamel FS TT-E-509.
Pittsburgh: Speedhide Semi-Gloss Enamel, 6-510. MWF 4.0 mils, MDF 1.4 mils per coat.

END OF SECTION

SECTION 10 21 13 - TOILET COMPARTMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes toilet compartments and screens as follows:
1. Type: Solid phenolic.
2. Compartment Style: Overhead braced and floor anchored.
3. Compartment Style: Floor anchored.
4. Screen Style: Wall hung.

B. Related Sections include the following:
1. Division 10 "Toilet and Bath Accessories" for toilet paper holders, grab bars, and similar accessories.

1.3 SUBMITTALS

A. Product Data: For each type and style of toilet compartment and screen specified. Include details of construction relative to materials, fabrication, and installation. Include details of anchors, hardware, and fastenings.

B. Shop Drawings: For fabrication and installation of toilet compartment and screen assemblies. Include plans, elevations, sections, details, and attachments to other work.
1. Show locations of reinforcement and cutouts for compartment-mounted toilet accessories.

C. Samples for Verification: Of each compartment or screen color and finish required, prepared on 6-inch-square Samples of same thickness and material indicated for Work.

1.4 PROJECT CONDITIONS

A. Field Measurements: Verify dimensions in areas of installation by field measurements before fabrication and indicate measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. Accurate Partitions Corporation.
2. Bobrick Washroom Equipment, Inc.
3. Commercial and Architectural Products, Inc.; Marlite.

4. Hadrian Inc.
5. Santana Products, Inc.

2.2 MATERIALS

A. General: Provide materials that have been selected for surface flatness and smoothness. Exposed surfaces that exhibit pitting, seam marks, roller marks, stains, discolorations, telegraphing of core material, or other imperfections on finished units are unacceptable.

B. Solid Phenolic: Solid phenolic, integral color. Provide units with eased edges and with minimum 3/4-inch- (19-mm-) thick doors and pilasters and minimum 1/2-inch- (13-mm-) thick panels and screens. Provide color as follows:
1. Color: One color in each room as selected by Architect from manufacturer's full range of colors.

C. Pilaster Shoes and Sleeves (Caps): ASTM A 666, Type 302 or 304 stainless steel, not less than 0.0312 inch (0.8 mm) thick and 3 inches (75 mm) high, finished to match hardware.

D. Stirrup Brackets: Manufacturer's standard ear or U-brackets for attaching panels and screens to walls and pilasters of the following material:
1. Material: Stainless steel.

E. Full-Height (Continuous) Brackets: Manufacturer's standard design for attaching panels and screens to walls and pilasters of the following material:
1. Material: Stainless steel.

F. Hardware and Accessories: Manufacturer's standard design, heavy-duty operating hardware and accessories of the following material:
1. Material: Stainless steel.

G. Overhead Bracing: Manufacturer's standard continuous, extruded-aluminum head rail with antigrip profile in manufacturer's standard finish.

H. Anchorages and Fasteners: Manufacturer's standard exposed fasteners of stainless steel or chrome-plated steel or brass, finished to match hardware, with theft-resistant-type heads. Provide sex-type bolts for through-bolt applications. For concealed anchors, use hot-dip galvanized or other rust-resistant, protective-coated steel.

2.3 FABRICATION

A. General: Provide standard doors, panels, screens, and pilasters fabricated for compartment system. Provide units with cutouts and drilled holes to receive compartment-mounted hardware, accessories, and grab bars, as indicated.
1. Provide internal reinforcement in metal units for compartment-mounted hardware, accessories, and grab bars, as indicated.

B. Overhead-Braced-and-Floor-Anchored Compartments: Provide manufacturer's standard corrosion-resistant supports, leveling mechanism, fasteners, and anchors at pilasters to suit floor conditions. Make provisions for setting and securing continuous head rail at top of each pilaster. Provide shoes at pilasters to conceal supports and leveling mechanism.

C. Wall-Hung Screens: Provide units in sizes indicated of same construction and finish as compartment panels, unless otherwise indicated.
   1. Provide metal-faced screens with integral full-height flanges for attachment to wall.

D. Doors: Unless otherwise indicated, provide 24-inch- (610-mm-) wide in-swinging doors for standard toilet compartments and 36-inch- (914-mm-) wide out-swinging doors with a minimum 32-inch- (813-mm-) wide clear opening for compartments indicated to be handicapped accessible.
   1. Hinges: Manufacturer's standard self-closing type that can be adjusted to hold door open at any angle up to 90 degrees.
   2. Latch and Keeper: Recessed latch unit designed for emergency access and with combination rubber-faced door strike and keeper. Provide units that comply with accessibility requirements of authorities having jurisdiction at compartments indicated to be handicapped accessible.
   3. Coat Hook: Manufacturer's standard combination hook and rubber-tipped bumper, sized to prevent door from hitting compartment-mounted accessories.
   4. Door Bumper: Manufacturer's standard rubber-tipped bumpers at out-swinging doors or entrance screen doors.
   5. Door Pull: Manufacturer's standard unit that complies with accessibility requirements of authorities having jurisdiction at out-swinging doors. Provide units on both sides of doors at compartments indicated to be handicapped accessible.

PART 3 - EXECUTION

3.1 INSTALLATION

A. General: Comply with manufacturer's written installation instructions. Install units rigid, straight, plumb, and level. Provide clearances of not more than 1/2 inch (13 mm) between pilasters and panels and not more than 1 inch (25 mm) between panels and walls. Secure units in position with manufacturer's recommended anchoring devices.
   1. Secure panels to walls and panels with not less than 2 stirrup brackets attached near top and bottom of panel. Locate wall brackets so holes for wall anchors occur in masonry or tile joints. Align brackets at pilasters with brackets at walls.

B. Overhead-Braced-and-Floor-Anchored Compartments: Secure pilasters to floor and level, plumb, and tighten. Secure continuous head rail to each pilaster with not less than 2 fasteners. Hang doors and adjust so tops of doors are parallel with overhead brace when doors are in closed position.

C. Screens: Attach with anchoring devices according to manufacturer's written instructions and to suit supporting structure. Set units level and plumb and to resist lateral impact.

3.2 ADJUSTING AND CLEANING

A. Hardware Adjustment: Adjust and lubricate hardware according to manufacturer's written instructions for proper operation. Set hinges on in-swinging doors to hold open approximately 30 degrees from closed position when unlatched. Set hinges on out-swinging doors and swing doors in entrance screens to return to fully closed position.

B. Provide final protection and maintain conditions that ensure toilet compartments and screens are without damage or deterioration at the time of Substantial Completion.

END OF SECTION

SECTION 10 28 13 - TOILET ACCESSORIES

PART 1 - GENERAL

1.01 RELATED DOCUMENTS: Drawings and general provisions of Contract, including General and Supplementary Conditions and other Division-1 Specification sections, apply to work of this section.

1.02 DESCRIPTION OF WORK: Extent of toilet accessories required include the following. All accessories must comply with Texas Accessibility Standards.

A. Electric hand dryers.
B. Toilet tissue dispensers.
C. Soap dispensers.
D. Stainless steel mirrors.
E. Grab bars.
F. Diaper changing tables.

1.03 QUALITY ASSURANCE:

A. Inserts and Anchorages: Furnish inserts and anchoring devices which must be set in concrete or built into masonry; coordinate delivery with other work to avoid delay. Provide all blocking required for adequate mounting of accessories.

B. Accessory Locations: Coordinate accessory locations with other work to avoid interference and to assure proper operation and servicing of accessory units.

C. Products: Provide products of same manufacturer for each type of accessory unit and for units exposed in same areas.

1.04 SUBMITTALS: Submit manufacturer's technical product data and installation instructions for each toilet accessory.

PART 2 - PRODUCTS

2.01 TOILET ACCESSORY ITEMS: Provide items as indicated on Drawings.

A. Toilet Tissue Dispensers: Stainless steel, recessed, dual roll dispenser. American Specialties, Inc. #0030 or approved equal.

B. Electric Hand Dryers: Satin chrome finish, surface-mount, ¼ HP; 180 CFM at 7,500 RPM; 120Volt, 16 amp; 1,620 watts. American Specialties, Inc. #185-93 Profile Compact Dryer or approved equal.

C. Soap Dispensers: Stainless steel, surface-mount, liquid soap dispenser. American Specialties, Inc. #0351 or approved equal.

D. Mirrors: Stainless steel frame and glazing, surface-mount, 18" wide x 36" high mirror. American Specialties, Inc. #0620 or approved equal.

E. Grab Bars: Stainless steel, concealed-mount, safety grip, 1-1/4" o.d. grab bars. 30" length at back; 42" length at side. American Specialties, Inc. #3100 P Series or approved equal.

F. Diaper Changing Tables: Koala KB200-01 Horizontal Baby Changing Station (Gray)

2.02 FASTENERS AND MOUNTING DEVICES: Provide all hardware required to mount accessories to substrates indicated.

PART 3 - EXECUTION

3.01 INSTALLATION: Install toilet accessory units in accordance with manufacturers' instructions, using fasteners which are appropriate to substrate and recommended by manufacturer of unit. Install units plumb and level, firmly anchored in locations and at heights indicated, to conform to Texas Accessibility Standards (TAS) requirements.

3.02 ADJUSTING AND CLEANING:

A. Adjust toilet accessories for proper operation and verify that mechanisms function smoothly. Replace damaged or defective items.

B. Clean and polish all exposed surfaces after removing temporary labels and protective coatings.

END OF SECTION

SECTION 10 60 50 - WIRE MESH PANELS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the C ontract, including Uniform General Conditions, Supplementary General Conditions, Special Cond itions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes exterior wire mesh panels installed above perimeter CMU walls.

B. Related Sections: The following Sections contain requirements that relate to this Section:
1. Section 05500- "Metal Fabrications".

1.3 DEFINITIONS

A. The types of weaves for the wire mesh specified in this Section are as illustrated and defined in ASTM E 437 and its Appendix X4.2:
1. Intercrimped: Similar to plain weave with extra crimps between the intersections.

1.4 SUBMITTALS

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

B. Product Data for each ty pe of product specified , consisting of m anufacturer's specification, technical data, and installation instructions.

C. Shop Drawings showing fabrica tion and installation of wire m esh panels, including plans, elevations, and large-scale details showing an chorage and accessory item s. Provide location template drawings for items supported or anchored to permanent construction.

D. Samples of a 12-by -12-inch wire m esh panel c onstructed of specified fram e m embers, wire mesh, and color charts.

1.5 QUALITY ASSURANCE

A. Manufacturer Qualifications: Engage a firm experienced in m anufacturing wire m esh panels similar to those indicated for this Project a nd that have a record of successful in-service performance.

1.6 PROJECT CONDITIONS

A. Field Measurements: Check actual locations for wire m esh products by accurate field measurements before fabrication and show recorded m easurements on Shop Drawings. Coordinate fabrication and delivery schedules with construction progress to avoid delay ing the Work.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

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

1. Acorn Wire and Iron Works, Inc.
2. G-S Company (The).
3. King Wire Partitions, Inc.
4. Lakeside Wire and Iron Co.
5. McNichols Co.
6. Wire and Iron Products, Inc.

2.2 MATERIALS

A. Steel Wire: ASTM A 853.

B. Steel Channels, Angles, Plates, and Bars: ASTM A 36 (ASTM A 36M).

C. Steel Sheet: ASTM A 568 (ASTM A 568M).

D. Cold-Rolled Steel Channels: Formed from steel sheet.

E. Galvanized Steel Wire: ASTM A 641 (ASTM A 641M).

F. Galvanized Steel Sheet: Commercial-quality, hot-dip-coated steel sheet, ASTM A 653, with G60 or A60 (ASTM A 653M, with Z180 or ZF180) coating.

2.3 RAILING INSERT PANELS

A. Mesh: 0.135-inch- (3.4-mm-) diameter, plain-weave steel wire woven into a square pattern as indicated, inserted through frame holes and welded into frame. Vertical wires are plumb. Horizontal wires are perpendicular to vertical wires.

B. Additive Alternate for Mesh: GDK Metal Fabrics - Mandarin

C. Frames: 1-by-1/2-by-1/8-inch (25-by-13-by-3-mm) cold-rolled steel channels.

2.4 FABRICATION

A. Shop fabricate wire mesh panels as much as possible.

B. Do not use components less than sizes indicated. Use larger-size components as recommended by panel component manufacturer.

C. Provide bolts, hardware, and accessories for complete installation.

PART 3 - EXECUTION

3.1 PREPARATION

A. Coordinate and furnish anchorages, setting drawings, diagrams, templates, instructions, and directions for installing anchorages, including concrete inserts, sleeves, anchor bolts, and miscellaneous items having integral anchors embedded in concrete or masonry construction. Coordinate delivery of such items to Project site.

3.2 INSTALLATION

A. Erect panels plumb, rigid, properly aligned, and securely fastened in place, complying with Drawings and manufacturer's recommendations.

B. Provide additional field bracing as shown or necessary for rigid, secure installation. Installer to provide additional clips and bracing as required.

3.3 ADJUSTING AND CLEANING

A. Adjust moving components for smooth operation without binding.

B. Touch up damaged finish after completing installation using field-applied paint to match color of shop-applied finish.

END OF SECTION

SECTION 116800 - PLAY FIELD EQUIPMENT AND STRUCTURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes the following:

1. Freestanding playground equipment and structures.
2. Basketball post, goal, netting and backboard
3. Volleyball post, net and boundary marker
4. Tennis court net-including center strap and anchor, tennis net posts – including ground sleeves.

B. Related Sections include the following:

1. Division 03 Section "Cast-in-Place Concrete" for concrete footings.
2. Division 32 Section "Playground Protective Surfacing" for protective surfacing under and around playground equipment.

1.3 DEFINITIONS

A. Fall Height: According to ASTM F 1487, "the vertical distance between a designated play surface and the protective surfacing beneath it."

B. HDPE: High-density polyethylene.

C. IPEMA: International Play Equipment Manufacturers Association.

D. LLDPE: Linear low-density polyethylene.

E. MDPE: Medium-density polyethylene.

F. Use Zone: According to ASTM F 1487, "the area beneath and immediately adjacent to a play structure that is designated for unrestricted circulation around the equipment and on whose surface it is predicted that a user would land when falling from or exiting the equipment."

1.4 SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: Show fabrication and installation details for applicable equipment and structures.

C. Coordination Drawings: Plans, drawn to scale, on which the following items are shown and coordinated with each other, based on input from installers of the items involved:

1. Extent of surface systems and use zones for equipment.
2. Critical heights for playground surface, or fall heights for equipment.

D. Samples for Initial Selection: For each type of playground equipment and structure indicated.

1. Manufacturer's color charts.
2. Includes similar Samples of playground equipment and accessories involving color selection.

E. Samples for Verification: For each type of exposed finish required, prepared on Samples of size indicated below, if applicable.

1. Posts and Rails: Not less than 6 inches (150 mm) long.
2. Platforms: Not less than 6 inches (150 mm) square.
3. Molded Plastic: Not less than 3 inches (75 mm) square.

F. Product Certificates: For each type of equipment, signed by product manufacturer.

G. Installer Certificates: Signed by manufacturers certifying that installers comply with requirements.

H. Qualification Data: For manufacturer and testing agency.

I. Material Certificates: For the following items, signed by manufacturers:

1. Shop finishes.
2. Wood Preservative Treatment: Include certification by treating plant that states type of preservative solution and pressure process used, net amount of preservative retained, and compliance with applicable standards, if applicable.
3. Recycled plastic.

J. Field quality-control test reports.

K. Product Test Reports: Based on evaluation of comprehensive tests performed by manufacturer and witnessed by a qualified testing agency, for playground equipment.

L. Maintenance Data: For playground equipment and finishes to include in maintenance manuals.

M. Warranty: Special warranty specified in this Section.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: An employer of workers trained and approved by manufacturer.

B. Manufacturer Qualifications: A firm whose playground equipment components have been certified by IPEMA's third-party product certification service.

1. Provide playground equipment and play structure components bearing the IPEMA Certification Seal.
2. Provide the following playground equipment and play structure components bearing the IPEMA Certification Seal:

a. GAMETIME, INC. Primetime Fitness Track (part 11853)

C. Testing Agency Qualifications: An independent agency qualified according to ANSI Z34.1 for testing indicated.

D. Safety Standards: Provide playground equipment complying with or exceeding requirements in the following:

1. ASTM F 1487.
2. CPSC No. 325.

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

1.6 WARRANTY

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

1. Failures include, but are not limited to, the following:

a. Structural failures
b. Deterioration of metals, metal finishes, and other materials beyond normal weathering.

2. Warranty Period: One year from date of Substantial Completion. Confirm manufacturers warranty.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

1. Playground Equipment: GAMETIME, INC. “Primetime Fitness Track” (part 11853)

2. Basketball Equipment: FIRST TEAM SPORTS, INC. “Legend, Jr.” - complete basketball post (black), steel backboard, goal and net.

3. Volleyball Equipment: FIRST TEAM SPORTS, INC “Blast Basic Complete Volleyball Set” and “FT5015 Outdoor Volleyball Boundary Kit”.

4. Tennis Net Posts: ATHLETIC CONNECTION COMPANY, "Edwards Wimbledon Square Posts-3" Black". Item # 1234442 and "Ground Sleeve" Item #1234480.

5. Tennis Net: ATHLETIC CONNECTION COMPANY, "Edwards 30 LS Tennis Net" Item #1162479. " Edwards Center Strap" Item #1158267. "Tennis Center Strap Ground Anchor" Item #1234466.

2.2 SPORTS EQUIPMENT FABRICATION

1. Install per manufacturer drawings and specifications and structural drawings for footing details. Refer to landscape architecture drawings for additional information.

2.3 FREESTANDING PLAYGROUND EQUIPMENT AND STRUCTURES

A. Playground:

1. Products:

a. GAMETIME, INC. Primetime Fitness Track (part 11853)

2.4 CAST-IN-PLACE CONCRETE

A. Concrete Materials and Properties: Comply with requirements in Division 03 Section "Cast-in-Place Concrete" to produce normal-weight, air-entrained]concrete with a minimum 28-day compressive strength of 3000 psi (20.7 MPa), 3-inch (75-mm) slump, and 1-inch- (25-mm-) maximum-size aggregate.

B. Concrete Materials and Properties: Dry-packaged concrete mix complying with ASTM C 387 and mixed at site with potable water, according to manufacturer's written instructions, to produce normal-weight concrete with a minimum 28-day compressive strength of 3000 psi (20.7 MPa), 3-inch (75-mm) slump, and 1-inch- (25-mm-) maximum-size aggregate.

2.5 FINISHES, GENERAL

A. Comply with Manufacturer's requirements

B. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in the same piece are not acceptable. Variations in appearance of other 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 areas and conditions, with Installer present, for compliance with requirements for site clearing, earthwork, site surface and subgrade drainage, and other conditions affecting performance.

1. Do not begin installation before final grading required for placing protective surfacing is completed, unless otherwise permitted by Architect.
2. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Verify locations of playground perimeter and pathways. Verify that playground layout and equipment locations comply with requirements for each type and component of equipment.

B. Verify court surfaces for volleyball, basketball and tennis, as applicable.

3.3 INSTALLATION, GENERAL

A. General: Comply with manufacturer's written installation instructions, unless more stringent requirements are indicated. Anchor all equipment securely, positioned at locations and elevations indicated.

1. Playground Maximum Equipment Height: Coordinate installed heights of equipment and components with finished elevations of protective surfacing. Set equipment so fall heights and elevation requirements for age group use and accessibility are within required limits. Verify that playground equipment elevations comply with requirements for each type and component of equipment.

2. Set basketball goal height and volleyball net height per manufacturer drawings and industry standards. Places goal and net horizontally per manufacturer drawings and industry standards.

3. Place tennis equipment as shown on plans and to manufacturer and industry standards.

B. Post and Footing Excavation: Excavate holes for posts and footings as indicated in firm, undisturbed or compacted subgrade soil as shown in structural engineering structural details.

C. Post Set on Subgrade: Level bearing surfaces with drainage fill to required elevation.

D. Post Set with Concrete Footing: Comply with ACI 301 for measuring, batching, mixing, transporting, forming, and placing concrete.

1. Connect equipment posts to concrete footing per manufacturer requirements. Protect portion of posts above footing from concrete splatter. Verify that posts are set plumb or at the correct angle, alignment, height, and spacing.

a. Place concrete around posts and vibrate or tamp for consolidation. Hold posts in position during placement and finishing operations until concrete is sufficiently cured.

2. Embedded Items: Use setting drawings and manufacturer's written instructions to ensure correct installation of anchorages for equipment.
3. Concrete Footings: Smooth top, and shape to shed water.

3.4 FIELD QUALITY CONTROL

A. Testing Agency: Engage a qualified independent testing and inspecting agency to perform field tests and inspections and prepare test reports.

B. Arrange for playground equipment manufacturer's technical personnel to inspect playground and playground equipment and components at final completion and to certify compliance with the following:

1. ASTM F 1487.
2. CPSC No. 325.

C. Notify Architect 48 hours in advance of date and time of final inspection.

END OF SECTION 116800

SECTION 129300 - SITE FURNISHINGS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes the following:

1. Stone Picnic Tables.
2. Reuse Concrete Tables.
3. Trash and Recycling Receptacles.
4. Fire Ring Campsite.
5. Stone Sand Play Table.
6. Ladder at Blue Hole.
7. Bike Rack.
8. Picnic Grill.
9. Bleachers at Tennis Courts.
10. Bench.
11. Cedar Fencing.
12. Cedar Bollards.
13. Accessibility Sleeve at Blue Hole

B. Related Sections include the following:

1. Division 03 Section "Cast-in-Place Concrete" for concrete footings.
2. See Civil Drawings "Earth Moving" for excavation for installation of concrete footings.

C. Products furnished, but not installed under this Section, include cast in concrete footings.

1.3 SUBMITTALS

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

B. Samples for Initial Selection: For units with factory-applied color finishes.
C. Samples for Verification: For each type of exposed finish required, prepared on Samples of size indicated below.

1. Stone bench and stone table: 1’x1’x1’ of limestone types
2. Stone bench and concrete table: 1’x1’x1’ of limestone bases and bench
3. Aluminum trash bin with lid
4. Cedar bollard 5’ in height

5. Ladder at Blue Hole

D. Product Schedule: For site furnishings. Use same designations indicated on Drawings.

E. Material Certificates: For site furnishings, signed by manufacturers.

F. Maintenance Data: For site furnishings to include in maintenance manuals.

1.4 QUALITY ASSURANCE

A. Source Limitations: Obtain stone site furnishing(s) through one source from a single manufacturer.

1.5 EXTRA MATERIALS

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

1. Trash Receptacle Inner Containers: 5 full-size units for each size indicated, but no fewer than 2 units.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Wood: Reuse cedar on site for bollards and fencing. If cedar posts need to be imported on site, after existing cedar use is exhausted, match size, finish and style.

1. Wood Species: Cedar
   a. Finish: with rough finish, bark intact as applicable.

B. Stone: Limestone (equal cream, nicotine and grey mix). Use for picnic tables and stone sand play table.

C. Concrete tops: Use existing concrete slabs found on site near Blue Hole parking lot.

D. Anchors, Fasteners, Fittings, and Hardware: Galvanized steel commercial quality.

1. Angle Anchors: For inconspicuously bolting legs of site furnishings to grade substrate;
2. Antitheft Hold-Down Brackets: For securing site furnishings to substrate;

E. Nonshrink, Nonmetallic Grout: Premixed, factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C 1107; recommended in writing by manufacturer, for exterior applications.

F. Erosion-Resistant Anchoring Cement: Factory-packaged, nonshrink, nonstaining, hydraulic-controlled expansion cement formulation for mixing with potable water at Project site to create

pourable anchoring, patching, and grouting compound; resistant to erosion from water exposure without needing protection by a sealer or waterproof coating; recommended in writing by manufacturer, for exterior applications.

G. Galvanizing: Where indicated for steel and iron components, provide the following protective zinc coating applied to components after fabrication:

1. Zinc-Coated Tubing: External, zinc with organic overcoat, consisting of a minimum of 0.9 oz./sq. ft. (0.27 kg/sq. m) of zinc after welding, a chromate conversion coating, and a clear, polymer film. Internal, same as external or consisting of 81 percent zinc pigmented coating, not less than 0.3 mil (0.0076 mm) thick.
2. Hot-Dip Galvanizing: According to ASTM A 123/A 123M, ASTM A 153/A 153M, or ASTM A 924/A 924M.

2.2 BICYCLE RACKS

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

B. Basis-of-Design Product: Subject to compliance with requirements, provide American Bicycle Security Company, Rolling 4H:
1. or approved equal.

2.3 TRASH AND RECYCLING RECEPTACLES

1. Receptacle Shape and Form: Round cylinder, 30 gallon aluminum; with opening for depositing trash in lid or top.
2. Lids and Tops: Aluminum secured by cable to wood frame.

    a. Description: Solid
    b. Cut two 4” diameter openings as shown on plans for recycling container on one of the two container lids per trash/recycling receptacle. Place “plastic and aluminum only sign and recycling symbol” on the recycled lid per signage lid

3. Receptacle Height: as indicated
4. Overall Height: as indicated
5. Overall Width: as indicated
6. Weight:
7. Inner Container: Plastic bag

8. Capacity: Not less than 28 gal. (106 L)
9. Service Access: Removable lid or top; inner container and disposable liner lift or slide out for emptying.

B. Installation Method: Freestanding but contained as shown on drawings

2.4 BOLLARDS and FENCING

1. Cedar wood bollards and Fencing: Reuse cedar trunks from on site clearance as shown in drawings.

B. Bollard and Fencing Construction:

1. Rough finish cedar posts Not less than 4" diameter and not larger than 8" in diameter
2. Installation Method: as indicated on drawings

2.5 PICNIC GRILL

1. Highland Products Group or approved equal from Texas.
2. Install per manufacturer recommendations and as shown on drawings

2.6 FIRE RING

1. Highland Products Group or approved equal from Texas.
2. Install per manufacturer recommendations and as shown on drawings

2.7 BENCHES

1. 'Village Green' By Landscape Forms.
2. Painted Black
3. Install per manufacturer recommendations and as shown on drawings

2.8 BLEACHERS

1. FAN3-1FP Fanstand 3-Row Bleacher by First Team Sport, Inc.
2. Aluminum
3. Install per manufacturer recommendations and as shown on drawings

2.9 LADDER AT BLUE HOLE

1. Straight Dock Ladder, 5 Step Wide Rung. WM#:9485186 by West Marine
2. Install per structural drawings for lumber connection as well as stone/concrete.

2.10 ACCESSIBILITY SLEEVE

1. Elkhorn/Aspen Anchor Sleeve. Spectrum Products 1-800-791-8056
2. Install per manufacturer including lid and key. Provide key to City.

2.11 FABRICATION

A. Metal Components: Form to required shapes and sizes with true, consistent curves, lines, and angles. Separate metals from dissimilar materials to prevent electrolytic action.

B. Welded Connections: Weld connections continuously. Weld solid members with full-length, full-penetration welds and hollow members with full-circumference welds. At exposed connections, finish surfaces smooth and blended so no roughness or unevenness shows after finishing and welded surface matches contours of adjoining surfaces.

C. Pipes and Tubes: Form simple and compound curves by bending members in jigs to produce uniform curvature for each repetitive configuration required; maintain cylindrical cross section of member throughout entire bend without buckling, twisting, cracking, or otherwise deforming exposed surfaces of handrail and railing components.

D. Preservative-Treated Wood Components: Complete fabrication of treated items before treatment if possible. If cut after treatment, apply field treatment complying with AWPA M4 to cut surfaces.

E. Exposed Surfaces: Polished, sanded, or otherwise finished; all surfaces smooth, free of burrs, barbs, splinters, and sharpness; all edges and ends rolled, rounded, or capped.

F. Factory Assembly: Assemble components in the factory to greatest extent possible to minimize field assembly. Clearly mark units for assembly in the field.

2.12 FINISHES, GENERAL

A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

B. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in the same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

2.13 STEEL AND GALVANIZED STEEL FINISHES

A. Baked-Enamel, Powder-Coat Finish: Manufacturer's standard, baked, polyester, powder-coat finish complying with finish manufacturer's written instructions for surface preparation, including pretreatment, application, baking, and minimum dry film thickness.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas and conditions, with Installer present, for compliance with requirements for correct and level finished grade, mounting surfaces, installation tolerances, and other conditions affecting performance.

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

3.2 INSTALLATION, GENERAL

A. Comply with manufacturer's written installation instructions unless more stringent requirements are indicated. Complete field assembly of site furnishings where required.

B. Unless otherwise indicated, install site furnishings after landscaping and paving have been completed.

C. Install site furnishings level, plumb, true, and positioned at locations indicated on Drawings.

D. Post Setting: Set cast-in support posts in concrete footing with smooth top, shaped to shed water. Protect portion of posts above footing from concrete splatter. Verify that posts are set plumb or at correct angle and are aligned and at correct height and spacing. Hold posts in position during placement and finishing operations until concrete is sufficiently cured.

3.3 CLEANING

A. After completing site furnishing installation, inspect components. Remove spots, dirt, and debris. Repair damaged finishes to match original finish or replace component.

END OF SECTION 129300

SECTION 221116 – DOMESTIC WATER PIPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes domestic water piping from locations indicated to fixtures and equipment inside the building.

1.3 PERFORMANCE REQUIREMENTS

A. Provide components and installation capable of producing domestic water piping systems with the following minimum working-pressure ratings, unless otherwise indicated:
   1. Domestic Water Service Piping: 125 psig.
   2. Domestic Water Distribution Piping: 125 psig.

1.4 SUBMITTALS

A. Product Data: For pipe, tube, fittings, and couplings.

B. Water Samples: Specified in "Cleaning" Article in Part 3.

C. Field Test Reports: Indicate and interpret test results for compliance with performance requirements.

1.5.1 QUALITY ASSURANCE

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

PART 2 - PRODUCTS

2.1 PIPING MATERIALS

A. Refer to Part 3 "Piping Applications" Article for applications of pipe, tube, fitting, and joining materials.

B. Transition Couplings for Aboveground Pressure Piping: Coupling or other manufactured fitting the same size as, with pressure rating at least equal to and ends compatible with, piping to be joined.

C. Transition Couplings for Underground Pressure Piping: AWWA C219, metal, sleeve-type coupling or other manufactured fitting the same size as, with pressure rating at least equal to and ends compatible with, piping to be joined.

2.2 COPPER TUBING

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

1. Copper Pressure Fittings: ASME B16.18, cast-copper-alloy or ASME B16.22, wrought-copper, solder-joint fittings. Furnish wrought-copper fittings if indicated.
2. Bronze Flanges: ASME B16.24, Class 150, with solder-joint end. Furnish Class 300 flanges if required to match piping.
3. Copper Unions: MSS SP-123, cast- copper-alloy, hexagonal-stock body, with ball-and-socket, metal-to-metal seating surfaces and solder-joint or threaded ends.

B. Hard Copper Tube: ASTM B 88, Types L and M, water tube, drawn temper.

1. Copper Pressure Fittings: ASME B16.18, cast-copper-alloy or ASME B16.22, wrought- copper, solder-joint fittings. Furnish wrought-copper fittings if indicated.
2. Bronze Flanges: ASME B16.24, Class 150, with solder-joint end. Furnish Class 300 flanges if required to match piping.
3. Copper Unions: MSS SP-123, cast- copper-alloy, hexagonal-stock body, with ball-and-socket, metal-to-metal seating surfaces and solder-joint or threaded ends.

2.3 PVC PIPING

A. PVC Schedule 40 Pipe: ASTM D 1785.

1. PVC Schedule 40 Fittings: ASTM D 2466, socket type.

B. PVC AWWA Pipe: AWWA C900, Class 150 and Class 200, with bell end with gasket and spigot end.

1. Provide piping listed for fire-protection service where indicated.
2. PVC Fabricated Fittings: AWWA C900, Class 150 and Class 200, with bell-and-spigot or double-bell ends. Include elastomeric gasket in each bell.
3. PVC Molded Fittings: AWWA C907, Class 150, with bell-and-spigot or double-bell ends. Include elastomeric gasket in each bell.

PART 3 - EXECUTION

3.1 EXCAVATION

A. Refer to Division 2 Section "Earthwork" for excavating, trenching, and backfilling.

3.2 PIPING APPLICATIONS

A. Transition and special fittings with pressure ratings at least equal to piping rating may be used in applications below, unless otherwise indicated.

B. Flanges may be used on aboveground piping, unless otherwise indicated.

C. Fitting Option: Mechanically formed tee-branch outlets and brazed joints may be used on aboveground copper tubing.

D. Underground Domestic Water Service Piping: Use the following piping material.:
   1. PVC, Schedule 40 pipe; PVC, Schedule 40 socket fittings; and solvent-cemented joints.

E. Aboveground Domestic Water Piping: Use the following piping material:

   1. Hard copper tube, Type L; copper pressure fittings; and soldered joints.

F. Below Slab Domestic Water Piping: Use the following piping material:

   1. Hard copper tube, Type L; copper pressure fittings.

3.3 VALVE APPLICATIONS

A. Drawings indicate valve types to be used. Where specific valve types are not indicated, the following requirements apply:

   1. Shutoff Duty: Use bronze ball for piping NPS 2 and smaller. Use cast-iron butterfly or gate valves with flanged ends for piping NPS 2-1/2 and larger.
   2. Throttling Duty: Use bronze ball or globe valves for piping NPS 2 and smaller. Use cast-iron butterfly valves with flanged ends for piping NPS 2-1/2 and larger.
   3. Drain Duty: Hose-end drain valves.

B. PVC ball, butterfly, and check valves may be used with PVC piping.

3.4 PIPING INSTALLATION

A. Refer to Division 22 Section "Water Distribution" for site water distribution and service piping.

B. Extend domestic water service piping to exterior water distribution piping in sizes and locations indicated and coordinate location with site requirements.

C. Install underground copper tubing according to CDA's "Copper Tube Handbook."

D. Install cast-iron sleeve with water stop and mechanical sleeve seal at each service pipe penetration through foundation wall. Select number of interlocking rubber links required to make installation watertight.

E. Install wall penetration system at each service pipe penetration through foundation wall. Make installation watertight.

F. Install shutoff valve, hose-end drain valve, strainer, pressure gage, and test tee with valve, inside building at each domestic water service.

G. Install water-pressure regulators downstream from shutoff valves.

H. Install aboveground domestic water piping level with 0.25 percent slope downward toward drain and plumb.

I. Fill water piping. Check components to determine that they are not air bound and that piping is full of water.

J. Perform the following steps before operation:

1. Close drain valves, hydrants, and hose bibbs.
2. Open shutoff valves to fully open position.
3. Open throttling valves to proper setting.
4. Remove plugs used during testing of piping and plugs used for temporary sealing of piping during installation.
5. Remove and clean strainer screens. Close drain valves and replace drain plugs.
6. Remove filter cartridges from housings, and verify that cartridges are as specified for application where used and that cartridges are clean and ready for use.

K. Check plumbing equipment and verify proper settings, adjustments, and operation. Do not operate water heaters before filling with water.

L. Check plumbing specialties and verify proper settings, adjustments, and operation.

1. Water-Pressure Regulators: Set outlet pressure at 80 psig maximum, unless otherwise indicated.

3.5 JOINT CONSTRUCTION

A. Refer to Division 23 Section "Common Work Results" for basic piping joint construction.

B. Soldered Joints: Use ASTM B 813, water-flushable, lead-free flux; ASTM B 32, lead-free-alloy solder; and ASTM B 828 procedure, unless otherwise indicated.

C. Mechanically Formed Outlets: Form tee in copper tube according to equipment manufacturer's written instructions. Use tool designed for copper tube; drill pilot hole, form collar for outlet, dimple tube to form seating stop, and braze branch tube into collar.

3.6 VALVE INSTALLATION

A. Install sectional valve close to water main on each branch and riser serving plumbing fixtures or equipment. Use ball or gate valves for piping NPS 2 and smaller. Use butterfly or gate valves for piping NPS 2-1/2 and larger.

B. Install shutoff valve on each water supply to equipment and on each water supply to plumbing fixtures without supply stops. Use ball or gate valves for piping NPS 2 and smaller. Use butterfly or gate valves for piping NPS 2-1/2 and larger.

C. Install drain valves for equipment, at base of each water riser, at low points in horizontal piping, and where required to drain water piping.

1. Install hose-end drain valves at low points in water mains, risers, and branches.
2. Install stop-and-waste drain valves where indicated.

3.7 HANGER AND SUPPORT INSTALLATION

A. Refer to Division 23 Section "Hangers and Supports" for pipe hanger and support devices. Install the following:

1. Vertical Piping: MSS Type 8 or Type 42, clamps.
2. Individual, Straight, Horizontal Piping Runs: According to the following:

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.

3. Multiple, Straight, Horizontal Piping Runs 100 Feet or Longer: MSS Type 44, pipe rolls. Support pipe rolls on trapeze.
4. Base of Vertical Piping: MSS Type 52, spring hangers.

B. Support vertical piping and tubing at base and at each floor.

C. Rod diameter may be reduced 1 size for double-rod hangers, to a minimum of 3/8 inch.

D. Install hangers for steel piping with the following maximum horizontal spacing and minimum rod diameters:

1. NPS 1-1/4 and Smaller: 84 inches with 3/8-inch rod.
2. NPS 1-1/2: 108 inches with 3/8-inch rod.
3. NPS 2: 10 feet with 3/8-inch rod.
4. NPS 2-1/2: 11 feet with 1/2-inch rod.
5. NPS 3 and NPS 3-1/2: 12 feet with 1/2-inch rod.

E. Install supports for vertical steel piping every 15 feet.

F. Install hangers for copper tubing with the following maximum horizontal spacing and minimum rod diameters:

1. NPS 3/4 and Smaller: 60 inches with 3/8-inch rod.
2. NPS 1 and NPS 1-1/4: 72 inches with 3/8-inch rod.
3. NPS 1-1/2 and NPS 2: 96 inches with 3/8-inch rod.
4. NPS 2-1/2: 108 inches with 1/2-inch rod.
5. NPS 3 to NPS 5: 10 feet with 1/2-inch rod.

G. Install supports for vertical copper tubing every 10 feet.

H. Support piping and tubing not listed above according to MSS SP-69 and manufacturer's written instructions.

3.8 CONNECTIONS

A. Drawings indicate general arrangement of piping, fittings, and specialties.

B. Install piping adjacent to equipment and machines to allow service and maintenance.

C. Connect domestic water piping to exterior water service piping. Use transition fitting to join dissimilar piping materials.

D. Connect domestic water piping to service piping with shutoff valve, and extend and connect to the following:
1. Water Heaters: Cold-water supply and hot-water outlet piping in sizes indicated, but not smaller than sizes of water heater connections.
2. Plumbing Fixtures: Cold- and hot-water supply piping in sizes indicated, but not smaller than required by plumbing code. Refer to Division 22 Section "Plumbing Fixtures."
3. Equipment: Cold- and hot-water supply piping as indicated, but not smaller than equipment connections. Provide shutoff valve and union for each connection. Use flanges instead of unions for NPS 2-1/2 and larger.

3.9 FIELD QUALITY CONTROL

A. Inspect domestic water piping as follows:

1. Do not enclose, cover, or put piping into operation until it is inspected and approved by authorities having jurisdiction.
2. 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:

    a. Roughing-in Inspection: Arrange for inspection of piping before concealing or closing-in after roughing-in and before setting fixtures.
    b. Final Inspection: Arrange for final inspection by authorities having jurisdiction to observe tests specified below and to ensure compliance with requirements.

3. Reinspection: If authorities having jurisdiction find that piping will not pass test or inspection, make required corrections and arrange for reinspection.
4. Reports: Prepare inspection reports and have them signed by authorities having jurisdiction.

B. Test domestic water piping as follows:

1. Test for leaks and defects in new piping and parts of existing piping that have been altered, extended, or repaired. 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 domestic water piping until it has been tested and approved. Expose work that was covered or concealed before it was tested.
3. Cap and subject piping to static water pressure of 50 psig above operating pressure, without exceeding pressure rating of piping system materials. Isolate test source and allow to stand for four hours. Leaks and loss in test pressure constitute defects that must be repaired.
4. Repair leaks and defects with new materials and retest piping or portion thereof until satisfactory results are obtained.

- Prepare reports for tests and required corrective action.

- CLEANING

C. Clean and disinfect potable domestic water piping as follows:

1. Purge new piping and parts of existing domestic water piping that have been altered, extended, or repaired before using.
2. Use purging and disinfecting procedures prescribed by authorities having jurisdiction or, if methods are not prescribed, procedures described in either AWWA C651 or AWWA C652 or as described below:

    a. Flush piping system with clean, potable water until dirty water does not appear at outlets.
    b. Fill and isolate system according to either of the following:

        1) Fill system or part thereof with water/chlorine solution with at least 50 ppm of chlorine. Isolate with valves and allow to stand for 24 hours.
        2) Fill system or part thereof with water/chlorine solution with at least 200 ppm of chlorine. Isolate and allow to stand for three hours.

    c. Flush system with clean, potable water until no chlorine is in water coming from system after the standing time.
    d. Submit water samples in sterile bottles to authorities having jurisdiction. Repeat procedures if biological examination shows contamination.

D. Prepare and submit reports of purging and disinfecting activities.

E. Clean interior of domestic water piping system. Remove dirt and debris as work progresses.

END OF SECTION

SECTION 221316 – SANITARY WASTE AND VENT PIPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes soil and waste, sanitary drainage and vent piping inside the building and to locations indicated.

1.3 PERFORMANCE REQUIREMENTS

A. Provide components and installation capable of producing piping systems with the following minimum working-pressure ratings, unless otherwise indicated:

1. Soil, Waste, and Vent Piping: 10-foot head of water.

1.4 SUBMITTALS

A. Product Data: For pipe, tube, fittings, and couplings.

B. Shop Drawings: For sovent drainage system, include plans, elevations, sections, and details.

C. Field Test Reports: Indicate and interpret test results for compliance with performance requirements.

1.5 QUALITY ASSURANCE

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

PART 2 - PRODUCTS

2.1 PIPING MATERIALS

A. Refer to Part 3 "Piping Applications" Article for applications of pipe, tube, fitting, and joining materials.

B. Flexible Transition Couplings for Underground Nonpressure Piping: ASTM C 1173 with elastomeric sleeve. Include ends of same sizes as piping to be joined and include corrosion-resistant metal band on each end.

C. Transition Couplings for Underground Pressure Piping: AWWA C219 metal, sleeve-type coupling or other manufactured fitting same size as, with pressure rating at least equal to and ends compatible with, piping to be joined.

2.2 SOIL PIPING

A. Cast-Iron Hub-and-Spigot Pipe and Fittings: ASTM A 74, Service class. **INSTALL UNDER BUILDING(S) SLAB TO LIFT STATION.**

1. Gaskets: ASTM C 564, rubber.

B. Hubless Pipe and Fittings: ASTM A 888 or CISPI 301.

1. Couplings: ASTM C 1277 assembly of metal housing, corrosion-resistant fasteners, and ASTM C 564 rubber sleeve with integral, center pipe stop.

a. Heavy-Duty, Type 304, Stainless-Steel Couplings: ASTM A 666, Type 304, stainless-steel shield; stainless-steel bands; and sleeve.

1) NPS 1-1/2 to NPS 4: 3-inch- wide shield with 4 bands.
2) NPS 5 to NPS 10: 4-inch- wide shield with 6 bands.

b. Heavy-Duty, FM-Approved Couplings: ASTM A 666, Type 304, stainless-steel housing; stainless-steel bands; and sleeve.

1) NPS 1-1/2 to NPS 4: 3-inch- wide housing with 2 bands.
2) NPS 5 to NPS 10: 4-inch- wide housing with 2 bands.

c. Heavy-Duty, Cast-Iron Couplings: ASTM A 48, 2-piece, cast-iron housing; stainless-steel bolts and nuts; and sleeve.

d. Heavy-Duty, Type 301, Stainless-Steel Couplings: ASTM A 666, Type 301, stainless-steel shield; stainless-steel bands; and sleeve.

1) NPS 1-1/2 to NPS 4: 3-inch- wide shield with 4 bands.
2) NPS 5 to NPS 10: 4-inch- wide shield with 6 bands.

e. Compact, Stainless-Steel Couplings: CISPI 310 with ASTM A 167, Type 301, or ASTM A 666, Type 301, stainless-steel corrugated shield; stainless-steel bands; and sleeve.

1) NPS 1-1/2 to NPS 4: 2-1/8-inch- wide shield with 2 bands.
2) NPS 5 and NPS 6: 3-inch- wide shield with 4 bands.
3) NPS 8 and NPS 10: 4-inch- wide shield with 4 bands.
4) NPS 12 and NPS 15: 5-1/2-inch- wide shield with 6 bands.

2. Sovent Fittings: ASME B16.45 or ASSE 1043, hubless, aerator and deaerator.

C. PVC Pipe: ASTM D 2665, solid-wall drain, waste, and vent.

1. PVC Socket Fittings: ASTM D 2665, socket type, made to ASTM D 3311, drain, waste, and vent patterns.

PART 3 - EXECUTION

3.1 EXCAVATION

A. Refer to Division 2 Section "Earthwork" for excavating, trenching, and backfilling.

3.2 PIPING APPLICATIONS

A. Transition and special fittings with pressure ratings at least equal to piping pressure ratings may be used in applications below, unless otherwise indicated.

B. Flanges may be used on aboveground pressure piping, unless otherwise indicated.

C. Aboveground, Soil, Waste, and Vent Piping: Use the following piping materials for each size range:

1. Up to 8 NPS: Service Weight cast iron No-Hub Piping system with neoprene gasket sleeves and stainless steel clamps. All materials shall conform to all appropriate ASTM and other standards and specifications.

2. 10 NPS and larger: Service Weight cast iron bell and spigot pipe ASTM A-74 with TY-Seal neoprene gaskets and TY-Seal lubricant. All materials shall conform to all appropriate ASTM and other standards and specifications

D. Below ground, Soil, Waste, and Vent Piping: Use the following piping materials for each size range:

1. Service Weight cast iron bell and spigot pipe ASTM A-74 with TY-Seal neoprene gaskets and TY-Seal lubricant. All materials shall conform to all appropriate ASTM and other standards and specifications

2. PIP NPS 5 and NPS 6: Use NPS 6 PVC pipe, PVC socket fittings, and solvent-cemented joints.

3.3 PIPING INSTALLATION

A. Refer to site engineering plans Project-site sanitary sewer piping.

B. Install cleanouts at grade and extend to where building sanitary drains connect to building sanitary sewers.

C. Install cleanout fitting with closure plug inside the building in sanitary force-main piping.

D. Underground, Ductile-Iron, Force-Main Piping: Comply with AWWA C600. Install buried piping inside the building between wall and floor penetrations and connection to sanitary sewer piping outside the building with restrained joints. Anchor pipe to wall or floor. Install thrust-block supports at vertical and horizontal offsets.

1. Encase piping with PE film according to ASTM A 674 or AWWA C105.

E. Install cast-iron sleeve with water stop and mechanical sleeve seal at each service pipe penetration through foundation wall. Select number of interlocking rubber links required to make installation watertight. Refer to Division 15 Section "Basic Mechanical Materials and Methods" for sleeves and mechanical sleeve seals.

F. Install wall penetration system at each service pipe penetration through foundation wall. Make installation watertight. Refer to Division 23 Section "Common Work Results" for wall penetration systems.

G. 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. Encase underground piping with PE film according to ASTM A 674 or AWWA C105.

H. Make changes in direction for soil and waste drainage and vent piping using appropriate branches, bends, and long-sweep bends. 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. Use long-turn, double Y-branch and 1/8-bend fittings if 2 fixtures are installed back to back or side by side with common drain pipe. Straight tees, elbows, and crosses may be used on vent lines. Do not change direction of flow more than 90 degrees. Use proper size of standard increasers and reducers if pipes of different sizes are connected. Reducing size of drainage piping in direction of flow is prohibited.

I. Lay buried building drainage piping beginning at low point of each system. Install true to grades and alignment indicated, with unbroken continuity of invert. Place hub ends of piping upstream. Install required gaskets according to manufacturer's written instructions for use of lubricants, cements, and other installation requirements. Maintain swab in piping and pull past each joint as completed.

J. Install soil and waste drainage and vent piping at the following minimum slopes, unless otherwise indicated:

1. Building Sanitary Drain: 1/4” per lineal foot downward in direction of flow for piping NPS 3 and smaller; 1/8” percent downward in direction of flow for piping NPS 4 and larger.
2. Vent Piping: 1/8” per lineal foot down toward vertical fixture vent or toward vent stack.

K. Install engineered soil and waste drainage and vent piping systems in locations indicated and as follows:
1. Cast-Iron, Sovent, Single Stack: Comply with ASSE 1043 and sovent fitting manufacturer's written installation instructions.
2. Reduced-Size Venting: Comply with standards of authorities having jurisdiction.

L. Sleeves are not required for cast-iron soil piping passing through concrete slabs-on-grade if slab is without membrane waterproofing.

M. Do not enclose, cover, or put piping into operation until it is inspected and approved by authorities having jurisdiction.

3.4 JOINT CONSTRUCTION

A. Cast-Iron, Soil-Piping Joints: Make joints according to CISPI's "Cast Iron Soil Pipe and Fittings Handbook," Chapter IV, "Installation of Cast Iron Soil Pipe and Fittings."
   1. Hubless Joints: Make with neoprene gasket sleeves and stainless steel clamps.
   2. Bell and spigot: Make with TY-Seal neoprene gaskets and TY-Seal lubricant.

3.5 VALVE INSTALLATION

A. Refer to Division 23 Section "Valves" for general-duty valves.

B. Backwater Valves: Install backwater valves in piping subject to sewage backflow.

   1. Horizontal Piping: Horizontal backwater valves. Use normally closed type, unless otherwise indicated.
   2. Floor Drains: Drain outlet backwater valves, unless drain has integral backwater valve.
   3. Install backwater valves in accessible locations.

3.6 HANGER AND SUPPORT INSTALLATION

A. Install the following:

   1. Vertical Piping: MSS Type 8 or Type 42, clamps.
   2. Individual, Straight, Horizontal Piping Runs: According to the following:

      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.

   3. Multiple, Straight, Horizontal Piping Runs 100 Feet or Longer: MSS Type 44, pipe rolls. Support pipe rolls on trapeze.
   4. Base of Vertical Piping: MSS Type 52, spring hangers.

B. Install supports according to Division 23 Section "Hangers and Supports."

C. Support vertical piping and tubing at base and at each floor.

D. Rod diameter may be reduced 1 size for double-rod hangers, with 3/8-inch minimum rods.

E. Install hangers for cast-iron soil piping with the following maximum horizontal spacing and minimum rod diameters:

   1. NPS 1-1/2 and NPS 2: 60 inches with 3/8-inch rod.

2. NPS 3: 60 inches with 1/2-inch rod.
3. NPS 4 and NPS 5: 60 inches with 5/8-inch rod.
4. NPS 6: 60 inches with 3/4-inch rod.
5. NPS 8 to NPS 12: 60 inches with 7/8-inch rod.
6. Spacing for 10-foot lengths may be increased to 10 feet. Spacing for fittings is limited to 60 inches.

F. Install supports for vertical cast-iron soil piping every 15 feet.

3.7 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 drainage and vent piping to the following:

1. Plumbing Fixtures: Connect drainage piping in sizes indicated, but not smaller than required by plumbing code. Refer to Division 22 Section "Plumbing Fixtures."
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 drainage and vent piping in sizes indicated, but not smaller than required by plumbing code.
4. Equipment: Connect drainage piping as indicated. Provide shutoff valve, if indicated, and union for each connection. Use flanges instead of unions for connections NPS 2-1/2 and larger.

3.8 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 drainage 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. 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 drainage and vent piping until it has been tested and approved. Expose work that was covered or concealed before it was tested.
3. Roughing-in Plumbing Test Procedure: Test drainage and vent piping, except outside leaders, on com pletion of roughing-i n. Close openings in piping s ystem and fill with water to point of overflow , but not less than 10-foot head of water. From 15 m inutes before inspection starts to co mpletion of insp ection, water level must not dro p. Inspect joints for leaks.
4. Finished Plu mbing Test Procedure: After plum bing fix tures h ave been set and traps filled with w ater, test connections and prove they are gastight and watertight. Plug vent-stack openings on roof and buildin g drains where they leave buildi ng. Introd uce air into piping system equal to pr essure of 1-inch wg. Use U-tube or manometer inserted in trap of water closet to measure this pressu re. Air pressure must remain constan t without introducing additional air throughout period of inspection. Inspect plu mbing fixture connections for gas and water leaks.
5. Repair leaks and defects with new materials and retest piping, or portion ther eof, until satisfactory results are obtained.
6. Prepare reports for tests and required corrective action.

3.9 CLEANING

A. Clean interior of piping. Remove dirt and debris as work progresses.

B. Protect drains during remainder of con struction period to avoi d c logging with dirt and debr is 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.

END OF SECTION 15150

SECTION 230500 – COMMON WORK RESULTS FOR MECHANICAL

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes the following basic mechanical materials and methods to complement other Division 23 Sections.

1. Piping materials and installation instructions common to most piping systems.
2. Concrete base construction requirements.
3. Escutcheons.
4. Dielectric fittings.
5. Flexible connectors.
6. Mechanical sleeve seals.
7. Equipment nameplate data requirements.
8. Nonshrink grout for equipment installations.
9. Field-fabricated metal and wood equipment supports.
10. Installation requirements common to equipment specification sections.
11. Cutting and patching.
12. Touchup painting and finishing.

B. Pipe and pipe fitting materials are specified in Division 22 piping system Sections.

1.3 DEFINITIONS

A. Finished Spaces: Spaces other than mechanical and electrical equipment rooms, furred spaces, pipe and duct shafts, unheated spaces immediately below roof, spaces above ceilings, unexcavated spaces, crawl spaces, and tunnels.

B. Exposed, Interior Installations: Exposed to view indoors. Examples include finished occupied spaces and mechanical equipment rooms.

C. Exposed, Exterior Installations: Exposed to view outdoors, or subject to outdoor ambient temperatures and weather conditions. Examples include rooftop locations.

D. Concealed, Interior Installations: Concealed from view and protected from physical contact by building occupants. Examples include above ceilings and in duct shafts.

E. Concealed, Exterior Installations: Concealed from view and protected from weather conditions and physical contact by building occupants, but subject to outdoor ambient temperatures. Examples include installations within unheated shelters.

F. The following are industry abbreviations for plastic materials:

1. ABS: Acrylonitrile-butadiene-styrene plastic.
2. CPVC: Chlorinated polyvinyl chloride plastic.
3. NP: Nylon plastic.
4. PE: Polyethylene plastic.
5. PVC: Polyvinyl chloride plastic.

G. The following are industry abbreviations for rubber materials:

1. CR: Chlorosulfonated polyethylene synthetic rubber.
2. EPDM: Ethylene propylene diene terpolymer rubber.

1.4 SUBMITTALS

A. Product Data: For dielectric fittings, flexible connectors, and identification materials and devices.

B. Shop Drawings: Detail fabrication and installation for metal and wood supports and anchorage for mechanical materials and equipment.

C. Coordination Drawings: Detail major elements, components, and systems of mechanical equipment and materials in relationship with other systems, installations, and building components. Show space requirements for installation and access. Indicate if sequence and coordination of installations are important to efficient flow of the Work. Include the following:

1. Planned piping layout, including valve and specialty locations and valve-stem movement.
2. Clearances for installing and maintaining insulation.
3. Clearances for servicing and maintaining equipment, accessories, and specialties, including space for disassembly required for periodic maintenance.
4. Equipment and accessory service connections and support details.
5. Exterior wall and foundation penetrations.
6. Sizes and location of required concrete pads and bases.
7. Floor plans, elevations, and details to indicate penetrations in floors, walls, and ceilings and their relationship to other penetrations and installations.

1.5 QUALITY ASSURANCE

A. Comply with ASME A13.1 for lettering size, length of color field, colors, and viewing angles of identification devices.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver pipes and tubes with factory-applied end caps. Maintain end caps through shipping, storage, and handling to prevent pipe end damage and prevent entrance of dirt, debris, and moisture.

B. Protect stored pipes and tubes from moisture and dirt. Elevate above grade. Do not exceed structural capacity of floor, if stored inside.

C. Protect flanges, fittings, hardware and piping specialties from moisture and dirt.

D. Store plastic pipes protected from direct sunlight. Support to prevent sagging and bending.

1.7 SEQUENCING AND SCHEDULING

A. Coordinate mechanical equipment installation with other building components.

B. Arrange for pipe spaces, chases, slots, and openings in building structure during progress of construction to allow for mechanical installations.

C. Coordinate installation of required supporting devices and set sleeves in poured-in-place concrete and other structural components, as they are constructed.

D. Coordinate connection of mechanical systems with exterior underground and overhead utilities and services. Comply with requirements of governing regulations, franchised service companies, and controlling agencies.Coordinate installation of identifying devices after completing covering and painting, if devices are applied to surfaces. Install identifying devices before installing acoustical ceilings and similar concealment.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

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

1. Dielectric Unions:

   a. Capitol Manufacturing Co.
   b. Central Plastics Co.
   c. Eclipse, Inc.; Rockford-Eclipse Div.
   d. Epco Sales Inc.
   e. Hart Industries International, Inc.
   f. Watts Industries, Inc.; Water Products Div.
   g. Zurn Industries, Inc.; Wilkins Div.

2. Dielectric Flanges:

   a. Capitol Manufacturing Co.
   b. Central Plastics Co.
   c. Epco Sales Inc.
   d. Watts Industries, Inc.; Water Products Div.

3. Dielectric-Flange Insulating Kits:

   a. Calpico, Inc.
   b. Central Plastics Co.

4. Dielectric Couplings:

   a. Calpico, Inc.
   b. Lochinvar Corp.

5. Dielectric Nipples:

   a. Grinnell Corp.; Grinnell Supply Sales Co.

b. Perfection Corp.
c. Victaulic Co. of America.

6. Metal, Flexible Connectors:

a. ANAMET Industrial, Inc.
b. Central Sprink, Inc.
c. Flexicraft Industries.
d. Flex-Weld, Inc.
e. Grinnell Corp.; Grinnell Supply Sales Co.
f. Hyspan Precision Products, Inc.
g. McWane, Inc.; Tyler Pipe; Gustin-Bacon Div.
h. Mercer Rubber Co.
i. Metraflex Co.
j. Proco Products, Inc.
k. Uniflex, Inc.

7. Rubber, Flexible Connectors:

a. General Rubber Corp.
b. Mercer Rubber Co.
c. Metraflex Co.
d. Proco Products, Inc.
e. Red Valve Co., Inc.
f. Uniflex, Inc.

8. Mechanical Sleeve Seals:

a. Calpico, Inc.
b. Metraflex Co.
c. Thunderline/Link-Seal.

2.2 PIPE AND PIPE FITTINGS

A. Refer to individual Division 23 piping Sections for pipe and fitting materials and joining methods.

B. Pipe Threads: ASME B1.20.1 for factory-threaded pipe and pipe fittings.

2.3 JOINING MATERIALS

A. Refer to individual Division 23 piping Sections for special joining materials not listed below.

B. Plastic, Pipe-Flange Gasket, Bolts, and Nuts: Type and material recommended by piping system manufacturer, unless otherwise indicated.

C. Solder Filler Metals: ASTM B 32.

1. Alloy Sn95 or Alloy Sn94: Approximately 95 percent tin and 5 percent silver, with 0.10 percent lead content.
2. Alloy E: Approximately 95 percent tin and 5 percent copper, with 0.10 percent maximum lead content.

D. Brazing Filler Metals: AWS A5.8.

1. BCuP Series: Copper-phosphorus alloys.
2. BAg1: Silver alloy.

E. Welding Filler Metals: Comply with AWS D10.12 for welding materials appropriate for wall thickness and chemical analysis of steel pipe being welded.

F. Solvent Cements: Manufacturer's standard solvent cements for the following:

1. ABS Piping: ASTM D 2235.
2. CPVC Piping: ASTM F 493.
3. PVC Piping: ASTM D 2564. Include primer according to ASTM F 656.
4. PVC to ABS Piping Transition: ASTM D 3138.

G. Plastic Pipe Seals: ASTM F 477, elastomeric gasket.

H. Flanged, Ductile-Iron Pipe Gasket, Bolts, and Nuts: AWWA C110, rubber gasket, carbon-steel bolts and nuts.

I. Couplings: Iron-body sleeve assembly, fabricated to match OD of plain-end, pressure pipes.

1. Sleeve: ASTM A 126, Class B, gray iron.
2. Followers: ASTM A 47 malleable iron or ASTM A 536 ductile iron.
3. Gaskets: Rubber.
4. Bolts and Nuts: AWWA C111.
5. Finish: Enamel paint.

2.4 DIELECTRIC FITTINGS

A. General: Assembly or fitting with insulating material isolating joined dissimilar metals, to prevent galvanic action and stop corrosion.

B. Description: Combination of copper alloy and ferrous; threaded, solder, plain, and weld-neck end types and matching piping system materials.

C. Insulating Material: Suitable for system fluid, pressure, and temperature.

D. Dielectric Unions: Factory-fabricated, union assembly, for 250-psig minimum working pressure at 180 deg F.

E. Dielectric Flanges: Factory-fabricated, companion-flange assembly, for 150- or 300-psig minimum working pressure as required to suit system pressures.

F. Dielectric-Flange Insulation Kits: Field-assembled, companion-flange assembly, full-face or ring type. Components include neoprene or phenolic gasket, phenolic or polyethylene bolt sleeves, phenolic washers, and steel backing washers.

1. Provide separate companion flanges and steel bolts and nuts for 150- or 300-psig minimum working pressure as required to suit system pressures.

G. Dielectric Couplings: Galvanized-steel coupling with inert and noncorrosive, thermoplastic lining; threaded ends; and 300-psig minimum working pressure at 225 deg F.

H. Dielectric Nipples: Electroplated steel nipple with inert and noncorrosive, thermoplastic lining; plain, threaded, or grooved ends; and 300-psig minimum working pressure at 225 deg F.

2.5 PIPING SPECIALTIES

A. Sleeves: The following materials are for wall, floor, slab, and roof penetrations:

1. Steel Sheet Metal: 0.0239-inch minimum thickness, galvanized, round tube closed with welded longitudinal joint.
2. Steel Pipe: ASTM A 53, Type E, Grade A, Schedule 40, galvanized, plain ends.
3. Cast Iron: Cast or fabricated "wall pipe" equivalent to ductile-iron pressure pipe, with plain ends and integral waterstop, unless otherwise indicated.
4. Stack Sleeve Fittings: Manufactured, cast-iron sleeve with integral clamping flange. Include clamping ring and bolts and nuts for membrane flashing.
    a. Underdeck Clamp: Clamping ring with set screws.
5. PVC: Manufactured, permanent, with nailing flange for attaching to wooden forms.
6. PVC Pipe: ASTM D 1785, Schedule 40.
7. PE: Manufactured, reusable, tapered, cup shaped, smooth outer surface, with nailing flange for attaching to wooden forms.

B. Escutcheons: Manufactured wall, ceiling, and floor plates; deep-pattern type if required to conceal protruding fittings and sleeves.

1. ID: Closely fit around pipe, tube, and insulation of insulated piping.
2. OD: Completely cover opening.
3. Cast Brass: One piece, with set screw.
    a. Finish: Polished chrome-plate.
4. Cast Brass: Split casting, with concealed hinge and set screw.
    a. Finish: Polished chrome-plate.

2.6 IDENTIFYING DEVICES AND LABELS

A. General: Manufacturer's standard products of categories and types required for each application as referenced in other Division 23 Sections. If more than one type is specified for application, selection is Installer's option, but provide one selection for each product category.

B. Equipment Nameplates: Metal nameplate with operational data engraved or stamped; permanently fastened to equipment.

1. Data: Manufacturer, product name, model number, serial number, capacity, operating and power characteristics, labels of tested compliances, and similar essential data.
2. Location: Accessible and visible location.

C. Stencils: Standard stencils, prepared for required applications with letter sizes complying with recommendations of ASME A13.1 for piping and similar applications, but not less than 1-1/4-inch- high letters for ductwork and not less than 3/4-inch- high letters for access door signs and similar operational instructions.

1. Material: Fiberboard.
2. Material: Brass.
3. Stencil Paint: Standard exterior-type stenciling enamel; black, unless otherwise indicated; either brushing grade or pressurized spray-can form and grade.

4. Identification Paint: Standard identification enamel of colors indicated or, if not otherwise indicated for piping systems, comply with ASME A13.1 for colors.

D. Snap-on Plastic Pipe Markers: Manufacturer's standard preprinted, semirigid, snap on, color-coded, complying with ASME A13.1.

E. Pressure-Sensitive Pipe Markers: Manufacturer's standard preprinted, permanent adhesive, color-coded, pressure-sensitive vinyl, complying with ASME A13.1.

F. Lettering and Graphics: Coordinate names, abbreviations, and other designations used in mechanical identification, with corresponding designations indicated. Use numbers, lettering, and wording indicated for proper identification and operation/maintenance of mechanical systems and equipment.

1. Multiple Systems: If multiple systems of same generic name are indicated, provide identification that indicates individual system number and service such as "Pump No. 1A or 1B," "Air Supply No. 2-1," or "Standpipe F12."

2.7 GROUT

A. Nonshrink, Nonmetallic Grout: ASTM C 1107, Grade B.

1. Characteristics: Post-hardening, volume-adjusting, dry, hydraulic-cement grout, nonstaining, noncorrosive, nongaseous, and recommended for interior and exterior applications.
2. Design Mix: 5000-psig, 28-day compressive strength.
3. Packaging: Premixed and factory packaged.

PART 3 - EXECUTION

3.1 PIPING SYSTEMS - COMMON REQUIREMENTS

A. General: Install all piping as described below, unless piping Sections specify otherwise. Individual Division 22 piping Sections specify unique piping installation requirements.

B. General Locations and Arrangements: Drawing plans, schematics, and diagrams indicate general location and arrangement of piping systems. Indicated locations and arrangements were used to size pipe and calculate friction loss, expansion, pump sizing, and other design considerations. Install piping as indicated, unless deviations to layout are approved on Coordination Drawings.

C. Install piping as code requires.

D. Install components with pressure rating equal to or greater than system operating pressure.

E. Install piping in concealed interior and exterior locations, except in equipment rooms and service areas.

F. Install piping free of sags and bends.

G. Install exposed interior and exterior piping at right angles or parallel to building walls. Diagonal runs are prohibited, unless otherwise indicated.

H. Install piping tight to slabs, beams, joists, columns, walls, and other building elements. Allow sufficient space above removable ceiling panels to allow for ceiling panel removal.

I. Install piping to allow application of insulation plus 1-inch clearance around insulation.

J. Locate groups of pipes parallel to each other, spaced to permit valve servicing.

K. Install fittings for changes in direction and branch connections.

L. Install couplings according to manufacturer's written instructions.

M. Install pipe escutcheons for pipe penetrations of concrete and masonry walls, wall board partitions, and suspended ceilings according to the following:
1. Uninsulated Piping Wall Escutcheons: Cast brass or stamped steel, with set screw.
2. Uninsulated Piping Floor Plates in Utility Areas: Cast-iron floor plates.
3. Insulated Piping: Cast brass or stamped steel; with concealed hinge, spring clips, and chrome-plated finish.
4. Piping in Utility Areas: Cast brass or stamped steel, with set-screw or spring clips.

N. Install sleeves for pipes passing through concrete and masonry walls, and concrete floor and roof slabs.

1. Cut sleeves to length for mounting flush with both surfaces.

a. Exception: Extend sleeves installed in floors of mechanical equipment areas or other wet areas 2 inches above finished floor level. Extend cast-iron sleeve fittings below floor slab as required to secure clamping ring if ring is specified.

2. Install sleeves large enough to provide 1/4-inch annular clear space between sleeve and pipe or pipe insulation. Use the following sleeve materials:
a. Steel Pipe Sleeves: For pipes smaller than 6-inch NPS.
b. Steel, Sheet-Metal Sleeves: For pipes 6-inch NPS and larger, penetrating gypsum-board partitions.
c. Stack Sleeve Fittings: For pipes penetrating floors with membrane waterproofing. Secure flashing between clamping flanges. Install section of cast-iron soil pipe to extend sleeve to 2 inches above finished floor level. Refer to Division 7 Section "Sheet Metal Flashing and Trim" for flashing.

1) Seal space outside of sleeve fittings with nonshrink, nonmetallic grout.

3. Except for underground wall penetrations, seal annular space between sleeve and pipe or pipe insulation, using elastomeric joint sealants. Refer to Division 7 Section "Joint Sealants" for materials.
4. Use Type S, Grade NS, Class 25, Use O, neutral-curing silicone sealant, unless otherwise indicated.

O. Aboveground, Exterior-Wall, Pipe Penetrations: Seal penetrations using sleeves and mechanical sleeve seals. Size sleeve for 1-inch annular clear space between pipe and sleeve for installing mechanical sleeve seals. Verify sleeve and annular space requirement with mechanical sleeve seal specified.

1. Install steel pipe for sleeves smaller than 6 inches in diameter.
2. Install cast-iron "wall pipes" for sleeves 6 inches in diameter and larger.
3. Assemble and install mechanical sleeve seals according to manufacturer's written instructions. Tighten bolts that cause rubber sealing elements to expand and make watertight seal.

P. Underground, Exterior-Wall, Pipe Penetrations: Install cast-iron "wall pipes" for sleeves. Seal pipe penetrations using mechanical sleeve seals. Size sleeve for 1-inch annular clear space between pipe and sleeve for installing mechanical sleeve seals. Verify sleeve and annular space requirement with mechanical sleeve seal specified.

1. Assemble and install mechanical sleeve seals according to manufacturer's written instructions. Tighten bolts that cause rubber sealing elements to expand and make watertight seal.

Q. Fire-Barrier Penetrations: Maintain indicated fire rating of walls, partitions, ceilings, and floors at pipe penetrations. Seal pipe penetrations with firestopping materials. Refer to Division 7 Section "Firestopping" for materials.

R. Verify final equipment locations for roughing-in.

S. Refer to equipment specifications in other Sections of these Specifications for roughing-in requirements.

T. Piping Joint Construction: Join pipe and fittings as follows and as specifically required in individual piping specification Sections:

1. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.
2. Remove scale, slag, dirt, and debris from inside and outside of pipe and fittings before assembly.
3. Soldered Joints: Construct joints according to AWS's "Soldering Manual," Chapter "The Soldering of Pipe and Tube"; or CDA's "Copper Tube Handbook."
4. Threaded Joints: Thread pipe with tapered pipe threads according to ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows:

    a. Note internal length of threads in fittings or valve ends, and proximity of internal seat or wall, to determine how far pipe should be threaded into joint.
    b. Apply appropriate tape or thread compound to external pipe threads, unless dry seal threading is specified.
    c. Align threads at point of assembly.
    d. Tighten joint with wrench. Apply wrench to valve end into which pipe is being threaded.
    e. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged. Do not use pipe sections that have cracked or open welds.

5. Welded Joints: Construct joints according to AWS D10.12, "Recommended Practices and Procedures for Welding Low Carbon Steel Pipe," using qualified processes and welding operators according to "Quality Assurance" Article.
6. Flanged Joints: Align flange surfaces parallel. Select appropriate gasket material, size, type, and thickness for service application. Install gasket concentrically positioned. Assemble joints by sequencing bolt tightening to make initial contact of flanges and gaskets as flat and parallel as possible. Use suitable lubricants on bolt threads. Tighten bolts gradually and uniformly using torque wrench.
7. Plastic Piping Solvent-Cement Joints: Clean and dry joining surfaces by wiping with clean cloth or paper towels. Join pipe and fittings according to the following:

    a. Comply with ASTM F 402 for safe-handling practice of cleaners, primers, and solvent cements.
    b. ABS Piping: ASTM D 2235 and ASTM D 2661.
    c. CPVC Piping: ASTM D 2846 and ASTM F 493.
    d. PVC Pressure Piping: ASTM D 2672.
    e. PVC Nonpressure Piping: ASTM D 2855.
    f. PVC to ABS Nonpressure Transition Fittings: Procedure and solvent cement according to ASTM D 3138.

U. Piping Connections: Make connections according to the following, unless otherwise indicated:

1. Install unions, in piping 2-inch NPS and smaller, adjacent to each valve and at final connection to each piece of equipment with 2-inch NPS or smaller threaded pipe connection.
2. Install flanges, in piping 2-1/2-inch NPS and larger, adjacent to flanged valves and at final connection to each piece of equipment with flanged pipe connection.
3. Dry Piping Systems: Install dielectric unions and flanges to connect piping materials of dissimilar metals.
4. Wet Piping Systems: Install dielectric coupling and nipple fittings to connect piping materials of dissimilar metals.

3.2 EQUIPMENT INSTALLATION - COMMON REQUIREMENTS

A. Install equipment to provide maximum possible headroom, if mounting heights are not indicated.

B. Install equipment according to approved submittal data. Portions of the Work are shown only in diagrammatic form. Refer conflicts to Architect/Engineer.

C. Install equipment level and plumb, parallel and perpendicular to other building systems and components in exposed interior spaces, unless otherwise indicated.

D. Install mechanical equipment to facilitate service, maintenance, and repair or replacement of components. Connect equipment for ease of disconnecting, with minimum interference to other installations. Extend grease fittings to accessible locations.

E. Install equipment giving right of way to piping installed at required slope.

F. Install flexible connectors on equipment side of shutoff valves, horizontally and parallel to equipment shafts if possible.

3.3 LABELING AND IDENTIFYING

A. Piping Systems: Install pipe markers on each system. Include arrows showing normal direction of flow.
1. Plastic markers, with application systems. Install on insulation segment if required for hot, uninsulated piping.
2. Locate pipe markers as follows if piping is exposed in finished spaces, machine rooms, and accessible maintenance spaces, such as shafts, tunnels, plenums, and exterior nonconcealed locations:

    a. Near each valve and control device.
    b. Near each branch, excluding short takeoffs for fixtures and terminal units. Mark each pipe at branch, if flow pattern is not obvious.
    c. Near locations if pipes pass through walls, floors, ceilings, or enter nonaccessible enclosures.
    d. At access doors, manholes, and similar access points that permit view of concealed piping.
    e. Near major equipment items and other points of origination and termination.
    f. Spaced at maximum of 50-foot intervals along each run. Reduce intervals to 25 feet in congested areas of piping and equipment.
    g. On piping above removable acoustical ceilings, except omit intermediately spaced markers.

B. Equipment: Install engraved plastic-laminate sign or equipment marker on or near each major item of mechanical equipment.

1. Lettering Size: Minimum 1/4-inch- high lettering for name of unit if viewing distance is less than 24 inches, 1/2-inch- high lettering for distances up to 72 inches, and proportionately larger

lettering for greater distances . Provide sec ondary lettering two-th irds to th ree-fourths o f size o f principal lettering.

2. Text of Signs: Provide name of identified unit. Include text to distinguish between multiple units, inform user o f operational requirements, indicate safety and em ergency precautions, and warn of hazards and improper operations.

C. Adjusting: Relocate identifying devices as necessary for unobstructed view in finished construction.

3.4 PAINTING AND FINISHING

A. Apply paint to exposed piping according to the following, unless otherwise indicated:

1. Interior, Ferrous Piping: Use semigloss, acrylic-enamel finish. Include finish coat over e namel undercoat and primer.
2. Interior, Galvanized-Steel Piping: Use semigloss, acrylic-enamel finish. Include two finish coats over galvanized metal primer.
3. Interior, Ferrous Supports: Use semigloss, acrylic-enamel finish. Include finish coat over enamel undercoat and primer.
4. Exterior, Ferrous Pi ping: Us e sem igloss, a crylic-enamel finish. I nclude t wo finish coats o ver rust-inhibitive metal primer.
5. Exterior, Galvanized-Steel Piping: Use semigloss, acrylic-enamel finish. Include two finish coats over galvanized metal primer.
6. Exterior, Ferrous Supports: Use semigloss, acrylic-enamel finish. I nclude two finish coats o ver rust-inhibitive metal primer.

B. Piping shall be painted with color coding as folllows with direction arrows every 10 feet and at equipment and every wall:

- Domestic Water Wh ite with Green Markings
- Drain Lines Black

C. Do not paint piping specialties with factory-applied finish.

D. Damage and Touchup: R epair m arred and damaged factory-painted fi nishes w ith materials and procedures to match original factory finish.

3.5 CONCRETE BASES (Coordinate with Swimming Pool Contractor)

A. Construct concrete bases of dimensions indicated, but not less than 4 inches larger in both directions than supported unit. F ollow supported e quipment m anufacturer's settin g tem plates fo r anch or bolt an d tie locations. Us e 30 00-psig, 28-day com pressive-strength conc rete and rei nforcement as specified in Division 3 Section "Cast-in-Place Concrete."

3.6 ERECTION OF METAL SUPPORTS AND ANCHORAGE

A. Cut, fit, and place miscella neous m etal s upports acc urately in location, alignm ent, and ele vation to support and anchor mechanical materials and equipment.

B. Field Welding: Comply with AWS D1.1, "Structural Welding Code--Steel."

3.7 CUTTING AND PATCHING

A. Cut, channel, chase, and drill floors, walls, partitions, ceilings, and other surfaces necessary for mechanical installations. Perform cutting by skilled mechanics of trades involved.

B. Repair cut surfaces to match adjacent surfaces.

3.8 GROUTING

A. Install nonmetallic, nonshrink, grout for mechanical equipment base bearing surfaces, pump and other equipment base plates, and anchors. Mix grout according to manufacturer's written instructions.

B. Clean surfaces that will come into contact with grout.

C. Provide forms as required for placement of grout.

D. Avoid air entrapment during placing of grout.

E. Place grout, completely filling equipment bases.

F. Place grout on concrete bases to provide smooth bearing surface for equipment.

G. Place grout around anchors.

H. Cure placed grout according to manufacturer's written instructions.

END OF SECTION 230500

SECTION 230713 – MECHANICAL INSULATION

PART 1 - GENERAL

1.1 GENERAL

A. Submittals: Product Data identifying thermal conductivity, thickness, and jackets (both factory and field applied, if any), for each type of product indicated.

1.2 PRODUCTS

A. Cellular-Glass Insulation: Inorganic, foamed or cellulated glass, annealed, rigid, hermatically sealed cells, incombustible.

1. Performed Pipe Insulation, without Jacket: Comply with ASTM C 552, Type II, Class 1.

2. Performed Pipe Insulation, with Jacket: Comply with ASTM C 552, Type II, Class 2.

B. Mineral-Fiber Insulation: Glass fibers bonded with a thermosetting resin complying with the following:

1. Preformed Pipe Insulation: Comply with ASTM C 547, Type 1, with factory-applied, all-purpose, vapor-retarder jacket.
2. Mineral-Fiber Blanket Thermal Insulation: Glass fibers bonded with a thermosetting resin. Comply with ASTM C 553, Type II, without facing and with all-service jacket manufactured from kraft paper, reinforcing scrim, aluminum foil, and vinyl film.
3. Fire-Resistant Adhesive: Comply with MIL-A-3316C in the following classes and grades:

   a. Class 1, Grade A for bonding glass cloth and tape to unfaced glass-fiber insulation, for sealing edges of glass-fiber insulation, and for bonding lagging cloth to unfaced glass-fiber insulation.
   b. Class 2, Grade A for bonding glass-fiber insulation to metal surfaces.

4. Vapor-Retarder Mastics: Fire- and water-resistant, vapor-retarder mastic for indoor applications. Comply with MIL-C-19565C, Type II.
5. Mineral-Fiber, Hydraulic-Setting Insulating and Finishing Cement: Comply with ASTM C 449/C 449M.

C. Prefabricated Thermal Insulating Fitting Covers: Comply with ASTM C 450 for dimensions used in preforming insulation to cover valves, elbows, tees, and flanges.

D. Field-Applied Jackets: ASTM C 921, Type 1, unless otherwise indicated.

1. Foil and Paper Jacket: Laminated, glass-fiber-reinforced, flame-retardant kraft paper and aluminum foil.
2. PVC Jacket: High-impact, ultraviolet-resistant PVC; 20 mils thick; roll stock ready for shop or field cutting and forming.

   a. Adhesive: As recommended by insulation material manufacturer.

3. Standard PVC Fitting Covers: Factory-fabricated fitting covers manufactured from 20-mil- thick, high-impact, ultraviolet-resistant PVC.

a. Shapes: 45- and 90-degree, short- and long-radius elbows, tees, valves, flanges, reducers, end caps, soil-pipe hubs, traps, mechanical joints, and P-trap and supply covers for lavatories for the disabled.
b. Adhesive: As recommended by insulation material manufacturer.

E. Glass Cloth and Tape: Woven glass-fiber fabrics, plain weave, presized a minimum of 8 oz./sq. yd..

F. Tape Width: 4 inches.

G. Bands: 3/4 inch wide in aluminum 0.007 inch thick.

H. Vapor Retarders: Materials recommended by insulation material manufacturer that are compatible with insulation materials, jackets, and substrates.

1.3 EXECUTION

A. Surface Preparation: Clean and dry surfaces. Remove materials that will adversely affect insulation application.

B. Apply insulation materials, accessories, and finishes according to the manufacturer's written instructions; with smooth, straight, and even surfaces; free of voids throughout the length of ducts, equipment, and pipes, including fittings, valves, and specialties.

C. Use accessories compatible with insulation materials and suitable for the service. Use accessories that do not corrode, soften, or otherwise attack insulation or jacket in either wet or dry state.

D. Seal joints and seams with vapor-retarder mastic on insulation indicated to receive a vapor retarder.

E. Apply insulation with the least number of joints practical.

F. Apply insulation over fittings, valves, and specialties, with continuous thermal and vapor-retarder integrity, unless otherwise indicated. Refer to special instructions for applying insulation over fittings, valves, and specialties.

G. CELLULAR-GLASS INSULATION APPLICATION

1. Apply insulation to straight pipes and tubes as follows:

a. Secure each layer of insulation to pipe with wire, tape, or bands without deforming insulation materials.
b. Where vapor retarders are indicated, seal longitudinal seams and end joints with vapor-retarder mastic. Apply mastic or compatible glue to 100% of pipe and insulation at end joints, 2 inches on each joint of insulation and pipe.
c. For insulation with factory-applied jackets, secure laps with outward clinched staples at 6 inches o.c.
d. For insulation with factory-applied jackets with vapor retarders, do not staple longitudinal tabs but secure tabs with additional adhesive as recommended by the insulation material manufacturer and seal with vapor-retarder mastic.

2. Apply insulation to flanges as follows:

a. Apply preformed pipe insulation to outer diameter of pipe flange.

b. Make width of insulation segment the same as overall width of the flange and bolts, plus twice the thickness of the pipe insulation.
c. Fill voids between inner circumference of flange insulation and outer circumference of adjacent straight pipe segments with cut sections of cellular-glass block insulation of the same thickness as pipe insulation.
d. Apply canvas jacket material with manufacturer's recommended adhesive, overlapping seams at least 1 inch, and seal joints with vapor-retarder mastic.

3. Apply insulation to fittings and elbows as follows:

a. Apply premolded insulation sections of the same material as straight segments of pipe insulation when available. Secure according to manufacturer's written instructions.
b. When premolded sections of insulation are not available, apply mitered sections of cellular-glass insulation. Secure insulation materials with wire, tape, or bands.
c. Cover fittings with standard PVC fitting covers.

4. Apply insulation to valves and specialties as follows:

a. Apply premolded segments of cellular-glass insulation or glass-fiber blanket insulation to valve body. Arrange insulation to permit access to packing and to allow valve operation without disturbing insulation. For check valves, arrange insulation for access to strainer basket without disturbing insulation.

H. Hangers and Anchors: Where vapor retarder is indicated, seal penetrations in insulation at hangers, supports, anchors, and other projections with vapor-retarder mastic.

I. Insulation Terminations: For insulation application where vapor retarders are indicated, taper insulation ends. Seal tapered ends with a compound recommended by the insulation material manufacturer to maintain vapor retarder.

J. Apply adhesives and mastics at the manufacturer's recommended coverage rate.

K. Exterior Wall Penetrations: For penetrations of below-grade exterior walls, terminate insulation flush with mechanical sleeve seal. Seal terminations with vapor-retarder mastic.

L. Interior Wall and Partition Penetrations: Apply insulation continuously through walls and floors.

M. Floor Penetrations: Apply insulation continuously through floor assembly.

N. Piping Application Schedule.

1. Service: Domestic cold water.

a. Operating Temperature: 50 to 140 deg F.
b. Insulation Material: Mineral-Fiber Insulation, with jacket.
c. Insulation Thickness: Apply the following insulation thicknesses:

1) Copper Pipe, ½ inch to 2 inch pipe:1/2 inch insulation.
2) Copper Pipe, 2-1/2 inch and larger pipe:1 inch insulation
3) Copper Pipe in Pavillion and Restrooms, all sizes shall be 1 inch insulation.

d. Heat tape applied prior to insulation
e. Field-Applied Jacket: Foil and Paper
f. Vapor Retarder Required: Yes.
g. Finish: Painted.

2. Service: Exposed sanitary drains and domestic water supplies and stops for fixtures.

    a. Operating Temperature: 35 to 120 deg F.
    b. Insulation Material: Mineral-fiber preformed pipe.
    c. Insulation Thickness: 1-inch thick
    d. Field-Applied Jacket: PVC P-trap and supply covers.
    e. Vapor Retarder Required: No.
    f. Finish: Painted

END OF SECTION

SECTION 260500 - COMMON WORK RESULTS FOR ELECTRICAL

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Sleeves for raceways and cables.
2. Sleeve seals.
3. Grout.
4. Common electrical installation requirements.

1.2 SUBMITTALS

A. Product Data: For sleeve seals.

PART 2 - PRODUCTS

2.1 SLEEVES FOR RACEWAYS AND CABLES

A. Steel Pipe Sleeves: ASTM A 53/A 53M, Type E, Grade B, Schedule 40, galvanized steel, plain ends.

B. Cast-Iron Pipe Sleeves: Cast or fabricated "wall pipe," equivalent to ductile-iron pressure pipe, with plain ends and integral waterstop, unless otherwise indicated.

C. Sleeves for Rectangular Openings: Galvanized sheet steel.

1. Minimum Metal Thickness:

a. For sleeve cross-section rectangle perimeter less than 50 inches and no side more than 16 inches, thickness shall be 0.052 inch.
b. For sleeve cross-section rectangle perimeter equal to, or more than, 50 inches and 1 or more sides equal to, or more than, 16 inches, thickness shall be 0.138 inch.

2.2 SLEEVE SEALS

A. Description: Modular sealing device, designed for field assembly, to fill annular space between sleeve and raceway or cable.

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. Advance Products & Systems, Inc.
b. Calpico, Inc.
c. Metraflex Co.
d. Pipeline Seal and Insulator, Inc.

2. Sealing Elements: **EPDM** interlocking links shaped to fit surface of cable or conduit. Include type and number required for material and size of raceway or cable.
3. Pressure Plates: **Stainless steel**. Include two for each sealing element.
4. Connecting Bolts and Nuts: **Stainless steel** of length required to secure pressure plates to sealing elements. Include one for each sealing element.

2.3 GROUT

A. Nonmetallic, Shrinkage-Resistant Grout: ASTM C 1107, factory-packaged, nonmetallic aggregate grout, noncorrosive, nonstaining, mixed with water to consistency suitable for application and a 30-minute working time.

PART 3 - EXECUTION

3.1 COMMON REQUIREMENTS FOR ELECTRICAL INSTALLATION

A. Comply with NECA 1.

B. Measure indicated mounting heights to bottom of unit for suspended items and to center of unit for wall-mounting items.

C. Headroom Maintenance: If mounting heights or other location criteria are not indicated, arrange and install components and equipment to provide maximum possible headroom consistent with these requirements.

D. Equipment: Install to facilitate service, maintenance, and repair or replacement of components of both electrical equipment and other nearby installations. Connect in such a way as to facilitate future disconnecting with minimum interference with other items in the vicinity.

E. Right of Way: Give to piping systems installed at a required slope.

3.2 SLEEVE INSTALLATION FOR ELECTRICAL PENETRATIONS

A. Electrical penetrations occur when raceways, cables, wireways, cable trays, or busways penetrate concrete slabs, concrete or masonry walls, or fire-rated floor and wall assemblies.

B. Concrete Slabs and Walls: Install sleeves for penetrations unless core-drilled holes or formed openings are used. Install sleeves during erection of slabs and walls.

C. Use pipe sleeves unless penetration arrangement requires rectangular sleeved opening.

D. Fire-Rated Assemblies: Install sleeves for penetrations of fire-rated floor and wall assemblies unless openings compatible with firestop system used are fabricated during construction of floor or wall.

E. Cut sleeves to length for mounting flush with both surfaces of walls.

F. Extend sleeves installed in floors **2 inches** above finished floor level.

G. Size pipe sleeves to provide 1/2-**inch** annular clear space between sleeve and raceway or cable, unless indicated otherwise.

H. Seal space outside of sleeves with grout for penetrations of concrete and masonry

1. Promptly pack grout solidly between sleeve and wall so no voids remain. Tool exposed surfaces smooth; protect grout while curing.

I. Interior Penetrations of Non-Fire-Rated Walls and Floors: Seal annular space between sleeve and raceway or cable, using joint sealant appropriate for size, depth, and location of joint. Comply with requirements in Division 07 Section "Joint Sealants.".

J. Fire-Rated-Assembly Penetrations: Maintain indicated fire rating of walls, partitions, ceilings, and floors at raceway and cable penetrations. Install sleeves and seal raceway and cable penetration sleeves with firestop materials. Comply with requirements in Division 07 Section "Penetration Firestopping."

K. Roof-Penetration Sleeves: Seal penetration of individual raceways and cables with flexible boot-type flashing units applied in coordination with roofing work.

L. Aboveground, Exterior-Wall Penetrations: Seal penetrations using **cast-iron** pipe sleeves and mechanical sleeve seals. Select sleeve size to allow for 1-inch annular clear space between pipe and sleeve for installing mechanical sleeve seals.

M. Underground, Exterior-Wall Penetrations: Install cast-iron pipe sleeves. Size sleeves to allow for 1-inch annular clear space between raceway or cable and sleeve for installing mechanical sleeve seals.

3.3 SLEEVE-SEAL INSTALLATION

A. Install to seal exterior wall penetrations.

B. Use type and number of sealing elements recommended by manufacturer for raceway or cable material and size. Position raceway or cable in center of sleeve. Assemble mechanical sleeve seals and install in annular space between raceway or cable and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make watertight seal.

3.4 FIRESTOPPING

A. Apply firestoppin g to p enetrations of fire-ra ted floor and wall assem blies for electrical installations to restore original fire-resistan ce rating of assem bly. Firestopping materials and installation requirements are specified in Division 07 Section "Penetration Firestopping."

END OF SECTION 260500

SECTION 262416 - PANELBOARDS

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

A. Submit Product Data.

PART 2 - PRODUCTS

2.1 PANELBOARDS AND LOAD CENTERS

A. Surface-mounted, NEMA PB 1, or NEMA Ty pe 3R for all supplem ental specifications on drawings.

1. Front: Secured to box with concealed trim clamps.
2. Bus: Hard drawn copper of 98 percent conductivity.
3. Feed-through Lugs: Sized to accommodate feeders indicated.

B. Molded-Case Circuit Breaker: NEMA AB 1; no tandem circuit breakers; single handle for multipole circuit breakers.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install panelboards and accessory items according to NEMA PB 1.1. Indicate installed circuit loads on a circuit directory after balancing panelboard loads.

B. Wiring in Panelboard Gutters: Arrange conductors into groups , bundle and wrap with wire ties.

C. Perform visual and mechanical inspections and electrical tests stated in NETA ATS.

END OF SECTION

SECTION 262726 – WIRING METHODS

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

A. Summary: Building wires and cables and associated splices, connectors, and term inations for wiring systems rated 600 V and less, and twisted-pair cable; and raceways and boxes.

PART 2 - PRODUCTS

2.1 WIRES AND CABLES

A. Building Wires and Cables: Ty pe THHN st randed copper conductor, #12 awg min size for power.

B. Connectors and Splices: Wiring connectors of size, am pacity rating, m aterial, and type and class for application and for service indicated.

C. Single Conductor Plenum Coaxial: 75-ohm characteristic impedance, solid bare copper central conductor, foamed Teflon dielectric, 100 percen t coverage tinned-copper, double-braid shield, Teflon jacket, suitable for installation in air-handling spaces.

D. Four-Pair: No. 24 AWG, Data Max, UTP Lot 5, 7-strand, tinned-c opper conductors; overall aluminum/polyester shield and No. 22 AWG tinned-copper drain wire.

2.2 RACEWAYS

A. Conduit: Comply with the following:

1. Rigid Steel Conduit: ANSI C80.1.
2. Intermediate Metal Conduit: ANSI C80.6.
3. Electrical metallic Tubing: ANSI C80.3.
4. Rigid Nonmetallic Conduit: NEMA TC 2, Schedule 40.

B. Outlet and Device Boxes: UL listed and labeled sheet metal boxes**.**

C. Floor Boxes: Cast metal, fully adjustable, rectangular.

D. Pull and Junction Boxes: Small sheet metal boxes.

2.3 ENCLOSURES

A. Hinged-Cover Enclosures: NEMA 250, steel enclosure with continuous hinge cover and flush latch. Finish inside and out with manufacturer's standard enamel.

B. Cabinets: NEMA 250, Type 1, except where another Type is indicated.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install wires and cables according to the NECA's "Standard of Installation."

B. Wiring at Outlets: Install with at least 12 inches (300 mm) of slack conductor at each outlet.

C. Outdoors Wiring Methods: As follows:

1. Exposed: Rigid or intermediate metal conduit.
2. Concealed: Rigid or intermediate metal conduit.
3. Underground, Single Run: Rigid nonmetallic conduit.
4. Underground, Grouped: Rigid nonmetallic conduit.

D. Indoors Wiring Methods: As follows:

1. Connection to Vibrating Equipment (Including Transformers and Hydraulic, Pneumatic, Electric Solenoid or Motor-Driven Equipment): Flexible metal conduit, except in wet or damp locations use liquidtight flexible metal conduit.
2. Use armored cable and nonmetallic sheathed cable in applications allowed by NFPA 70.
3. Damp or Wet Locations: Rigid steel conduit.
4. Exposed: Electrical metallic tubing or rigid nonmetallic conduit.
5. Concealed: Electrical metallic tubing, electrical nonmetallic tubing, or rigid nonmetallic conduit.
6. Boxes and Enclosures: NEMA 250, Type 1, except in damp or wet locations use NEMA 250, Type 4, stainless steel.
7. Install raceways, boxes, enclosures, and cabinets as indicated, according to manufacturer's written instructions.
8. Conceal conduit and electrical metallic tubing, unless otherwise indicated, within finished walls, ceilings, and floors.

E. Use raceway fittings compatible with raceway and suitable for use and location. For intermediate steel conduit, use threaded rigid steel conduit fittings, unless otherwise indicated.

F. Raceways Embedded in Slabs: Install in middle third of the slab thickness where practical, and leave at least 1-inch concrete cover.

G. Install exposed raceways parallel to or at right angles to nearby surfaces or structural members, and follow the surface contours as much as practical.

H. Join raceways with fittings designed and approved for the purpose and make joints tight. Use bonding bushings or wedges at connections subject to vibration. Use bonding jumpers where joints cannot be made tight. Use insulating bushings to protect conductors.

I. Install pull wires in em pty raceway s. Use No. 14 AWG zinc-coated steel or monofilament plastic line having not less than 200-lb tensile st rength. Leave not less than 12 inches of slack at each end of the pull wire.

J. Install raceway sealing fittings and locate at suitable, approved, accessible locations and fill them with UL-listed sealing com pound. For con cealed raceways, install each fitting in a flush steel box with a blank cover plate having a finish sim ilar to that of adjacent plates or surfaces. Install raceway sealing fittings where required by the NEC.

K. Stub-up Connections: Extend conduc tors to equipment with rigid steel conduit; flexible m etal conduit may be used 6 inches above the floor.

L. Flexible Connections: Use m aximum of 72 inches of flexible conduit for recessed and semirecessed lighting fixtures; for equipm ent subject to vibration, noise transmission, or movement; and for all m otors. Use liquid tight flexible conduit in wet or dam p locations. Install separate ground conductor across flexible connections.

M. Install a separate green ground conductor in surface m etal raceway from the junction box supplying the raceway to receptacle or fixture ground terminals.

END OF SECTION

SECTION 262816 – ENCLOSED SWITCHES AND CIRCUIT BREAKERS

PART 1 - GENERAL (Not Applicable)

PART 2 - PRODUCTS

2.1 SWITCHES

A. Enclosed, Nonfusible Switch: NEMA KS 1, Type HD, with lockable handle.

B. Enclosed, Fusible Switch, 800 A and Smaller: NEMA KS 1, Type HD, clips to accommodate specified fuses, enclosure consistent with environment where located, handle lockable with 2 padlocks, and interlocked with cover in closed position.

2.2 CIRCUIT BREAKERS

A. Enclosed, Molded-Case Circuit Breaker: NEMA AB 1, with lockable handle.

1. Characteristics: Frame size, trip rating, number of poles, and auxiliary devices as indicated and interrupting rating to meet available fault current.
2. Circuit Breakers, 200 A and Larger: Trip units interchangeable within frame size.
3. Circuit Breakers, 400 A and Larger: Field-adjustable, short-time and continuous-current settings.
4. Current-Limiting Trips: Where indicated, let-through ratings less than NEMA FU 1, Class RK-5.
5. Enclosure: NEMA AB 1, Type 1, unless otherwise specified or required to meet environmental conditions of installed location.

PART 3 - EXECUTION

3.1 TESTING

A. Perform visual and mechanical inspections and electrical tests stated in NETA ATS.

END OF SECTION

SECTION 321400 - UNIT PAVING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes the following:

1. Rough-stone pavers set in mortar and sand setting beds.
2. Stone curbs.
3. Decomposed Granite
4. Wood Mulch Trail
5. Detectable Warning Strips

B. Related Sections include the following:
1. Division 03 Section "Concrete”

1.3 SUBMITTALS

A. Product Data: For materials other than water and aggregates.

B. Product Data: For the following:

1. Stone Paving.
2. Bituminous setting materials.
3. Mortar and grout materials.
4. Stone curbs.
5. Decomposed Granite Paving.
6. Detectable Warning Strips

C. Sieve Analyses: For aggregate setting-bed materials, according to ASTM C 136.

D. Samples for Initial Selection: For the following:

1. Each type of stone paver indicated.
2. Joint materials involving color selection.
3. Stone curbs.
4. Grout.

E. Samples for Verification: