SECTION 08111

STANDARD STEEL DOORS AND FRAMES

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. Standard hollow-metal steel doors.
2. Standard hollow-metal steel frames.

B. Related Sections include the following:
1. Division 8 Section "Glazing" for glazed lites in standard steel doors and frames.
2. Division 8 Sections for door hardware for standard steel doors.
3. Division 9 painting Sections for field painting standard steel doors and frames.

1.3 DEFINITIONS

A. Minimum Thickness: Minimum thickness of base metal without coatings.

1.4 SUBMITTALS

A. Product Data: Include construction details, material descriptions, core descriptions, label compliance, and finishes for each type of steel door and frame specified.

B. Shop Drawings: In addition to requirements below, provide a schedule of standard steel doors and frames using same reference numbers for details and openings as those on Drawings:

1. Elevations of each door design.
2. Details of doors, including vertical and horizontal edge details.
3. Frame details for each frame type, including dimensioned profiles.
4. Details and locations of reinforcement and preparations for hardware.
5. Details of each different wall opening condition.
6. Details of anchorages, accessories, joints, and connections.
7. Details of glazing frames and stops showing glazing.

1.5 QUALITY ASSURANCE

A. Source Limitations: Obtain standard steel doors and frames through one source from a single manufacturer.

B. Fire-Rated Door Frame Assemblies: Assemblies complying with NFPA 80 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire-protection ratings indicated.

1. Test Pressure: Test at atmospheric (neutral) pressure according to NFPA 252 or UL 10B.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver doors and frames palletized, wrapped, or crated to provide protection during transit and Project-site storage. Do not use nonvented plastic.

B. Deliver welded frames with two removable spreader bars across bottom of frames, tack welded to jambs and mullions.

C. Store doors and frames under cover at Project site. Place units in a vertical position with heads up, spaced by blocking, on minimum 4-inch- (102-mm-) high wood blocking. Avoid using nonvented plastic or canvas shelters that could create a humidity chamber.

1. If wrappers on doors become wet, remove cartons immediately. Provide minimum 1/4-inch (6-mm) space between each stacked door to permit air circulation.

1.7 PROJECT CONDITIONS

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

1. Established Dimensions: Where field measurements cannot be made without delaying the Work, establish opening dimensions and proceed with fabricating standard steel frames without field measurements. Coordinate wall construction to ensure that actual opening dimensions correspond to established dimensions.

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. Amweld Building Products, LLC.
2. Ceco Door Products; an ASSA ABLOY Group Company.
3. CURRIES Company; an ASSA ABLOY Group Company.
4. Steelcraft; an Ingersoll-Rand Company.

2.2 MATERIALS

A. Cold-Rolled Steel Sheet: ASTM A 1008/A 1008M, Commercial Steel (CS), Type B; suitable for exposed applications.

B. Hot-Rolled Steel Sheet: ASTM A 1011/A 1011M, Commercial Steel (CS), Type B; free of scale, pitting, or surface defects; pickled and oiled.

C. Metallic-Coated Steel Sheet: ASTM A 653/A 653M, Commercial Steel (CS), Type B; with minimum A40 (ZF120) zinc-iron-alloy (galvannealed) coating designation.

D. Electrolytic Zinc-Coated Steel Sheet: ASTM A 591/A 591M, Commercial Steel (CS), Class B coating; mill phosphatized.

E. Supports and Anchors: After fabricating, galvanize units to be built into exterior walls according to ASTM A 153/A 153M, Class B.

F. Inserts, Bolts, and Fasteners: Provide items to be built into exterior walls, hot-dip galvanized according to ASTM A 153/A 153M.

G. Glazing: Comply with requirements in Division 8 Section "Glazing."

H. Bituminous Coating: Cold-applied asphalt mastic, SSPC-Paint 12, compounded for 15-mil (0.4-mm) dry film thickness per coat. Provide inert-type noncorrosive compound free of asbestos fibers, sulfur components, and other deleterious impurities.

2.3 STANDARD STEEL DOORS

A. General: Provide doors of design indicated, not less than thickness indicated; fabricated with smooth surfaces, without visible joints or seams on exposed faces, unless otherwise indicated. Comply with ANSI A250.8.

1. Design: Flush panel and Embossed panel.
2. Core Construction: Manufacturer's standard kraft-paper honeycomb, polystyrene, polyurethane, mineral-board, or vertical steel-stiffener core that produces doors complying with ANSI A250.8.

a. Fire Door Core: As required to provide fire-protection ratings indicated.
b. Thermal-Rated (Insulated) Doors: Where indicated, provide doors fabricated with thermal-resistance value (R-value) of not less than 4.0 deg F x h x sq. ft./Btu (0.704 K x sq. m/W) when tested according to ASTM C 1363.

1) Locations: Exterior doors.

3. Vertical Edges for Single-Acting Doors: Beveled edge.

a. Beveled Edge: 1/8 inch in 2 inches (3 mm in 50 mm).

4. Top and Bottom Edges: Closed with flush or inverted 0.042-inch- (1.0-mm-) thick end closures or channels of same material as face sheets.
5. Tolerances: Comply with SDI 117, "Manufacturing Tolerances for Standard Steel Doors and Frames."

B. Exterior Doors: Face sheets fabricated from metallic-coated steel sheet. Provide doors complying with requirements indicated below by referencing ANSI A250.8 for level and model and ANSI A250.4 for physical-endurance level:
1. Level 2 and Physical Performance Level B (Heavy Duty), Model 1 (Full Flush).

C. Interior Doors: Face sheets fabricated from cold-rolled steel sheet, unless otherwise indicated to comply with exterior door requirements. Provide doors complying with requirements indicated below by referencing ANSI A250.8 for level and model and ANSI A250.4 for physical-endurance level:
1. Level 2 and Physical Performance Level B (Heavy Duty), Model 1 (Full Flush).

D. Hardware Reinforcement: Fabricate reinforcement plates from same material as door face sheets to comply with the following minimum sizes:

1. Hinges: Minimum 0.123 inch (3.0 mm) thick by 1-1/2 inches (38 mm) wide by 6 inches (152 mm) longer than hinge, secured by not less than 6 spot welds.
2. Lock Face, Flush Bolts, Closers, and Concealed Holders: Minimum 0.067 inch (1.7 mm) thick.
3. All Other Surface-Mounted Hardware: Minimum 0.067 inch (1.7 mm) thick.

E. Fabricate concealed stiffeners and hardware reinforcement from either cold- or hot-rolled steel sheet.

2.4 STANDARD STEEL FRAMES

A. General: Comply with ANSI A250.8 and with details indicated for type and profile.

B. Exterior Frames: Fabricated from metallic-coated steel sheet.

1. Fabricate frames with mitered or coped and welded face corners and seamless face joints.
2. Frames for Level 2 Steel Doors: 0.053-inch- (1.3-mm-) thick steel sheet.

C. Interior Frames: Fabricated from cold-rolled steel sheet, unless otherwise indicated to comply with exterior frame requirements.

1. Fabricate frames with mitered or coped and welded face corners at frames with integral sidelites.
2. Fabricate knocked-down, drywall slip-on frames for in-place gypsum board partitions.
3. Frames for Level 2 Steel Doors: 0.053-inch- (1.3-mm-) thick steel sheet.
4. Frames for Wood Doors: 0.042-inch- (1.0-mm-).
5. Frames for Borrowed Lights: 0.042-inch- (1.0-mm-) thick steel sheet.

D. Hardware Reinforcement: Fabricate reinforcement plates from same material as frames to comply with the following minimum sizes:

1. Hinges: Minimum 0.123 inch (3.0 mm) thick by 1-1/2 inches (38 mm) wide by 6 inches (152 mm) longer than hinge, secured by not less than 6 spot welds.
2. Lock Face, Flush Bolts, Closers, and Concealed Holders: Minimum 0.067 inch (1.7 mm) thick.
3. All Other Surface-Mounted Hardware: Minimum 0.067 inch (1.7 mm) thick.

E. Supports and Anchors: Fabricated from electrolytic zinc-coated or metallic-coated steel sheet.

F. Jamb Anchors:
1. Stud-Wall Type: Designed to engage stud, welded to back of frames; not less than 0.042 inch (1.0 mm) thick.

G. Floor Anchors: Formed from same material as frames, not less than 0.042 inch (1.0 mm) thick, and as follows:

1. Monolithic Concrete Slabs: Clip-type anchors, with two holes to receive fasteners.

H. Fabricate concealed stiffeners and hardware reinforcement from either cold- or hot-rolled steel sheet.

I. Ceiling Struts: Minimum 3/8-inch-thick by 2-inch- (9.5-mm-thick by 50-mm-) wide steel.

J. Plaster Guards: Formed from same material as frames, not less than 0.016-inch (0.4-mm) thick.

2.5 STOPS AND MOLDINGS

A. Moldings for Glazed Lites in Doors: Minimum 0.032 inch (0.8 mm) thick, fabricated from same material as door face sheet in which they are installed.

B. Loose Stops for Glazed Lites in Frames: Minimum 0.032 inch (0.8 mm) thick, fabricated from same material as frames in which they are installed.

2.6 FABRICATION

A. General: Fabricate standard steel doors and frames to be rigid and free of defects, warp, or buckle. Accurately form metal to required sizes and profiles, with minimum radius for thickness of metal. Where practical, fit and assemble units in manufacturer's plant. To ensure proper assembly at Project site, clearly identify work that cannot be permanently factory assembled before shipment.

B. Standard Steel Doors:

1. Exterior Doors: Provide weep-hole openings in bottom of exterior doors to permit moisture to escape. Seal joints in top edges of doors against water penetration.
2. Glazed Lites: Factory cut openings in doors.

C. Standard Steel Frames: Where frames are fabricated in sections due to shipping or handling limitations, provide alignment plates or angles at each joint, fabricated of same thickness metal as frames.

1. Welded Frames: Weld flush face joints continuously; grind, fill, dress, and make smooth, flush, and invisible.
2. Sidelight Frames: Provide closed tubular members with no visible face seams or joints; fabricated from same material as door frame. Fasten members at crossings and to jambs by butt welding.
3. Provide countersunk, flat- or oval-head exposed screws and bolts for exposed fasteners, unless otherwise indicated.
4. Plaster Guards: Weld guards to frame at back of hardware mortises in frames installed in concrete or masonry.
5. Floor Anchors: Weld anchors to bottom of jambs and mullions with at least four spot welds per anchor.
6. Jamb Anchors: Provide number and spacing of anchors as follows:

    a. Stud-Wall Type: Locate anchors not more than 18 inches (457 mm) from top and bottom of frame. Space anchors not more than 32 inches (813 mm) o.c. and as follows:

        1) Three anchors per jamb up to 60 inches (1524 mm) in height.
        2) Four anchors per jamb from 60 to 90 inches (1524 to 2286 mm) in height.
        3) Five anchors per jamb from 90 to 96 inches (2286 to 2438 mm) in height.
        4) Five anchors per jamb plus 1 additional anchor per jamb for each 24 inches (610 mm) or fraction thereof more than 96 inches (2438 mm) in height.
        5) Two anchors per head for frames more than 42 inches (1066 mm) wide and mounted in metal-stud partitions.

7. Door Silencers: Except on weather-stripped doors, drill stops to receive door silencers as follows. Provide plastic plugs to keep holes clear during construction.

    a. Single-Door Frames: Drill stop in strike jamb to receive three door silencers.
    b. Double-Door Frames: Drill stop in head jamb to receive two door silencers.

D. Hardware Preparation: Factory prepare standard steel doors and frames to receive templated mortised hardware; include cutouts, reinforcement, mortising, drilling, and tapping, according to the Door Hardware Schedule and templates furnished as specified in Division 8 Section "Door Hardware."

1. Reinforce doors and frames to receive nontemplated mortised and surface-mounted door hardware.
2. Comply with applicable requirements in ANSI A250.6 and ANSI/DHI A115 Series specifications for door and frame preparation for hardware. Locate hardware as indicated on Shop Drawings or, if not indicated, according to ANSI A250.8.

E. Stops and Moldings: Provide stops and moldings around glazed lites where indicated. Form corners of stops and moldings with butted or mitered hairline joints.

1. Single Glazed Lites: Provide fixed stops and moldings welded on secure side of door or frame.
2. Multiple Glazed Lites: Provide fixed and removable stops and moldings such that each glazed lite is capable of being removed independently.
3. Provide fixed frame moldings on outside of exterior and on secure side of interior doors and frames.

4. Provide loose stops and moldings on inside of doors and frames.
5. Coordinate rabbet width between fixed and removable stops with type of glazing and type of installation indicated.

2.7 STEEL FINISHES

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

1. Finish standard steel door and frames after assembly.

B. Metallic-Coated Steel Surface Preparation: Clean surfaces with nonpetroleum solvent so surfaces are free of oil and other contaminants. After cleaning, apply a conversion coating suited to the organic coating to be applied over it. Clean welds, mechanical connections, and abraded areas, and apply galvanizing repair paint specified below to comply with ASTM A 780.

1. Galvanizing Repair Paint: High-zinc-dust-content paint for regalvanizing welds in steel, complying with SSPC-Paint 20.

C. Steel Surface Preparation: Clean surfaces to comply with SSPC-SP 1, "Solvent Cleaning"; remove dirt, oil, grease, or other contaminants that could impair paint bond. Remove mill scale and rust, if present, from uncoated steel; comply with SSPC-SP 3, "Power Tool Cleaning," or SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."

D. Factory Priming for Field-Painted Finish: Apply shop primer specified below immediately after surface preparation and pretreatment. Apply a smooth coat of even consistency to provide a uniform dry film thickness of not less than 0.7 mils (0.018 mm).

1. Shop Primer: Manufacturer's standard, fast-curing, lead- and chromate-free primer complying with ANSI A250.10 acceptance criteria; recommended by primer manufacturer for substrate; compatible with substrate and field-applied finish paint system indicated; and providing a sound foundation for field-applied topcoats despite prolonged exposure.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of standard steel doors and frames.

1. Examine roughing-in for embedded and built-in anchors to verify actual locations of standard steel frame connections before frame installation.
2. For the record, prepare written report, endorsed by Installer, listing conditions detrimental to performance of work.
3. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Remove welded-in shipping spreaders installed at factory.

B. Prior to installation and with installation spreaders in place, adjust and securely brace standard steel door frames for squareness, alignment, twist, and plumb to the following tolerances:

1. Squareness: Plus or minus 1/16 inch (1.6 mm), measured at door rabbet on a line 90 degrees from jamb perpendicular to frame head.
2. Alignment: Plus or minus 1/16 inch (1.6 mm), measured at jambs on a horizontal line parallel to plane of wall.
3. Twist: Plus or minus 1/16 inch (1.6 mm), measured at opposite face corners of jambs on parallel lines, and perpendicular to plane of wall.
4. Plumbness: Plus or minus 1/16 inch (1.6 mm), measured at jambs on a perpendicular line from head to floor.

C. Drill and tap doors and frames to receive nontemplated mortised and surface-mounted door hardware.

3.3 INSTALLATION

A. General: Provide doors and frames of sizes, thicknesses, and designs indicated. Install standard steel doors and frames plumb, rigid, properly aligned, and securely fastened in place; comply with Drawings and manufacturer's written instructions.

B. Standard Steel Frames: Install standard steel frames for doors and sidelights and other openings, of size and profile indicated. Comply with SDI 105.

1. Set frames accurately in position; plumbed, aligned, and braced securely until permanent anchors are set. After wall construction is complete, remove temporary braces, leaving surfaces smooth and undamaged.

a. At fire-protection-rated openings, install frames according to NFPA 80.
b. Where frames are fabricated in sections due to shipping or handling limitations, field splice at approved locations by welding face joint continuously; grind, fill, dress, and make splice smooth, flush, and invisible on exposed faces.
c. Install frames with removable glazing stops located on secure side of opening.
d. Install door silencers in frames before grouting.
e. Remove temporary braces necessary for installation only after frames have been properly set and secured.
f. Check plumb, squareness, and twist of frames as walls are constructed. Shim as necessary to comply with installation tolerances.
g. Apply bituminous coating to backs of frames that are filled with mortar, grout, and plaster containing antifreezing agents.

2. Floor Anchors: Provide floor anchors for each jamb and mullion that extends to floor and secure with postinstalled expansion anchors.

a. Floor anchors may be set with powder-actuated fasteners instead of postinstalled expansion anchors if so indicated and approved on Shop Drawings.

3. Metal-Stud Partitions: Solidly pack mineral-fiber insulation behind frames.
4. In-Place Gypsum Board Partitions: Secure frames in place with postinstalled expansion anchors through floor anchors at each jamb. Countersink anchors, and fill and make smooth, flush, and invisible on exposed faces.
5. Ceiling Struts: Extend struts vertically from top of frame at each jamb to supporting construction above, unless frame is anchored to masonry or to other structural support at each jamb. Bend top of struts to provide flush contact for securing to supporting construction above. Provide adjustable wedged or bolted anchorage to frame jamb members.
6. Installation Tolerances: Adjust standard steel door frames for squareness, alignment, twist, and plumb to the following tolerances:

    a. Squareness: Plus or minus 1/16 inch (1.6 mm), measured at door rabbet on a line 90 degrees from jamb perpendicular to frame head.
    b. Alignment: Plus or minus 1/16 inch (1.6 mm), measured at jambs on a horizontal line parallel to plane of wall.
    c. Twist: Plus or minus 1/16 inch (1.6 mm), measured at opposite face corners of jambs on parallel lines, and perpendicular to plane of wall.
    d. Plumbness: Plus or minus 1/16 inch (1.6 mm), measured at jambs at floor.

C. Standard Steel Doors: Fit hollow-metal doors accurately in frames, within clearances specified below. Shim as necessary.

1. Non-Fire-Rated Standard Steel Doors:

    a. Jambs and Head: 1/8 inch (3 mm) plus or minus 1/16 inch (1.6 mm).
    b. Between Edges of Pairs of Doors: 1/8 inch (3 mm) plus or minus 1/16 inch (1.6 mm).
    c. Between Bottom of Door and Top of Threshold: Maximum 3/8 inch (9.5 mm).
    d. Between Bottom of Door and Top of Finish Floor (No Threshold): Maximum 3/4 inch (19 mm).

2. Fire-Rated Doors: Install doors with clearances according to NFPA 80.

D. Glazing: Comply with installation requirements in Division 8 Section "Glazing" and with standard steel door and frame manufacturer's written instructions.

1. Secure stops with countersunk flat- or oval-head machine screws spaced uniformly not more than 9 inches (230 mm) o.c., and not more than 2 inches (50 mm) o.c. from each corner.

3.4 ADJUSTING AND CLEANING

A. Final Adjustments: Check and readjust operating hardware items immediately before final inspection. Leave work in complete and proper operating condition. Remove and replace defective work, including standard steel doors or frames that are warped, bowed, or otherwise unacceptable.

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

C. Galvannealed Surfaces: Clean abraded areas and repair with galvanizing repair paint according to manufacturer's written instructions.

END OF SECTION 08111

SECTION 08211

FLUSH WOOD DOORS

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. Solid-core doors with medium-density overlay faces.
2. Shop priming flush wood doors.
3. Factory fitting flush wood doors to frames and factory machining for hardware.

B. Related Sections include the following:

1. Division 1 Section "LEED Requirements" for additional LEED requirements.
2. Division 8 Section "Glazing" for glass view panels in flush wood doors.
3. Division 8 Section "Standard Steel Doors and Frames" for frames for wood doors.

1.3 SUBMITTALS

A. Product Data: For each type of door. Include details of core and edge construction and trim for openings. Include factory-finishing specifications.

B. Samples for Verification:

1. Factory finishes applied to actual door face materials, approximately 8 by 10 inches (200 by 250 mm), for each material and finish.

C. LEED Submittals:

1. Credit EQ 4.4: Adhesive and composite wood materials manufacturers' product data indicating urea-formaldehyde content.
2. Credit MR 7: Certificates of chain-of-custody signed by door manufacturers certifying that wood products were obtained from forests certified by an FSC-accredited certification body to comply with FSC 1.2, "Principles and Criteria." Include evidence that door manufacturer is certified for chain-of-custody by an FSC-accredited certification body.

1.4 QUALITY ASSURANCE

A. Source Limitations: Obtain flush wood doors through one source from a single manufacturer.

B. Quality Standard: Comply with NWWDA I.S.1-A, "Architectural Wood Flush Doors."

C. Forest Certification: Provide doors made from wood products obtained from forests certified by an FSC-accredited certification body to comply with FSC 1.2, "Principles and Criteria."

1.5 DELIVERY, STORAGE, AND HANDLING

A. Comply with requirements of referenced standard and manufacturer's written instructions.

B. Package doors individually in plastic bags or cardboard cartons.

C. Mark each door on top and bottom rail with opening number used on Shop Drawings.

1.6 PROJECT CONDITIONS

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

B. Environmental Limitations: Do not deliver or install woodwork until building is enclosed, wet work is complete, and HVAC system is operating and maintaining temperature between 60 and 90 deg F (16 and 32 deg C) and relative humidity between 25 and 55 percent during the remainder of the construction period.

1.7 WARRANTY

A. Special Warranty: Manufacturer's standard form, signed by manufacturer, Installer, and Contractor, in which manufacturer agrees to repair or replace doors that are defective in materials or workmanship, have warped (bow, cup, or twist) more than 1/4 inch (6.4 mm) in a 42-by-84-inch (1067-by-2134-mm) section, or show telegraphing of core construction in face veneers exceeding 0.01 inch in a 3-inch (0.25 mm in a 75-mm) span.

1. Warranty shall also include installation and finishing that may be required due to repair or replacement of defective doors.
2. Warranty shall be in effect during the following period of time from date of Substantial Completion:
   a. Solid-Core Interior Doors: Life of installation.

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. Flush Wood Doors:

a. Algoma Hardwoods Inc.
b. GRAHAM Manufacturing Corp.
c. Lambton Doors.
d. Mohawk Flush Doors, Inc.
e. VT Industries Inc.
f. Weyerhaeuser Company.

2.2 DOOR CONSTRUCTION, GENERAL

A. Adhesives: Do not use adhesives containing urea formaldehyde.

B. Doors for Opaque Finish:

1. Grade: Custom.
2. Faces for Interior Doors: Medium-density overlay.
3. Apply medium-density overlay to standard thickness, closed-grain, hardwood face veneers or directly to high-density hardboard crossbands.

2.3 SOLID-CORE DOORS

A. Particleboard Cores: Comply with the following requirements:

1. Particleboard: ANSI A208.1, Grade LD-1.

a. Use particleboard made with binder containing no urea-formaldehyde resin.

2. Blocking: Provide wood blocking in particleboard-core doors as needed to eliminate through-bolting hardware.

3. Provide doors with either glued-block or structural composite lumber cores instead of particleboard cores at locations where exit devices are indicated.

2.4 LIGHT FRAMES

A. Wood Beads for Light Openings in Wood Doors:

1. Wood Species: Species compatible with door faces.
2. Profile: Manufacturer's standard shape.

3. At 20-minute, fire-rated, wood-core doors, provide wood beads and metal glazing clips approved for such use.

2.5 FABRICATION

A. Factory fit doors to suit frame-opening sizes indicated, with the following uniform clearances and bevels, unless otherwise indicated:

1. Comply with clearance requirements of referenced quality standard for fitting. Comply with requirements in NFPA 80 for fire-rated doors.

B. Factory machine doors for hardware that is not surface applied. Locate hardware to comply with DHI-WDHS-3. Comply with final hardware schedules, door frame Shop Drawings, DHI A115-W series standards, and hardware templates.

1. Coordinate measurements of hardware mortises in metal frames to verify dimensions and alignment before factory machining.

C. Openings: Cut and trim openings through doors to comply with applicable requirements of referenced standards for kind(s) of door(s) required.

1. Light Openings: Trim openings with moldings of material and profile indicated.
2. Louvers: Factory install louvers in prepared openings.

2.6 SHOP PRIMING

A. Doors for Opaque Finish: Shop prime faces and edges of doors, including cutouts, with one coat of wood primer specified in Division 9 Section "Painting."

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine doors and installed door frames before hanging doors.

1. Verify that frames comply with indicated requirements for type, size, location, and swing characteristics and have been installed with level heads and plumb jambs.
2. Reject doors with defects.

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

3.2 INSTALLATION

A. Hardware: For installation, see Division 8 Section "Door Hardware."

B. Manufacturer's Written Instructions: Install doors to comply with manufacturer's written instructions, referenced quality standard, and as indicated.

C. Factory-Fitted Doors: Align in frames for uniform clearance at each edge.

D. Field-Finished Doors: Refer to the following for finishing requirements:

1. Division 9 Section "Painting."

3.3 ADJUSTING

A. Operation: Rehang or replace doors that do not swing or operate freely.

END OF SECTION 08211

SECTION 08212

STILE AND RAIL WOOD DOORS

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. Exterior stile and rail wood doors and sidelites and transoms.
2. Interior stile and rail wood doors.
3. Shop priming and Factory finishing stile and rail wood doors.
4. Factory fitting stile and rail wood doors to frames and factory machining for hardware.

B. Related Sections include the following:

1. Division 1 Section "LEED Requirements" for additional LEED requirements.

1.3 SUBMITTALS

A. Product Data: For each type of door. Include details of construction and glazing.

1. Include factory-finishing specifications.

B. Shop Drawings: Indicate location, size, and hand of each door; elevation of each kind of door; construction details not covered in Product Data, including those for stiles, rails, panels, and moldings (sticking); and other pertinent data.

1. Indicate dimensions and locations of mortises and holes for hardware.
2. Indicate doors to be factory finished and finish requirements.

C. LEED Submittals:

1. Credit EQ 4.4: Adhesive and composite wood materials manufacturers' product data indicating urea-formaldehyde content.
2. Credit MR 7: Certificates of chain-of-custody signed by door manufacturers certifying that wood products were obtained from forests certified by an FSC-accredited certification body to comply with FSC 1.2, "Principles and Criteria." Include evidence that door manufacturer is certified for chain-of-custody by an FSC-accredited certification body.

D. Product Certificates: Signed by door manufacturers.

E. Warranty: Special warranty specified in this Section.

1.4 QUALITY ASSURANCE

A. Source Limitations: Obtain each type of stile and rail wood door through one source from a single manufacturer.

B. Quality Standard for Doors of Stock Design and Construction: Comply with WDMA I.S.6, "Industry Standard for Wood Stile and Rail Doors," unless more stringent requirements are specified.

1. Mark, label, or otherwise identify stile and rail wood doors as complying with WDMA I.S.6, and include panel design number if applicable.

C. Forest Certification: Provide doors made from wood products obtained from forests certified by an FSC-accredited certification body to comply with FSC 1.2, "Principles and Criteria."

D. Safety Glass: Provide products complying with testing requirements in 16 CFR 1201, for Category II materials, unless those of Category I are expressly indicated and permitted.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Comply with requirements of referenced standard and manufacturer's written instructions.

B. Package doors individually in opaque plastic bags or cardboard cartons.

C. Mark each door on top and bottom edge with opening number used on Shop Drawings.

1.6 PROJECT CONDITIONS

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

B. Environmental Limitations: Do not deliver or install doors until building is enclosed, wet work is complete, and HVAC system is operating and maintaining temperature between 60 and 90 deg F (16 and 32 deg C) and relative humidity between 25 and 55 percent during the remainder of the construction period.

1.7 WARRANTY

A. Special Warranty: Manufacturer's standard form, signed by manufacturer, Installer, and Contractor, in which manufacturer agrees to repair or replace doors that are defective in materials or workmanship, and have warped (bow, cup, or twist) more than 1/4 inch (6.4 mm) in a 42-by-84-inch (1067-by-2134-mm) section.

1. Warranty shall also include installation and finishing that may be required due to repair or replacement of defective doors.
2. Warranty shall be in effect during the following period of time from date of Substantial Completion:

    a. Exterior Doors: Ten years.
    b. Interior Doors: Five years.
    c. Insulating Glass Vision Panels: Twenty years.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:
    1. Basis-of-Design Product: The design for each stile and rail door is based on the product named. Subject to compliance with requirements, provide either the named product or a comparable product by one of the other manufacturers specified.

2.2 MATERIALS

A. General: Use only materials that comply with referenced quality standards unless more stringent requirements are specified.

    1. Assemble exterior doors and sidelites, including components, with wet-use adhesives complying with ASTM D 5572 for finger joints and ASTM D 5751 for joints other than finger joints.
    2. Assemble interior doors, frames, and sidelites, including components, with either dry-use or wet-use adhesives complying with ASTM D 5572 for finger joints and ASTM D 5751 for joints other than finger joints.

B. Low-Emitting Materials:

    1. Provide doors made with adhesives and composite wood products that do not contain urea-formaldehyde resins.

2.3 STILE AND RAIL DOORS OF STOCK DESIGN AND CONSTRUCTION

A. Manufacturers:

    1. Morgan Marquis French Doors in pine as distributed by Brosco for interior stile and rail doors. Model No.: M-3912 with single thick tempered glass and solid bar divided lights. Unfinished pine.

    2. Andersen Series 400 Woodwright Doors, Sidelights and Transoms for exterior doors. Doors, sidelights and transoms to be finished in Forest Green with 7/8" unfinished pine

mullions on the interior. Doors should be provided with Andersen hinges and weatherstripping, all other hardware is specified in Section 08710 for these doors.

3. Wood Species for Opaque Finish: Manufacturer's standard softwood species and cut for stiles and rails; with panels of same species or wood-base construction materials, as standard with manufacturer.
4. Glass for Openings: Uncoated, clear, fully tempered float glass, 5.0 mm thick at interior doors and insulating-glass units made from 2 lites of 3.0-mm-thick, fully tempered glass with 1/4-inch (6.4-mm) interspace complying with Division 8 Section "Glazing."

B. Construction, General:
1. Panel Designs: Drawings indicate panel designs. 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.

C. Door Construction for Transparent Finish:

1. Stile and Rail Construction: Clear lumber; may be edge glued for width. Select lumber for similarity of grain and color, and arrange for optimum match between adjacent pieces.

D. Door Construction for Opaque Finish:

1. Stile and Rail Construction: Clear softwood; may be edge glued for width and finger jointed.

2.4 FABRICATION

A. Factory fit doors to suit frame-opening sizes indicated, with the following uniform clearances and bevels, unless otherwise indicated:

1. Clearances: Provide 1/8 inch (3.2 mm) at heads, jambs, and between pairs of doors. Provide 1/2 inch (13 mm) from bottom of door to top of decorative floor finish or covering. Where threshold is shown or scheduled, provide 3/8 inch (10 mm) from bottom of door to top of threshold.

2. Bevel non-fire-rated doors 1/8 inch in 2 inches (3-1/2 degrees) at lock and hinge edges.

B. Factory machine doors for hardware that is not surface applied. Locate hardware to comply with DHI-WDHS-3. Comply with final hardware schedules, door frame Shop Drawings, DHI A115-W Series standards, and hardware templates.

C. Glazed Openings: Glaze doors at factory with glass of type and thickness indicated, complying with Division 8 Section "Glazing." Install glass using manufacturer's standard elastomeric glazing sealant complying with ASTM C 920. Secure glass in place with removable wood stops.

D. Glazed Openings: Trim openings indicated for glazing with solid wood moldings, with one side removable.

E. Transom and Side Panels: Fabricate panels to match adjoining doors in materials, finish, and quality of construction.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine doors and substrates, with Installer present, for suitable conditions where wood stile and rail doors will be installed.

1. Verify that installed frames comply with indicated requirements for type, size, location, and swing characteristics and have been installed with plumb jambs and level heads.
2. Reject doors with defects.

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

3.2 INSTALLATION

A. Hardware: For installation, see Division 8 Section "Door Hardware."

B. Install wood doors to comply with manufacturer's written instructions and with referenced quality standard, and as indicated.

C. Factory-Fitted Doors: Align in frames for uniform clearance at each edge.

D. Field-Finished Doors: Refer to the following for finishing requirements:

1. Division 9 Section "Painting."

3.3 ADJUSTING AND PROTECTING

A. Operation: Rehang or replace doors that do not swing or operate freely.

B. Finished Doors: Replace doors that are damaged or do not comply with requirements. Doors may be repaired or refinished if work complies with requirements and shows no evidence of repair or refinishing.

END OF SECTION 08212

SECTION 08550

WOOD 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 clad wood-framed window product types:
   1. Double-hung windows.
   2. Fixed windows.

B. Related Sections include the following:

   1. Division 8 Section "Stile and Rail Wood Doors."
   2. Division 8 Section "Glazing" for glazing requirements for wood windows, including those specified to be factory glazed.

1.3 DEFINITIONS

A. C: Commercial.

B. HC: Heavy Commercial.

C. LC: Light Commercial.

D. R: Residential.

E. 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.

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

G. 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 wood 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. Minimum size required by AAMA/NWWDA 101/I.S.2.

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

1. Performance Class: LC.
2. Performance Grade: Minimum for performance class indicated.
3. Performance Grade: 30.

C. Structural Performance: Provide wood 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. Deflection: Design glass framing system to limit lateral deflections of glass edges to less than 1/175 of glass-edge length at design pressure based on structural computations.
3. Basic Wind Speed: As indicated in miles per hour (meters per second) at 33 feet (10 m) 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. ASCE 7, "Minimum Design Loads for Buildings and Other Structures," Section 6.4.2, "Analytic Procedure."
    b. Appendix B in AAMA/NWWDA 101/I.S.2.

4. Design Pressure: 30 lbf/sq. ft. (1440 Pa).

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. (5 cu. m/h x sq. m) of area at an inward test pressure of 1.57 lbf/sq. ft. (75 Pa).

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: 15 percent of positive design pressure, but not less than 2.86 lbf/sq. ft. (140 Pa) or more than 12 lbf/sq. ft. (580 Pa).

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

G. Thermal Transmittance: Provide wood windows with a whole-window U-value maximum indicated at 15-mph (24-km/h) exterior wind velocity and winter condition temperatures when tested according to AAMA 1503.

1. U-Value: .34 Btu/sq. ft. x h x deg F (3.17 W/sq. m x K).

H. Solar Heat-Gain Coefficient: Provide wood windows with a whole-window SHGC maximum of .29, determined according to NFRC 200 procedures.

I. Sound Transmission Class: Provide glazed windows rated for not less than 27 STC when tested for laboratory sound transmission loss according to ASTM E 90 and determined by ASTM E 413.

J. Double-Hung Windows: 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 wood window indicated.

B. Shop Drawings: Include plans, elevations, sections, details, hardware, attachments to other Work, operational clearances, and the following:

1. Mullion details, including reinforcement and stiffeners.
2. Joinery details.
3. Expansion provisions.
4. Flashing and drainage details.
5. Weather-stripping details.
6. Thermal-break details.
7. Glazing details.
8. Window cleaning provisions.
9. For installed products indicated to comply with design loads, include structural analysis data signed and sealed by the qualified professional engineer responsible for their preparation and used to determine the following:

    a. Structural test pressures and design pressures from basic wind speeds indicated.
    b. Deflection limitations of glass framing systems.

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

1. Main Framing Member: 12-inch- (300-mm-) 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- (300-mm-) long sections.

D. Maintenance Data: For operable window sash, operating hardware, weather stripping and finishes to include in maintenance manuals.

1.6 QUALITY ASSURANCE

A. Source Limitations: Obtain wood windows through one source from a single manufacturer.

B. Product Options: Drawings indicate size, profiles, and dimensional requirements of wood windows and are based on the specific system indicated. Refer to Division 1 Section "Product Requirements."

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.

C. Fenestration Standard: Comply with AAMA/NWWDA 101/I.S.2, "Voluntary Specifications for Aluminum, Vinyl (PVC) and Wood Windows and Glass Doors," for minimum standards of performance, materials, components, accessories, and fabrication unless more stringent requirements are indicated.

1. Provide WDMA-certified wood windows with an attached label.

D. Glazing Publications: Comply with published recommendations of glass manufacturers and GANA's "Glazing Manual" unless more stringent requirements are indicated.

1.7 PROJECT CONDITIONS

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

1. Established Dimensions: Where field measurements cannot be made without delaying the Work, establish opening dimensions and proceed with fabricating wood windows without field measurements. Coordinate wall construction to ensure that actual opening dimensions correspond to established dimensions.

1.8 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace wood windows that fail in materials or workmanship within specified warranty period. Failures include, but are not limited to, the following:

1. Failure to meet performance requirements.
2. Structural failures including excessive deflection.
3. Water leakage, air infiltration, or condensation.
4. Faulty operation of movable sash and hardware.
5. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
6. Insulting glass failure.

B. Warranty Period: Ten years from date of Substantial Completion.

C. Warranty Period for Glass: 20 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

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

1. Vinyl-Clad Wood Windows:

a. Double-Hung Windows:

1) Andersen Commercial Group; Andersen Corp., 400 Series, Woodwright with divided lites as shown on construction documents. 7/8" dimension.

b. Fixed Windows:

1) Andersen Commercial Group; Andersen Corp., 400 Series, Woodwright. Transoms to have divided lites as shown on construction documents.

2.2 MATERIALS, GENERAL

A. Wood: Clear ponderosa pine or another suitable fine-grained lumber; kiln-dried to a moisture content of 6 to 12 percent at time of fabrication; free of visible finger joints, blue stain, knots, pitch pockets, and surface checks larger than 1/32 inch (0.8 mm) deep by 2 inches (51 mm) wide; water-repellent preservative treated.

B. Vinyl for Cladding: Consisting of a rigid PVC sheath, made from PVC complying with ASTM D 4726, not less than 35-mil (0.9-mm) average thickness, in permanent, integral color, Forest Green finish, mechanically bonded to exterior wood sash and frame members.

C. Interior Wood Trim and Glazing Stops: 7/8" pine.

D. Clad Trim and Glazing Stops: Clad-wood material; material and finish to match clad frame members.

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

1. 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.

F. 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.

G. 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.

H. Compression-Type Weather Stripping: Provide compressible weather stripping designed for permanently resilient sealing under bumper or wiper action, and completely concealed when wood window is closed.
1. Weather-Stripping Material: Manufacturer's standard system and materials complying with AAMA/NWWDA 101/I.S.2.

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

2.3 GLAZING

A. Glass: Clear, insulating-glass with low-e coating or film, argon-gas filled units complying with Division 8 Section "Glazing."

B. Glazing System: Manufacturer's standard factory-glazing system that produces weathertight 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 wood; designed to smoothly operate, tightly close, and securely lock wood 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 composite resin lock and keeper.

B. Counterbalancing Mechanism: Comply with AAMA 902.

1. Sash-Balance Type: Concealed type of size and capacity to hold sash stationary at any open position.

C. Sill Cap/Track: Rigid PVC or other weather-resistant plastic with manufacturer's standard integral color track of thickness, dimensions, and profile indicated; designed to comply with performance requirements indicated and to drain to the exterior.

D. Locks and Latches: Designed to allow unobstructed movement of the sash across adjacent sash in direction indicated and operated from the inside only.

2.5 INSECT SCREENS

A. General: Design 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. Aluminum Tubular Frame Screens: Comply with SMA 1004, "Specifications for Aluminum Tubular Frame Screens for Windows," Residential R-20 class.

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. Aluminum Tubular Framing Sections and Cross Braces: Roll-formed from aluminum sheet with minimum wall thickness as required for class indicated.
2. Finish: Baked-on organic coating in manufacturer's standard color to match windows.

C. Glass-Fiber Mesh Fabric: 18-by-14 (1.4-by-1.8-mm) or 18-by-16 (1.4-by-1.6-mm) 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 in the following color. Comply with ASTM D 3656.

1. Mesh Color: Charcoal gray.

2.6 FABRICATION

A. General: Fabricate wood windows, in sizes indicated, that comply with AAMA/NWWDA 101/I.S.2 for performance class and performance grade indicated. Include a complete system for assembling components and anchoring windows.

B. General: Fabricate wood 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. Double-Hung Windows: LC.
2. Fixed Windows: LC.

C. Fabricate wood windows that are reglazable without dismantling sash or ventilator framing.

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

1. Double-Hung Windows: Provide weather stripping only at horizontal rails of operable sash.

E. Factory machine windows for openings and hardware that is not surface applied.

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: Except for light sizes in excess of 100 united inches (2500 mm width plus length), glaze wood 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.

1. Groove Glazing: Factory-glazed units without removable stops or other provision permitting convenient field disassembly to facilitate replacement of broken glass will not be accepted.

H. Complete fabrication, assembly, finishing, hardware application, and other work in the factory to greatest extent possible. Disassemble components only as necessary for shipment and installation. Allow for scribing, trimming, and fitting at Project site.

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; and other conditions affecting performance of work.
1. Wood Frame Walls: Dry, clean, sound, well nailed, free of voids, and without offsets at joints. Ensure that nail heads are driven flush with surfaces in opening and within 3 inches (76 mm) of opening.
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 weathertight construction.

D. 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 weathertight 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 exposed 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 08550

SECTION 08710

DOOR HARDWARE

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. Commercial door hardware for the following:

a. Swinging doors.

b. Folding doors.

2. Cylinders for doors specified in other Sections.

B. Related Sections include the following:

1. Division 8 Section "Standard Steel Doors and Frames" for door silencers provided as part of hollow-metal frames.

2. Division 8 Section "Wood Stile and Rail Doors" for entrance doors to receive cylinders and doors to receive folding door hardware.

1.3 SUBMITTALS

A. Product Data: Include construction and installation details, material descriptions, dimensions of individual components and profiles, and finishes.

B. Maintenance Data: For each type of door hardware to include in maintenance manuals. Include final hardware and keying schedule.

C. Other Action Submittals:

1. Door Hardware Sets: Prepared by or under the supervision of Installer, detailing fabrication and assembly of door hardware, as well as procedures and diagrams. Coordinate the final door hardware sets with doors, frames, and related work to ensure proper size, thickness, hand, function, and finish of door hardware.

a. Format: Comply with scheduling sequence and vertical format in DHI's "Sequence and Format for the Hardware Schedule." Double space entries, and number and date each page.

b. Format: Use same scheduling sequence and format and use same door numbers as in the Contract Documents.

c. Content: Include the following information:

1) Identification number, location, hand, fire rating, and material of each door and frame.
2) Type, style, function, size, quantity, and finish of each door hardware item. Include description and function of each lockset and exit device.
3) Complete designations of every item required for each door or opening including name and manufacturer.
4) Fastenings and other pertinent information.
5) Location of each door hardware set, cross-referenced to Drawings, both on floor plans and in door and frame schedule.
6) Explanation of abbreviations, symbols, and codes contained in schedule.
7) Mounting locations for door hardware.
8) Door and frame sizes and materials.
9) List of related door devices specified in other Sections for each door and frame.

d. Submittal Sequence: Submit the final door hardware sets at earliest possible date, particularly where approval of the door hardware sets must precede fabrication of other work that is critical in Project construction schedule. Include Product Data, Samples, Shop Drawings of other work affected by door hardware, and other information essential to the coordinated review of the door hardware sets.

2. Keying Schedule: Prepared by or under the supervision of Installer, detailing Owner's final keying instructions for locks. Include schematic keying diagram and index each key set to unique door designations.

1.4 QUALITY ASSURANCE

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

1. Installer's responsibilities include supplying and installing door hardware and providing a qualified Architectural Hardware Consultant available during the course of the Work to consult with Contractor, Architect, and Owner about door hardware and keying.
2. Installer shall have warehousing facilities in Project's vicinity.
3. Scheduling Responsibility: Preparation of door hardware and keying schedules.

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

C. Source Limitations: Obtain each type and variety of door hardware from a single manufacturer, unless otherwise indicated.

D. Fire-Rated Door Assemblies: Assemblies complying with NFPA 80 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire ratings indicated, based on testing according to NFPA 252.

E. Keying Conference: Conduct conference at Project site to comply with requirements in Division 1 Section "Project Management and Coordination." In addition to Owner, Construction Manager, and Architect, conference participants shall also include Installer's Architectural Hardware Consultant. Incorporate keying conference decisions into final keying schedule after reviewing door hardware keying system including, but not limited to, the following:

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

1.5 DELIVERY, STORAGE, AND HANDLING

A. Inventory door hardware on receipt and provide secure lock-up for door hardware delivered to Project site.

B. Tag each item or package separately with identification related to the final door hardware sets, and include basic installation instructions, templates, and necessary fasteners with each item or package.

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

1.6 COORDINATION

A. Templates: Distribute door hardware templates for doors, frames, and other work specified to be factory prepared for installing door hardware. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing door hardware to comply with indicated requirements.

1.7 WARRANTY

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

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

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

2. Warranty Period: Three years from date of Substantial Completion, except as follows:
   a. Exit Devices: Two years from date of Substantial Completion.
   b. Manual Closers: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 SCHEDULED DOOR HARDWARE

A. General: Provide door hardware for each door to comply with requirements in this Section and door hardware sets indicated in Part 3 "Door Hardware Sets" Article.

1. Door Hardware Sets: Provide quantity, item, size, finish or color indicated, and products equivalent in function and comparable in quality to named products.

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

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

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

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

2.2 HINGES, GENERAL

A. Quantity: Provide the following, unless otherwise indicated:

1. Two Hinges: For doors with heights up to 60 inches (1524 mm).
2. Three Hinges: For doors with heights 61 to 90 inches (1549 to 2286 mm).
3. Four Hinges: For doors with heights 91 to 120 inches (2311 to 3048 mm).
4. For doors with heights more than 120 inches (3048 mm), provide 4 hinges, plus 1 hinge for every 30 inches (750 mm) of door height greater than 120 inches (3048 mm).

B. Hinge Weight: Unless otherwise indicated, provide the following:

1. Entrance Doors: Heavy-weight hinges.
2. Doors with Closers: Antifriction-bearing hinges.
3. Interior Doors: Standard-weight hinges.

C. Hinge Base Metal: Unless otherwise indicated, provide the following:

1. Exterior Hinges: Stainless steel, with stainless-steel pin.
2. Interior Hinges: Brass, with stainless-steel pin body and brass protruding heads.
3. Hinges for Fire-Rated Assemblies: Steel, with steel pin.

D. Hinge Options: Where indicated in door hardware sets or on Drawings:
1. Nonremovable Pins: Provide set screw in hinge barrel that, when tightened into a groove in hinge pin, prevents removal of pin while door is closed; for outswinging exterior doors and outswinging corridor doors with locks.
2. Corners: Square.

E. Fasteners: Comply with the following:

1. Machine Screws: For metal doors and frames. Install into drilled and tapped holes.
2. Wood Screws: For wood doors and frames.

2.3 HINGES

A. Butts and Hinges: BHMA A156.1.

B. Template Hinge Dimensions: BHMA A156.7.

C. Available Manufacturers:

1. Baldwin Hardware Corporation (BH).
2. Hager Companies (HAG).
3. Lawrence Brothers, Inc. (LB).
4. McKinney Products Company; an ASSA ABLOY Group company (MCK).
5. Stanley Commercial Hardware; Div. of The Stanley Works (STH).

2.4 LOCKS AND LATCHES, GENERAL

A. Accessibility Requirements: Where indicated to comply with accessibility requirements, comply with the U.S. Architectural & Transportation Barriers Compliance Board's "Americans with Disabilities Act (ADA), Accessibility Guidelines for Buildings and Facilities (ADAAG)."

1. Provide operating devices that do not require tight grasping, pinching, or twisting of the wrist and that operate with a force of not more than 5 lbf (22 N).

B. Latches and Locks for Means of Egress Doors: Comply with NFPA 101. Latches shall not require more than 15 lbf (67 N) to release the latch. Locks shall not require use of a key, tool, or special knowledge for operation.

C. Lock Trim:

1. Levers: Wrought.

a. Equal to Sargent 10-Line Cylindrical Locksets, unless mortise locks are specified in hardware sets.

2. Knobs: Wrought.
3. Escutcheons (Roses): Wrought.
4. Dummy Trim: Match lever lock trim and escutcheons.
5. Lockset Designs: LB Trim with L Rose and B Lever.

D. Lock Throw: Comply with testing requirements for length of bolts required for labeled fire doors, and as follows:

1. Bored Locks: Minimum 1/2-inch (13-mm) latchbolt throw.

E. Backset: 2-3/4 inches (70 mm), unless otherwise indicated.

F. Strikes: Manufacturer's standard strike with strike box for each latchbolt or lock bolt, with curved lip extended to protect frame, finished to match door hardware set, and as follows:

1. Strikes for Bored Locks and Latches: BHMA A156.2.

2.5 DOOR BOLTS

A. Bolt Throw: Comply with testing requirements for length of bolts required for labeled fire doors, and as follows:
1. Fire-Rated Surface Bolts: Minimum 1-inch (25-mm) throw; listed and labeled for fire-rated doors.
2. Mortise Flush Bolts: Minimum 3/4-inch (19-mm) throw.

B. Dustproof Strikes: BHMA A156.16, Grade 1.

C. Surface Bolts: BHMA A156.16, Grade 1.

1. Flush Bolt Heads: Minimum of 1/2-inch- (13-mm-) diameter rods of brass, bronze, or stainless steel with minimum 12-inch- (305-mm-) long rod for doors up to 84 inches (2134 mm) in height. Provide longer rods as necessary for doors exceeding 84 inches (2134 mm).
2. Available Manufacturers:
   a. Door Controls International (DCI).
   b. Hager Companies (HAG).
   c. IVES Hardware; an Ingersoll-Rand Company (IVS).
   d. Stanley Commercial Hardware; Div. of The Stanley Works (STH).
   e. Trimco (TBM).

D. Manual Flush Bolts: BHMA A156.16, Grade 1; designed for mortising into door edge.

1. Available Manufacturers:
   a. Door Controls International (DCI).
   b. Hager Companies (HAG).
   c. Hiawatha, Inc. (HIA).
   d. IVES Hardware; an Ingersoll-Rand Company (IVS).
   e. Stanley Commercial Hardware; Div. of The Stanley Works (STH).
   f. Trimco (TBM).

E. Automatic and Self-Latching Flush Bolts: BHMA A156.3, Grade 1; designed for mortising into door edge.

1. Available Manufacturers:
   a. Door Controls International (DCI).
   b. Hager Companies (HAG).
   c. IVES Hardware; an Ingersoll-Rand Company (IVS).
   d. Trimco (TBM).

2.6 LOCK CYLINDERS

A. Standard Lock Cylinders: BHMA A156.5, Grade 1.

B. Cylinders: Manufacturer's standard tumbler type, constructed from brass or bronze, stainless steel, or nickel silver, and complying with the following:

1. Number of Pins: Six.
2. Mortise Type: Threaded cylinders with rings and straight- or clover-type cam.
3. Bored-Lock Type: Cylinders with tailpieces to suit locks.

C. Manufacturer: Same manufacturer as for locks and latches.

2.7 KEYING

A. Keying System: Factory registered, complying with guidelines in BHMA A156.28, Appendix A. Incorporate decisions made in keying conference, and as follows:
1. Master Key System: Cylinders are operated by a change key and a master key.

B. Keys: Nickel silver.

1. Stamping: Permanently inscribe each key with a visual key control number and include the following notation:

   a. Notation: "DO NOT DUPLICATE."

2. Quantity: In addition to one extra key blank for each lock, provide the following:

   a. Cylinder Change Keys: Three.
   b. Master Keys: Five.

2.8 KEY CONTROL SYSTEM

A. Key Control Cabinet: BHMA A156.5, Grade 2; metal cabinet with baked-enamel finish; containing key-holding hooks, labels, 2 sets of key tags with self-locking key holders, key-gathering envelopes, and temporary and permanent markers; with key capacity of 150 percent of the number of locks.
1. Wall-Mounted Cabinet: Cabinet with hinged-panel door equipped with key-holding panels and pin-tumbler cylinder door lock.

B. Cross-Index System: Single-index system for recording key information. Include three receipt forms for each key-holding hook. Set up by Installer.

1. Available Manufacturers:

a. Key Control Systems, Inc. (KCS).
b. Lund Equipment Co., Inc. (LUN).
c. MMF Industries (MMF).
d. Sunroc Corporation (SUN).

C. Key Lock Boxes: Designed for storage of two keys, with tamper switches to connect to intrusion detection system.

1. Manufacturers:

a. As required to meet the City of Portland Fire Department requirements.

2.9 EXIT DEVICES

A. Exit Devices: BHMA A156.3, Grade 1.

B. Accessibility Requirements: Where handles, pulls, latches, locks, and other operating devices are indicated to comply with accessibility requirements, comply with the U.S. Architectural & Transportation Barriers Compliance Board's "Americans with Disabilities Act (ADA), Accessibility Guidelines for Buildings and Facilities (ADAAG)."

1. Provide operating devices that do not require tight grasping, pinching, or twisting of the wrist and that operate with a force of not more than 5 lbf (22 N).

C. Exit Devices for Means of Egress Doors: Comply with NFPA 101. Exit devices shall not require more than 15 lbf (67 N) to release the latch. Locks shall not require use of a key, tool, or special knowledge for operation.

D. Outside Trim: Lever with cylinder; material and finish to match locksets, unless otherwise indicated.

1. Match design for locksets and latchsets, unless otherwise indicated.

E. Available Manufacturers:
1. Locknetics; an Ingersoll-Rand Company (LSE).
2. SARGENT Manufacturing Company; an ASSA ABLOY Group company (SGT).
3. Von Duprin; an Ingersoll-Rand Company (VD).
4. Yale Commercial Locks and Hardware; an ASSA ABLOY Group company (YAL).

2.10 OPERATING TRIM

A. Standard: BHMA A156.6.

B. Materials: Fabricate from materials to coordinate with hardware finish, unless otherwise indicated.

C. Products: Push Plates similar to Ives, 8302-6 3.5 x 15 and Pulls mounted on plates similar to Ives 8311-5 3.5 x 15.

D. Available Manufacturers:
1. Hager Companies (HAG).
2. Hiawatha, Inc. (HIA).
3. IVES Hardware; an Ingersoll-Rand Company (IVS).
4. Rockwood Manufacturing Company (RM).
5. Trimco (TBM).

2.11 CLOSERS

A. Accessibility Requirements: Where handles, pulls, latches, locks, and other operating devices are indicated to comply with accessibility requirements, comply with the U.S. Architectural & Transportation Barriers Compliance Board's "Americans with Disabilities Act (ADA), Accessibility Guidelines for Buildings and Facilities (ADAAG)."

1. Comply with the following maximum opening-force requirements:

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

B. Door Closers for Means of Egress Doors: Comply with NFPA 101. Door closers shall not require more than 30 lbf (133 N) to set door in motion and not more than 15 lbf (67 N) to open door to minimum required width.

C. Size of Units: Unless otherwise indicated, comply with manufacturer's written recommendations for size of door closers depending on size of door, exposure to weather, and anticipated frequency of use. Provide factory-sized closers, adjustable to meet field conditions and requirements for opening force.

D. Surface Closers: BHMA A156.4, Grade 1 Provide type of arm required for closer to be located on non-public side of door, unless otherwise indicated.

1. Available Manufacturers:
a. LCN Closers; an Ingersoll-Rand Company (LCN).
b. Norton Door Controls; an ASSA ABLOY Group company (NDC).
c. Rixson Specialty Door Controls; an ASSA ABLOY Group company (RIX).
d. SARGENT Manufacturing Company; an ASSA ABLOY Group company (SGT).

E. Coordinators: BHMA A156.3.

2.12 PROTECTIVE TRIM UNITS

A. Size: 1-1/2 inches (38 mm) less than door width on push side and 1/2 inch (13 mm) less than door width on pull side, by height specified in door hardware sets.

B. Fasteners: Manufacturer's standard machine or self-tapping screws.

C. Metal Protective Trim Units: BHMA A156.6; beveled top and 2 sides; fabricated from the following material:

1. Material: 0.050-inch- (1.3-mm-) thick aluminum in finish to match US10B.
2. Available Manufacturers:
   a. Baldwin Hardware Corporation (BH).
   b. Hager Companies (HAG).
   c. Hiawatha, Inc. (HIA).
   d. IVES Hardware; an Ingersoll-Rand Company (IVS).
   e. Rockwood Manufacturing Company (RM).
   f. Trimco (TBM).

2.13 STOPS AND HOLDERS

A. Stops and Bumpers: BHMA A156.16, Grade 1.

1. Provide floor stops for doors unless wall or other type stops are scheduled or indicated. Do not mount floor stops where they will impede traffic. Where floor or wall stops are not appropriate, provide overhead holders.

B. Available Manufacturers:
1. Hager Companies (HAG).
2. Hiawatha, Inc. (HIA).
3. IVES Hardware; an Ingersoll-Rand Company (IVS).
4. Rixson Specialty Door Controls; an ASSA ABLOY Group company (RIX).
5. Rockwood Manufacturing Company (RM).
6. SARGENT Manufacturing Company; an ASSA ABLOY Group company (SGT).
7. Stanley Commercial Hardware; Div. of The Stanley Works (STH).
8. Trimco (TBM).

2.14 THRESHOLDS

A. Standard: BHMA A156.21.

B. Accessibility Requirements: Where thresholds are indicated to comply with accessibility requirements, comply with the U.S. Architectural & Transportation Barriers Compliance Board's "Americans with Disabilities Act (ADA), Accessibility Guidelines for Buildings and Facilities (ADAAG)."

1. Bevel raised thresholds with a slope of not more than 1:2. Provide thresholds not more than 1/2 inch (13 mm) high.

C. Thresholds for Means of Egress Doors: Comply with NFPA 101. Maximum 1/2 inch (13 mm) high.

D. Available Manufacturers:

1. Hager Companies (HAG).
2. National Guard Products (NGP).
3. Pemko Manufacturing Co. (PEM).
4. Reese Enterprises (RE).
5. Rixson Specialty Door Controls; an ASSA ABLOY Group company (RIX).
6. Sealeze; a unit of Jason Incorporated (SEL).
7. Zero International (ZRO).

2.15 FOLDING DOOR HARDWARE

A. General: BHMA A156.14; consisting of complete sets including overhead rails, hangers, supports, bumpers, floor guides, and accessories indicated.

1. Interior Doors: Provide door hardware for interior bifolding doors when not furnished as part of door package.

B. Multiple Folding Door Hardware: Rated for door panels weighing up to 75 lb (34 kg).

C. Available Manufacturers:

1. Cox, Arthur & Sons, Inc. (ACS).
2. Hager Companies (HAG).
3. Henderson, P. C. Inc.; Div. of Hepworth PLC (PCH).
4. Johnson, L. E. Products, Inc. (LEJ).
5. Lawrence Brothers, Inc. (LB).
6. Stanley Commercial Hardware; Div. of The Stanley Works (STH).

2.16 FABRICATION

A. Manufacturer's Nameplate: Do not provide products that have manufacturer's name or trade name displayed in a visible location except in conjunction with required fire-rated labels and as otherwise approved by Architect.

1. Manufacturer's identification is permitted on rim of lock cylinders only.

B. Base Metals: Produce door hardware units of base metal, fabricated by forming method indicated, using manufacturer's standard metal alloy, composition, temper, and hardness. Furnish metals of a quality equal to or greater than that of specified door hardware units and BHMA A156.18. Do not furnish manufacturer's standard materials or forming methods if different from specified standard.

C. Fasteners: Provide door hardware manufactured to comply with published templates generally prepared for machine, wood, and sheet metal screws. Provide screws according to commercially recognized industry standards for application intended, except aluminum

fasteners are not permitted. Provide Phillips flat-head screws with finished heads to match surface of door hardware, unless otherwise indicated.

1. Concealed Fasteners: For door hardware units that are exposed when door is closed, except for units already specified with concealed fasteners. Do not use through bolts for installation where bolt head or nut on opposite face is exposed unless it is the only means of securely attaching the door hardware. Where through bolts are used on hollow door and frame construction, provide sleeves for each through bolt.
2. Steel Machine or Wood Screws: For the following fire-rated applications:

    a. Mortise hinges to doors.
    b. Strike plates to frames.
    c. Closers to doors and frames.

3. Steel Through Bolts: For the following fire-rated applications unless door blocking is provided:

    a. Surface hinges to doors.
    b. Closers to doors and frames.
    c. Surface-mounted exit devices.

4. Spacers or Sex Bolts: For through bolting of hollow-metal doors.
5. Fasteners for Wood Doors: Comply with requirements in DHI WDHS.2, "Recommended Fasteners for Wood Doors."

2.17 FINISHES

A. Standard: BHMA A156.18, as indicated in door hardware sets.

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

C. 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 doors and frames, with Installer present, for compliance with requirements for installation tolerances, labeled fire door assembly construction, wall and floor construction, and other conditions affecting performance.

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

3.2 PREPARATION

A. Steel Doors and Frames: Comply with DHI A115 Series.

1. Surface-Applied Door Hardware: Drill and tap doors and frames according to ANSI A250.6.

B. Wood Doors: Comply with DHI A115-W Series.

3.3 INSTALLATION

A. Mounting Heights: Mount door hardware units at heights indicated as follows unless otherwise indicated or required to comply with governing regulations.

1. Standard Steel Doors and Frames: DHI's "Recommended Locations for Architectural Hardware for Standard Steel Doors and Frames."
2. Wood Doors: DHI WDHS.3, "Recommended Locations for Architectural Hardware for Wood Flush Doors."

B. Install each door hardware item to comply with manufacturer's written instructions. Where cutting and fitting are required to install door hardware onto or into surfaces that are later to be painted or finished in another way, coordinate removal, storage, and reinstallation of surface protective trim units with finishing work specified in Division 9 Sections. Do not install surface-mounted items until finishes have been completed on substrates involved.

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

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

D. Thresholds: Set thresholds for exterior and acoustical doors in full bed of sealant complying with requirements specified in Division 7 Section "Joint Sealants."

3.4 ADJUSTING

A. Initial Adjustment: Adjust and check each operating item of door hardware and each door to ensure proper operation or function of every unit. Replace units that cannot be adjusted to operate as intended. Adjust door control devices to compensate for final operation of heating and ventilating equipment and to comply with referenced accessibility requirements.
1. Door Closers: Unless otherwise required by authorities having jurisdiction, adjust sweep period so that, from an open position of 70 degrees, the door will take at least 3 seconds to move to a point 3 inches (75 mm) from the latch, measured to the leading edge of the door.

B. Occupancy Adjustment: Approximately six months after date of Substantial Completion, Installer's Architectural Hardware Consultant shall examine and readjust, including adjusting

operating forces, each item of door hardware as necessary to ensure function of doors, door hardware, and electrified door hardware.

3.5 CLEANING AND PROTECTION

A. Clean adjacent surfaces soiled by door hardware installation.

B. Clean operating items as necessary to restore proper function and finish.

C. Provide final protection and maintain conditions that ensure that door hardware is without damage or deterioration at time of Substantial Completion.

3.6 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain door hardware and door hardware finishes. Refer to Division 1 Section "Demonstration and Training."

3.7 DOOR HARDWARE SETS

A. All finishes to be US10B (Oil rubbed bronze) or painted dark brown.

B. HWS 1:

Doors: 001,003, 005

Each Door to Receive: Hinges, Lockset (Storage Function), Stop.

C. HWS 2:

Doors: 004, 014, 015a, 211, 216

Each Door to Receive: Hinges, Latchset, Closer, Stop. (At doors 211 and 216, the doors need to be lockable from the inside of the stair.)

D. HWS 3:

Doors: 002, 008, 009, 010, 011, 012b, 013, 111

Each Door to Receive: Hinges, Lockset (Storage Function), Closer, Stop.

E. HWS 4:

Doors: 008, 009, 010, 012b, 013, 111

Each Door to Receive: Hinges. Active Leaf to receive: Lockset (Storage Function), Closer. Inactive Leaf to receive: Automatic Flush Bolts.

F. HWS 5:

Doors: 017, 018, 204, 205

Each Door to Receive: Hinges, Locksest (Privacy Function), Stop.

G. HWS 6:

Doors: 101, 112

Each Door to Receive: Hinges (by Andersen), Exit Device, Closer, Threshold, Weatherstripping (by Andersen), Protective Trim (Kickplate).

H. HWS 7:

Doors 102

Each Door to Receive: Hinges (by Andersen), Pull, Push Plate, Closer.

I. HWS 8:

Doors: 103, 104

Each Door to Receive: Hinges, Push, Pull, Closer, Stop.

J. HWS 9:

Doors: 105, 109

Each Door to Receive: Hinges, Latchset (Passage Function), Stop.

K. HWS 10:

Doors: 106, 108b, 115b

Each Door to Receive: Hinges, Mortise Lockset (Entrance Function), Closer, Threshold, Weatherstripping.

L. HWS 11:

Doors: 107

Each Door to Receive: Hinges, Latchset (Passage), Closer, Stop.

M. HWS 12:

Doors: 108a, 113, 114, 116, 117, 202, 208, 212

Each Door to Receive: Hinges, Lockset (Office Function), Closer, Stop.

N. HWS 13:

Doors: 110a, 110c

Each Door to Receive: Special Folding Door Hardware Kit to allow doors to fold back.

O. HWS 14:

Doors: 110b, 120

Each Leaf to Receive: Hinges, Push Plate, Pull, Hold Open Closer, Stop. (Provide deadbolt at Trading Post – Door 120).

P. HWS 15:

Doors: 118, 119

Each Door to Receive: Hinges, Lockset (Privacy Function.).

Q. HWS 16:

Doors: 206, 207, 209a, 210, 213, 214, 217

Each Door to Receive: Hinges, Lockset (Office Function), Stop.

END OF SECTION 08710

SECTION 08800

GLAZING

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

1.3 DEFINITIONS

A. Manufacturers of Glass Products: Firms that produce primary glass, fabricated glass, or both, as defined in referenced glazing publications.

B. Glass Thicknesses: Indicated by thickness designations in millimeters according to ASTM C 1036.

C. Interspace: Space between lites of an insulating-glass unit that contains dehydrated air or a specified gas.

D. Deterioration of Coated Glass: Defects developed from normal use that are attributed to the manufacturing process and not to causes other than glass breakage and practices for maintaining and cleaning coated glass contrary to manufacturer's written instructions. Defects include peeling, cracking, and other indications of deterioration in metallic coating.

E. Deterioration of Insulating Glass: Failure of hermetic seal under normal use that is attributed to the manufacturing process and not to causes other than glass breakage and practices for maintaining and cleaning insulating glass contrary to manufacturer's written instructions. Evidence of failure is the obstruction of vision by dust, moisture, or film on interior surfaces of glass.

F. Deterioration of Laminated Glass: Defects developed from normal use that are attributed to the manufacturing process and not to causes other than glass breakage and practices for maintaining and cleaning laminated glass contrary to manufacturer's written instructions. Defects include edge separation, delamination materially obstructing vision through glass, and blemishes exceeding those allowed by referenced laminated-glass standard.

1.4 PERFORMANCE REQUIREMENTS

A. General: Provide glazing systems capable of withstanding normal thermal movement and wind and impact loads (where applicable) without failure, including loss or glass breakage attributable to the following: defective manufacture, fabrication, and installation; failure of sealants or gaskets to remain watertight and airtight; deterioration of glazing materials; or other defects in construction.

B. Glass Design: Glass thickness designations indicated are minimums and are for detailing only. Confirm glass thicknesses by analyzing Project loads and in-service conditions. Provide glass lites in the thickness designations indicated for various size openings, but not less than thicknesses and in strengths (annealed or heat treated) required to meet or exceed the following criteria:

1. Glass Thicknesses: Select minimum glass thicknesses to comply with ASTM E 1300, according to the following requirements:

a. Specified Design Wind Loads: 85 MPH.

C. Thermal Movements: Provide glazing that allows for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures acting on glass framing members and glazing components. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.

1. Temperature Change (Range): 120 deg F (67 deg C), ambient; 180 deg F (100 deg C), material surfaces.

D. Thermal and Optical Performance Properties: Provide glass with performance properties specified based on manufacturer's published test data, as determined according to procedures indicated below:

1. For monolithic-glass lites, properties are based on units with lites of thickness indicated.
2. For insulating-glass units, properties are based on units with lites 6.0 mm thick and a nominal 1/2-inch- (12.7-mm-)wide interspace.
3. Center-of-Glass Values: Based on using LBL-44789 WINDOW 5.0 computer program for the following methodologies:

a. U-Factors: NFRC 100 expressed as Btu/ sq. ft. x h x deg F (W/sq. m x K).
b. Solar Heat Gain Coefficient: NFRC 200.
c. Solar Optical Properties: NFRC 300.

1.5 SUBMITTALS

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

B. Warranties: Special warranties specified in this Section.

1.6 QUALITY ASSURANCE

A. Installer Qualifications: An experienced installer who has completed glazing similar in material, design, and extent to that indicated for this Project; whose work has resulted in glass installations with a record of successful in-service performance; and who employs glass installers for this Project who are certified under the National Glass Association's Certified Glass Installer Program.

B. Glazing for Fire-Rated Window Assemblies: Glazing for assemblies that comply with NFPA 80 and that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire ratings indicated, based on testing according to NFPA 257.

C. Safety Glazing Products: Comply with testing requirements in 16 CFR 1201 and, for wired glass, ANSI Z97.1.

1. Subject to compliance with requirements, obtain safety glazing products permanently marked with certification label of the Safety Glazing Certification Council or another certification agency or manufacturer acceptable to authorities having jurisdiction.
2. Where glazing units, including Kind FT glass and laminated glass, are specified in Part 2 articles for glazing lites more than 9 sq. ft. (0.84 sq. m) in exposed surface area of one side, provide glazing products that comply with Category II materials, for lites 9 sq. ft. (0.84 sq. m) or less in exposed surface area of one side, provide glazing products that comply with Category I or II materials, except for hazardous locations where Category II materials are required by 16 CFR 1201 and regulations of authorities having jurisdiction.

D. Glazing Publications: Comply with published recommendations of glass product manufacturers and organizations below, unless more stringent requirements are indicated. Refer to these publications for glazing terms not otherwise defined in this Section or in referenced standards.
1. IGMA Publication for Insulating Glass: SIGMA TM-3000, "Glazing Guidelines for Sealed Insulating Glass Units."

E. Insulating-Glass Certification Program: Permanently marked either on spacers or on at least one component lite of units with appropriate certification label of the following testing and inspecting agency:

1. Insulating Glass Certification Council.
2. Associated Laboratories, Inc.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Protect glazing materials according to manufacturer's written instructions and as needed to prevent damage to glass and glazing materials from condensation, temperature changes, direct exposure to sun, or other causes.

1.8 PROJECT CONDITIONS

A. Environmental Limitations: Do not proceed with glazing when ambient and substrate temperature conditions are outside limits permitted by glazing material manufacturers and when glazing channel substrates are wet from rain, frost, condensation, or other causes.

1. Do not install liquid glazing sealants when ambient and substrate temperature conditions are outside limits permitted by glazing sealant manufacturer or below 40 deg F (4.4 deg C).

1.9 WARRANTY

A. Manufacturer's Special Warranty on Insulating Glass: Manufacturer's standard form, made out to Owner and signed by insulating-glass manufacturer agreeing to replace insulating-glass units that deteriorate as defined in "Definitions" Article, f.o.b. the nearest shipping point to Project site, within specified warranty period indicated below.

1. Warranty Period: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

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

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

2.2 GLASS PRODUCTS

A. Annealed Float Glass: ASTM C 1036, Type I (transparent flat glass), Quality-Q3; of class indicated.

1. Ultra-Clear (Low-Iron) Float Glass: Class I (clear); with a minimum 91 percent visible light transmission and a minimum solar heat gain coefficient of 0.87.

a. Available Products:

1) AFG Industries Inc.; Krystal Klear.
2) Pilkington Building Products North America; Optiwhite.
3) PPG Industries, Inc.; Starphire.
4) Schott Corporation; Amiran.

B. Heat-Treated Float Glass: ASTM C 1048; Type I (transparent flat glass); Quality-Q3; of class, kind, and condition indicated.

1. Fabrication Process: By horizontal (roller-hearth) process with roll-wave distortion parallel to bottom edge of glass as installed, unless otherwise indicated.
2. Provide Kind HS (heat-strengthened) float glass in place of annealed float glass where needed to resist thermal stresses induced by differential shading of individual glass lites and to comply with glass design requirements specified in Part 1 "Performance Requirements" Article.
3. For uncoated glass, comply with requirements for Condition A.
4. Provide Kind FT (fully tempered) float glass in place of annealed or Kind HS (heat-strengthened) float glass where safety glass is indicated.

C. Wired Glass: ASTM C 1036, Type II (patterned and wired flat glass), Class 1 (clear), Quality-Q-6; and of form and mesh pattern specified.

D. Insulating-Glass Units, General: Factory-assembled units consisting of sealed lites of glass separated by a dehydrated interspace, and complying with ASTM E 774 for Class CBA units and with requirements specified in this Article and in Part 2 "Insulating-Glass Units" Article.

1. Provide Kind HS (heat-strengthened) float glass in place of annealed glass where needed to resist thermal stresses induced by differential shading of individual glass lites and to comply with glass design requirements specified in Part 1 "Performance Requirements" Article.
2. Provide Kind FT (fully tempered) glass lites where safety glass is indicated.
3. Overall Unit Thickness and Thickness of Each Lite: Dimensions indicated for insulating-glass units are nominal and the overall thicknesses of units are measured perpendicularly from outer surfaces of glass lites at unit's edge.
4. Sealing System: Dual seal, with primary and secondary sealants as follows:

   a. Manufacturer's standard sealants.

5. Spacer Specifications: Manufacturer's standard spacer material and construction.

2.3 GLAZING SEALANTS

A. General: Provide products of type indicated, complying with the following requirements:

1. Compatibility: Select glazing sealants that are compatible with one another and with other materials they will contact, including glass products, seals of insulating-glass units, and glazing channel substrates, under conditions of service and application, as demonstrated by sealant manufacturer based on testing and field experience.
2. Suitability: Comply with sealant and glass manufacturers' written instructions for selecting glazing sealants suitable for applications indicated and for conditions existing at time of installation.
3. Colors of Exposed Glazing Sealants: As selected by Architect from manufacturer's full range.

B. Elastomeric Glazing Sealants: Comply with ASTM C 920 and other requirements indicated for each liquid-applied chemically curing sealant specified, including those referencing

ASTM C 920 classifications for type, grade, class, and uses related to exposure and joint substrates.

1. Single-Component Neutral- and Basic-Curing Silicone Glazing Sealants GS-<#>:

   a. Available Products:

      1) Dow Corning Corporation; 790.
      2) GE Silicones; SilPruf LM SCS2700.
      3) Tremco; Spectrem 1 (Basic).
      4) GE Silicones; SilPruf SCS2000.
      5) Pecora Corporation; 864.
      6) Pecora Corporation; 890.
      7) Polymeric Systems Inc.; PSI-641.
      8) Sonneborn, Div. of ChemRex, Inc.; Omniseal.
      9) Tremco; Spectrem 3.

   b. Type and Grade: S (single component) and NS (nonsag).
   c. Class: 50.
   d. Use Related to Exposure: NT (nontraffic).
   e. Uses Related to Glazing Substrates: M, G, A, and, as applicable to glazing substrates indicated, O.

      1) Use O Glazing Substrates: galvanized steel and wood.

2.4 FABRICATION OF GLAZING UNITS

A. Fabricate glazing units in sizes required to glaze openings indicated for Project, with edge and face clearances, edge and surface conditions, and bite complying with written instructions of product manufacturer and referenced glazing publications, to comply with system performance requirements.

B. Clean-cut or flat-grind vertical edges of butt-glazed monolithic lites in a manner that produces square edges with slight kerfs at junctions with outdoor and indoor faces.

C. Grind smooth and polish exposed glass edges and corners.

2.5 MONOLITHIC FLOAT-GLASS UNITS

A. Uncoated Clear Float-Glass Units: Class 1 (clear) Kind FT (fully tempered) float glass.

   1. Thickness: 6.0 mm.

2.6 MONOLITHIC WIRED-GLASS UNITS

A. Polished Wired-Glass Units: Form 1 (wired glass, polished both sides), Quality-Q6, Mesh 1 (M1) (Diamond), 6.0 mm thick.

1. Available Manufacturers:

   a. Asahi/AMA Glass Corp.; affiliated with AFG Industries, Inc.
   b. Central Glass Co., Ltd.; distributed by Northwestern Industries Inc.
   c. Pilkington Sales (North America) Ltd.

2.7 INSULATING-GLASS UNITS

A. Clear Insulating-Glass Units:

1. Overall Unit Thickness and Thickness of Each Lite: 25 and 6.0 mm.
2. Interspace Content: Air or Argon.
3. Outdoor Lite: Class 1 (clear) float glass.
   a. Kind FT (fully tempered).
4. Indoor Lite: Class 1 (clear) float glass.
   a. Kind FT (fully tempered).

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine framing glazing, with Installer present, for compliance with the following:

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

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

3.2 PREPARATION

A. Clean glazing channels and other framing members receiving glass immediately before glazing. Remove coatings not firmly bonded to substrates.

3.3 GLAZING, GENERAL

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

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

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

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

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

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

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

H. Set glass lites in each series with uniform pattern, draw, bow, and similar characteristics.

I. Where wedge-shaped gaskets are driven into one side of channel to pressurize sealant or gasket on opposite side, provide adequate anchorage so gasket cannot walk out when installation is subjected to movement.

J. Square cut wedge-shaped gaskets at corners and install gaskets in a manner recommended by gasket manufacturer to prevent corners from pulling away; seal corner joints and butt joints with sealant recommended by gasket manufacturer.

3.4 CLEANING AND PROTECTION

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

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

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

D. Wash glass on both exposed surfaces in each area of Project not more than four days before date scheduled for inspections that establish date of Substantial Completion. Wash glass as recommended in writing by glass manufacturer.

END OF SECTION 08800

SECTION 09260

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. Non-load-bearing steel framing.

B. Related Sections include the following:

1. Division 1 Section "LEED Requirements" for additional LEED requirements.
2. Division 5 Section "Cold-Formed Metal Framing" for load-bearing steel framing.
3. Division 6 Section "Rough Carpentry" for wood framing and furring, and gypsum sheathing applied over wood framing.
4. Division 7 Section "Building Insulation" for insulation installed in gypsum board assemblies.
5. Division 9 Section "Gypsum Board Shaft-Wall Assemblies" for framing, gypsum panels, and other components of shaft wall assemblies.

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.

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

C. LEED Submittals:

1. Credit EQ 4.1: Manufacturers' product data for adhesives and sealants, including printed statement of VOC content.

2. Credit MR 4.1: Manufacturer's verification of percentage of recycled or post industrial content for products.

1.5 QUALITY ASSURANCE

A. Fire-Test-Response Characteristics: For gypsum board assemblies with fire-resistance ratings, provide materials and construction identical to those tested in assembly indicated according to ASTM E 119 by an independent testing and inspecting agency acceptable to authorities having jurisdiction.

1. Fire-Resistance-Rated Assemblies: Indicated by design designations from UL's "Fire Resistance Directory."

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. 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. Steel Framing and Furring:
   a. Dale Industries, Inc. - Dale/Incor.
   b. Dietrich Industries, Inc.
   c. MarinoWare; Division of Ware Ind.
   d. National Gypsum Company.
   e. Unimast, Inc.

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 PARTITION AND SOFFIT FRAMING

A. Components, General: As follows:

1. Comply with ASTM C 754 for conditions indicated.
2. Steel Sheet Components: Complying with ASTM C 645 requirements for metal and with ASTM A 653/A 653M, G40 (Z120), hot-dip galvanized zinc coating.

B. Steel Studs and Runners: ASTM C 645.

1. Minimum Base Metal Thickness: Provide material thickness to meet deflection criteria of stud length divided by 240.
2. Depth: As indicated on Construction Drawings.

C. Deep-Leg Deflection Track: ASTM C 645 top runner with 2-inch- (50.8-mm-) deep flanges.

D. Proprietary Firestop Track: Top runner manufactured to allow partition heads to expand and contract with movement of the structure while maintaining continuity of fire-resistance-rated assembly indicated; in thickness not less than indicated for studs and in width to accommodate depth of studs.

1. Available Product: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:
2. Product: Subject to compliance with requirements, provide one of the following:

a. Fire Trak Corp.; Fire Trak attached to studs with Fire Trak Slip Clip.
b. Metal-Lite, Inc.; The System.

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

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 (15.9 mm).
b. Long Edges: Tapered.
c. Location: Vertical surfaces, unless otherwise indicated.

2.4 TRIM ACCESSORIES

A. Interior Trim: ASTM C 1047.

1. Material: Galvanized or aluminum-coated steel sheet or rolled zinc.

2. Shapes:

a. Cornerbead: Use at outside corners.
b. LC-Bead: J-shaped; exposed long flange receives joint compound.
c. Expansion (Control) Joint.

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 and damaged surface areas, use setting-type taping compound.
2. Embedding and First Coat: For embedding tape and first coat on joints, fasteners, and trim flanges, use setting-type taping compound.

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

3. Fill Coat: For second coat, use setting-type, sandable topping compound.
4. Finish Coat: For third coat, use setting-type, sandable topping compound.

2.6 ACOUSTICAL SEALANT

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

B. Products: Subject to compliance with requirements, provide one of the following:

1. Acoustical Sealant for Exposed and Concealed Joints:

a. Pecora Corp.; AC-20 FTR Acoustical and Insulation Sealant.
b. United States Gypsum Co.; SHEETROCK Acoustical Sealant.

2. Acoustical Sealant for Concealed Joints:

a. Ohio Sealants, Inc.; Pro-Series SC-170 Rubber Base Sound Sealant.
b. Pecora Corp.; BA-98.
c. Tremco, Inc.; Tremco Acoustical Sealant.

C. Acoustical Sealant for Exposed and Concealed Joints: Nonsag, paintable, nonstaining, latex sealant, with a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24), complying with ASTM C 834 that effectively reduces airborne sound transmission through perimeter joints and openings in building construction as demonstrated by testing representative assemblies according to ASTM E 90.

2.7 AUXILIARY MATERIALS

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

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

1. Use screws complying with ASTM C 954 for fastening panels to steel members from 0.033 to 0.112 inch (0.84 to 2.84 mm) thick.

C. Isolation Strip at Exterior Walls:

1. Asphalt-Saturated Organic Felt: ASTM D 226, Type I (No. 15 asphalt felt), nonperforated.
2. Foam Gasket: Adhesive-backed, closed-cell vinyl foam strips that allow fastener penetration without foam displacement, 1/8 inch (3.2 mm) thick, in width to suit steel stud size.

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

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

E. Thermal Insulation: As specified in Division 7 Section "Building Insulation."

F. Polyethylene Vapor Retarder: As specified in Division 7 Section "Building Insulation."

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 framing, for compliance with requirements and other conditions affecting performance. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLING STEEL FRAMING, GENERAL

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

B. Install supplementary framing, blocking, and bracing at terminations in gypsum board assemblies to support fixtures, equipment services, heavy trim, grab bars, toilet accessories, furnishings, or similar construction. Comply with details indicated and with gypsum board manufacturer's written recommendations or, if none available, with United States Gypsum's "Gypsum Construction Handbook."

C. Isolate steel framing from building structure at locations indicated to prevent transfer of loading imposed by structural movement.
   1. Isolate partition framing and wall furring where it abuts structure, except at floor. Install slip-type joints at head of assemblies that avoid axial loading of assembly and laterally support assembly.
      a. Use deep-leg deflection track where indicated.
      b. Use proprietary firestop track where indicated.

D. Do not bridge building control and expansion joints with steel framing or furring members. Frame both sides of joints independently.

3.3 INSTALLING STEEL PARTITION AND SOFFIT FRAMING

A. Install tracks (runners) at floors, ceilings, and structural walls and columns where gypsum board assemblies abut other construction.
   1. Where studs are installed directly against exterior walls, install asphalt-felt or foam-gasket isolation strip between studs and wall.

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

C. Extend partition framing full height to structural supports or substrates above suspended ceilings, except where partitions are indicated to terminate at suspended ceilings. Continue framing over frames for doors and openings and frame around ducts penetrating partitions above ceiling to provide support for gypsum board.
   1. Cut studs 1/2 inch (13 mm) short of full height to provide perimeter relief.
   2. For fire-resistance-rated partitions that extend to the underside of floor/roof slabs and decks or other continuous solid-structure surfaces to obtain ratings, install framing around structural and other members extending below floor/roof slabs and decks, as needed to support gypsum board closures and to make partitions continuous from floor to underside of solid structure.

D. Install steel studs so flanges point in the same direction and leading edge or end of each panel can be attached to open (unsupported) edges of stud flanges first.

E. Frame door openings to comply with GA-600 and with gypsum board manufacturer's applicable written recommendations, unless otherwise indicated. Screw vertical studs at jambs to jamb anchor clips on door frames; install runner track section (for cripple studs) at head and secure to jamb studs.
   1. Install two studs at each jamb, unless otherwise indicated.
   2. Extend jamb studs through suspended ceilings and attach to underside of floor or roof structure above.

F. Frame openings other than door openings the same as required for door openings, unless otherwise indicated. Install framing below sills of openings to match framing required above door heads.

3.4 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.

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. Floating Construction: Where feasible, including where recommended in writing by manufacturer, install gypsum panels over wood framing, with floating internal corner construction.

L. Space fasteners in gypsum panels according to referenced gypsum board application and finishing standard and manufacturer's written recommendations.

3.5 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 stairwells and other high walls, install panels horizontally, unless otherwise indicated or required by fire-resistance-rated assembly.

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

3.6 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.

3.7 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 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 1: Embed tape at joints in ceiling plenum areas, concealed areas, and where indicated, unless a higher level of finish is required for fire-resistance-rated assemblies.
2. 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.

END OF SECTION 09260

SECTION 09265

GYPSUM BOARD SHAFT-WALL 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. Shaft enclosures.
2. Chase enclosures.
3. Stair enclosures.

B. Related Sections include the following:

1. Division 1 Section "LEED Requirements" for additional LEED requirements.
2. Division 9 "Gypsum Board Assemblies" for applying and finishing panels in gypsum board shaft-wall assemblies.

1.3 DEFINITIONS

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

1.4 PERFORMANCE REQUIREMENTS

A. Structural Performance:

1. Provide gypsum board shaft-wall assemblies capable of withstanding the full air-pressure loads indicated for maximum heights of partitions without failing and while maintaining an airtight and smoke-tight seal. Evidence of failure includes deflections exceeding limits indicated, bending stresses causing studs to break or to distort, and end-reaction shear causing track (runners) to bend or to shear and studs to become crippled.
2. Air-pressure loads and deflection limits are specified in "Gypsum Board Shaft Wall" Article in Part 2.

1.5 SUBMITTALS

A. Product Data: For each gypsum board shaft-wall assembly indicated.

B. LEED Submittals:

1. Credit EQ 4.1: Manufacturers' product data for sealants, including printed statement of VOC content.

2. Credit MR 4.1: Manufacturer's verification of percentage of recycled or post industrial content for products.

C. Fire-Test-Response Reports: From a qualified independent testing and inspecting agency substantiating each gypsum board shaft-wall assembly's required fire-resistance rating.

1. Include data substantiating that elevator entrances and other items that penetrate each gypsum board shaft-wall assembly do not negate fire-resistance rating.

1.6 QUALITY ASSURANCE

A. Fire-Resistance-Rated Assemblies: Provide materials and construction identical to those tested in assembly indicated according to ASTM E 119 by an independent testing and inspecting agency acceptable to authorities having jurisdiction.

1. Fire-Resistance-Rated Assemblies: Indicated by design designations from UL's "Fire Resistance Directory."

1.7 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials in original packages, containers, and 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 on leveled supports off the ground to prevent sagging.

1.8 PROJECT CONDITIONS

A. Comply with requirements for environmental conditions, room temperatures, and ventilation specified in Division 9 Section "Gypsum Board Assemblies."

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. American Gypsum Co.
2. G-P Gypsum Corp.
3. National Gypsum Company.

4. United States Gypsum Co.

2.2 ASSEMBLY MATERIALS

A. General: Provide materials and components complying with requirements of fire-resistance-rated assemblies indicated.

1. Provide panels in maximum lengths available to eliminate or minimize end-to-end butt joints.
2. Provide auxiliary materials complying with gypsum board shaft-wall assembly manufacturer's written recommendations.

B. Steel Framing: ASTM C 645.

1. Protective Coating: Manufacturer's standard corrosion-resistant zinc coating.

C. Gypsum Liner Panels: Manufacturer's proprietary liner panels in 1-inch (25.4-mm) thickness and with moisture-resistant paper faces.

D. Gypsum Wallboard: ASTM C 36, core type as required by fire-resistance-rated assembly indicated.

E. Accessories: Cornerbead, edge trim, and control joints of material and shapes specified in Division 9 Section "Gypsum Board Assemblies" that comply with gypsum board shaft-wall assembly manufacturer's written recommendations for application indicated.

F. Gypsum Wallboard Joint-Treatment Materials: ASTM C 475 and as specified in Division 9 Section "Gypsum Board Assemblies."

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

1. Use screws complying with ASTM C 954 for fastening panels to steel members from 0.033 to 0.112 inch (0.84 to 2.84 mm) thick.

H. Track (Runner) Fasteners: Power-driven fasteners of size and material required to withstand loading conditions imposed on shaft-wall assemblies without exceeding allowable design stress of track, fasteners, or structural substrates in which anchors are embedded.

1. Powder-Actuated Fasteners: Provide powder-actuated fasteners with capability to sustain, without failure, a load equal to 10 times that imposed by shaft-wall assemblies, as determined by testing conducted by a qualified independent testing agency according to ASTM E 1190.
2. Postinstalled Expansion Anchors: Where indicated, provide expansion anchors with capability to sustain, without failure, a load equal to 5 times that imposed by shaft-wall assemblies, as determined by testing conducted by a qualified independent testing agency according to ASTM E 488.

I. Acoustical Sealant: As specified in Division 9 Section "Gypsum Board Assemblies."

1. Use sealants that have a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

J. Sound Attenuation Blankets: ASTM C 665 for Type I, unfaced mineral-fiber-blanket insulation produced by combining thermosetting resins with mineral fibers manufactured from slag or rock wool.

2.3 GYPSUM BOARD SHAFT WALL

A. Studs: Manufacturer's standard profile for repetitive members and corner and end members and for fire-resistance-rated assembly indicated.

1. Depth: 2-1/2 inches (63.5 mm).
2. Minimum Base Metal Thickness: Manufacturer's standard thicknesses that comply with structural performance requirements for stud depth indicated.

B. Track (Runner): Manufacturer's standard J-profile track with long-leg length as standard with manufacturer, but at least 2 inches (51 mm), in depth matching studs.

1. Minimum Base Metal Thickness: Manufacturer's standard thicknesses that comply with structural performance requirements for stud depth indicated.

C. Jamb Struts: Manufacturer's standard J-profile strut with long-leg length of 3 inches (76.2 mm), in depth matching studs, and not less than 0.0329 (0.84 mm) thick.

D. Room-Side Finish: Gypsum board.

E. Shaft-Side Finish: As indicated by fire-resistance-rated assembly design designation.

F. Cavity Insulation: Sound attenuation blankets.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates to which gypsum board shaft-wall assemblies attach or abut, with Installer present, including hollow-metal frames, elevator hoistway door frames, cast-in anchors, and structural framing. Examine for compliance with requirements for installation tolerances and other conditions affecting performance. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. General: Install gypsum board shaft-wall assemblies to comply with requirements of fire-resistance-rated assemblies indicated, manufacturer's written installation instructions, and the following:

1. ASTM C 754 for installing steel framing.

2. Division 9 Section "Gypsum Board Assemblies" for applying and finishing panels.

B. Install supplementary framing in gypsum board shaft-wall assemblies around openings and as required for blocking, bracing, and support of gravity and pullout loads of fixtures, equipment, services, heavy trim, furnishings, and similar items that cannot be supported directly by shaft-wall assembly framing.

1. At elevator hoistway door frames, provide jamb struts on each side of door frame.
2. Where handrails directly attach to gypsum board shaft-wall assemblies, provide galvanized steel reinforcing strip with 0.0312-inch (0.79-mm) minimum thickness of base (uncoated) metal, accurately positioned and secured behind at least 1 face-layer panel.

C. Integrate stair hangers with gypsum board shaft-wall assemblies by locating cavity of assemblies where required to enclose hangers.

D. At penetrations in shaft wall, maintain fire-resistance rating of shaft-wall assembly by installing supplementary steel framing around perimeter of penetration and fire protection behind boxes containing wiring devices, elevator call buttons, elevator floor indicators, and similar items.

E. Isolate gypsum finish panels from building structure to prevent cracking of finish panels while maintaining continuity of fire-rated construction.

F. Install control joints to maintain fire-resistance rating of assemblies.

G. Seal gypsum board shaft walls with acoustical sealant at perimeter of each assembly where it abuts other work and at joints and penetrations within each assembly. Install acoustical sealant to withstand dislocation by air-pressure differential between shaft and external spaces; maintain an airtight and smoke-tight seal; and comply with manufacturer's written instructions or ASTM C 919, whichever is more stringent.

H. In elevator shafts where gypsum board shaft-wall assemblies cannot be positioned within 2 inches (51 mm) of the shaft face of structural beams, floor edges, and similar projections into shaft, install 1/2- or 5/8-inch- (12.7- or 15.9-mm-) thick, gypsum board cants covering tops of projections.

1. Slope cant panels at least 75 degrees from horizontal. Set base edge of panels in adhesive and secure top edges to shaft walls at 24 inches (610 mm) o.c. with screws fastened to shaft-wall framing.
2. Where steel framing is required to support gypsum board cants, install framing at 24 inches (610 mm) o.c. and extend studs from the projection to the shaft-wall framing.

END OF SECTION 09265

SECTION 09511

ACOUSTICAL PANEL CEILINGS

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 acoustical panels and exposed suspension systems for ceilings.

B. Related Sections include the following:

1. Division 1 Section "LEED Requirements" for additional LEED requirements.

1.3 DEFINITIONS

A. AC: Articulation Class.

B. CAC: Ceiling Attenuation Class.

C. LR: Light Reflectance coefficient.

D. NRC: Noise Reduction Coefficient.

1.4 SUBMITTALS

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

B. Samples for Verification: For each component indicated and for each exposed finish required, prepared on Samples of size indicated below.

1. Acoustical Panel: Set of 6-inch- (150-mm-) square Samples of each type, color, pattern, and texture.
2. Exposed Suspension System Members, Moldings, and Trim: Set of 12-inch- (300-mm-) long Samples of each type, finish, and color.

C. LEED Submittals:

1. Credit EQ 4.1: Manufacturers' product data for sealants, including printed statement of VOC content.

2. Credit MR 4.1: Manufacturer's certification of percentage of recycled or post industrial content of products.

1.5 QUALITY ASSURANCE

A. Source Limitations:

1. Acoustical Ceiling Panel: Obtain each type through one source from a single manufacturer.
2. Suspension System: Obtain each type through one source from a single manufacturer.

3. Surface-Burning Characteristics: Provide acoustical panels with the following surface-burning characteristics complying with ASTM E 1264 for Class A materials as determined by testing identical products per ASTM E 84:

a. Smoke-Developed Index: 450 or less.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver acoustical panels, suspension system components, and accessories to Project site in original, unopened packages and store them in a fully enclosed, conditioned space where they will be protected against damage from moisture, humidity, temperature extremes, direct sunlight, surface contamination, and other causes.

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

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

1.7 PROJECT CONDITIONS

A. Environmental Limitations: Do not install acoustical panel ceilings until spaces are enclosed and weatherproof, wet work in spaces is complete and dry, work above ceilings is complete, and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.

1. Pressurized Plenums: Operate ventilation system for not less than 48 hours before beginning acoustical panel ceiling installation.

1.8 COORDINATION

A. Coordinate layout and installation of acoustical panels and suspension system with other construction that penetrates ceilings or is supported by them, including light fixtures, HVAC equipment, fire-suppression system, and partition assemblies.

1.9 EXTRA MATERIALS

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

1. Acoustical Ceiling Panels: Full-size panels equal to 2.0 percent of quantity installed.
2. Suspension System Components: Quantity of each exposed component equal to 2.0 percent of quantity installed.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. In other Part 2 articles where titles below introduce lists, the following requirements apply for product selection:
1. Products: Subject to compliance with requirements, provide the product specified. (Due to LEED certifications for products.)
2. Manufacturers: Subject to compliance with requirements, provide product by the manufacturer specified.

2.2 ACOUSTICAL PANELS, GENERAL

A. Acoustical Panel Standard: Provide manufacturer's standard panels of configuration indicated that comply with ASTM E 1264 classifications as designated by types, patterns, acoustical ratings, and light reflectances, unless otherwise indicated.

1. Mounting Method for Measuring NRC: Type E-400; plenum mounting in which face of test specimen is 15-3/4 inches (400 mm) away from test surface per ASTM E 795.

B. Acoustical Panel Colors and Patterns: Match appearance characteristics indicated for each product type.

1. Where appearance characteristics of acoustical panels are indicated by referencing pattern designations in ASTM E 1264 and not manufacturers' proprietary product designations, provide products selected by Architect from each manufacturer's full range that comply with requirements indicated for type, pattern, color, light reflectance, acoustical performance, edge detail, and size.

C. Coating-Based Antimicrobial Treatment: Provide acoustical panels with face and back surfaces coated with antimicrobial treatment consisting of manufacturer's standard formulation with fungicide added to inhibit growth of mold and mildew and showing no mold or mildew growth when tested according to ASTM D 3273.

D. Panel-Based Antimicrobial Treatment: Provide acoustical panels treated with manufacturer's standard antimicrobial solution that inhibits fungus, mold, mildew, and gram-positive and gram-negative bacteria.

2.3 WATER-FELTED, MINERAL-BASE ACOUSTICAL PANELS FOR ACOUSTICAL PANEL CEILING- ACT1

A. Product:

1. Armstrong, "Cirrus", 538.

B. Classification: Provide panels complying with ASTM E 1264 for Type III, mineral base with painted finish; Form 1, water felted; and pattern as follows:

1. Pattern: E1 (lightly textured).

C. Color: White.

D. LR: Not less than 0.86.

E. NRC: Not less than 0.65.

F. CAC: Not less than 38.

G. Edge Detail: Beveled tegular.

H. Thickness: 7/8 inch.

I. Size: 24 by 24 inches (610 by 610 mm).

J. Antimicrobial Treatment: Coating based.

2.4 WATER-FELTED, MINERAL-BASE ACOUSTICAL PANELS FOR ACOUSTICAL PANEL CEILING- ACT2

A. Product:

1. Armstrong, "Fine Fissured, Square Lay-in" No. 1728.

B. Classification: Provide panels complying with ASTM E 1264 for Type III, mineral base with painted finish; Form 2, water felted; and pattern as follows:

1. Pattern: CE.

C. Color: White.

D. LR: Not less than 0.85.

E. NRC: Not less than 0.55.

F. CAC: Not less than 33.

G. Edge Detail: Square.

H. Thickness: 5/8 inch.

I. Size: 24 by 24 inches (610 by 610 mm).

2.5 METAL SUSPENSION SYSTEMS, GENERAL

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

B. Finishes and Colors, General: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes. Provide manufacturer's standard factory-applied finish for type of system indicated.

1. High-Humidity Finish: Comply with ASTM C 635 requirements for "Coating Classification for Severe Environment Performance" where high-humidity finishes are indicated.

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

D. Wire Hangers, Braces, and Ties: Provide wires complying with the following requirements:

1. Zinc-Coated Carbon-Steel Wire: ASTM A 641/A 641M, Class 1 zinc coating, soft temper.
2. Size: Select wire diameter so its stress at three times hanger design load (ASTM C 635, Table 1, "Direct Hung") will be less than yield stress of wire, but provide not less than 0.106-inch- (2.69-mm-) diameter wire.

E. Angle Hangers: Angles with legs not less than 7/8 inch (22 mm) wide; formed with 0.04-inch- (1-mm-) thick, galvanized steel sheet complying with ASTM A 653/A 653M, G90 (Z275) coating designation; with bolted connections and 5/16-inch- (8-mm-) diameter bolts.

2.6 METAL SUSPENSION SYSTEM FOR ACOUSTICAL PANEL CEILING

A. Available Products:

1. Armstrong, Suprafine XL. (25% recycled content) at ACT1

2. Armstrong, Prelude XL 15/16". (25% recycled content) at ACT2.

B. Narrow-Face, Capped, Double-Web, Steel Suspension System: Main and cross runners roll formed from cold-rolled steel sheet, prepainted, electrolytically zinc coated, or hot-dip galvanized according to ASTM A 653/653M, not less than G30 (Z90) coating designation, with prefinished 9/16-inch- (15-mm-) wide metal caps on flanges.

1. Structural Classification: Intermediate-duty system.
2. End Condition of Cross Runners: Override type.
3. Face Design: Flat, flush.

4. Cap Material: Steel cold-rolled sheet.
5. Cap Finish: Painted white.

2.7 METAL EDGE MOLDINGS AND TRIM

A. Manufacturer:

1. Armstrong World Industries, Inc.

B. Roll-Formed Sheet-Metal Edge Moldings and Trim: Type and profile indicated or, if not indicated, manufacturer's standard moldings for edges and penetrations that fit acoustical panel edge details and suspension systems indicated; formed from sheet metal of same material, finish, and color as that used for exposed flanges of suspension system runners.

1. For lay-in panels with reveal edge details, provide stepped edge molding that forms reveal of same depth and width as that formed between edge of panel and flange at exposed suspension member.
2. For narrow-face suspension systems, provide suspension system and manufacturer's standard edge moldings that match width and configuration of exposed runners.

2.8 ACOUSTICAL SEALANT

A. Available Products:

1. Acoustical Sealant for Exposed and Concealed Joints:

a. Pecora Corp; AC-20 FTR Acoustical and Insulation Sealant.
b. United States Gypsum Co.; SHEETROCK Acoustical Sealant.

2. Acoustical Sealant for Concealed Joints:

a. OSI Sealants, Inc.; Pro-Series SC-170 Rubber Base Sound Sealant.
b. OSI Sealants, Inc.; Pro-Series SC-175 Rubber Base Sound Sealant.
c. Pecora Corp.; BA-98.
d. Tremco, Inc.; Tremco Acoustical Sealant.

B. Acoustical Sealant for Exposed and Concealed Joints: Manufacturer's standard nonsag, paintable, nonstaining latex sealant, with a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24), complying with ASTM C 834 and effective in reducing airborne sound transmission through perimeter joints and openings in building construction as demonstrated by testing representative assemblies according to ASTM E 90.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, including structural framing to which acoustical panel ceilings attach or abut, with Installer present, for compliance with requirements specified in this and other Sections that affect ceiling installation and anchorage and with requirements for installation tolerances and other conditions affecting performance of acoustical panel ceilings.

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

3.2 PREPARATION

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

3.3 INSTALLATION, GENERAL

A. General: Install acoustical panel ceilings to comply with ASTM C 636 and seismic requirements indicated, per manufacturer's written instructions and CISCA's "Ceiling Systems Handbook."

B. Suspend ceiling hangers from building's structural members and as follows:

1. Install hangers plumb and free from contact with insulation or other objects within ceiling plenum that are not part of supporting structure or of ceiling suspension system.
2. Splay hangers only where required to miss obstructions; offset resulting horizontal forces by bracing, countersplaying, or other equally effective means.
3. Where width of ducts and other construction within ceiling plenum produces hanger spacings that interfere with location of hangers at spacings required to support standard suspension system members, install supplemental suspension members and hangers in form of trapezes or equivalent devices. Size supplemental suspension members and hangers to support ceiling loads within performance limits established by referenced standards and publications.
4. Secure wire hangers to ceiling suspension members and to supports above with a minimum of three tight turns. Connect hangers directly either to structures or to inserts, eye screws, or other devices that are secure and appropriate for substrate and that will not deteriorate or otherwise fail due to age, corrosion, or elevated temperatures.
5. Do not support ceilings directly from permanent metal forms or floor deck. Fasten hangers to cast-in-place hanger inserts, postinstalled mechanical or adhesive anchors, or power-actuated fasteners that extend through forms into concrete.
6. Do not attach hangers to steel deck tabs.
7. Do not attach hangers to steel roof deck. Attach hangers to structural members.
8. Space hangers not more than 48 inches (1200 mm) o.c. along each member supported directly from hangers, unless otherwise indicated; provide hangers not more than 8 inches (200 mm) from ends of each member.

C. Secure bracing wires to ceiling suspension members and to supports with a minimum of four tight turns. Suspend bracing from building's structural members as required for hangers, without attaching to permanent metal forms, steel deck, or steel deck tabs. Fasten bracing wires into concrete with cast-in-place or postinstalled anchors.

D. Install edge moldings and trim of type indicated at perimeter of acoustical ceiling area and where necessary to conceal edges of acoustical panels.

1. Apply acoustical sealant in a continuous ribbon concealed on back of vertical legs of moldings before they are installed.
2. Screw attach moldings to substrate at intervals not more than 16 inches (400 mm) o.c. and not more than 3 inches (75 mm) from ends, leveling with ceiling suspension system to a tolerance of 1/8 inch in 12 feet (3.2 mm in 3.66 m). Miter corners accurately and connect securely.
3. Do not use exposed fasteners, including pop rivets, on moldings and trim.

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

F. Install acoustical panels with undamaged edges and fit accurately into suspension system runners and edge moldings. Scribe and cut panels at borders and penetrations to provide a neat, precise fit.
1. For reveal-edged panels on suspension system runners, install panels with bottom of reveal in firm contact with top surface of runner flanges.
2. Paint cut edges of panel remaining exposed after installation; match color of exposed panel surfaces using coating recommended in writing for this purpose by acoustical panel manufacturer.

G. Remove and replace acoustical panel ceiling hangers where test results indicate that they do not comply with specified requirements.

3.4 CLEANING

A. Clean exposed surfaces of acoustical panel ceilings, including trim, edge moldings, and suspension system members. Comply with manufacturer's written instructions for cleaning and touchup of minor finish damage. Remove and replace ceiling components that cannot be successfully cleaned and repaired to permanently eliminate evidence of damage.

END OF SECTION 09511

SECTION 09640

WOOD FLOORING

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 Factory-finished wood flooring.

B. Related Sections include the following:

1. Division 1 Section "LEED Requirements" for additional LEED requirements.

1.3 SUBMITTALS

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

B. Shop Drawings: Show installation details including location and layout of each type of wood flooring and accessory.

C. Samples for Verification: For each type of wood flooring and accessory, with stain color and finish required, approximately 12 inches (300 mm) long and of same thickness and material indicated for the Work and showing the full range of normal color and texture variations expected.

D. LEED Submittals:

1. Credit EQ 4.1: Manufacturers' product data for wood flooring installation adhesives, including printed statement of VOC content.
2. Credit EQ 4.4: Composite wood manufacturer's product data for each composite wood product used indicating that the bonding agent contains no urea formaldehyde.
3. Credit MR 6: Manufacturer's certification that wood flooring is a rapidly renewable material.

1.4 QUALITY ASSURANCE

A. Source Limitations: For field-finished wood flooring, obtain each species, grade, and cut of wood from one source with resources to provide materials and products of consistent quality in appearance and physical properties.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver wood flooring materials in unopened cartons or bundles.

B. Protect wood flooring from exposure to moisture. Do not deliver wood flooring until after concrete, masonry, plaster, ceramic tile, and similar wet work is complete and dry.

C. Store wood flooring materials in a dry, warm, ventilated, weathertight location.

1.6 PROJECT CONDITIONS

A. Conditioning period begins not less than seven days before wood flooring installation, is continuous through installation, and continues not less than seven days after wood flooring installation.

1. Environmental Conditioning: Maintain an ambient temperature between 65 and 75 deg F (18 and 24 deg C) and relative humidity planned for building occupants in spaces to receive wood flooring during the conditioning period.
2. Wood Flooring Conditioning: Move wood flooring into spaces where it will be installed, no later than the beginning of the conditioning period.

a. Do not install flooring until it adjusts to relative humidity of, and is at same temperature as, space where it is to be installed.
b. Open sealed packages to allow wood flooring to acclimatize immediately on moving flooring into spaces in which it will be installed.

B. After conditioning period, maintain relative humidity and ambient temperature planned for building occupants.

C. Install factory-finished wood flooring after other finishing operations, including painting, have been completed.

1.7 EXTRA MATERIALS

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

1. Wood Flooring: Equal to 1 percent of amount installed for each type of wood flooring indicated.

PART 2 - PRODUCTS

2.1 FACTORY-FINISHED WOOD FLOORING

A. Solid-Wood, Strip Flooring: Kiln dried to 6 to 9 percent maximum moisture content; tongue and groove and end matched; and with backs channeled (kerfed) for stress relief.
1. Products: Subject to compliance with requirements, provide the following:

a. TimberGrass; Carmelized, Flat Grain. Distributed by NRF Distributors – Hardwood Division (Augusta, Maine) 800-777-2037.

2. Species: Bamboo, Moso species.
3. Thickness: 5/8 inch.
4. Face Width: 3-5/8 inches.
5. Lengths: Random-length strips.
6. Edge Style: Micro-Bevel.
7. Finish: UV urethane system.

2.2 ACCESSORY MATERIALS

A. Wood Flooring Adhesive: Mastic recommended by flooring and adhesive manufacturers for application indicated.

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

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas and conditions, with Installer present, for compliance with requirements for maximum moisture content, installation tolerances, and other conditions affecting performance of wood flooring.

1. Verify that substrates comply with tolerances and other requirements specified in other Sections.
2. For adhesively applied wood flooring, verify that substrates are free of cracks, ridges, depressions, scale, and foreign deposits that might interfere with adhesion of resilient products.
3. Proceed with installation only after unsatisfactory conditions have been corrected.

B. Concrete Moisture Testing: Perform anhydrous calcium chloride test per ASTM F 1869, as follows:

1. Perform tests so that each test area does not exceed 200 sq. ft. (18.6 sq. m) and perform not less than 2 tests in each installation area with test areas evenly spaced in installation area.
2. Proceed with installation only after substrates have maximum moisture-vapor-emission rate of 3 lb of water/1000 sq. ft. (1.36 kg of water/92.9 sq. m) in 24 hours.

3.2 PREPARATION

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

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

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

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

3.3 INSTALLATION

A. Comply with flooring manufacturer's written installation instructions, but not less than applicable recommendations in NWFA's "Installation Guidelines: Wood Flooring."

B. Provide expansion space at walls and other obstructions and terminations of flooring as recommended by flooring manufacturer.

C. Asphalt-Saturated Felt: Where strip or plank flooring is nailed to solid-wood subfloor, install flooring over a layer of asphalt-saturated felt.

D. Vapor Retarder:

1. Wood Flooring Nailed to Sleepers over Concrete: Install flooring over a layer of polyethylene sheet with edges overlapped over sleepers and turned up behind baseboards.
2. Wood Flooring Installed Directly on Concrete: Install a layer of polyethylene sheet according to flooring manufacturer's written instructions.

E. Solid-Wood Strip Flooring: Set in adhesive.

F. Wood Trim: Nail baseboard to wall and nail shoe molding or other trim to baseboard; do not nail to flooring.

3.4 PROTECTION

A. Protect installed wood flooring during remainder of construction period with covering of heavy kraft paper or other suitable material. Do not use plastic sheet or film that might cause condensation.

1. Do not move heavy and sharp objects directly over kraft-paper-covered wood flooring. Protect flooring with plywood or hardboard panels to prevent damage from storing or moving objects over flooring.

END OF SECTION 09640

SECTION 09653

RESILIENT WALL BASE AND ACCESSORIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes the following:

1. Wall base.
2. Stair accessories.
3. Molding accessories.
4. Recycled rubber floor tiles.

B. Related Sections include the following:

1. Division 1 Section "LEED Requirements" for additional LEED requirements.

1.3 SUBMITTALS

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

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

C. LEED Submittals:

1. Credit EQ 4.1: Manufacturers' product data for adhesives, including printed statement of VOC content.

2. Credit MR 4.1: Manufacturer's certification of recycled or post industrial content of products.

1.4 QUALITY ASSURANCE

A. Fire-Test-Response Characteristics: Provide resilient stair accessories with a critical radiant flux classification of Class I, not less than 0.45 W/sq. cm, as determined by testing identical products per ASTM E 648 by a testing and inspecting agency acceptable to authorities having jurisdiction.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Store resilient products and installation materials in dry spaces protected from the weather, with ambient temperatures maintained within range recommended by manufacturer, but not less than 50 deg F (10 deg C) or more than 90 deg F (32 deg C).

1.6 PROJECT CONDITIONS

A. Maintain temperatures within range recommended by manufacturer, but not less than 70 deg F (21 deg C) or more than 95 deg F (35 deg C), in spaces to receive floor tile during the following time periods:

1. 48 hours before installation.
2. During installation.
3. 48 hours after installation.

B. After postinstallation period, maintain temperatures within range recommended by manufacturer, but not less than 55 deg F (13 deg C) or more than 95 deg F (35 deg C).

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

1.7 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. Furnish not less than 10 linear feet (3 linear m) for every 500 linear feet (150 linear m) or fraction thereof, of each type, color, pattern, and size of resilient product installed.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, products listed in other Part 2 articles.

2.2 COLORS AND PATTERNS

A. Colors and Patterns: As selected by Architect from manufacturer's full range.

2.3 RESILIENT WALL BASE

A. Wall Base: ASTM F 1861.
1. Burke Mercer Flooring Products; Vinyl Wall base Type TV.

2. Johnsonite; Vinyl Wall Base (ColorMatch).
3. Roppe Corporation; Vinyl Base.

B. Type (Material Requirement): TV (vinyl).

C. Group (Manufacturing Method): I (solid, homogeneous).

D. Style: Cove (with top-set toe).

E. Minimum Thickness: 0.125 inch (3.2 mm).

F. Height: 4 inches (102 mm).

G. Lengths: Coils in manufacturer's standard length..

H. Outside Corners: Job formed.

I. Inside Corners: Job formed.

J. Surface: Smooth.

2.4 RECYCLED RUBBER FLOOR TILE

A. Product: EcoPave by Dodge-Regupol, Inc. (877-326-7873)

B. Color: To be selected.

C. Size: Square tile, 2' x 2' x 5/8" thick.

2.5 RESILIENT STAIR ACCESSORIES

A. Treads: FS RR-T-650.

1. Endura; Flecksible Sculptured One-Step.
2. Johnsonite; Roundel Speckled, Hammer Finish, One piece.
3. Roppe Corporation; Fiesta Treads.

B. Material: Rubber, Composition A.

C. Surface Design: Type Textured or Hammered.

D. Nosing Style: Square, adjustable to cover angles between 60 and 90 degrees.

E. Nosing Height: 1-1/2 inches (38 mm).

F. Thickness: 3/16".

G. Size: Lengths and depths to fit each stair tread in one piece.

H. Risers: Smooth, flat, toeless, height and length to cover risers; produced by same manufacturer as treads and recommended by manufacturer for installation with treads.

1. Thickness: 0.125 inch (3.2 mm).

2.6 RESILIENT MOLDING ACCESSORY

A. Description: Carpet edge for glue-down applications, Reducer strip for resilient floor covering and Joiner for tile and carpet.

B. Material: Vinyl.

C. Color: Selected from manufacturer's full range of colors.

D. Profile and Dimensions: As required.

2.7 INSTALLATION MATERIALS

A. Trowelable Leveling and Patching Compounds: Latex-modified, portland cement based or blended hydraulic cement based formulation provided or approved by resilient product manufacturers for applications indicated.

B. Adhesives: Water-resistant type recommended by manufacturer to suit resilient products and substrate conditions indicated.

1. Use adhesives that comply with the following limits for VOC content when calculated according to 40 CFR 59, Subpart D (EPA Method 24):

a. Cove Base Adhesives: 50 g/L.
b. Rubber Floor Adhesives: 60 g/L.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, with Installer present, for compliance with requirements for installation tolerances, moisture content, and other conditions affecting performance.

1. Verify that finishes of substrates comply with tolerances and other requirements specified in other Sections and that substrates are free of cracks, ridges, depressions, scale, and foreign deposits that might interfere with adhesion of resilient products.
2. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Prepare substrates according to manufacturer's written recommendations to ensure adhesion of resilient products.

B. Concrete Substrates for Stair Accessories: Prepare according to ASTM F 710.

1. Verify that substrates are dry and free of curing compounds, sealers, and hardeners.
2. Alkalinity and Adhesion Testing: Perform tests recommended by manufacturer. Proceed with installation only after substrates pass testing.
3. Moisture Testing:

a. Perform anhydrous calcium chloride test, ASTM F 1869. Proceed with installation only after substrates have maximum moisture-vapor-emission rate of 3 lb of water/1000 sq. ft. (1.36 kg of water/92.9 sq. m) in 24 hours.
b. Perform tests recommended by manufacturer. Proceed with installation only after substrates pass testing.

C. Remove substrate coatings and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, using mechanical methods recommended by manufacturer. Do not use solvents.

D. Use trowelable leveling and patching compound to fill cracks, holes, and depressions in substrates.

E. Move resilient products and installation materials into spaces where they will be installed at least 48 hours in advance of installation.

1. Do not install resilient products until they are the same temperature as the space where they are to be installed.

F. Sweep and vacuum clean substrates to be covered by resilient products immediately before installation. After cleaning, examine substrates for moisture, alkaline salts, carbonation, and dust. Proceed with installation only after unsatisfactory conditions have been corrected.

3.3 RESILIENT WALL BASE INSTALLATION

A. Apply wall base to walls, columns, pilasters, casework and cabinets in toe spaces, and other permanent fixtures in rooms and areas where base is required.

B. Install wall base in lengths as long as practicable without gaps at seams and with tops of adjacent pieces aligned.

C. Tightly adhere wall base to substrate throughout length of each piece, with base in continuous contact with horizontal and vertical substrates.

D. Do not stretch wall base during installation.

E. Job-Formed Corners:

1. Outside Corners: Use straight pieces of maximum lengths possible. Form without producing discoloration (whitening) at bends. Shave back of base at points where bends occur and remove strips perpendicular to length of base that are only deep enough to produce a snug fit without removing more than half the wall base thickness.

2. Inside Corners: Use straight pieces of maximum lengths possible. Form by cutting an inverted V-shaped notch in toe of wall base at the point where corner is formed. Shave back of base where necessary to produce a snug fit to substrate.

3.4 RESILIENT ACCESSORY INSTALLATION

A. Resilient Stair Accessories:

1. Use stair-tread-nose filler to fill nosing substrates that do not conform to tread contours.
2. Tightly adhere to substrates throughout length of each piece.

B. Resilient Molding Accessories: Butt to adjacent materials and tightly adhere to substrates throughout length of each piece. Install reducer strips at edges of floor coverings that would otherwise be exposed.

3.5 CLEANING AND PROTECTION

A. Perform the following operations immediately after completing resilient product installation:

1. Remove adhesive and other blemishes from exposed surfaces.
2. Sweep and vacuum surfaces thoroughly.
3. Damp-mop surfaces to remove marks and soil.

   a. Do not wash surfaces until after time period recommended by manufacturer.

B. Protect resilient products from mars, marks, indentations, and other damage from construction operations and placement of equipment and fixtures during remainder of construction period. Use protection methods recommended in writing by manufacturer.

1. Apply protective floor polish to stair accessory surfaces that are free from soil, visible adhesive, and surface blemishes if recommended in writing by manufacturer.

   a. Use commercially available product acceptable to manufacturer.
   b. Coordinate selection of floor polish with Owner's maintenance service.

2. Cover stair accessory products with undyed, untreated building paper until Substantial Completion.
3. Do not move heavy and sharp objects directly over stair accessories. Place plywood or hardboard panels over surfaces and under objects while they are being moved. Slide or roll objects over panels without moving panels.

END OF SECTION 09653

SECTION 09654

LINOLEUM FLOOR COVERINGS

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 linoleum floor tile.

B. Related Sections include the following:

1. Division 1 Section "LEED Requirements" for additional LEED requirements.
2. Division 9 Section "Resilient Wall Base and Accessories" for resilient wall base, reducer strips, and other accessories installed with linoleum floor coverings.

1.3 SUBMITTALS

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

B. Samples for Initial Selection: For each type of linoleum floor covering indicated.

1. Include similar Samples of installation accessories involving color selection.

C. LEED Submittals:

1. Credit EQ 4.1: Manufacturers' product data for adhesives, including printed statement of VOC content.

D. Maintenance Data: For linoleum floor coverings to include in maintenance manuals.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Store floor coverings and installation materials in dry spaces protected from the weather, with ambient temperatures maintained within range recommended by manufacturer, but not less than 50 deg F (10 deg C) or more than 90 deg F (32 deg C).

1. Floor Tile: Store on flat surfaces.

1.5 PROJECT CONDITIONS

A. Maintain temperatures within range recommended by manufacturer, but not less than 70 deg F (21 deg C or more than 95 deg F (35 deg C), in spaces to receive floor tile during the following time periods:

1. 72 hours before installation.
2. During installation.
3. 72 hours after installation.

B. After postinstallation period, maintain temperatures within range recommended by manufacturer, but not less than 55 deg F (13 deg C) or more than 95 deg F (35 deg C).

C. Close spaces to traffic during floor covering installation.

D. Close spaces to traffic for 72 hours after floor covering installation.

E. Install floor coverings after other finishing operations, including painting, have been completed.

1.6 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. Floor Tile: Furnish one box for every 50 boxes or fraction thereof of each type, color, and pattern of floor tile installed.

PART 2 - PRODUCTS

2.1 LINOLEUM FLOOR COVERING

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

B. Products: Subject to compliance with requirements, provide one of the following:
1. Forbo Industries, Inc.; Dual.
2. Tarkett , Linoleum Tile.

C. Color and Pattern: As selected by Architect from manufacturer's full range. Install in pattern detailed on Construction Documents.

D. Tile: Solidified mixture of linoleum cement binder (linseed oil and pine, fossil, or other resins or rosins, or equivalent oxidized oleoresinous binder) and ground cork, wood flour, mineral fillers, and pigments bonded to a fibrous or other suitable backing so that backing is partially embedded in mixture. Patterns and colors extend through entire wear-layer thickness.

1. Nominal Tile Size: 20 by 20 inches. (approximately, varies by manufacturer)

E. Thickness: 0.10 inch (2.5 mm).

F. Fire-Test-Response Characteristics:

1. Critical Radiant Flux Classification: Class I, not less than 0.45 W/sq. cm per ASTM E 648.

2.2 INSTALLATION MATERIALS

A. Trowelable Leveling and Patching Compounds: Latex-modified, portland cement based or blended hydraulic cement based formulation provided or approved by floor covering manufacturer for applications indicated.

B. Adhesives: Water-resistant type recommended by floor covering manufacturer for products and substrate conditions indicated.

1. Use adhesives that comply with the following limits for VOC content when calculated according to 40 CFR 59, Subpart D (EPA Method 24):

a. VCT and Asphalt Tile Adhesives: 50 g/L.
b. Rubber Floor Adhesives: 60 g/L.

C. Metal Edge Strips: Extruded aluminum with mill finish, of width shown, of height required to protect exposed edge of floor covering, and in maximum available lengths to minimize running joints.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, with Installer present, for compliance with requirements for installation tolerances, moisture content, and other conditions affecting performance.

1. Verify that finishes of substrates comply with tolerances and other requirements specified in other Sections and that substrates are free of cracks, ridges, depressions, scale, and foreign deposits that might interfere with adhesion of floor coverings.
2. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Prepare substrates according to manufacturer's written recommendations to ensure adhesion of floor coverings.

B. Concrete Substrates: Prepare according to ASTM F 710.

1. Verify that substrates are dry and free of curing compounds, sealers, and hardeners.
2. Alkalinity and Adhesion Testing: Perform tests recommended by manufacturer. Proceed with installation only after substrates pass testing.
3. Moisture Testing:

a. Perform anhydrous calcium chloride test, ASTM F 1869. Proceed with installation only after substrates have maximum moisture-vapor-emission rate of 3 lb of water/1000 sq. ft. (1.36 kg of water/92.9 sq. m) in 24 hours.
b. Perform tests recommended by manufacturer. Proceed with installation only after substrates pass testing.

C. Remove substrate coatings and other substances that are incompatible with floor covering adhesives and that contain soap, wax, oil, or silicone, using mechanical methods recommended by manufacturer. Do not use solvents.

D. Use trowelable leveling and patching compound to fill cracks, holes, and depressions in substrates.

E. Move floor coverings and installation materials into spaces where they will be installed at least 72 hours in advance of installation.

1. Do not install floor coverings until they are same temperature as space where they are to be installed.

F. Sweep and vacuum clean substrates to be covered by floor coverings immediately before installation. After cleaning, examine substrates for moisture, alkaline salts, carbonation, and dust. Proceed with installation only after unsatisfactory conditions have been corrected.

3.3 INSTALLATION, GENERAL

A. Scribe and cut floor coverings to butt neatly and tightly to vertical surfaces, permanent fixtures, and built-in furniture including cabinets, pipes, outlets, edgings, thresholds, and nosings.

B. Extend floor coverings into toe spaces, door reveals, closets, and similar openings.

C. Maintain reference markers, holes, or openings that are in place or marked for future cutting by repeating on floor coverings as marked on subfloor. Use chalk or other nonpermanent marking device.

D. Install floor coverings on covers for telephone and electrical ducts and similar items in finished floor areas. Maintain overall continuity of color and pattern with pieces of floor coverings installed on covers. Tightly adhere floor covering edges to substrates that abut covers and to cover perimeters.

E. Adhere floor coverings to substrates using a full spread of adhesive applied to substrate to produce a completed installation without open cracks, voids, raising and puckering at joints, telegraphing of adhesive spreader marks, and other surface imperfections.

3.4 TILE INSTALLATION

A. Lay out tiles from center marks established with principal walls, discounting minor offsets, so tiles at opposite edges of room are of equal width. Adjust as necessary to avoid using cut widths that equal less than one-half tile at perimeter.

1. Lay tiles square with room axis.

B. Match tiles for color and pattern by selecting tiles from cartons in same sequence as manufactured and packaged, if so numbered. Discard broken, cracked, chipped, or deformed tiles.

1. Lay tiles in pattern of colors and sizes indicated.

3.5 CLEANING AND PROTECTION

A. Perform the following operations immediately after installing floor coverings:

1. Remove adhesive and other surface blemishes from floor covering surfaces.
2. Sweep and vacuum floor coverings thoroughly.
3. Damp-mop floor coverings to remove marks and soil.

a. Do not wash floor coverings until after time period recommended by manufacturer.

B. Protect floor coverings against mars, marks, indentations, and other damage from construction operations and placement of equipment and fixtures during remainder of construction period. Use protection methods indicated or recommended in writing by manufacturer.

1. Apply protective floor polish to surfaces that are free of soil, visible adhesive, and surface blemishes.

a. Seal linoleum as recommended by manufacturer but with not less than two coats of floor polish.
b. Use commercially available product acceptable to manufacturer.
c. Coordinate selection of floor polish with Owner's maintenance service.

2. Cover linoleum floor coverings with undyed, untreated building paper until inspection for Substantial Completion.

a. Allow drying room film (yellow film caused by linseed oil oxidation) to disappear before Substantial Completion.

3. Do not move heavy and sharp objects directly over floor covering surfaces. Place plywood or hardboard panels over floor coverings and under objects while they are being moved. Slide or roll objects over panels without moving panels.

END OF SECTION 09654

SECTION 09680

CARPET

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. Tufted carpet.

B. Related Sections include the following:

1. Division 1 Section "LEED Requirements" for additional LEED requirements.
2. Division 9 Section "Resilient Wall Base and Accessories" for resilient wall base and accessories installed with carpet.

1.3 SUBMITTALS

A. Product Data: For the following, including installation recommendations for each type of substrate:

1. Carpet: For each type indicated. Include manufacturer's written data on physical characteristics, durability, and fade resistance.

B. Samples: For each of the following products and for each color and texture required. Label each Sample with manufacturer's name, material description, color, pattern, and designation indicated on Drawings and in schedules.

1. Carpet: 12-inch- (300-mm-) square Sample.

C. LEED Submittals:

1. Credit EQ 4.3: Manufacturers' product data for carpet and installation adhesive, including printed statement of VOC content.

2. Credit MR 4.1: Manufacturer's certification of recycled or post industrial content of products.

D. Maintenance Data: For carpet to include in maintenance manuals. Include the following:

1. Methods for maintaining carpet, including cleaning and stain-removal products and procedures and manufacturer's recommended maintenance schedule.
2. Precautions for cleaning materials and methods that could be detrimental to carpet.

E. Warranties: Special warranties specified in this Section.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Comply with CRI 104, Section 5, "Storage and Handling."

1.5 PROJECT CONDITIONS

A. Comply with CRI 104, Section 7.2, "Site Conditions; Temperature and Humidity" and Section 7.12, "Ventilation."

B. Environmental Limitations: Do not install carpet until wet work in spaces is complete and dry, and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.

C. Do not install carpet over concrete slabs until slabs have cured, are sufficiently dry to bond with adhesive, and have pH range recommended by carpet manufacturer.

D. Where demountable partitions or other items are indicated for installation on top of carpet, install carpet before installing these items.

1.6 WARRANTY

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

1. Warranty does not include deterioration or failure of carpet due to unusual traffic, failure of substrate, vandalism, or abuse.
2. Failures include, but are not limited to, more than 10 percent loss of face fiber, edge raveling, snags, runs, loss of tuft bind strength and delamination.
3. Warranty Period: Lifetime fiber warranty.

1.7 EXTRA MATERIALS

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

1. Carpet: Full-width rolls equal to 5 percent of amount installed for each type indicated, but not less than 10 sq. yd. (8.3 sq. m).

PART 2 - PRODUCTS

2.1 TUFTED CARPET

A. Products: Subject to compliance with requirements, provide the following:

1. J&J Commercial.

a. Color: As selected by Architect from manufacturer's full range.
b. Pattern: Xtra Terrestrial.

B. Fiber Content: 100 percent nylon, J&J Encore SD Ultima.

C. Pile Characteristic: Dense textured loop pile.

D. Pile Thickness: .131 inches.

E. Gage: 1/10.

F. Face Weight: 30oz./sq. yd.

G. Primary Backing: Woven synthetic.

H. Secondary Backing: Manufacturer's standard material.

I. Width: 12 feet (3.7 m).

J. Applied Soil-Resistance Treatment: Manufacturer's standard material.

K. Antimicrobial Treatment: Manufacturer's standard material.

L. Performance Characteristics: As follows:

1. Critical Radiant Flux Classification: Not less than 0.45 W/sq. cm.
2. Electrostatic Propensity: Less than 3.0 kV per AATCC 134.
3. VOC Limits: Provide carpet that complies with the following limits for VOC content when tested according to ASTM D 5116:

a. Total VOCs: 0.5 mg/sq. m x h.
b. 4-PC (4-Phenylcyclohexene): 0.05 mg/sq. m x h.
c. Formaldehyde: 0.05 mg/sq. m x h.
d. Styrene: 0.4 mg/sq. m x h.

2.2 INSTALLATION ACCESSORIES

A. Trowelable Leveling and Patching Compounds: Latex-modified, hydraulic-cement-based formulation provided or recommended by carpet manufacturer.

B. Adhesives: Water-resistant, mildew-resistant, nonstaining type to suit products and subfloor conditions indicated, that complies with flammability requirements for installed carpet and is recommended or provided by carpet manufacturer.

1. VOC Limits: Provide adhesives that comply with the following limits for VOC content when tested according to ASTM D 5116:

a. Total VOCs: 10.00 mg/sq. m x h.
b. Formaldehyde: 0.05 mg/sq. m x h.
c. 2-Ethyl-1-Hexanol: 3.00 mg/sq. m x h.

C. Seam Adhesive: Hot-melt adhesive tape or similar product recommended by carpet manufacturer for sealing and taping seams and butting cut edges at backing to form secure seams and to prevent pile loss at seams.

D. Metal Edge Strips: Extruded aluminum with mill finish of width shown, of height required to protect exposed edge of carpet, and of maximum lengths to minimize running joints.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for maximum moisture content, alkalinity range, installation tolerances, and other conditions affecting carpet performance. Examine carpet for type, color, pattern, and potential defects.

B. Concrete Subfloors: Verify that concrete slabs comply with ASTM F 710 and the following:

1. Slab substrates are dry and free of curing compounds, sealers, hardeners, and other materials that may interfere with adhesive bond. Determine adhesion and dryness characteristics by performing bond and moisture tests recommended by carpet[**cushion**] manufacturer.
2. Subfloor finishes comply with requirements specified in Division 3 Section "Cast-in-Place Concrete" for slabs receiving carpet.
3. Subfloors are free of cracks, ridges, depressions, scale, and foreign deposits.

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

3.2 PREPARATION

A. General: Comply with CRI 104, Section 7.3, "Site Conditions; Floor Preparation," and with carpet manufacturer's written installation instructions for preparing substrates.

B. Use trowelable leveling and patching compounds, according to manufacturer's written instructions, to fill cracks, holes, depressions, and protrusions in substrates. Fill or level cracks, holes and depressions 1/8 inch (3 mm) wide or wider, and protrusions more than 1/32 inch (0.8 mm), unless more stringent requirements are required by manufacturer's written instructions.

C. Remove coatings, including curing compounds, and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, without using solvents. Use mechanical methods recommended in writing by carpet manufacturer.

D. Broom and vacuum clean substrates to be covered immediately before installing carpet.

3.3 INSTALLATION

A. Comply with CRI 104 and carpet manufacturer's written installation instructions for the following:

1. Direct-Glue-Down Installation: Comply with CRI 104, Section 9, "Direct Glue-Down Installation."

B. Cut and fit carpet to butt tightly to vertical surfaces, permanent fixtures, and built-in furniture including cabinets, pipes, outlets, edgings, thresholds, and nosings. Bind or seal cut edges as recommended by carpet manufacturer.

C. Extend carpet into toe spaces, door reveals, closets, open-bottomed obstructions, removable flanges, alcoves, and similar openings.

D. Maintain reference markers, holes, and openings that are in place or marked for future cutting by repeating on finish flooring as marked on subfloor. Use nonpermanent, nonstaining marking device.

E. Install pattern parallel to walls and borders to comply with CRI 104, Section 15, "Patterned Carpet Installations" and with carpet manufacturer's written recommendations.

3.4 CLEANING AND PROTECTING

A. Perform the following operations immediately after installing carpet:

1. Remove excess adhesive, seam sealer, and other surface blemishes using cleaner recommended by carpet manufacturer.
2. Remove yarns that protrude from carpet surface.
3. Vacuum carpet using commercial machine with face-beater element.

B. Protect installed carpet to comply with CRI 104, Section 16, "Protection of Indoor Installations."

C. Protect carpet against damage from construction operations and placement of equipment and fixtures during the remainder of construction period. Use protection methods indicated or recommended in writing by carpet manufacturer.

END OF SECTION 09680

SECTION 09720

WALL COVERINGS

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. Vinyl wall covering.

B. Related Sections include the following:

1. Division 1 Section "LEED Requirements" for additional LEED requirements.
2. Division 9 Section "Painting (Professional Line Products)" for priming wall surfaces.

1.3 SUBMITTALS

A. Product Data: For each type of product indicated. Include data on physical characteristics, durability, fade resistance, and flame-resistance characteristics.

B. Samples for Initial Selection: For each type of wall covering indicated.

C. LEED Submittals:

1. Credit EQ 4.1: Manufacturers' product data for adhesives, including printed statement of VOC content.

D. Maintenance Data: For wall coverings to include in maintenance manuals.

1.4 QUALITY ASSURANCE

A. Fire-Test-Response Characteristics: Provide wall coverings and adhesives with the following fire-test-response characteristics as determined by testing identical products applied with identical adhesives to substrates per test method indicated below by UL or another testing and inspecting agency acceptable to authorities having jurisdiction.

1. Surface-Burning Characteristics: As follows, per ASTM E 84:

a. Flame-Spread Index: 25 or less.

b. Smoke-Developed Index: 450 or less.

1.5 PROJECT CONDITIONS

A. Environmental Limitations: Do not install wall coverings until spaces are enclosed and weatherproof, wet work in spaces is complete and dry, work above ceilings is complete, and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.

B. Ventilation: Provide continuous ventilation during installation and for not less than the time recommended by wall-covering manufacturer for full drying or curing.

1.6 EXTRA MATERIALS

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

1. Wall-Covering Material: Full-size units equal to 5 percent of amount of each type installed.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, products listed in Part 2 "Wall-Covering Products" Article.

2.2 WALL-COVERING PRODUCTS

A. General: Provide rolls of each type of wall covering from the same run number or dye lot.

B. Vinyl Wall Covering:

1. Products:

a. Acrovyn (by Construction Specialties) Wall Covering: .030" Semi-rigid acrylic/PVC wall covering with poly/cotton Osnaburg backing and supplied in 54" by 20 yard rolls. Finish to be Pebblette Texture. Provide matching wainscot molding and vertical joint molding.

2.3 ACCESSORIES

A. Adhesive: Manufacturer's clay-based adhesive.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions, with Installer present, for compliance with requirements for levelness, wall plumbness, maximum moisture content, and other conditions affecting performance of work.

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

3.2 PREPARATION

A. Comply with manufacturer's written instructions for surface preparation.

B. Clean substrates of substances that could impair wall covering's bond, including mold, mildew, oil, grease, incompatible primers, dirt, and dust.

C. Prepare substrates to achieve a smooth, dry, clean, structurally sound surface free of flaking, unsound coatings, cracks, and defects.

1. Moisture Content: Maximum of 5 percent on new plaster, concrete, and concrete masonry units when tested with an electronic moisture meter.
2. Gypsum Board: Prime with primer recommended by wall-covering manufacturer.

D. Remove hardware and hardware accessories, electrical plates and covers, light fixture trims, and similar items.

E. Acclimatize wall-covering materials by removing them from packaging in the installation areas not less than 24 hours before installation.

3.3 INSTALLATION

A. General: Comply with wall-covering manufacturers' written installation instructions applicable to products and applications indicated, except where more stringent requirements apply.

B. Install wall covering with no gaps or overlaps, no lifted or curling edges, and no visible shrinkage.

C. Install seams vertical and plumb at least 6 inches (150 mm) from outside corners and 3 inches from inside corners unless a change of pattern or color exists at corner. No horizontal seams are permitted.

D. Fully bond wall covering to substrate. Remove air bubbles, wrinkles, blisters, and other defects.

3.4 CLEANING

A. Remove excess adhesive at finished seams, perimeter edges, and adjacent surfaces.

B. Use cleaning methods recommended in writing by wall-covering manufacturer.

C. Replace strips that cannot be cleaned.

D. Reinstall hardware and hardware accessories, electrical plates and covers, light fixture trims, and similar items.

END OF SECTION 09720

SECTION 09912

PAINTING (PROFESSIONAL LINE PRODUCTS)

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 surface preparation and field painting of exposed exterior and interior items and surfaces.

1. Surface preparation, priming, and finish coats specified in this Section are in addition to shop priming and surface treatment specified in other Sections.

B. Paint exposed surfaces, except where these Specifications indicate that the surface or material is not to be painted or is to remain natural. If an item or a surface is not specifically mentioned, paint the item or surface the same as similar adjacent materials or surfaces. If a color of finish is not indicated, Architect will select from standard colors and finishes available.

1. Painting includes field painting of exposed bare and covered pipes and ducts (including color coding), hangers, exposed steel and iron supports, and surfaces of mechanical and electrical equipment that do not have a factory-applied final finish.

C. Do not paint prefinished items, concealed surfaces, finished metal surfaces, operating parts, and labels.

1. Prefinished items include the following factory-finished components:

a. Architectural woodwork.
b. Metal lockers.
c. Elevator entrance doors and frames.
d. Elevator equipment.
e. Finished mechanical and electrical equipment.
f. Light fixtures.

2. Concealed surfaces include walls or ceilings in the following generally inaccessible spaces:

a. Foundation spaces.
b. Furred areas.
c. Ceiling plenums.
d. Pipe spaces.

e. Duct shafts.
f. Elevator shafts.

3. Finished metal surfaces include the following:

a. Anodized aluminum.
b. Stainless steel.
c. Chromium plate.
d. Copper and copper alloys.
e. Bronze and brass.

4. Operating parts include moving parts of operating equipment and the following:

a. Valve and damper operators.
b. Linkages.
c. Sensing devices.
d. Motor and fan shafts.

5. Labels: Do not paint over UL, FMG, or other code-required labels or equipment name, identification, performance rating, or nomenclature plates.

D. Related Sections include the following:

1. Division 1 Section "LEED Requirements" for additional LEED requirements.
2. Division 5 Section "Structural Steel" for shop priming structural steel.
3. Division 5 Section "Metal Fabrications" for shop priming ferrous metal.
4. Division 6 Section "Interior Architectural Woodwork" for shop priming interior architectural woodwork.
5. Division 8 Section "Steel Doors and Frames" for factory priming steel doors and frames.
6. Division 9 Section "Gypsum Board Assemblies" for surface preparation of gypsum board.
7. Division 9 Section "Exterior Wood Stain."

1.3 DEFINITIONS

A. General: Standard coating terms defined in ASTM D 16 apply to this Section.

1. Flat refers to a lusterless or matte finish with a gloss range below 15 when measured at an 85-degree meter.
2. Eggshell refers to low-sheen finish with a gloss range between 20 and 35 when measured at a 60-degree meter.
3. Semigloss refers to medium-sheen finish with a gloss range between 35 and 70 when measured at a 60-degree meter.
4. Full gloss refers to high-sheen finish with a gloss range more than 70 when measured at a 60-degree meter.

1.4 SUBMITTALS

A. Product Data: For each paint system indicated. Include primers.

1. Material List: An inclusive list of required coating materials. Indicate each material and cross-reference specific coating, finish system, and application. Identify each material by manufacturer's catalog number and general classification.
2. Manufacturer's Information: Manufacturer's technical information, including label analysis and instructions for handling, storing, and applying each coating material.

B. Samples for Initial Selection: For each type of finish-coat material indicated.

1. After color selection, Architect will furnish color chips for surfaces to be coated.

C. LEED Submittals:

1. Credit EQ 4.2: Manufacturers' product data for paints and coatings, including printed statement of VOC content and chemical components.

D. Qualification Data: For Applicator.

1.5 DELIVERY, STORAGE, AND HANDLING

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

1. Product name or title of material.
2. Product description (generic classification or binder type).
3. Manufacturer's stock number and date of manufacture.
4. Contents by volume, for pigment and vehicle constituents.
5. Thinning instructions.
6. Application instructions.
7. Color name and number.
8. VOC content.

B. Store materials not in use in tightly covered containers in a well-ventilated area at a minimum ambient temperature of 45 deg F (7 deg C). Maintain storage containers in a clean condition, free of foreign materials and residue.

1. Protect from freezing. Keep storage area neat and orderly. Remove oily rags and waste daily.

1.6 PROJECT CONDITIONS

A. Apply waterborne paints only when temperatures of surfaces to be painted and surrounding air are between 50 and 90 deg F (10 and 32 deg C).

B. Do not apply paint in snow, rain, fog, or mist; or when relative humidity exceeds 85 percent; or at temperatures less than 5 deg F (3 deg C) above the dew point; or to damp or wet surfaces.

1. Painting may continue during inclement weather if surfaces and areas to be painted are enclosed and heated within temperature limits specified by manufacturer during application and drying periods.

1.7 EXTRA MATERIALS

1. Quantity: Furnish Owner with an additional 3 percent, but not less than 1 gal. (3.8 L) or 1 case, as appropriate, of each material and color applied.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Products: Subject to compliance with requirements, provide one of the products listed in other Part 2 articles.

B. Manufacturers' Names: Shortened versions (shown in parentheses) of the following manufacturers' names are used in other Part 2 articles:

1. Benjamin Moore & Co. (Benjamin Moore).
2. ICI Dulux Paint Centers (ICI Dulux Paints).
3. Sherwin-Williams Co. (Sherwin-Williams).

2.2 PAINT MATERIALS, GENERAL

A. Material Compatibility: Provide block fillers, primers, and finish-coat materials that are compatible with one another and with the substrates indicated under conditions of service and application, as demonstrated by manufacturer based on testing and field experience.

B. Material Quality: Provide manufacturer's best-quality paint material of the various coating types specified that are factory formulated and recommended by manufacturer for application indicated. Paint-material containers not displaying manufacturer's product identification will not be acceptable.

1. Proprietary Names: Use of manufacturer's proprietary product names to designate colors or materials is not intended to imply that products named are required to be used to the exclusion of equivalent products of other manufacturers. Furnish manufacturer's material data and certificates of performance for proposed substitutions.

C. Chemical Components of Interior Paints and Coatings: Provide products that comply with the following limits for VOC content when calculated according to 40 CFR 59, Subpart D (EPA Method 24) and the following chemical restrictions:

1. Flat Paints and Coatings: VOC content of not more than 50 g/L.
2. Non-Flat Paints and Coatings: VOC content of not more than 150 g/L.
3. Anticorrosive Coatings: VOC content of not more than 250 g/L.
4. Varnishes and Sanding Sealers: VOC content of not more than 350 g/L.
5. Stains: VOC content of not more than 250 g/L.
6. Aromatic Compounds: Paints and coatings shall not contain more than 1.0 percent by weight of total aromatic compounds (hydrocarbon compounds containing one or more benzene rings).
7. Restricted Components: Paints and coatings shall not contain any of the following:

a. Acrolein.
b. Acrylonitrile.
c. Antimony.
d. Benzene.
e. Butyl benzyl phthalate.
f. Cadmium.
g. Di (2-ethylhexyl) phthalate.
h. Di-n-butyl phthalate.
i. Di-n-octyl phthalate.
j. 1,2-dichlorobenzene.
k. Diethyl phthalate.
l. Dimethyl phthalate.
m. Ethylbenzene.
n. Formaldehyde.
o. Hexavalent chromium.
p. Isophorone.
q. Lead.
r. Mercury.
s. Methyl ethyl ketone.
t. Methyl isobutyl ketone.
u. Methylene chloride.
v. Naphthalene.
w. Toluene (methylbenzene).
x. 1,1,1-trichloroethane.
y. Vinyl chloride.

D. Colors: As selected by Architect from manufacturer's full range.

2.3 EXTERIOR PRIMERS

A. Exterior Ferrous-Metal Primer: Factory-formulated rust-inhibitive metal primer for exterior application.

1. Benjamin Moore; Moore's IMC Alkyd Metal Primer No. M06: Applied at a dry film thickness of not less than 2.0 mils (0.051 mm).
2. ICI Dulux Paints; 4160-XXXX Devguard Multi-Purpose Tank & Structural Primer. Applied at a dry film thickness of not less than 2.0 mils (0.051 mm).
3. Sherwin-Williams; Kem Kromik Universal Metal Primer B50NZ6/B50WZ1: Applied at a dry film thickness of not less than 3.0 mils (0.076 mm).

2.4 INTERIOR PRIMERS

A. Interior Gypsum Board Primer: Factory-formulated latex-based primer for interior application.

1. Benjamin Moore; Moorcraft Super Spec Latex Enamel Undercoater & Primer Sealer No. 253: Applied at a dry film thickness of not less than 1.2 mils (0.030 mm).
2. ICI Dulux Paints; 1000-1200 Dulux Ultra Basecoat Interior Latex Wall Primer: Applied at a dry film thickness of not less than 1.2 mils (0.031 mm).

3. Sherwin-Williams; PrepRite 200 Latex Wall Primer B28W200 Series: Applied at a dry film thickness of not less than 1.6 mils (0.041 mm).

B. Interior Wood Primer for Acrylic-Enamel and Semigloss Alkyd-Enamel Finishes: Factory-formulated alkyd- or acrylic-latex-based interior wood primer.

1. Benjamin Moore; Moorcraft Super Spec Alkyd Enamel Underbody and Primer Sealer No. 245: Applied at a dry film thickness of not less than 1.5 mils (0.038 mm).
2. ICI Dulux Paints; 3210-1200 Ultra-Hide Aquacrylic GRIPPER Stain Killer Primer Sealer: Applied at a dry film thickness of not less than 1.8 mils (0.046 mm).
3. Sherwin-Williams; PrepRite Wall and Wood Primer B49W200 Series: Applied at a dry film thickness of not less than 1.6 mils (0.041 mm).

C. Interior Ferrous-Metal Primer: Factory-formulated quick-drying rust-inhibitive alkyd-based metal primer.

1. Benjamin Moore; Moore's IMC Alkyd Metal Primer No. M06: Applied at a dry film thickness of not less than 2.0 mils (0.051 mm).
2. ICI Dulux Paints; 4130-6130 Devshield Rust Penetrating Metal Primer: Applied at a dry film thickness of not less than 2.2 mils (0.056 mm).
3. Sherwin-Williams; Kem Kromik Universal Metal Primer B50NZ6/B50WZ1: Applied at a dry film thickness of not less than 3.0 mils (0.076 mm).

2.5 EXTERIOR FINISH COATS

A. Exterior Semigloss Acrylic Enamel: Factory-formulated semigloss waterborne acrylic-latex enamel for exterior application.

1. Benjamin Moore; Moorcraft Super Spec Latex House & Trim Paint No. 170: Applied at a dry film thickness of not less than 1.1 mils (0.028 mm).
2. ICI Dulux Paints; 2406-XXXX Dulux Professional Exterior 100 Percent Acrylic Semi-Gloss Finish: Applied at a dry film thickness of not less than 1.3 mils (0.033 mm).
3. Sherwin-Williams; A-100 Latex Gloss A8 Series: Applied at a dry film thickness of not less than 1.3 mils (0.033 mm).

2.6 INTERIOR FINISH COATS

A. Interior Low-Luster Acrylic Enamel: Factory-formulated eggshell acrylic-latex interior enamel.

1. Benjamin Moore; Moorcraft Super Spec Latex Eggshell Enamel No. 274: Applied at a dry film thickness of not less than 1.3 mils (0.033 mm).
2. ICI Dulux Paints; 1402-XXXX Dulux Professional Acrylic Eggshell Interior Wall & Trim Enamel: Applied at a dry film thickness of not less than 1.4 mils (0.036 mm).
3. Sherwin-Williams; ProMar 200 Interior Latex Egg-Shell Enamel B20W200 Series: Applied at a dry film thickness of not less than 1.6 mils (0.041 mm).

B. Interior Semigloss Acrylic Enamel: Factory-formulated semigloss acrylic-latex enamel for interior application.

1. Benjamin Moore; Moorcraft Super Spec Latex Semi-Gloss Enamel No. 276: Applied at a dry film thickness of not less than 1.2 mils (0.031 mm).
2. ICI Dulux Paints; 1406-XXXX Dulux Professional Acrylic Semi-Gloss Interior Wall & Trim Enamel: Applied at a dry film thickness of not less than 1.5 mils (0.038 mm).
3. Sherwin-Williams; ProMar 200 Interior Latex Semi-Gloss Enamel B31W200 Series: Applied at a dry film thickness of not less than 1.3 mils (0.033 mm).

2.7 INTERIOR WOOD STAINS AND VARNISHES

A. Interior Wood Stain: Factory-formulated alkyd-based penetrating wood stain for interior application applied at spreading rate recommended by manufacturer.

1. Benjamin Moore; Benwood Penetrating Stain No. 234.
2. ICI Dulux Paints; 1700-XXX WoodPride Interior Solventborne Wood Finishing Stain.
3. Sherwin-Williams; Wood Classics Interior Oil Stain A-48 Series.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Applicator present, for compliance with requirements for paint application.

1. Proceed with paint application only after unsatisfactory conditions have been corrected and surfaces receiving paint are thoroughly dry.
2. Start of painting will be construed as Applicator's acceptance of surfaces and conditions within a particular area.

B. Coordination of Work: Review other Sections in which primers are provided to ensure compatibility of the total system for various substrates. On request, furnish information on characteristics of finish materials to ensure use of compatible primers.

1. Notify Architect about anticipated problems when using the materials specified over substrates primed by others.

3.2 PREPARATION

A. General: Remove hardware and hardware accessories, plates, machined surfaces, lighting fixtures, and similar items already installed that are not to be painted. If removal is impractical or impossible because of size or weight of the item, provide surface-applied protection before surface preparation and painting.

1. After completing painting operations in each space or area, reinstall items removed using workers skilled in the trades involved.

B. Cleaning: Before applying paint or other surface treatments, clean substrates of substances that could impair bond of the various coatings. Remove oil and grease before cleaning.

1. Schedule cleaning and painting so dust and other contaminants from the cleaning process will not fall on wet, newly painted surfaces.

C. Surface Preparation: Clean and prepare surfaces to be painted according to manufacturer's written instructions for each particular substrate condition and as specified.

1. Provide barrier coats over incompatible primers or remove and reprime.

2. Wood: Clean surfaces of dirt, oil, and other foreign substances with scrapers, mineral spirits, and sandpaper, as required. Sand surfaces exposed to view smooth and dust off.

   a. Scrape and clean small, dry, seasoned knots, and apply a thin coat of white shellac or other recommended knot sealer before applying primer. After priming, fill holes and imperfections in finish surfaces with putty or plastic wood filler. Sand smooth when dried.
   b. Prime, stain, or seal wood to be painted immediately on delivery. Prime edges, ends, faces, undersides, and back sides of wood, including cabinets, counters, cases, and paneling.
   c. If transparent finish is required, backprime with spar varnish.
   d. Seal tops, bottoms, and cutouts of unprimed wood doors with a heavy coat of varnish or sealer immediately on delivery.

3. Ferrous Metals: Clean ungalvanized ferrous-metal surfaces that have not been shop coated; remove oil, grease, dirt, loose mill scale, and other foreign substances. Use solvent or mechanical cleaning methods that comply with SSPC's recommendations.

   a. Blast steel surfaces clean as recommended by paint system manufacturer and according to SSPC-SP 6/NACE No. 3.
   b. Treat bare and sandblasted or pickled clean metal with a metal treatment wash coat before priming.
   c. Touch up bare areas and shop-applied prime coats that have been damaged. Wire-brush, clean with solvents recommended by paint manufacturer, and touch up with same primer as the shop coat.

D. Material Preparation: Mix and prepare paint materials according to manufacturer's written instructions.

1. Maintain containers used in mixing and applying paint in a clean condition, free of foreign materials and residue.
2. Stir material before application to produce a mixture of uniform density. Stir as required during application. Do not stir surface film into material. If necessary, remove surface film and strain material before using.
3. Use only thinners approved by paint manufacturer and only within recommended limits.

E. Tinting: Tint each undercoat a lighter shade to simplify identification of each coat when multiple coats of same material are applied. Tint undercoats to match the color of the finish coat, but provide sufficient differences in shade of undercoats to distinguish each separate coat.

3.3 APPLICATION

A. General: Apply paint according to manufacturer's written instructions. Use applicators and techniques best suited for substrate and type of material being applied.

1. Paint colors, surface treatments, and finishes are indicated in the paint schedules.
2. Do not paint over dirt, rust, scale, grease, moisture, scuffed surfaces, or conditions detrimental to formation of a durable paint film.
3. Provide finish coats that are compatible with primers used.
4. The term "exposed surfaces" includes areas visible when permanent or built-in fixtures, grilles, convector covers, covers for finned-tube radiation, and similar components are in place. Extend coatings in these areas, as required, to maintain system integrity and provide desired protection.
5. Paint surfaces behind movable equipment and furniture the same as similar exposed surfaces. Before final installation of equipment, paint surfaces behind permanently fixed equipment or furniture with prime coat only.
6. Paint interior surfaces of ducts with a flat, nonspecular black paint where visible through registers or grilles.
7. Paint back sides of access panels and removable or hinged covers to match exposed surfaces.
8. Finish exterior doors on tops, bottoms, and side edges the same as exterior faces.
9. Finish interior of wall and base cabinets and similar field-finished casework to match exterior.
10. Sand lightly between each succeeding enamel or varnish coat.

B. Scheduling Painting: Apply first coat to surfaces that have been cleaned, pretreated, or otherwise prepared for painting as soon as practicable after preparation and before subsequent surface deterioration.

1. The number of coats and film thickness required are the same regardless of application method. Do not apply succeeding coats until previous coat has cured as recommended by manufacturer. If sanding is required to produce a smooth, even surface according to manufacturer's written instructions, sand between applications.
2. Omit primer over metal surfaces that have been shop primed and touchup painted.
3. If undercoats, stains, or other conditions show through final coat of paint, apply additional coats until paint film is of uniform finish, color, and appearance. Give special attention to ensure that edges, corners, crevices, welds, and exposed fasteners receive a dry film thickness equivalent to that of flat surfaces.
4. Allow sufficient time between successive coats to permit proper drying. Do not recoat surfaces until paint has dried to where it feels firm, and does not deform or feel sticky under moderate thumb pressure, and until application of another coat of paint does not cause undercoat to lift or lose adhesion.

C. Application Procedures: Apply paints and coatings by brush, roller, spray, or other applicators according to manufacturer's written instructions.

1. Brushes: Use brushes best suited for type of material applied. Use brush of appropriate size for surface or item being painted.
2. Rollers: Use rollers of carpet, velvet-back, or high-pile sheep's wool as recommended by manufacturer for material and texture required.

3. Spray Equipment: Use airless spray equipment with orifice size as recommended by manufacturer for material and texture required.

D. Minimum Coating Thickness: Apply paint materials no thinner than manufacturer's recommended spreading rate to achieve dry film thickness indicated. Provide total dry film thickness of the entire system as recommended by manufacturer.

E. Mechanical and Electrical Work: Painting of mechanical and electrical work is limited to items exposed in equipment rooms and occupied spaces.

F. Mechanical items to be painted include, but are not limited to, the following:

1. Uninsulated metal piping.
2. Uninsulated plastic piping.
3. Pipe hangers and supports.
4. Visible portions of internal surfaces of metal ducts, without liner, behind air inlets and outlets.
5. Duct, equipment, and pipe insulation having "all-service jacket" or other paintable jacket material.
6. Mechanical equipment that is indicated to have a factory-primed finish for field painting.

G. Electrical items to be painted include, but are not limited to, the following:
1. Electrical equipment that is indicated to have a factory-primed finish for field painting.

H. Prime Coats: Before applying finish coats, apply a prime coat, as recommended by manufacturer, to material that is required to be painted or finished and that has not been prime coated by others. Recoat primed and sealed surfaces where evidence of suction spots or unsealed areas in first coat appears, to ensure a finish coat with no burn-through or other defects due to insufficient sealing.

I. Pigmented (Opaque) Finishes: Completely cover surfaces as necessary to provide a smooth, opaque surface of uniform finish, color, appearance, and coverage. Cloudiness, spotting, holidays, laps, brush marks, runs, sags, ropiness, or other surface imperfections will not be acceptable.

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

1. Provide satin finish for final coats.

K. Stipple Enamel Finish: Roll and redistribute paint to an even and fine texture. Leave no evidence of rolling, such as laps, irregularity in texture, skid marks, or other surface imperfections.

L. Completed Work: Match approved samples for color, texture, and coverage. Remove, refinish, or repaint work not complying with requirements.

3.4 CLEANING

A. Cleanup: At the end of each workday, remove empty cans, rags, rubbish, and other discarded paint materials from Project site.

1. After completing painting, clean glass and paint-spattered surfaces. Remove spattered paint by washing and scraping without scratching or damaging adjacent finished surfaces.

3.5 PROTECTION

A. Protect work of other trades, whether being painted or not, against damage from painting. Correct damage by cleaning, repairing or replacing, and repainting, as approved by Architect.

B. Provide "Wet Paint" signs to protect newly painted finishes. After completing painting operations, remove temporary protective wrappings provided by others to protect their work.

1. After work of other trades is complete, touch up and restore damaged or defaced painted surfaces. Comply with procedures specified in PDCA P1.

3.6 EXTERIOR PAINT SCHEDULE

A. Ferrous Metal: Provide the following finish systems over exterior ferrous metal. Primer is not required on shop-primed items.

1. Semigloss Acrylic-Enamel Finish: Two finish coats over a rust-inhibitive primer.

a. Primer: Exterior ferrous-metal primer.
b. Finish Coats: Exterior semigloss acrylic enamel.

3.7 INTERIOR PAINT SCHEDULE

A. Gypsum Board: Provide the following finish systems over interior gypsum board surfaces:

1. Low-Luster Acrylic-Enamel Finish: Two finish coats over a primer.

a. Primer: Interior gypsum board primer.
b. Finish Coats: Interior low-luster acrylic enamel.

B. Wood and Hardboard: Provide the following paint finish systems over new interior wood surfaces:

1. Semigloss Acrylic-Enamel Finish: Two finish coats over a wood undercoater.

a. Primer: Interior wood primer for acrylic-enamel and semigloss alkyd-enamel finishes.
b. Finish Coats: Interior semigloss acrylic enamel.

C. Ferrous Metal: Provide the following finish systems over ferrous metal:

1. Semigloss Acrylic-Enamel Finish: Two finish coats over a primer.

   a. Primer: Interior ferrous-metal primer.
   b. Finish Coats: Interior semigloss acrylic enamel.

D. All-Service Jacket over Insulation: Provide the following finish system on cotton or canvas insulation covering:

1. Flat Acrylic Finish: Two finish coats. Add fungicidal agent to render fabric mildew proof.

   a. Finish Coats: Interior flat latex-emulsion size.

3.8 INTERIOR STAIN AND NATURAL-FINISH WOODWORK SCHEDULE

A. Stained Woodwork: Provide the following stained finishes over new interior woodwork:

1. Waterborne Stain: Two finish coats of waterborne interior wood stain.
   a. Stain Coat: Interior wood stain.

B. Natural-Finish Woodwork: Provide the following natural finishes over new interior woodwork:

1. Waterborne Satin-Varnish Finish: Two finish coats of waterborne clear satin varnish over a sanding sealer. Wipe wood filler before applying stain.

   a. Filler Coat: Open-grain wood filler.
   b. Sealer Coat: Clear sanding sealer.
   c. Finish Coats: Interior waterborne clear satin varnish.

END OF SECTION 09912

SECTION 09931

EXTERIOR WOOD STAINS

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 surface preparation and the application of wood stains to exterior wood surfaces.

B. Related Sections include the following:

1. Division 9 Section "Painting (Professional Line Products)" for other exterior coatings and for stained and natural-finished interior woodwork.
2. Division 6 Section "Finish Carpentry" for pre-finished lumber siding.
3. Division 7 Section "Wood Shingles" for pre-finished wood shingles.
4. Division 1 Section "LEED Requirements" for additional LEED requirements.

1.3 SUBMITTALS

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

1. Material List: An inclusive list of required stain materials. Indicate each material and cross-reference the specific stain system and application. Identify each exterior wood stain material by manufacturer's catalog number and general classification.
2. Manufacturer's Information: Manufacturer's technical information, including label analysis and instructions for handling, storing, and applying each exterior wood stain.

B. Samples for Initial Selection: For each type of finish-coat material indicated.

1. After color selection, Architect will furnish color chips for surfaces to be stained.

C. LEED Submittals:

1. Credit EQ 4.2: Manufacturers' product data for paints and coatings, including printed statement of VOC content and chemical components.

1.4 DELIVERY, STORAGE, AND HANDLING

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

1. Product name or title of material.
2. Product description (generic classification).
3. Manufacturer's stock number and date of manufacture.
4. Contents by volume, for pigment and vehicle constituents.
5. Thinning instructions.
6. Application instructions.
7. Color name and number.
8. Handling instructions and precautions.
9. VOC content.

B. Store materials not in use in tightly covered containers in a well-ventilated area at a minimum ambient temperature of 45 deg F (7 deg C). Maintain storage containers in a clean condition, free of foreign materials and residue.

1. Protect from freezing. Keep storage area neat and orderly. Remove oily rags and waste daily.

1.5 PROJECT CONDITIONS

A. Temperature Limitations: Apply stains only when temperatures of surfaces to be stained and the surrounding air are between 45 deg F (7 deg C) and 90 deg F (32 deg C) for oil-based stain, or between 50 deg F (10 deg C) and 90 deg F (32 deg C) for latex-based stain.

B. Weather Limitations: Do not apply stain in snow, rain, fog, or mist; when relative humidity exceeds 85 percent; when temperatures are less than 5 deg F (3 deg C) above the dew point; or to damp or wet surfaces.

1. Allow wet surfaces to dry thoroughly and attain temperature and conditions specified before starting or continuing with coating operation.

1.6 EXTRA MATERIALS

A. Furnish extra stain materials from the same production run as the materials applied and in quantities described below. Package with protective covering for storage and identify with labels describing contents. Deliver extra materials to Owner.

1. Quantity: Furnish Owner with an additional 3 percent, but not less than 1 gal. (3.8 L) or 1 case, as appropriate, of each material and color applied.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Products: Subject to compliance with requirements, provide the products named in other Part 2 articles.

B. Manufacturers' Names: Shortened versions (shown in parentheses) of the following manufacturers' names are used in other Part 2 articles:
1. Samuel Cabot, Inc. (Samuel Cabot).

2.2 EXTERIOR WOOD STAIN MATERIALS, GENERAL

A. Material Compatibility: Provide primers and finish-coat materials that are compatible with one another and with the substrates indicated under conditions of service and application, as demonstrated by manufacturer based on testing and field experience.

B. Stain-Material Quality: Provide manufacturer's best-quality stain material of the various stain types specified that are factory formulated and recommended by manufacturer for application indicated. Stain-material containers not displaying manufacturer's product identification will not be acceptable.

1. Proprietary Names: Use of manufacturer's proprietary product names to designate colors or materials is not intended to imply that products named are required to be used to the exclusion of equivalent products of other manufacturers. Furnish manufacturer's material data and certificates of performance for proposed substitutions.

C. Colors: As selected by Architect from manufacturer's full range.

2.3 EXTERIOR WOOD STAIN PRODUCTS

A. Solid-Color Acrylic Stain: Factory-formulated acrylic-resin-based solid-color stain applied at spreading rate recommended by manufacturer.
1. Samuel Cabot: O.V.T. Solid Color Acrylic Stain 0600 Series.

B. Clear Wood Finish: Factory-formulated oil-based clear wood finish applied at spreading rate recommended by manufacturer.

1. Benjamin Moore: Moorwood Penetrating Clear Wood Finish & Preservative No. 088.
2. Coronado: 199-10 Exterior Clear Wood Finish.
3. Samuel Cabot: Clear Solutions 3000/9100 Series.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Applicator present, for compliance with requirements for stain application. Surfaces to be stained must be thoroughly dry before stains are applied.

1. Proceed with stain application only after unsatisfactory conditions have been corrected.
2. Start of application will be construed as Applicator's acceptance of surfaces and conditions.

B. Coordination of Work: Review other Sections in which coatings are provided to ensure compatibility of the total system for various substrates.

3.2 PREPARATION

A. General: Remove hardware and hardware accessories, plates, machined surfaces, lighting fixtures, and similar items already installed that are not to be stained. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and staining.

1. After completing staining operations, reinstall items removed using workers skilled in trades involved.

B. Surface Preparation: Clean and prepare surfaces to be stained according to manufacturer's written instructions for each particular substrate condition and as specified.

1. Remove surface dirt, oil, or grease by washing with a detergent solution; rinse thoroughly with clean water and allow to dry. Remove grade stamps and pencil marks by sanding lightly. Remove loose wood fibers by brushing.
2. Countersink steel nails, if used, and fill with putty tinted to final color to eliminate rust leach stains.

C. Mixing: Mix and prepare stains according to manufacturer's written instructions. Stir stain thoroughly before applying and frequently during application to maintain color consistency.

1. Maintain containers used in mixing and application in a clean condition, free of foreign materials and residue.
2. Stir material before application to produce a mixture of uniform density. Stir as required during application. Do not stir surface film into material. If necessary, remove surface film and then strain material before using.

3.3 APPLICATION

A. Minimum Spreading Rate: Apply stain at manufacturer's recommended spreading rate to ensure proper penetration. Use applicators and techniques best suited for substrate and type of stain material being applied.

1. Do not apply stain on surfaces that are not sufficiently dry. Ensure that each coat is dry and hard before applying succeeding coat.

B. Apply stain evenly with brush, roller, or spray. Thoroughly stain edges and ends of boards. Brush out excess stain that collects in butts of shingles or boards. Avoid staining in direct sunlight.

1. Brushes: Use brushes best suited for type of material applied. Use brushes of appropriate size for surface being stained.
2. Rollers: Use rollers of carpet, velvet-back, or high-pile sheep's wool as recommended by stain manufacturer.
3. Spraying: Use airless or conventional air-atomizing high-pressure spraying equipment with orifice size as recommended by stain manufacturer. Ensure that an adequate amount of stain is applied to surface. Use a 40- to 60-degree fan angle. Back-brush immediately after each section is coated.
4. Horizontal Siding: Start at one edge and continue through to a logical break, such as a door, window, or corner; maintain a wet edge for a uniform finish and to avoid lap marks.
5. Drying Time: Allow 24 – 48 hours between coats.

3.4 CLEANING

A. Cleanup: At the end of each workday, remove empty cans, rags, rubbish, and other discarded materials from Project site.

1. After completing staining, clean window glass and other surfaces. Remove spattered stain by proper methods without scratching or damaging adjacent finished surfaces.

3.5 PROTECTION

A. Protect work of other trades, whether being stained or not, against damage from staining. Correct damage by cleaning, repairing or replacing, and restaining as approved by Architect.

B. Provide "Wet Paint" signs to protect newly stained finishes. After completing staining operations, remove temporary protective wrappings provided by others to protect their work.

1. After work of other trades is complete, touch up and restore damaged or defaced stained surfaces. Comply with procedures specified in PDCA P1.

3.6 EXTERIOR WOOD STAIN SCHEDULE

A. Exterior Wood Siding and Shingles (Note these are to be pre-finished with touch up in the field to match): Provide the following stain systems on exterior wood siding, shingles, shakes, and wood trim including fasciae and soffits:

1. Solid-Color Acrylic Finish: Two stain coats over a primer as recommended by manufacturer.

a. Primer Coat: As recommended by manufacturer.

b. Stain Coats: Solid-color acrylic stain.

2. Clear Wood Finish on Soffits, ends of beams and other exposed wood as noted on the construction documents: Two coats.

a. Finish Coats: Clear wood finish.

END OF SECTION 09931

SECTION 10155

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 solid-polymer units as follows:

1. Toilet Enclosures: Floor and ceiling anchored.

B. Related Sections include the following:

1. Division 1 Section "LEED Requirements" for additional LEED requirements.
2. Division 10 "Toilet and Bath Accessories" for toilet tissue dispensers, grab bars, purse shelves, and similar accessories.

1.3 SUBMITTALS

A. Product Data: For each type of product indicated. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.

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

1. Show locations of cutouts for compartment-mounted toilet accessories.
2. Show locations of reinforcements for compartment-mounted grab bars.

C. Samples for Initial Selection: For each type of unit indicated.

D. LEED Submittals:

1. Credit EQ 4.1: Manufacturers' product data, including printed statement of VOC content.

2. Credit MR 4.1: Manufacturer's verification of percentage of recycled or post industrial content for products.

1.4 QUALITY ASSURANCE

A. Comply with requirements in CID-A-A-60003, "Partitions, Toilets, Complete."

1.5 PROJECT CONDITIONS

A. Field Measurements: Verify actual locations of walls, columns, ceilings, and other construction contiguous with toilet compartments by field measurements before fabrication and indicate measurements on Shop Drawings.

1. Established Dimensions: Where field measurements cannot be made without delaying the Work, establish dimensions and proceed with fabricating toilet compartments without field measurements. Coordinate wall, floor, ceilings, and other contiguous construction to ensure that actual dimensions correspond to established dimensions.

PART 2 - PRODUCTS

2.1 SOLID-POLYMER UNITS

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. Accurate Partitions Corporation.
2. Ampco.
3. Bradley Corporation; Mills Partitions.
4. Capitol Partitions, Inc.
5. Comtec Industries.
6. General Partitions Mfg. Corp.
7. Global Steel Products Corp.
8. Metpar Corp.
9. Santana Products, Inc.
10. Sanymetal; a Crane Plumbing Company.

B. Door, Panel, and Pilaster Construction: Solid, polypropylene (PP) panel material, not less than 1 inch (25 mm) thick, seamless, with eased edges, and with homogenous color and pattern throughout thickness of material.

1. Color and Pattern: One color and pattern in each room as selected by Architect from manufacturer's full range of colors and patterns.

C. Pilaster Shoes: Manufacturer's standard design; stainless steel.

D. Brackets (Fittings):

1. Stirrup Type: Ear or U-brackets, chrome-plated, nonferrous, cast zinc alloy (zamac) or clear anodized aluminum.
2. Full-Height (Continuous) Type: Manufacturer's standard design; extruded aluminum.

E. Heat-Sink Strip: Manufacturer's standard continuous, extruded-aluminum strip fastened to exposed bottom edges of solid-polymer components to prevent burning.

2.2 ACCESSORIES

A. Hardware and Accessories: Manufacturer's standard design, heavy-duty operating hardware and accessories.

1. Material: Chrome-plated, nonferrous, cast zinc alloy (zamac) or clear anodized aluminum.

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

C. Anchorages and Fasteners: Manufacturer's standard exposed fasteners of stainless steel 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. Floor-and-Ceiling-Anchored Units: Provide manufacturer's standard corrosion-resistant anchoring assemblies complete with leveling adjustment at tops and bottoms of pilasters. Provide shoes and sleeves (caps) at pilasters to conceal anchorage.

B. 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 accessible to people with disabilities.

1. Hinges: Manufacturer's standard self-closing type that can be adjusted to hold doors open at any angle up to 90 degrees.
2. Latch and Keeper: Manufacturer's standard surface-mounted 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 accessible to people with disabilities.
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 bumper at out-swinging doors.
5. Door Pull: Manufacturer's standard unit at out-swinging doors that complies with accessibility requirements of authorities having jurisdiction. Provide units on both sides of doors at compartments indicated to be accessible to people with disabilities.

3.1 INSTALLATION

A. General: Comply with manufacturer's written installation instructions. Install units rigid, straight, level, and plumb. Secure units in position with manufacturer's recommended anchoring devices.

1. Maximum Clearances:

a. Pilasters and Panels: 1/2 inch (13 mm).
b. Panels and Walls: 1 inch (25 mm).

2. Stirrup Brackets: Secure panels to walls and to pilasters with not less than three brackets attached at midpoint and near top and bottom of panel.

a. Locate wall brackets so holes for wall anchors occur in masonry or tile joints.
b. Align brackets at pilasters with brackets at walls.

B. Floor-and-Ceiling-Anchored Units: Secure pilasters to supporting construction and level, plumb, and tighten. Hang doors and adjust so doors are level and aligned with panels when doors are in closed position.

3.2 ADJUSTING

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

END OF SECTION 10155

SECTION 10200

LOUVERS AND VENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes the following:

1. Fixed, extruded-aluminum louvers.

B. Related Sections include the following:

1. Division 7 Section "Joint Sealants" for sealants installed in perimeter joints between louver frames and adjoining construction.

1.3 DEFINITIONS

A. Louver Terminology: Definitions of terms for metal louvers contained in AMCA 501 apply to this Section unless otherwise defined in this Section or in referenced standards.

B. Drainable-Blade Louver: Louver with blades having gutters that collect water and drain it to channels in jambs and mullions, which carry it to bottom of unit and away from opening.

1.4 PERFORMANCE REQUIREMENTS

A. Structural Performance: Provide louvers capable of withstanding the effects of gravity loads and the following loads and stresses within limits and under conditions indicated without permanent deformation of louver components, noise or metal fatigue caused by louver blade rattle or flutter, or permanent damage to fasteners and anchors. Wind pressures shall be considered to act on vertical projection of louvers.

1. Wind Loads: Determine loads based on pressures as indicated on Drawings.

B. Thermal Movements: Provide louvers that allow for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures by preventing buckling, opening of joints, overstressing of components, failure of connections, and other detrimental effects. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.

1. Temperature Change (Range): 120 deg F (67 deg C), ambient; 180 deg F (100 deg C), material surfaces.

C. Air-Performance, Water-Penetration, Air-Leakage, and Wind-Driven Rain Ratings: Provide louvers complying with performance requirements indicated, as demonstrated by testing manufacturer's stock units identical to those provided, except for length and width according to AMCA 500-L.

1.5 SUBMITTALS

A. Product Data: For each type of product indicated. For louvers specified to bear AMCA seal, include printed catalog pages showing specified models with appropriate AMCA Certified Ratings Seals.

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

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

1.6 QUALITY ASSURANCE

A. Source Limitations: Obtain louvers and vents through one source from a single manufacturer where indicated to be of same type, design, or factory-applied color finish.

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

1. AWS D1.2, "Structural Welding Code--Aluminum."
2. AWS D1.3, "Structural Welding Code--Sheet Steel."

C. SMACNA Standard: Comply with recommendations in SMACNA's "Architectural Sheet Metal Manual" for fabrication, construction details, and installation procedures.

D. UL and NEMA Compliance: Provide motors and related components for motor-operated adjustable louvers that are listed and labeled by UL and comply with applicable NEMA standards.

1.7 PROJECT CONDITIONS

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

1. Established Dimensions: Where field measurements cannot be made without delaying the Work, establish opening dimensions and proceed with fabricating louvers without field measurements. Coordinate construction to ensure that actual opening dimensions correspond to established dimensions.

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. Louvers:
   a. Airolite Company (The).
   b. American Warming and Ventilating, Inc.
   c. Arrow United Industries.
   d. Carnes Company, Inc.
   e. Cesco Products.
   f. Greenheck.
   g. Louvers & Dampers, Inc.
   h. Reliable Products; Hart & Cooley, Inc.
   i. Ruskin Company; Tomkins PLC.

B. In other Part 2 articles where titles below introduce lists, the following requirements apply for product selection:

1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the products specified.
2. Basis-of-Design Product: The design for each louver is based on the product named. Subject to compliance with requirements, provide either the named product or a comparable product by one of the other manufacturers specified.

2.2 MATERIALS

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

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

C. Fasteners: Of same basic metal and alloy as fastened metal or 300 Series stainless steel, unless otherwise indicated. Do not use metals that are incompatible with joined materials.

1. Use types and sizes to suit unit installation conditions.
2. Use Phillips flat-head screws for exposed fasteners, unless otherwise indicated.

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

2.3 FABRICATION, GENERAL

A. Assemble louvers in factory to minimize field splicing and assembly. Disassemble units as necessary for shipping and handling limitations. Clearly mark units for reassembly and coordinated installation.

B. Maintain equal louver blade spacing, including separation between blades and frames at head and sill, to produce uniform appearance.

C. Maintain equal louver blade spacing to produce uniform appearance.

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

1. Frame Type: Exterior flange, unless otherwise indicated.

E. Include supports, anchorages, and accessories required for complete assembly.

F. Provide vertical mullions of type and at spacings indicated, but not more than recommended by manufacturer, or 72 inches (1830 mm) o.c., whichever is less.
1. Exposed Mullions: Where indicated, provide units with exposed mullions of same width and depth as louver frame. Where length of louver exceeds fabrication and handling limitations, provide interlocking split mullions designed to permit expansion and contraction.

G. Where indicated, provide subsills made of same material as louvers for recessed louvers.

H. Join frame members to each other and to fixed louver blades with fillet welds concealed from view, unless otherwise indicated or size of louver assembly makes bolted connections between frame members necessary.

I. Join frame members to each other and to fixed louver blades with fillet welds, threaded fasteners, or both, as standard with louver manufacturer, concealed from view, unless otherwise indicated or size of louver assembly makes bolted connections between frame members necessary.

2.4 FIXED, EXTRUDED-ALUMINUM LOUVERS

A. Horizontal, Drainable-Blade Louver:

1. Basis-of-Design Product: Ruskin, ELF6375 DX Stationary Louver, Drainable Blade or a comparable product by manufacturer's listed above:

2. Louver Depth: 6 inches (150 mm).
3. Frame and Blade Nominal Thickness: As required to comply with structural performance requirements, but not less than 0.080 inch (2.0 mm).
4. Mullion Type: Exposed.
5. Performance Requirements:

a. Free Area: Not less than 57% free area for 48-inch- (1.2-m-) wide by 48-inch- (1.2-m-) high louver.
b. Point of Beginning Water Penetration: Not less than 1050 fpm (5.3 m/s).
c. Air Performance: Not more than 0.10-inch wg (25-Pa) static pressure drop at 600-fpm free-area velocity.

6. AMCA Seal: Mark units with AMCA Certified Ratings Seal.

2.5 LOUVER SCREENS

A. General: Provide screen at each exterior louver.

1. Screen Location for Fixed Louvers: Interior face.
2. Screening Type: Bird screening.

B. Secure screens to louver frames with stainless-steel machine screws, spaced a maximum of 6 inches (150 mm) from each corner and at 12 inches (300 mm) o.c.

C. Louver Screen Frames: Fabricate with mitered corners to louver sizes indicated.

1. Metal: Same kind and form of metal as indicated for louver to which screens are attached. Reinforce extruded-aluminum screen frames at corners with clips.
2. Finish: Same finish as louver frames to which louver screens are attached.
3. Type: Rewirable frames with a driven spline or insert for securing screen mesh.

D. Louver Screening for Aluminum Louvers:

1. Bird Screening: Flattened, expanded aluminum, 3/4 by 0.050 inch (19 by 1.27 mm) thick.

2.6 BLANK-OFF PANELS

A. Uninsulated, Blank-off Panels:

1. Aluminum sheet for aluminum louvers, not less than 0.050-inch (1.2-mm) nominal thickness, unless otherwise indicated.
2. Panel Finish: Same finish applied to louvers.
3. Attach blank-off panels to back of louver frames with clips.

2.7 FINISHES, GENERAL

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

B. Finish louvers after assembly.

2.8 ALUMINUM FINISHES

A. Finish designations prefixed by AA comply with system established by the Aluminum Association for designating aluminum finishes.

B. High-Performance Organic-Coating Finish: AA-C12C42R1x (Chemical Finish: cleaned with inhibited chemicals; Chemical Finish: acid-chromate-fluoride-phosphate conversion coating; Organic Coating: as specified below). Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.

1. Fluoropolymer Two-Coat Coating System: Manufacturer's standard two-coat, thermocured system consisting of specially formulated inhibitive primer and fluoropolymer color topcoat containing not less than 70 percent polyvinylidene fluoride resin by weight; complying with AAMA 2605.
   a. Color and Gloss: Match Architect's sample.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and openings, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance.

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

3.2 PREPARATION

A. Coordinate setting drawings, diagrams, templates, instructions, and directions for installation of anchorages that are to be embedded in concrete or masonry construction. Coordinate delivery of such items to Project site.

3.3 INSTALLATION

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

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

C. Form closely fitted joints with exposed connections accurately located and secured.

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

E. Repair finishes damaged by cutting, welding, soldering, and grinding. Restore finishes so no evidence remains of corrective work. Return items that cannot be refinished in the field to the factory, make required alterations, and refinish entire unit or provide new units.

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

G. Install concealed gaskets, flashings, joint fillers, and insulation as louver installation progresses, where weathertight louver joints are required. Comply with Division 7 Section "Joint Sealants" for sealants applied during louver installation.

3.4 ADJUSTING AND CLEANING

A. Clean exposed surfaces of louvers and vents that are not protected by temporary covering, to remove fingerprints and soil during construction period. Do not let soil accumulate until final cleaning.

B. Before final inspection, clean exposed surfaces with water and a mild soap or detergent not harmful to finishes. Thoroughly rinse surfaces and dry.

C. Restore louvers and vents damaged during installation and construction so no evidence remains of corrective work. If results of restoration are unsuccessful, as determined by Architect, remove damaged units and replace with new units.

1. Touch up minor abrasions in finishes with air-dried coating that matches color and gloss of, and is compatible with, factory-applied finish coating.

END OF SECTION 10200

SECTION 10350

FLAGPOLES

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 ground-set flagpoles made from aluminum.

B. Related Sections include the following:

1. Division 3 Section "Cast-in-Place Concrete" for concrete footings for flagpoles.

1.3 PERFORMANCE REQUIREMENTS

A. Structural Performance: Provide flagpole assemblies, including anchorages and supports, capable of withstanding the effects of wind loads, determined according to NAAMM FP 1001, "Guide Specifications for Design of Metal Flagpoles."

1. Base flagpole design on polyester flags of maximum standard size suitable for use with flagpole or flag size indicated, whichever is more stringent.
2. Basic Wind Speed: 85 mph (38 m/s); 3-second gust speed at 33 feet (10 m) aboveground.

1.4 SUBMITTALS

A. Product Data: For each type of flagpole required.

B. Shop Drawings: Include elevations and details showing general arrangement, jointing, fittings and accessories, grounding, and anchoring and supporting systems.

1. Include details of foundation system for ground-set flagpoles.

C. Finish Samples for Verification: For each finished material used for flagpoles and accessories.

1.5 QUALITY ASSURANCE

A. Source Limitations: Obtain each flagpole as a complete unit, including fittings, accessories, bases, and anchorage devices, from a single manufacturer.

1. Obtain flagpoles through one source from a single manufacturer.

1.6 DELIVERY, STORAGE, AND HANDLING

A. General: Spiral wrap flagpoles with heavy paper and enclose in a hard fiber tube or other protective container.

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. Concord Industries, Inc.
2. Pole-Tech Company Inc.

2.2 FLAGPOLES

A. Flagpole Construction, General: Construct flagpoles in one piece if possible. If more than one piece is necessary, comply with the following:

1. Fabricate shop and field joints without using fasteners, screw collars, or lead calking.
2. For tapered flagpoles, provide flush hairline joints using self-aligning, snug-fitting, internal sleeves.
3. For stepped-sectional flagpoles, provide self-aligning, snug-fitting joints.

B. Exposed Height: (2) at 20 feet (6.1 m) and (1) at 25 feet (7.6 m).

C. Aluminum Flagpoles: Provide cone-tapered flagpoles fabricated from seamless extruded tubing complying with ASTM B 241/ (B 241M), Alloy 6063, with a minimum wall thickness of 3/16 inch (4.8 mm). Heat treat after fabrication to comply with ASTM B 597, Temper T6.

D. Foundation Tube: Galvanized corrugated-steel foundation tube, 0.064-inch- (1.6-mm-) minimum nominal wall thickness. Provide with 3/16-inch (4.8-mm) steel bottom plate and support plate; 3/4-inch- (19-mm-) diameter, steel ground spike; and steel centering wedges all welded together. Galvanize steel parts, including foundation tube, after assembly. Provide loose hardwood wedges at top of foundation tube for plumbing pole.

1. Provide flashing collar of same material and finish as flagpole.

2.3 FITTINGS

A. Finial Ball: Manufacturer's standard flush-seam ball, sized as indicated or, if not indicated, to match flagpole-butt diameter.

1. 0.063-inch (1.6-mm) spun aluminum, with gold anodic finish.

B. Finial Eagle on 25' pole: Manufacturer's standard, sized as indicated or, if not indicated, as standard with manufacturer for flagpole size indicated.

1. Cast aluminum, with gold anodic finish.

C. Internal Halyard, Winch System: Manually operated winch with control stop device and removable handle, stainless-steel cable halyard, and concealed revolving truck assembly with plastic-coated counterweight and sling. Provide flush access door secured with cylinder lock. Finish truck assembly to match flagpole.

D. Halyard Flag Snaps: Provide two stainless-steel swivel snap hooks per halyard.

1. Provide with neoprene or vinyl covers.

2.4 MISCELLANEOUS MATERIALS

A. Concrete: Comply with requirements in Division 3 Section "Cast-in-Place Concrete" for normal-weight, air-entrained, ready-mix concrete with a minimum 28-day compressive strength of 3000 psi (20 MPa, unless otherwise indicated.)

B. Nonshrink, Nonmetallic Grout: Factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C 1107.

C. Sand: ASTM C 33, fine aggregate.

D. Elastomeric Joint Sealant: Multicomponent urethane joint sealant complying with requirements in Division 7 Section "Joint Sealants" for Use NT (nontraffic) and for Use M, G, A, and, as applicable to joint substrates indicated, O joint substrates.

2.5 FINISHES

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

B. Aluminum: Finish designations prefixed by AA comply with the system established by the Aluminum Association for designating aluminum finishes.
1. Class I, Color Anodic Finish: AA-M12C22A42/A44 (Mechanical Finish: nonspecular as fabricated; Chemical Finish: etched, medium matte; Anodic Coating: Architectural Class I, integrally colored or electrolytically deposited color coating 0.018 mm or thicker) complying with AAMA 611.

a. Color: Medium bronze.

PART 3 - EXECUTION

3.1 PREPARATION

A. Prepare uncoated metal flagpoles that are set in foundation tubes by painting below-grade portions with a heavy coat of bituminous paint.

B. Foundation Excavation: Excavate to neat clean lines in undisturbed soil. Remove loose soil and foreign matter from excavation and moisten earth before placing concrete.

C. Provide forms where required due to unstable soil conditions and for perimeter of flagpole base at grade. Secure and brace forms and foundation tube, sleeve, or anchor bolts in position, to prevent displacement during concreting.

D. Place concrete immediately after mixing. Compact concrete in place by using vibrators. Moist-cure exposed concrete for not less than seven days or use nonstaining curing compound.

E. Trowel exposed concrete surfaces to a smooth, dense finish, free of trowel marks, and uniform in texture and appearance. Provide positive slope for water runoff to perimeter of concrete base.

3.2 FLAGPOLE INSTALLATION

A. General: Install flagpoles where shown and according to Shop Drawings and manufacturer's written instructions.

B. Foundation-Tube Installation: Install flagpole in foundation tube, seated on bottom plate between steel centering wedges. Plumb flagpole and install hardwood wedges to secure flagpole in place. Place and compact sand in foundation tube and remove hardwood wedges. Seal top of foundation tube with a 2-inch (50-mm) layer of elastomeric joint sealant and cover with flashing collar.

END OF SECTION 10350

SECTION 10520

FIRE-PROTECTION SPECIALTIES

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. Portable fire extinguishers.
2. Fire-protection cabinets for the following:

    a. Portable fire extinguishers.

3. Mounting brackets for fire extinguishers.

1.3 SUBMITTALS

A. Product Data: Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for fire-protection cabinets.

1. Fire Extinguishers: Include rating and classification.
2. Fire-Protection Cabinets: Include roughing-in dimensions, details showing mounting methods, relationships of box and trim to surrounding construction, door hardware, cabinet type, trim style, and panel style.

B. Maintenance Data: For fire extinguishers to include in maintenance manuals.

1.4 QUALITY ASSURANCE

A. Source Limitations: Obtain fire extinguishers and fire-protection cabinets through one source from a single manufacturer.

B. NFPA Compliance: Fabricate and label fire extinguishers to comply with NFPA 10, "Portable Fire Extinguishers."

1.5 COORDINATION

A. Coordinate size of fire-protection cabinets to ensure that type and capacity of fire extinguishers indicated are accommodated.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:
1. Basis-of-Design Product: The design for each product is based on the product named. Subject to compliance with requirements, provide either the named product or a comparable product by one of the other manufacturers specified.

2.2 MATERIALS

A. Cold-Rolled Steel Sheet: ASTM A 1008/A 1008M, Commercial Steel (CS), Type B.

B. Stainless-Steel Sheet: ASTM A 666, Type 304.

C. Tempered Float Glass: ASTM C 1048, Kind FT, Condition A, Type I, Quality q3, 3 mm thick, Class 1 (clear).

2.3 PORTABLE FIRE EXTINGUISHERS

A. Available Manufacturers:
1. JL Industries, Inc.
2. Larsen's Manufacturing Company.
3. Potter Roemer; Div. of Smith Industries, Inc.

B. General: Provide fire extinguishers of type, size, and capacity for each fire-protection cabinet and mounting bracket indicated.
1. Handles and Levers: Stainless steel.

C. Multipurpose Dry-Chemical Type in Steel Container 4-A:60-B:C, 10-lb (4.5-kg) nominal capacity, with monoammonium phosphate-based dry chemical in enameled-steel container.

2.4 FIRE-PROTECTION CABINET (FE-2)

A. Basis-of-Design Product: JL Industries Academy Series or a comparable product by one of the following:

B. Available Manufacturers:

1. JL Industries, Inc.
2. Larsen's Manufacturing Company.

3. Potter Roemer; Div. of Smith Industries, Inc.

C. Cabinet Type: Suitable for fire extinguisher.

D. Cabinet Construction: Nonrated.

E. Cabinet Material: Enameled-steel sheet.

1. Shelf: Same metal and finish as cabinet.

F. Semirecessed Cabinet: Cabinet box partially recessed in walls of shallow depth to suit style of trim indicated; with one-piece combination trim and perimeter door frame overlapping surrounding wall surface with exposed trim face and wall return at outer edge (backbend).

1. Square-Edge Trim: 1-1/4- to 1-1/2-inch (32- to 38-mm) backbend depth.

G. Cabinet Trim Material: Aluminum sheet.

H. Door Material: Aluminum sheet.

I. Door Style: Fully glazed panel with frame.

J. Door Glazing: Tempered float glass (clear).

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

1. Provide projecting lever handle with cam-action.
2. Provide manufacturer's standard hinge permitting door to open 180 degrees.

L. Accessories:

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

a. Identify fire extinguisher in fire-protection cabinet with the words "FIRE EXTINGUISHER."

1) Location: Applied to cabinet door.
2) Application Process: Silk-screened.
3) Lettering Color: Red.
4) Orientation: Horizontal.

M. Finishes:

1. Manufacturer's standard baked-enamel paint for the following:
a. Interior of cabinet.

2. Aluminum: Color anodic.

a. Color and Texture: Medium bronze.

2.5 MOUNTING BRACKETS

A. Available Manufacturers:
1. JL Industries, Inc.
2. Larsen's Manufacturing Company.
3. Potter Roemer; Div. of Smith Industries, Inc.

B. Mounting Brackets: Manufacturer's standard steel, designed to secure fire extinguisher to wall or structure, of sizes required for types and capacities of fire extinguishers indicated, with plated or baked-enamel finish.

1. Color: Red.

C. Identification: Lettering complying with authorities having jurisdiction for letter style, size, spacing, and location. Locate as indicated by Architect.

1. Identify bracket-mounted fire extinguishers with the words "FIRE EXTINGUISHER" in red letter decals applied to mounting surface.

a. Orientation: Vertical.

2.6 FABRICATION

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

1. Weld joints and grind smooth.

B. Cabinet Doors: Fabricate doors according to manufacturer's standards, from materials indicated and coordinated with cabinet types and trim styles selected.

1. Fabricate door frames with tubular stiles and rails and hollow-metal design, minimum 1/2 inch (13 mm) thick.
2. Miter and weld perimeter door frames.

C. Cabinet Trim: Fabricate cabinet trim in one piece with corners mitered, welded, and ground smooth.

2.7 FINISHES, GENERAL

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

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

C. 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.

2.8 ALUMINUM FINISHES

A. Finish designations prefixed by AA comply with the system established by the Aluminum Association for designating aluminum finishes.

B. Class I, Color Anodic Finish: AA-M12C22A42/A44 (Mechanical Finish: nonspecular as fabricated; Chemical Finish: etched, medium matte; Anodic Coating: Architectural Class I, integrally colored or electrolytically deposited color coating 0.018 mm or thicker) complying with AAMA 611.

2.9 STEEL FINISHES

A. Surface Preparation: Clean surfaces of dirt, oil, grease, mill scale, rust, and other contaminants that could impair paint bond using manufacturer's standard methods.

B. Baked-Enamel Finish: Immediately after cleaning and pretreating, apply manufacturer's standard two-coat, baked-enamel finish consisting of prime coat and thermosetting topcoat. Comply with paint manufacturer's written instructions for applying and baking to achieve a minimum dry film thickness of 2 mils (0.05 mm).

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine walls and partitions for suitable framing depth and blocking where semirecessed cabinets will be installed.

B. Examine fire extinguishers for proper charging and tagging.

1. Remove and replace damaged, defective, or undercharged units.

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

3.2 PREPARATION

A. Prepare recesses for semirecessed fire-protection cabinets as required by type and size of cabinet and trim style.

3.3 INSTALLATION

A. General: Install fire-protection specialties in locations and at mounting heights indicated or, if not indicated, at heights acceptable to authorities having jurisdiction.

B. Fire-Protection Cabinets: Fasten fire-protection cabinets to structure, square and plumb.

1. Unless otherwise indicated, provide recessed fire-protection cabinets. If wall thickness is not adequate for recessed cabinets, provide semirecessed fire-protection cabinets.
2. Fasten mounting brackets to inside surface of fire-protection cabinets, square and plumb.

C. Mounting Brackets: Fasten mounting brackets to surfaces, square and plumb, at locations indicated.

D. Identification: Apply vinyl lettering at locations indicated.

3.4 ADJUSTING AND CLEANING

A. Remove temporary protective coverings and strippable films, if any, as fire-protection specialties are installed, unless otherwise indicated in manufacturer's written installation instructions.

B. Adjust fire-protection cabinet doors to operate easily without binding. Verify that integral locking devices operate properly.

C. On completion of fire-protection cabinet installation, clean interior and exterior surfaces as recommended by manufacturer.

D. Touch up marred finishes, or replace fire-protection cabinets that cannot be restored to factory-finished appearance. Use only materials and procedures recommended or furnished by fire-protection cabinet manufacturer.

E. Replace fire-protection cabinets that have been damaged or have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

END OF SECTION 10520

SECTION 10801

TOILET AND BATH ACCESSORIES

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. Public-use washroom accessories.
2. Childcare accessories.

1.3 SUBMITTALS

A. Product Data: For each type of product indicated. Include the following:

1. Construction details and dimensions.
2. Anchoring and mounting requirements, including requirements for cutouts in other work and substrate preparation.
3. Material and finish descriptions.
4. Manufacturer's warranty.

B. Maintenance Data: For toilet and bath accessories to include in maintenance manuals.

1.4 QUALITY ASSURANCE

A. Source Limitations: For products listed together in the same articles in Part 2, provide products of same manufacturer unless otherwise approved by Architect.

1.5 COORDINATION

A. Coordinate accessory locations with other work to prevent interference with clearances required for access by people with disabilities, and for proper installation, adjustment, operation, cleaning, and servicing of accessories.

1.6 WARRANTY

A. Special Mirror Warranty: Manufacturer's standard form in which manufacturer agrees to replace mirrors that develop visible silver spoilage defects and that fail in materials or workmanship within specified warranty period.

1. Warranty Period: 15 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Stainless Steel: ASTM A 666, Type 304, 0.0312-inch (0.8-mm) minimum nominal thickness, unless otherwise indicated.

B. Brass: ASTM B 19 flat products; ASTM B 16 (ASTM B 16M), rods, shapes, forgings, and flat products with finished edges; or ASTM B 30, castings.

C. Steel Sheet: ASTM A 1008/A 1008M, Designation CS (cold rolled, commercial steel), 0.0359-inch (0.9-mm) minimum nominal thickness.

D. Galvanized Steel Sheet: ASTM A 653/A 653M, with G60 (Z180) hot-dip zinc coating.

E. Galvanized Steel Mounting Devices: ASTM A 153/A 153M, hot-dip galvanized after fabrication.

F. Fasteners: Screws, bolts, and other devices of same material as accessory unit and tamper-and-theft resistant where exposed, and of galvanized steel where concealed.

G. Chrome Plating: ASTM B 456, Service Condition Number SC 2 (moderate service).

H. Mirrors: ASTM C 1503, Mirror Glazing Quality, clear-glass mirrors, nominal 6.0 mm thick.

I. ABS Plastic: Acrylonitrile-butadiene-styrene resin formulation.

2.2 PUBLIC-USE WASHROOM ACCESSORIES

A. Basis-of-Design Product: The design for accessories is based on products indicated. Subject to compliance with requirements, provide the named product or a comparable product by one of the following:
1. Bobrick Washroom Equipment, Inc.
2. Bradley Corporation.
3. General Accessory Manufacturing Co. (GAMCO).

B. Toilet Tissue (Roll) Dispenser T-8:

1. Basis-of-Design Product: Bobrick B-2740, Classic Series Toilet Tissue Dispenser for Two Rolls
2. Description: Double-roll dispenser.

3. Mounting: Surface mounted.
4. Operation: Noncontrol delivery with theft-resistant spindle.
5. Capacity: Designed for up to 6inch diameter tissue rolls.
6. Material and Finish: Satin-finish aluminum bracket with plastic spindle.

C. Paper Towel (Folded) Dispenser T-14:

1. Basis-of-Design Product: Bobrick B262.
2. Mounting: Surface mounted.
3. Minimum Capacity: 400 C-fold or 525 multifold towels.
4. Material and Finish: Stainless steel, No. 4 finish (satin).
5. Lockset: Tumbler type.
6. Refill Indicators: Pierced slots at sides or front.

D. Combination Towel (Folded) Dispenser/Waste Receptacle T-5 and T-9:

1. Basis-of-Design Product: Bobrick, T-5 B-3944 and T-9 B369.
2. Description: Combination unit for dispensing C-fold or multifold towels, with removable waste receptacle.
3. Mounting: Recessed and Semirecessed.

   a. Designed for nominal 4-inch (100-mm) wall depth.

4. Minimum Towel-Dispenser Capacity: 600 C-fold or 800 multifold paper towels and 350 C-fold or 475 multifold paper towels.
5. Minimum Waste-Receptacle Capacity: 2 gal. And 12 gal. (45.4 L).
6. Material and Finish: Stainless steel, No. 4 finish (satin).
7. Liner: Reusable, vinyl waste-receptacle liner.
8. Lockset: Tumbler type for towel-dispenser compartment.

E. Liquid-Soap Dispenser T-7:

1. Basis-of-Design Product: Bobrick, B-2112.
2. Description: Designed for dispensing soap in liquid or lotion form.
3. Mounting: Horizontally oriented, surface mounted.
4. Capacity: 40 fl. Oz.
5. Materials: Stainless steel, No. 4 finish (satin).
6. Lockset: Tumbler type.
7. Refill Indicator: Window type.

F. Grab Bar T-1:

1. Basis-of-Design Product: Bobrick, B-5806.
2. Mounting: Flanges with concealed fasteners.
3. Material: Stainless steel, 0.05 inch (1.3 mm) thick.

   a. Finish: Smooth, No. 4, satin finish on ends and slip-resistant texture in grip area.

4. Outside Diameter: 1-1/4 inches (32 mm).
5. Configuration and Length: As indicated on Drawings.

G. Vendor T-11:

1. Basis-of-Design Product: Bobrick, B-282 25.
2. Type: Sanitary napkin and tampon.
3. Mounting: Surface mounted.
4. Capacity: 30 napkins and 27 tampons.
5. Operation: Single coin (25 cents).
6. Exposed Material and Finish: Stainless steel, No. 4 finish (satin).
7. Lockset: Tumbler type with separate lock and key for coin box.

H. Sanitary-Napkin Disposal Unit T-6 and T-12:

1. Basis-of-Design Product: Bobrick, B-270 and Bobrick B-354.
2. Mounting: Partition mounted, dual access and Surface mounted.
3. Door or Cover: Self-closing disposal-opening cover and hinged face panel with tumbler lockset.
4. Receptacle: Removable.
5. Material and Finish: Stainless steel, No. 4 finish (satin).

I. Mirror Unit T-3 and T-13:

1. Basis-of-Design Product: T-3 – Bobrick B-292 2436, T-11 – Bobrick B-290 (1) 7236 and (1)6036.
2. Frame: Stainless-steel channel.

   a. Corners: Manufacturer's standard.
3. Hangers: Produce rigid, tamper- and theft-resistant installation, using method indicated below.

   a. One-piece, galvanized steel, wall-hanger device with spring-action locking mechanism to hold mirror unit in position with no exposed screws or bolts.

J. Robe Hook T-4:

1. Basis-of-Design Product: Bobrick, B-671.
2. Description: Single-prong unit.
3. Material and Finish: Stainless steel, No. 7 finish (polished).

2.3 CHILDCARE ACCESSORIES

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. American Infant Care Products Inc.
2. American Specialties, Inc.
3. Brocar Products, Inc.
4. General Accessory Manufacturing Co. (GAMCO).
5. Koala Corporation.
6. Safe-Strap Company, Inc.

B. Diaper-Changing Station T-2:

1. Basis-of-Design Product: Bobrick B-2210.
2. Description: Horizontal unit that opens by folding down from stored position and with child-protection strap.

    a. Engineered to support a minimum of 250-lb (113-kg) static load when opened.

3. Mounting: Surface mounted, with unit projecting not more than 4 inches (100 mm) from wall when closed.
4. Operation: By pneumatic shock-absorbing mechanism.
5. Material and Finish: High-density polyethylene in manufacturer's standard color.
6. Liner Dispenser: Built in.

2.4 FABRICATION

A. General: Fabricate units with tight seams and joints, and exposed edges rolled. Hang doors and access panels with full-length, continuous hinges. Equip units for concealed anchorage and with corrosion-resistant backing plates.

B. Keys: Provide universal keys for internal access to accessories for servicing and resupplying. Provide minimum of six keys to Owner's representative.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install accessories according to manufacturers' written instructions, using fasteners appropriate to substrate indicated and recommended by unit manufacturer. Install units level, plumb, and firmly anchored in locations and at heights indicated.

B. Grab Bars: Install to withstand a downward load of at least 250 lbf (1112 N), when tested according to method in ASTM F 446.

3.2 ADJUSTING AND CLEANING

A. Adjust accessories for unencumbered, smooth operation. Replace damaged or defective items.

B. Remove temporary labels and protective coatings.

C. Clean and polish exposed surfaces according to manufacturer's written recommendations.

END OF SECTION 10801

SECTION 11132

PROJECTION SCREENS

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. Front-projection screens.

B. Related Sections include the following:

1. Division 6 Section "Rough Carpentry" for wood backing for recessed screen installation.
2. Division 16 Sections for electrical service and connections including metal device boxes for switches.

1.3 DEFINITIONS

A. Gain of Front-Projection Screens: Ratio of light reflected from screen material to that reflected perpendicularly from a magnesium carbonate surface as determined per SMPTE RP 94.

B. Half-Gain Angle: The angle, measured from the axis of the screen surface, to the most central position on a perpendicular plane through the horizontal centerline of the screen where the gain is half of the peak gain.

1.4 SUBMITTALS

A. Product Data: For each type of screen indicated.
1. Accessories.
2. Wiring Diagrams: For electrically operated units.

B. Maintenance Data: For projection screens to include in maintenance manuals.

1.5 QUALITY ASSURANCE

A. Source Limitations: Obtain each type of projection screen through one source from a single manufacturer. Obtain each screen as a complete unit, including necessary mounting hardware and accessories.

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

1.6 DELIVERY, STORAGE, AND HANDLING

A. Do not deliver projection screens until building is enclosed and other construction within spaces where screens will be installed is substantially complete and ready for screen installation.

1.7 COORDINATION

A. Coordinate layout and installation of projection screens with adjacent construction, including ceiling framing, light fixtures, HVAC equipment, fire-suppression system, and partitions.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

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

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

2.2 FRONT-PROJECTION SCREENS

A. Manually Operated Screens, General: Manufacturer's standard spring-roller-operated units, consisting of case, screen, mounting accessories, and other components necessary for a complete installation.

1. Screen Mounting: Top edge securely anchored to a 3-inch- (75-mm-) diameter, rigid steel roller; bottom edge formed into a pocket holding a tubular metal slat, with ends of slat protected by plastic caps, and with a saddle and pull attached to slat by screws.

B. Electrically Operated Screens, General: Manufacturer's standard units consisting of case, screen, motor, controls, mounting accessories, and other components necessary for a complete installation. Provide units that are listed and labeled as an assembly by UL or another testing and inspecting agency acceptable to authorities having jurisdiction.

1. Line Voltage Control: Remote, 3-position control switch installed in recessed metal device box with flush cover plate matching other electrical device cover plates in room where switch is installed.

2. Motor in Roller: Instant-reversing motor of size and capacity recommended by screen manufacturer; with permanently lubricated ball bearings, automatic thermal-overload

protection, preset limit switches to automatically stop screen in up and down positions, and positive-stop action to prevent coasting. Mount motor inside roller with vibration isolators to reduce noise transmission.

3. Screen Mounting: Top edge securely anchored to rigid metal roller and bottom edge formed into a pocket holding a 3/8-inch- (9.5-mm-) diameter metal rod with ends of rod protected by plastic caps.
   a. Roller for motor in roller supported by vibration- and noise-absorbing supports.

C. Recessed-Mounted, Metal Encased, Manually Operated Screens: Units designed and fabricated for surface mounting on wall or ceiling, fabricated from formed steel sheet not less than 0.027 inch (0.7 mm) thick or aluminum extrusions; with flat back design and vinyl covering or baked-enamel finish. Provide end caps and universal mounting brackets, finished to match end caps.

1. Available Products:
   a. Da-Lite Screen Co., Inc.; Advantage Manual with CSR.
   b. Draper Inc.; Apex.

D. Recessed, Electrically Operated Screens with Automatic Ceiling Closure: Motor in roller units designed and fabricated for recessed installation in ceiling; with bottom of case composed of two panels fully enclosing screen, motor, and wiring, one panel hinged and designed to open and close automatically when screen is lowered and fully raised, the other removable or openable for access to interior of case.

1. Available Products:
   a. Da-Lite Screen Co., Inc.; Boardroom Electrol.
   b. Draper Inc.; Envoy.
2. Provide metal or metal-lined wiring compartment on units with motor in roller.
3. Screen Case: Made from metal, wood, wood products, and fire-retardant materials.
4. Provide screen case with trim flange to receive ceiling finish.
5. Prime paint surfaces of screen case that will be exposed to view in the finished work.

E. Screen Material and Viewing Surface:

1. Matte-White Viewing Surface: Peak gain of 0.9 to 1.0, and gain of not less than 0.8 at an angle of 50 degrees from the axis of the screen surface.

   a. Available Products:
      1) Da-Lite Screen Co., Inc.; Da-Mat.
      2) Draper Inc. Fiberglass Matte White.

2. Material: Vinyl-coated glass-fiber fabric.
3. Mildew Resistance: Rating of 0 or 1 when tested according to ASTM G 21.
4. Flame Resistance: Passes NFPA 701.
5. Flame-Spread Index: Not greater than 75 when tested according to ASTM E 84. Retain subparagraph below after verifying availability, in sizes indicated and type of viewing surface specified, with manufacturers selected.

6. Seamless Construction: Provide screens, in sizes indicated, without seams.
7. Edge Treatment: Black masking borders.

8. Size of Viewing Surface: Manual model: 50 by 50 inches (1270 by 1270 mm)] at Conference Room. Electric Model: 84 by 84 inches (2133 by 2133 mm) at Training Room.

PART 3 - EXECUTION

3.1 INSTALLATION

A. General: Install projection screens at locations indicated to comply with screen manufacturer's written instructions.

B. Install front-projection screens with screen cases in position and in relation to adjoining construction indicated. Securely anchor to supporting substrate in a manner that produces a smoothly operating screen with vertical edges plumb and viewing surface flat when screen is lowered.

1. Install low-voltage controls according to NFPA 70 and manufacturer's written instructions.

a. Wiring Method: Install wiring in raceway except in accessible ceiling spaces and in gypsum board partitions where unenclosed wiring method may be used. Use UL-listed plenum cable in environmental air spaces, including plenum ceilings. Conceal raceway and cables except in unfinished spaces.

2. Test electrically operated units to verify that screen controls, limit switches, closure, and other operating components are in optimum functioning condition.
3. Test manually operated units to verify that screen operating components are in optimum functioning condition.

3.2 PROTECTING AND CLEANING

A. After installation, protect projection screens from damage during construction. If damage occurs despite such protection, remove and replace damaged components or entire unit as required to provide units in their original, undamaged condition.

END OF SECTION 11132

SECTION 11451

RESIDENTIAL APPLIANCES

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. Cooking equipment including:
   a. Microwave ovens.
2. Refrigerator/freezers.
3. Gas fireplace inserts.

B. Related Sections include the following:

1. Division 6 Section "Interior Architectural Woodwork" for custom-made cabinets and plastic-laminate tops that receive residential appliances.
2. Division 15 Section "Domestic Water Piping" for water distribution piping connections to residential appliances.
3. Division 16 Section "Conductors and Cables" for services and connections to residential appliances.

1.3 SUBMITTALS

A. Product Data: For each type of product indicated. Include operating characteristics, dimensions of individual appliances, and finishes for each appliance.

B. Maintenance Data: For each product to include in maintenance manuals.

C. Warranties: Special warranties specified in this Section.

1.4 QUALITY ASSURANCE

A. Product Options: Information on Drawings and in Specifications establishes requirements for product's aesthetic effects and performance characteristics. Aesthetic effects are indicated by dimensions, arrangements, alignment, and profiles of components and assemblies as they relate to sightlines, to one another, and to adjoining construction. Performance characteristics are

indicated by criteria subject to verification by one or more methods including preconstruction testing, field testing, and in-service performance.

B. Regulatory Requirements: Comply with provisions of the following product certifications:

1. NFPA: Provide electrical appliances listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
2. UL and NEMA: Provide electrical components required as part of residential appliances that are listed and labeled by UL and that comply with applicable NEMA standards.
3. ANSI: Provide gas-burning appliances that comply with ANSI Z21 Series standards.
4. NAECA: Provide residential appliances that comply with NAECA standards.

C. Regulatory Requirements, Accessibility: Where residential appliances are indicated to comply with accessibility requirements, comply with the U.S. Architectural & Transportation Barriers Compliance Board's "Americans with Disabilities Act (ADA), Accessibility Guidelines for Buildings and Facilities (ADAAG).".

1. Operable Parts: Provide controls with forward reach no higher than 48 inches (1219 mm) above the floor, horizontal front reach no more than 25 inches (635 mm), horizontal side reach no more than 24 inches (610 mm), and that do not require tight grasping, pinching, or twisting of the wrist and that operate with a force of not more than 5 lbf (22.2 N).
2. Refrigerator/Freezer: Provide 50 percent of freezer space within 54 inches (1370 mm) of the floor.

D. AHAM Standards: Provide appliances that comply with the following AHAM standards:
1. Household Refrigerators: AHAM HRF-1.

E. Energy Ratings: Provide residential appliances that carry labels indicating energy-cost analysis (estimated annual operating costs) and efficiency information as required by the FTC Appliance Labeling Rule.

1. Provide appliances that qualify for the EPA/DOE ENERGY STAR product labeling program.

1.5 WARRANTY

A. Special Warranties: Manufacturer's standard form in which manufacturer of each appliance specified agrees to repair or replace residential appliances or components that fail in materials or workmanship within specified warranty period.
1. Microwave Oven: Five-year limited warranty for defects in the magnetron tube.
2. Refrigerator/Freezer: Five-year limited warranty for in-home service on the sealed refrigeration system.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:
1. Basis-of-Design Product: The design for each residential appliance is based on the product named. Subject to compliance with requirements, provide either the named product or a comparable product by one of the other manufacturers specified.

2.2 COOKING APPLIANCES

A. Microwave Oven:

1. Basis-of-Design Product: Panasonic NN-T793SF or a comparable product by one of the following:

2. Oven: Standard features include the following:

a. Oven Capacity: 1.6 cu. ft.
b. Oven Features: Digital control panel with timer display, turntable, temperature probe and child lock-out.
c. Electrical Power: 1460 Watts 120 Volts, 60 Hertz.
d. Stainless steel exterior with epoxy interior.

2.3 REFRIGERATION APPLIANCES

A. Refrigerator/Freezer:

1. Basis-of-Design Product: Maytag MBB2254GES or a comparable product by one of the following:

2. Type: Freestanding, frost-free, with freezer on bottom.
3. Storage Capacity: 21.9 cu.ft.

4. Refrigerator Features.
a. Door Storage: Gallon door storage.
b. Interior light in compartment.

5. Freezer Features:

a. Ice storage bins.
b. Automatic icemaker and storage bin.
c. Circulator fan.

6. Energy Consumption: Energy Star model – exceeds federal standards.
7. Front Panel: Stainless-steel door front and lower access panel.

2.4 GAS FIREPLACE INSERTS

A. Gas Fireplace insert and accessories to be Heat-n-Glo Model Escape-36DV. Provide complete with vent pipe and screen. Finish to be Bronze.

2.5 FINISHES, GENERAL

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

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

C. Stainless-Steel Finish: Provide appliances with manufacturer's standard finish complying with manufacturer's written instructions for surface preparation including ground and polished stainless-steel surfaces for uniform, directionally textured finish.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of work.

B. Examine roughing-in for piping systems to verify actual locations of piping connections before equipment installation.

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

3.2 INSTALLATION, GENERAL

A. General: Comply with manufacturer's written instructions.

B. Built-in Equipment: Securely anchor units to supporting cabinets or countertops with concealed fasteners. Verify that clearances are adequate for proper functioning and rough openings are completely concealed.

C. Freestanding Equipment: Place units in final locations after finishes have been completed in each area. Verify that clearances are adequate to properly operate equipment.

D. Utilities: Refer to Divisions 15 and 16 for plumbing and electrical requirements.

3.3 CLEANING AND PROTECTION

A. Test each item of residential appliances to verify proper operation. Make necessary adjustments.

B. Verify that accessories required have been furnished and installed.

C. Remove packing material from residential appliances and leave units in clean condition, ready for operation.

3.4 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain residential appliances. Refer to Division 1 Section "Demonstration and Training."

END OF SECTION 11451

SECTION 12491

HORIZONTAL LOUVER BLINDS

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. Horizontal louver blinds with aluminum slats.

B. Related Sections include the following:

1. Division 6 Section "Miscellaneous Carpentry" for wood blocking and grounds for mounting horizontal louver blinds and accessories.

1.3 SUBMITTALS

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

B. Samples for Initial Selection: For each type and color of horizontal louver blind indicated.

1. Include similar Samples of accessories involving color selection.

C. Maintenance Data: For horizontal louver blinds to include in maintenance manuals.

1.4 QUALITY ASSURANCE

A. Source Limitations: Obtain horizontal louver blinds through one source from a single manufacturer.

B. Product Standard: Provide horizontal louver blinds complying with WCSC A 100.1.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver horizontal louver blinds in factory packages, marked with manufacturer and product name and location of installation using same designations indicated on Drawings and in a window treatment schedule.

1.6 PROJECT CONDITIONS

A. Environmental Limitations: Do not install horizontal louver blinds until construction and wet and dirty finish work in spaces, including painting, is complete and dry and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.

B. Field Measurements: Where horizontal louver blinds are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication and indicate measurements on Shop Drawings. Allow clearances for operable glazed units' operation hardware throughout the entire operating range. Notify Architect of discrepancies. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

1.7 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. Horizontal Louver Blinds: Before installation begins, for each size, color, texture, pattern, and gloss indicated, full-size units equal to 5 percent of amount installed, but no fewer than 2 units.

PART 2 - PRODUCTS

2.1 HORIZONTAL LOUVER BLINDS, ALUMINUM SLATS

A. Available Products: Subject to compliance with requirements, 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 Levelor Mark I DustGuard or a comparable product by one of the following:

1. Hunter Douglas.

C. Slats: Aluminum; alloy and temper recommended by producer for type of use and finish indicated; with crowned profile and radiused corners.

1. Width: 1 inch (25 mm).

a. Spacing: Not less than every 0.77 inch (19.5 mm).

2. Thickness: Not less than 0.008 inch (0.20 mm).
3. Finish: One color.

a. Ionized Coating: Antistatic, dust-repellent, baked polyester finish.

D. Headrail: Formed steel or extruded aluminum; long edges returned or rolled; fully enclosing operating mechanisms on three sides and the following:
1. Integrated Headrail/Valance: Curved face.
2. Light-blocking lower back lip.

3. Tilt limiter with preselected degree settings.

E. Bottom Rail: Formed-steel or extruded-aluminum tube, with plastic or metal capped; with enclosed ladders and tapes to prevent contact with sill.

F. Ladders: Evenly spaced to prevent long-term slat sag.
1. For Blinds with Nominal Slat Width 1 Inch (25 mm): Braided string.

G. Lift Cords: Manufacturer's standard.

H. Tilt Control: Enclosed worm-gear mechanism, slip clutch or detachable wand preventing overrotation, and linkage rod, and the following:

1. Tilt Operation: Manual with clear plastic wand.
2. Length of Tilt Control: Manufacturer's standard.
3. Tilt: Full.

I. Lift Operation: Manual, cord lock; locks pull cord to stop blind at any position in ascending or descending travel.

J. Tilt-Control and Cord-Lock Position: Right and left side of headrail, respectively, unless otherwise indicated.

K. Mounting: End mounting, permitting easy removal and replacement without damaging blind or adjacent surfaces and finishes; with spacers and shims required for blind placement and alignment indicated.

L. Colors, Textures, Patterns, and Gloss: As selected by Architect from manufacturer's full range.

2.2 HORIZONTAL LOUVER BLIND FABRICATION

A. Concealed Components: Noncorrodible or corrosion-resistant-coated materials.

1. Lift-and-Tilt Mechanisms: With permanently lubricated moving parts.

B. Unit Sizes: Obtain units fabricated in sizes to fill window and other openings as follows, measured at 74 deg F (23 deg C):

1. Blind Units Installed between (inside) Jambs: Width equal to 1/4 inch (6 mm) per side or 1/2 inch (13 mm) total, plus or minus 1/8 inch (3.1 mm), less than jamb-to-jamb dimension of opening in which each blind is installed. Length equal to 1/4 inch (6 mm), plus or minus 1/8 inch (3.1 mm), less than head-to-sill dimension of opening in which each blind is installed.

C. Installation Brackets: Designed for easy removal and reinstallation of blind, for supporting headrail and operating hardware, and for hardware position and blind mounting method indicated.

D. Installation Fasteners: No fewer than two fasteners per bracket, fabricated from metal noncorrosive to blind hardware and adjoining construction; type designed for securing to supporting substrate; and supporting blinds and accessories under conditions of normal use.

E. Color-Coated Finish:

1. Metal: For components exposed to view, apply manufacturer's standard baked finish complying with manufacturer's written instructions for surface preparation including pretreatment, application, baking, and minimum dry film thickness.

F. Component Color: Provide rails, cords, ladders, and exposed-to-view metal and plastic matching or coordinating with slat color, unless otherwise indicated.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances, operational clearances, and other conditions affecting performance.

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

3.2 INSTALLATION

A. Install horizontal louver blinds level and plumb and aligned with adjacent units according to manufacturer's written instructions, and located so exterior slat edges in any position are not closer than 1 inch (25 mm) to interior face of glass. Install intermediate support as required to prevent deflection in headrail. Allow clearances between adjacent blinds and for operating glazed opening's operation hardware if any.

B. Head Mounted: Install headrail on face of opening head.

3.3 ADJUSTING

A. Adjust horizontal louver blinds to operate smoothly, easily, safely, and free of binding or malfunction throughout entire operational range.

3.4 CLEANING AND PROTECTION

A. Clean horizontal louver blind surfaces after installation, according to manufacturer's written instructions.

B. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and Installer, that ensure that horizontal louver blinds are without damage or deterioration at time of Substantial Completion.

C. Replace damaged horizontal louver blinds that cannot be repaired, in a manner approved by Architect, before time of Substantial Completion.

END OF SECTION 12491

SECTION 13900

BASIC FIRE PROTECTION MATERIALS AND METHODS

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 specifies the basic requirements for fire protection installations and includes requirements common to more than one section. It expands and supplements the requirements specified in sections of Division 1.
   1. Mechanical sleeve seals.
   2. Sleeves.
   3. Escutcheons.
   4. Grout.
   5. Equipment installation requirements.
   6. Painting and finishing.
   7. Concrete bases.
   8. Supports and anchorages.
   9. Access panels and doors.
   10. Seismic Bracing.

B. Related Sections include the following:
   1. Division 1 Section, "Commissioning Requirements."
   2. Division 3 Section, "Cast-In-Place Concrete."
   3. Division 7 Section, "Firestopping."
   4. Division 8 Section, "Access Panels."
   5. Division 9 Section, "Painting."
   6. Division 16 Section, "Fire Alarm."

1.3 DEFINITIONS

A. Complete and Operational System: A Fire Protection system that has been installed, tested, cleaned, signed-off by appropriate Authority and made operational. Completion of Owner training to be part of this requirement.

B. Fire Protection Contractor: The project Contractor responsible for the installation of the Fire Protection systems and equipment.

C. 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, crawlspaces, and tunnels.

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

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

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

G. 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.

H. NFPA: National Fire Protection Association.

I. AHJ: Authority Having Jurisdiction, parties responsible for the approval of materials and installations.

1.4 SUBMITTALS

A. General: See Division 1 for general submittal and product substitution requirements.
   1. Pre-Construction Submittals: Submit the following items prior to commencing with installations.
      a. Copies of permits required for performing the work.
      b. Copies of certificates of registrations indicating compliance with the "Quality Assurance" paragraph that follows.
      c. Supports and hangers.
      d. Sleeves and sleeve seals.
      e. Escutcheons.
      f. Seismic bracing materials.
   2. Post-Construction Submittals: Submit the following items upon completion of the work.
      a. Copies of final system sign-off and acceptance by the AHJ.

1.5 QUALITY ASSURANCE

A. Commissioning: Project scope will include commissioning of life safety systems. The Fire Protection Contractor shall support this effort in accordance with the requirements of Section 01320, "Commissioning Requirements."

B. Installer Qualifications: All work shall be performed by qualified journeymen of their respective trades who are employed by a firm that can demonstrate successful experience with work similar in type, quality and extent to the work required by this project.

C. Steel Support Welding: Qualify processes and operators according to AWS D1.1, "Structural Welding Code--Steel."

D. Steel Pipe Welding: Qualify processes and operators according to ASME Boiler and Pressure Vessel Code: Section IX, "Welding and Brazing Qualifications."
1. Comply with provisions in ASME B31 Series, "Code for Pressure Piping."
2. Certify that each welder has passed AWS qualification tests for welding processes involved and that certification is current.

E. Electrical Characteristics for Mechanical Equipment: Equipment of higher electrical characteristics may be furnished provided such proposed equipment is approved in writing and connecting electrical services, circuit breakers, and conduit sizes are appropriately modified. If minimum energy ratings or efficiencies are specified, equipment shall comply with requirements.

F. Listing and Approval: Unless otherwise required by the Owner's Insurance Underwriter, components intended for use in fire suppression systems shall be "listed" or "approved."
1. "Listed": UL Listed.
2. "Approved": FMC Approved.

1.6 BASIS OF DESIGN (B.O.D.)

A. General: The following information is intended to provide an overview of the intent and operation of the project fire Protection systems. It is not intended that each and every project Fire Protection scope item be captured herein. The absence of a specific item or system in the descriptions below does not absolve the Fire Protection Contractor from providing the work identified by other Sections and the Drawings.
1. The Fire Protection Contractor shall provide complete and operational systems and installations.

B. Fire Protection Systems Description:
1. Water Entrance: Connect to a 6-inch water entrance into the facility. Water shall enter the basement water room.
2. Entrance Equipment: Provide a double check style backflow preventer and wet-pipe alarm valve. Alarm valve to include the following trim:
a. Retard chamber & pressure switch.
b. Electric bell, (for exterior wall mounting).
c. Water motor gong, (for exterior wall mounting).
3. Fire Department Connection: Provide a wall mount FDC, including check valve and ball drip.
4. Sprinkler System: Provide complete wet-pipe sprinkler coverage throughout the facility. In loading and other areas subject to freezing use dry barrel heads or a small anti-freeze system. Anti-freeze systems to include a reduced pressure zone style backflow preventer and expansion tank.

1.7 CODES, STANDARDS AND AUTHORITIES

A. General: The following listing is intended to identify the major Codes, Standards, and Authorities Having Jurisdiction, (AHJ's) for the project. This information is at least partially provided on the G-000 series Drawings as well. In the event that there is a discrepancy between the information contained herein and that on the G-000 Drawings, the information herein shall govern.
   1. In the event that an item is included on the G-000 Drawings and is not listed herein, compliance with the requirements of said item is required.
   2. The exclusion of an applicable Code, Standard, or AHJ in the list below does not absolve the Contractor from meeting the requirements of said Code, Standard or AHJ.

B. Codes and Standards: Work performed on the project must comply with the requirements of the following Codes and Standards:
   1. BOCA, 1999 Edition.
   2. NFPA 101, 2000 Edition.
   3. NFPA 13, "Standard for the Installation of Sprinkler Systems," 2002 Edition.
   4. NFPA 24, "Standard for the Installation of Private Service Mains and Their Appurtenances," 1995 Edition.

C. Authorities Having Jurisdiction: Work performed on the project must comply with the requirements of the following AHJ's:
   1. State Fire Marshal.
   2. Local Fire Department.
   3. Building Official.
   4. Owner's Insurance Underwriter.

1.8 DRAWINGS AND SPEICIFICATIONS

A. Refer to the Plumbing Drawings for the location of the facility water entrance and water entrance equipment.

B. Refer to the Architectural Drawings for ceiling sprinkler head layout requirements.
   1. Reflected Ceiling Plans: Head layouts indicated on these plans are not necessarily complete. The intent of these layouts is to indicate head placement requirements in specific areas. Closely spaced heads at interior glazing, window type heads, unfinished space head layouts, and are not necessarily indicated on the Drawings. Additionally, head layouts indicated shall not have priority over NFPA and other Code head layout requirements.

1.9 SUBSTITUTIONS

A. General: See Division 1 for product substitution requirements.
   1. No substitute materials or equipment shall be incorporated in the work without the written approval of the Architect/Engineer.

1.10 FIRE PROTECTION SUBMITTALS

A. General: Refer to Division 1 for submittal definitions, requirements and procedures.

B. Submittal of shop drawings, certified performance data, and samples will be accepted only when submitted per Division 1. Data submitted from subcontractors and material suppliers directly to the Architect/Engineer will not be processed.

C. When two or more items of the same material or equipment are required, they shall be products of the same manufacturer insofar as possible.
1. This does not apply to raw or bulk materials such as pipe and fittings, etc.

1.11 RECORD DOCUMENTS

A. General: Refer to Division 1 for requirements.

B. As work progresses, mark Drawings to indicate revisions to fire protection systems.

C. Mark specifications to indicate approved substitutions; Change Orders; actual equipment and materials used.

D. At completion of work and prior to final request for payment, the Fire Protection Subcontractor shall submit a complete set of reproducible record drawings showing all systems as actually installed. Drawings submitted shall be in the following format:
1. Re-issuances of the project shop drawings.
2. Re-issuance of the project hydraulic calculations, with revisions as necessary to account for modifications since the time of shop drawing submittal.

1.12 OPERATION AND MAINTENANCE, (O&M) MANUALS

A. General: Refer to Division 1 for procedures and requirements for preparation and submittal of O&M Manuals.

B. Systems Descriptions: Provide description of function, normal operating characteristics and limitations, performance curves, engineering data and tests, and complete nomenclature and commercial numbers of all replaceable parts.

C. Operating Procedures: Provide manufacturer's printed data, including start-up, break-in, routine and normal operating instructions; regulation control, stopping, shut-down, and emergency instructions; and summer and winter operating instructions.

D. Maintenance Procedures: Provide for routine preventive maintenance and troubleshooting; disassembly, repair, and reassembly; aligning and adjusting instructions.

E. Servicing Instructions: Provide instructions, lubrication charts and schedules.

F. Product Data: Provide copies of all approved submittals.

1.13 OWNER TRAINING

A. General: Refer to Division 1 for general requirements.

1.14 WARRANTIES

A. Refer to Division 1 for project requirements for warranties. Individual warranties are required for each item of power driven or other fire protection equipment having moving parts, and wherever else specified in Division 15.
   1. Submit the warranties specified in Division 15 in a vinyl covered, three ring binder, tabulated and indexed for easy reference.

B. Provide complete warranty information for each item, to include date of commencement; duration; and the names, addresses, and telephone numbers and procedures for filing claims and obtaining warranty services.

C. Duration of warranties shall be not less than one year from the date of substantial completion of the facility unless the Architect/Engineer has granted prior written approval. If the manufacturer's warranty expires less than one year from the date of substantial completion, the mechanical subcontractor at no cost shall provide that warranty service and replacement of parts to the Owner.

1.15 DELIVERY, STORAGE AND HANDLING

A. General: Refer to Division 1 for material procurement requirements.

B. Deliver products to project properly identified with names, model numbers, types, grades, compliance labels, and similar information needed for distinct identifications; adequately packaged and protected to prevent damage during shipment, storage, and handling.

C. Store equipment and materials at the site, unless off-site storage is authorized in writing. Protect stored equipment and materials from damage.

D. Coordinate deliveries of mechanical materials and equipment to minimize construction site congestion. Limit each shipment of materials and equipment to the items and quantities needed for the smooth and efficient flow of installations.

1.16 DIVISION OF FIRE PROTECTION, FIRE ALARM AND ELECTRICAL RESPONSIBILITY

A. General: Line voltage switches, fused switches, outlets, motor starters, power wiring and fuses necessary to connect and operate all electrically powered equipment specified herein will be furnished and installed as a part of the total project. Coordinate work with Division 16. The intent is to have a complete and operational system. The Fire Protection Contractor shall be responsible for furnishing and installing the equipment necessary to provide for the complete and operational system.

B. Power Wiring: Wiring for equipment shall be furnished and installed as specified under Division 16.

C. Facility Alarm Wiring: Wiring for alarm devices, (between the devices and the fire alarm control panel) shall be furnished and installed as specified under Division 16.

D. System Alarm Wiring: Interconnecting wiring for alarm devices that are part of a packaged fire protection system, (between the devices and the system control panel) shall be furnished and installed by the Fire Protection Contractor per the requirements of Division 16. Examples include; Pre-Action Sprinkler, Clean Agent Gaseous, Wet Chemical.

1.17 SEISMIC REQUIREMENTS

A. General: Performance requirements to be used in the design of seismic controls are as identified on the Structural drawings.

1.18 COORDINATION

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

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

C. Coordinate requirements for access panels and doors for fire protection items requiring access that are concealed behind finished surfaces. Access panels and doors are specified in Division 8 Section "Access Doors and Frames."
   1. The Fire Protection Contractor shall provide access panels per the requirements of Division 8 Sections. Installation of the panels to be as directed by the General Contractor / Construction Manager.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

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

B. Mechanical Sleeve Seals:
   1. Advance Products & Systems, Inc.
   2. Calpico, Inc.
   3. Metraflex Co.
   4. Pipeline Seal and Insulator, Inc.
   5. Thunderline/Link-Seal.

C. Pipe Identification Systems:

1. Seaton Name Plate Co.
2. Brady: Signmark Div.; W.H. Brady Co.
3. Kolbi Industries, Inc.

D. Equipment and System Nameplates:
1. Central Sprinkler Corp.
2. Reliable Automatic Sprinkler Co., Inc.
3. Viking Corp.

E. Supports and Anchors:
1. B-Line Systems, Inc.
2. Carpenter & Patterson, Inc.
3. Grinnell Corp.
4. Fee & Mason Mfg. Co.

F. Seismic Restraints:
1. B-Line Systems, Inc.
2. Loos & Co., Inc.; Cableware Technology Division.
3. Mason Industries, Inc.
4. TOLCO Incorporated.
5. Grinnell Corp.

2.2 JOINING MATERIALS

A. Refer to individual 13900 series Sections for special joining materials not listed below.

B. Pipe-Flange Gasket Materials: Suitable for chemical and thermal conditions of piping system contents.
1. ASME B16.21, nonmetallic, flat, asbestos-free, 1/8-inch (3.2-mm) maximum thickness unless thickness or specific material is indicated.
   a. Full-Face Type: For flat-face, Class 125, cast-iron and cast-bronze flanges.
   b. Narrow-Face Type: For raised-face, Class 250, cast-iron and steel flanges.
2. AWWA C110, rubber, flat face, 1/8 inch (3.2 mm) thick, unless otherwise indicated; and full-face or ring type, unless otherwise indicated.

C. Flange Bolts and Nuts: ASME B18.2.1, carbon steel, unless otherwise indicated.

D. Solder Filler Metals: ASTM B 32, lead-free alloys. Include water-flushable flux according to ASTM B 813.

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

2.3 MECHANICAL SLEEVE SEALS

A. Description: Modular sealing element unit, designed for field assembly, to fill annular space between pipe and sleeve.

1. Sealing Elements: EPDM interlocking links shaped to fit surface of pipe. Include type and number required for pipe material and size of pipe.
2. Pressure Plates: Plastic, include two for each sealing element.
3. Connecting Bolts and Nuts: Carbon steel with corrosion-resistant coating of length required to secure pressure plates to sealing elements. Include one for each sealing element.

2.4 SLEEVES

A. Galvanized-Steel Sheet: 0.0239-inch (0.6-mm) minimum thickness; round tube closed with welded longitudinal joint.

B. Steel Pipe: ASTM A 53, Type E, Grade B, Schedule 40, galvanized, plain ends.

C. Cast Iron: Cast or fabricated "wall pipe" equivalent to ductile-iron pressure pipe, with plain ends and integral waterstop, unless otherwise indicated.

D. Stack Sleeve Fittings: Manufactured, cast-iron sleeve with integral clamping flange. Include clamping ring and bolts and nuts for membrane flashing.
1. Underdeck Clamp: Clamping ring with setscrews.

2.5 ESCUTCHEONS

A. Description: Manufactured wall and ceiling escutcheons and floor plates, with an ID to closely fit around pipe, and an OD that completely covers opening. Escutcheon finishes to be as follows:
1. Finished area, exposed to view: Polished chrome-plated.
2. Unfinished areas: Galvanized steel.

2.6 GROUT

A. Description: ASTM C 1107, Grade B, non-shrink and non-metallic, dry hydraulic-cement grout.

1. Characteristics: Post-hardening, volume adjusting, non-staining, non-corrosive, nongaseous, and recommended for interior and exterior applications.
2. Design Mix: 5000-psi (34.5-MPa), 28-day compressive strength.
3. Packaging: Premixed and factory packaged.

2.7 ACCESS PANELS AND DOORS

A. Panels and doors are to be furnished to provide access to items required in 13900 Series Sections and the Fire Protection Drawings. Panels and doors are to furnished per the requirements of Division 8 Section, "Access Doors."

2.8 PIPE IDENTIFICATION SYSTEMS

A. General: Provide Manufacturer's standard products.
1. Lettering: Comply with ASME A13.1 for lettering size, colors, and viewing angles.

B. Pipe Markers: Manufacturer's standard preprinted, semi-rigid snap-on, plastic color-coded pipe markers, ASME A13.1.

2.9 NAMEPLATES

A. General: Provide factory pre-printed porcelain enameled, 20 gauge minimum, steel nameplates.

B. Hydraulic Nameplates: Indicate the following:
1. Area served.
2. Design area, density, and occupancy classification.
3. Flow and residual pressure required at the base of the riser.
4. Inside hose stream demand.
5. Outside hose stream demand.

C. Ancillary Nameplates: Provide for the following:
1. Drain locations.
2. Inspector's Test Stations.
3. Auxiliary Drains.
4. Concealed Floor Control and General Sprinkler Zone Valve Assemblies.

2.10 SUPPORTS AND ANCHORS

A. General: Provide Hangers, Supports and Anchors in accordance with NFPA 13, as specified herein, and as per the Manufacturer's Standardization Society Standard Practices, (MSS SP):
1. MSS SP-58, "Pipe Hanger and Supports – Materials, Design and Manufacture."
2. MSS SP-69, " Pipe Hanger and Supports – Selection and Application."
3. MSS SP-89, " Pipe Hanger and Supports – Fabrication and Installation Practices."

B. Material Compatibility: Provide hangers and supports which match the piping system material:
1. Copper Piping Systems: Provide copper plated or non-metallic coated hangers and supports.
2. CPVC Piping Systems: Provide non-metallic coated hangers and supports.

C. Miscellaneous Materials:
1. Structural Steel: ASTM A 36/A 36M, steel plates, shapes, and bars, black and galvanized.
2. Bolts and Nuts: ASME B18.10 or ASTM A 183, steel, hex-head, track bolts and nuts.
3. Washers: ASTM F 844, steel, plain, flat washers.
4. Powder-Actuated Drive-Pin Fasteners: Powder-actuated-type, drive-pin attachments with pull-out and shear capacities appropriate for supported loads and building materials where used. Fasteners for fire protection systems include UL listing and FM approval.
5. Mechanical-Anchor Fasteners: Insert-type attachments with pullout and shear capacities appropriate for supported loads and building materials where used.

D. Retaining Straps: Install retaining straps on c-clamp style structure attachments where seismic bracing is a project criterion.

2.11 SEISMIC CONTROLS

A. General: Restraint systems for these items shall consist of tension and compression, (strut) components, or tension only, (cable) components. In either case, provide necessary ancillary appurtenances as required to meet seismic restrain design criteria. Each and every component is not identified herein.
1. A single manufacturer shall provide systems and their components.
2. Components shall be intended and listed for use with each other, (do not mix and match components not intended for use with each other).
3. Systems may include:
a. Attachments to structure.
b. Braces and other means of augmenting standard hanger and support assemblies.
4. Restraint devices constructed of aluminum or cast iron materials are not acceptable.

B. Strut Restraint Systems: Tension and Compression systems consisting of strut manufacturer's standard channel and attachments.

C. Restraining Cable Systems: Galvanized steel aircraft cables with end connections made of steel assemblies that swivel to final installation angle and utilize two clamping bolts for cable engagement.

PART 3 - EXECUTION

3.1 CUTTING AND PATCHING

A. Refer to Division 1 Sections "Cutting and Patching" and "Selective Demolition" for general demolition requirements and procedures.

B. Refer to Division 16 for requirements for cutting and patching electrical equipment, components, and materials.

C. Do not endanger or damage installed Work through procedures and processes of cutting and patching.

D. Arrange for repairs required to restore other work, because of damage caused as a result of fire protection installations.

E. No additional compensation will be authorized for cutting and patching work that is necessitated by ill-timed, defective, or non-conforming installations.

F. Perform cutting, fitting, and patching of fire protection equipment and materials required to:
1. Uncover Work to provide for installation of ill-timed Work.
2. Remove and replace defective Work.
3. Remove and replace Work not conforming to requirements of the Contract Documents.

4. Remove samples of installed Work as specified for testing.
5. Upon written instructions from the Architect/Engineer, uncover and restore Work to provide for Architect/Engineer observation of concealed Work.

G. Protect the structure, furnishings, finishes, and adjacent materials not indicated or scheduled to be removed.

H. Provide and maintain temporary partitions or dust barriers adequate to prevent the spread of dust and dirt to adjacent areas.

3.2 GENERAL INSTALLATION REQUIREMENTS

A. General: Coordinate equipment and materials for installation with other building components.

B. Verify dimensions by field measurements.

C. Arrange for chases, slots, and openings in other building components to allow for fire protection installations.

D. Sequence, coordinate and integrate installations of fire protection materials and equipment for efficient flow of the work.

E. Coordinate the cutting and patching of building components to accommodate the installation of fire protection equipment and materials. Refer to Division 1.

F. Install mechanical equipment to facilitate maintenance and repair or replacement of equipment components. As much as practical, connect equipment for ease of disconnecting, with minimum of interference with other installations.

G. Install access panels to allow access to equipment and other system components that require servicing or adjustment per the requirements of Division 8.

H. Coordinate the installation of mechanical materials and equipment above ceilings with suspension system, lighting fixtures, and other installations.

3.3 PIPING SYSTEMS - COMMON REQUIREMENTS

A. Install piping according to the following requirements and other 13900 series Sections specifying piping systems.

B. 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 in concealed locations, unless otherwise indicated and except in equipment rooms and service areas.

D. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.

E. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal.

F. Install piping to permit valve servicing.

G. Install piping at indicated slopes.

H. Install piping free of sags and bends.

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

J. Install piping to allow application of insulation.

K. Select system components with pressure rating equal to or greater than system operating pressure.

L. Install escutcheons for penetrations of walls, ceilings, and floors according to the following. Use One-piece escutcheons whenever possible in new construction. Split-casting units acceptable for installation on existing piping systems.

M. Sleeves are not required for core-drilled holes.

N. Install sleeves for pipes passing through concrete and masonry walls, gypsum-board partitions, 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 (50 mm) 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 in new walls and slabs as new walls and slabs are constructed.
   3. Install sleeves that are large enough to provide 1/4-inch (6.4-mm) annular clear space between sleeve and pipe or pipe insulation. Use the following sleeve materials:

      a. Steel Pipe Sleeves: For pipes smaller than NPS 6 (DN 150).
      b. Steel Sheet Sleeves: For pipes NPS 6 (DN 150) 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 (50 mm) above finished floor level. Refer to Division 7 Section "Sheet Metal Flashing and Trim" for flashing.
         1) Seal space outside of sleeve fittings with grout.

   4. Except for underground wall penetrations, seal annular space between sleeve and pipe or pipe insulation, using joint sealants appropriate for size, depth, and location of joint. Refer to Division 7 Section "Joint Sealants" for materials and installation.

O. Aboveground, Exterior-Wall Pipe Penetrations: Seal penetrations using sleeves and mechanical sleeve seals. Select sleeve size to allow for 1-inch (25-mm) annular clear space between pipe and sleeve for installing mechanical sleeve seals.
1. Install steel pipe for sleeves smaller than 6 inches (150 mm) in diameter.
2. Install cast-iron "wall pipes" for sleeves 6 inches (150 mm) and larger in diameter.
3. Mechanical Sleeve Seal Installation: Select type and number of sealing elements required for pipe material and size. Position pipe in center of sleeve. Assemble mechanical sleeve seals and install in annular space between pipe and sleeve. Tighten bolts against pressure plates that cause 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. Select sleeve size to allow for 1-inch (25-mm) annular clear space between pipe and sleeve for installing mechanical sleeve seals.
1. Mechanical Sleeve Seal Installation: Select type and number of sealing elements required for pipe material and size. Position pipe in center of sleeve. Assemble mechanical sleeve seals and install in annular space between pipe and sleeve. Tighten bolts against pressure plates that cause 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 firestop materials. Refer to Division 7 Section "Through-Penetration Firestop Systems" for materials.

3.4 PIPING JOINT CONSTRUCTION

A. Join pipe and fittings according to the following requirements and Division 15 Sections specifying piping systems.

B. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.

C. Remove scale, slag, dirt, and debris from inside and outside of pipe and fittings before assembly.

D. 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:

1. Apply appropriate tape or thread compound to external pipe threads unless dry seal threading is specified.
2. 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.

E. Welded Joints: Construct joints according to AWS D10.12, using qualified processes and welding operators according to Part 1 "Quality Assurance" Article.

F. Flanged Joints: Select appropriate gasket material, size, type, and thickness for service application. Install gasket concentrically positioned. Use suitable lubricants on bolt threads.

3.5 PIPING CONNECTIONS

A. Make connections according to the following, unless otherwise indicated:

1. Install unions, in piping NPS 2 (DN 50) and smaller, adjacent to each valve and at final connection to each piece of equipment.
2. Install flanges, in piping NPS 2-1/2 (DN 65) and larger, adjacent to flanged valves and at final connection to each piece of equipment.
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.

3.6 EQUIPMENT INSTALLATION - COMMON REQUIREMENTS

A. Install equipment to allow maximum possible headroom unless specific mounting heights are not indicated.

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

C. Install fire protection 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.

D. Install equipment to allow right of way for piping installed at required slope.

3.7 CLEAN CONSTRUCTION MEASURES

A. General: Take care during construction to maintain the integrity and cleanliness of pipe and equipment systems.

B. Exposed ends of piping systems and equipment connection ports shall be capped, plugged, or otherwise covered during construction.

3.8 PAINTING

A. Painting of mechanical systems, equipment, and components is specified in Division 9 Section "Painting."

B. Damage and Touchup: Repair marred and damaged factory-painted finishes with materials and procedures to match original factory finish.

C. Sprinkler Heads: Painting of sprinkler heads and their fusible link is prohibited.
1. Provide protective coverings on sprinkler heads where general area painting is taking place.
2. Remove coverings once painting is complete.

3. Replace heads that may have inadvertently been painted.

3.9 CONCRETE BASES

A. Concrete Bases: Anchor equipment to concrete base according to equipment manufacturer's written instructions and according to seismic codes at Project.

1. Construct concrete bases of dimensions indicated, but not less than 4 inches (100 mm) larger in both directions than supported unit.
2. Install dowel rods to connect concrete base to concrete floor. Unless otherwise indicated, install dowel rods on 18-inch (450-mm) centers around the full perimeter of the base.
3. Install epoxy-coated anchor bolts for supported equipment that extend through concrete base, and anchor into structural concrete floor.
4. Place and secure anchorage devices. Use supported equipment manufacturer's setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
5. Install anchor bolts to elevations required for proper attachment to supported equipment.
6. Install anchor bolts according to anchor-bolt manufacturers written instructions.
7. Use 3000-psi (20.7-MPa), 28-day compressive-strength concrete and reinforcement as specified in Division 3 Section "Cast-in-Place Concrete."

3.10 ERECTION OF METAL SUPPORTS AND ANCHORAGES

A. Refer to Division 5 Section "Metal Fabrications" for structural steel.

B. Cut, fit, and place miscellaneous metal supports accurately in location, alignment, and elevation to support and anchor mechanical materials and equipment.

C. Field Welding: Comply with AWS D1.1.

3.11 ERECTION OF WOOD SUPPORTS AND ANCHORAGES

A. Cut, fit, and place wood grounds, nailers, blocking, and anchorages to support, and anchor mechanical materials and equipment.

B. Select fastener sizes that will not penetrate members if opposite side will be exposed to view or will receive finish materials. Tighten connections between members. Install fasteners without splitting wood members.

C. Attach to substrates as required to support applied loads.

3.12 GROUTING

A. Mix and install grout for mechanical equipment base bearing surfaces, pump and other equipment base plates, and anchors.
1. Clean surfaces that will come into contact with grout.

2. Provide forms as required for placement of grout.
3. Avoid air entrapment during placement of grout.
4. Place grout, completely filling equipment bases.
5. Place grout on concrete bases and provide smooth bearing surface for equipment.
6. Place grout around anchors.
7. Cure placed grout.

3.13 SUPPORT AND ANCHORAGE INSTALLATION

A. General: Comply with NFPA 13, MSS SP-69 and MSS SP-89. Install hangers, supports, clamps, and attachments as required to properly support piping from building structure.

B. Install building attachments within concrete slabs or attach to structural steel. Space attachments within maximum piping span length indicated in MSS SP-69. Install additional attachments at concentrated loads, including valves, flanges, guides, strainers, and expansion joints, and at changes in direction of piping. Install concrete inserts before concrete is placed; fasten inserts to forms and install reinforcing bars through openings at top of inserts.

C. Install powder-actuated drive-pin fasteners in concrete after concrete is placed and completely cured. Use operators that are licensed by powder-actuated tool manufacturer. Install fasteners according to powder-actuated tool manufacturer's operating manual.

D. Install mechanical-anchor fasteners in concrete after concrete is placed and completely cured. Install fasteners according to manufacturer's written instructions.

E. Install hangers and supports complete with necessary inserts, bolts, rods, nuts, washers, and other accessories.

F. Load Distribution: Install hangers and supports so that piping live and dead loads and stresses from movement will not be transmitted to connected equipment.

G. Open Web Joist Attachments: Where systems are supported via attachments to open web steel joints, connections to the joists shall be made at joist panel points. Connections and loading shall also be made concentrically.

H. Pipe Slopes: Install hangers and supports to provide indicated pipe slopes and so maximum pipe deflections allowed by ASME B31.9, "Building Services Piping," is not exceeded.

I. Support Spacing: Install piping supports at the following maximum spacing intervals using the minimum threaded rod sizes indicated;

Nominal Pipe Size (inches)	Max. Sch. 10, 30 & 40 Steel Pipe Span (feet)	-	Min. Rod Dia. (inches)
1	12	-	3/8
1-1/4	12	-	3/8
1-1/2	15	-	3/8
2	15	-	3/8
2-1/2	15	-	3/8
3	15	-	3/8

4	15	-	3/8
6	15	-	1/2
8	15	-	1/2

J. Seismic Bracing: Install seismic bracing of fire protection systems, per NFPA 13 requirements.

3.14 IDENTIFICATION SYSTEMS INSTALLATION

A. Nameplates: Install nameplates using corrosion resistant fasteners.
1. Secure hydraulic nameplates directly to the riser valves to which they apply.
2. Install miscellaneous nameplates adjacent to the item being identified.
a. For identification of items that are concealed, (i.e.; above a ceiling) install the nameplate in a clearly visible location.

B. Pipe Identification: Install pipe identification markers on fire protection system mains only, (not required on branch piping). Markers to be located as follows;
1. At 50-foot intervals-max., 25-foot in congested areas.
2. Adjacent to each system valve.
3. At either side of wall or floor penetration.
4. Behind access panels.

3.15 START UP AND TESTING

A. General: The Fire Protection Contractor is responsible for startup of all equipment provided in 13900 Series Sections.

3.16 CLEANING FOR PAINT

A. Where fire protection piping is to remain exposed in finished rooms, clean all oil, grease, and other materials from piping in preparation for painting. Refer to Division 9 Section "Painting" for additional information.

3.17 FINAL CLEANING

A. General: Refer to Division 1 for general requirements regarding final cleaning.

END OF SECTION

SECTION 13930

FIRE SUPPRESSION SPRINKLER SYSTEMS

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.

B. The requirements of Section 13900, "Basic Fire Protection Materials and Methods" apply to work defined by this Section.

1.2 SUMMARY

A. This Section includes the following fire-suppression systems inside the building:
1. Sprinkler Systems.

B. Related Sections include the following:

1. Division 2 Section "Water Distribution" for piping outside the building.
2. Division 16 Section "Fire Alarm" for alarm device wiring.

1.3 DEFINITIONS

A. AHJ: Authorities Having Jurisdiction.

B. Underground Service-Entrance Piping: Underground service piping below the building.

1.4 SYSTEM DESCRIPTIONS

A. Wet-Pipe Sprinkler System: Automatic sprinklers are attached to piping containing water and that is connected to water supply. Water discharges immediately from sprinklers when they are opened. Sprinklers open when heat melts fusible link or destroys frangible device. Hose connections are included if indicated.

1.5 PERFORMANCE REQUIREMENTS

A. Standard Piping System Component Working Pressure: Listed for at least 175 psig (1200 kPa).

B. Water Supply Performance: The following municipal water performance data is provided for bidding purposes only. The Installing Contractor shall conduct a hydrant flow test to serve as the basis for hydraulically calculated systems.
1. Source of Information: Portland Water District.
2. Static Pressure: 69 psig.
3. Residual Pressure: 56 psig.
4. Flow: 1255 gpm.
5. Test Date: 06/19/91.
6. Test Location: Sanborn Right-of-way.

C. Sprinkler Systems:
1. System pipeline velocities shall be limited to a maximum of 25 feet per second.
2. Margin of Safety for Available Water Flow and Pressure: System design to include a 10 psig minimum cushion between required supplies and available water performance.
3. Sprinkler Occupancy Hazard Classifications:
a. Common spaces and Offices: Light Hazard.
b. Laboratory and Research Spaces: Ordinary Hazard, Group 1.
c. Equipment and Storage Spaces: Ordinary Hazard, Group 1.
d. Other Spaces: As recommended by NFPA 13.

4. Minimum Density for Automatic-Sprinkler Piping Design:

a. Light-Hazard Occupancy: 0.10 gpm over 1500-sq. ft. (6.3 mL/s over 139-sq. m) area.
b. Ordinary-Hazard, Group 1 Occupancy: 0.15 gpm over 1500-sq. ft. (9.5 mL/s over 139-sq. m) area.

5. Maximum Protection Area per Sprinkler:
a. Light-Hazard Occupancy: 225 sf per sprinkler.
1) Exception: Shell spaces being provided with temporary upright head coverage that will ultimately be converted to pendent finished ceiling coverage: 130 sf per sprinkler.
b. Ordinary-Hazard, Group 1 Occupancy: 130 sf per sprinkler.

6. Total Combined Hose-Stream Demand Requirement: According to NFPA 13, unless otherwise indicated:
a. Light-Hazard Occupancies: 100 gpm (6.3 L/s) for 30 minutes.
b. Ordinary-Hazard Occupancies: 250 gpm (15.75 L/s) for 60 to 90 minutes.

1.6 SUBMITTALS

A. General: See Division 1 for general submittal and product substitution requirements.

B. Pre-Construction Submittals: Submit the following items prior to commencing with installations.
1. Flow Test Results: The Contractor shall perform a hydrant flow test in the immediate vicinity of the project. At a minimum, test results shall include the following:
a. Flow and Gauge hydrant ID numbers and locations in relation to the project.
b. Hydrant elevations in relation to the finished floor elevation of the project.

c. Static and residual pressure readings.
d. Flow at residual pressure.
e. Date, time, weather, and testing agency.

2. Product Data: For the following:
   a. Piping materials, including sprinkler specialty fittings.
   b. Valves, including listed fire-protection valves, unlisted general-duty valves, and specialty valves and trim.
   c. Sprinklers, escutcheons, and guards. Include sprinkler flow characteristics, mounting, finish, and other pertinent data.
   d. Fire department connections, including type; number, size, and arrangement of inlets; caps and chains; size and direction of outlet; escutcheon and marking; and finish.
   e. Alarm devices, including electrical data.
3. Shop Drawings and Hydraulic Calculations: Sprinkler system layout drawings and supporting hydraulic calculations that include information as required by NFPA 13. The Authorities Having Jurisdiction prior to being submitted to the Architect shall approve drawings. Drawings shall be generated at 1/8-inch per foot minimum scale. Information to be shown includes, but is not limited to the following;
   a. Pipe size, location and elevation.
   b. Sprinkler head locations and types.
   c. Seismic brace details and locations, (where bracing is required by Section 13900).
   d. At least one building section that indicates fire suppression pipe and component location.
   e. Hydraulic reference points.
   f. Remote area, including performance data.
   g. Hanger details.
   h. Calculaions.

C. Post-Construction Submittals: Submit the following items upon completion of systems installations.
1. NFPA 13 "Contractor's Material and Test Certificate for Aboveground Piping"
2. NFPA 13 "Contractor's Material and Test Certificate for Underground Piping."
3. Operation and Maintenance Data: Include approved product submittals and as-built shop drawings in O&M manuals, (see Section 13900).

1.7 QUALITY ASSURANCE

A. Installer Qualifications: Installer's responsibilities include designing, fabricating, and installing fire-suppression systems.
1. Contractor to hold a sprinkler installer license in the project State.
2. Contractor's designer to be NICET Level IV Certified or a Registered Professional Fire Protection Engineer.
3. Contractor's designer to be a Responsible Managing Supervisor, (RMS).

B. Welding: Qualify processes and operators according to ASME Boiler and Pressure Vessel Code: Section IX.

C. Listing and Approval: Unless otherwise required by the Owner's Insurance Underwriter, components intended for use in fire suppression systems shall be "listed" or "approved."
1. "Listed": UL Listed.
2. "Approved": FM Approved.

1.8 COORDINATION

A. Coordinate layout and installation of sprinklers with other construction that penetrates ceilings, including light fixtures, HVAC equipment, and partition assemblies.

1.9 EXTRA MATERIALS

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

1. Sprinkler Cabinets: Finished, wall-mounting, steel cabinet with hinged cover, with space for minimum of six spare sprinklers plus sprinkler wrench. Include number of sprinklers required by NFPA 13 and sprinkler wrench. Include separate cabinet with sprinklers and wrench for each type of sprinkler on Project.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

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

B. Grooved-Joint Piping Systems:
1. Anvil International, Inc.
2. Central Sprinkler Corp.
3. Star Pipe Products; Star Fittings Div.
4. Victaulic Co. of America.

C. Flexible Piping:
1. Flex Head Industries.

D. Specialty Test and Drain Valves:
1. Central Sprinkler Corp.
2. Fire-End and Croker Corp.
3. Viking Corp.
4. Victaulic Co. of America.

E. Check and Gate Valves:
1. Clow Valve Co.
2. Crane Co.; Crane Valve Group; Crane Valves.
3. Crane Co.; Crane Valve Group; Jenkins Valves.

4. Hammond Valve.
5. Milwaukee Valve Company.
6. Mueller Company.
7. NIBCO.
8. Red-White Valve Corp.
9. United Brass Works, Inc.

F. Indicating Type Butterfly Valves:
1. Central Sprinkler Corp.
2. Grinnell Fire Protection.
3. McWane, Inc.; Kennedy Valve Div.
4. Milwaukee Valve Company.
5. NIBCO.
6. Victaulic Co. of America.

G. Backflow Preventers:
1. Ames Co., Inc.
2. CMB Industries, Inc.; Febco Backflow Preventers.
3. Conbraco Industries, Inc.
4. Watts Industries, Inc.; Water Products Div.
5. Zurn Industries, Inc.; Wilkins Div.

H. Alarm Check Valves:
1. Central Sprinkler Corp.
2. Globe Fire Sprinkler Corporation.
3. Grinnell Fire Protection.
4. Reliable Automatic Sprinkler Co., Inc.
5. Star Sprinkler Inc.
6. Victaulic Co. of America.
7. Viking Corp.

I. Sprinkler Heads:
1. Central Sprinkler Corp.
2. Globe Fire Sprinkler Corporation.
3. Grinnell Fire Protection.
4. Reliable Automatic Sprinkler Co., Inc.
5. Star Sprinkler Inc.
6. Viking Corp.

J. Fire Department Connections:
1. Central Sprinkler Corp.
2. Elkhart Brass Mfg. Co., Inc.
3. Fire-End and Croker Corp.
4. Fire Protection Products, Inc.
5. Guardian Fire Equipment Incorporated.
6. Potter-Roemer; Fire-Protection Div.
7. Reliable Automatic Sprinkler Co., Inc.

K. Water Motor Gongs:

1. Central Sprinkler Corp.
2. Globe Fire Sprinkler Corporation.
3. Grinnell Fire Protection.
4. Reliable Automatic Sprinkler Co., Inc.
5. Star Sprinkler Inc.
6. Viking Corp.

L. Electric Bells; Flow, Pressure and Supervisory Switches:
1. ADT Security Services, Inc.
2. Grinnell Fire Protection.
3. ITT McDonnell & Miller.
4. Potter Electric Signal Company.
5. System Sensor.
6. Viking Corp.

M. Pressure Gauges:
1. AGF Manufacturing Co.
2. AMETEK, Inc.; U.S. Gauge.
3. Brecco Corporation.
4. Dresser Equipment Group; Instrument Div.
5. Marsh Bellofram.
6. WIKA Instrument Corporation.

2.2 DUCTILE-IRON PIPE AND FITTINGS

A. Mechanical-Joint, Ductile-Iron Pipe: AWWA C151, with mechanical-joint bell end and plain end.

1. Mechanical-Joint, Ductile-Iron Fittings: AWWA C110, ductile- or gray-iron standard pattern.
2. Glands, Gaskets, and Bolts: AWWA C111, ductile- or gray-iron gland, rubber gasket, and steel bolts and nuts.
3. Lining: Pipe and fittings to have a hydraulically applied internal cement lining.

B. Restraints: As per the Water Authority, NFPA 13, NFPA 24 and the Drawings. Restraints shall consist of clamps, tie rods, concrete thrust blocks, and combinations thereof.

2.3 STEEL PIPE AND FITTINGS

A. Threaded-End, Schedule 40 Steel Pipe: ASTM A 53/A 53M, ASTM A 135, or ASTM A 795, hot-dip galvanized where indicated and with factory- or field-formed threaded ends.

1. Cast-Iron Threaded Flanges: ASME B16.1.
2. Malleable-Iron Threaded Fittings: ASME B16.3.
3. Gray-Iron Threaded Fittings: ASME B16.4.
4. Steel Threaded Pipe Nipples: ASTM A 733, made of ASTM A 53/A 53M or ASTM A 106, Schedule 40, seamless steel pipe hot-dip galvanized where indicated. Include ends matching joining method.

5. Steel Threaded Couplings: ASTM A 865 hot-dip galvanized-steel pipe where indicated.

B. Grooved-End, Schedule 30 Steel Pipe: ASTM A 135 or ASTM A 795, with wall thickness less than Schedule 40 and equal to or greater than Schedule 30; or ASTM A 795 and ASME B36.10M, Schedule 30 wrought-steel pipe hot-dip galvanized where indicated; with factory- or field-formed, roll-grooved ends.
1. Grooved-End Fittings: UL-listed, ASTM A 536, ductile-iron casting with OD matching steel-pipe OD.
2. Grooved-End-Pipe Couplings: UL 213 and AWWA C606, flexible and rigid pattern, unless otherwise indicated; gasketed fitting matching steel-pipe OD. Include ductile-iron housing with keys matching steel-pipe and fitting grooves, prelubricated rubber gasket listed for use with housing, and steel bolts and nuts.
a. Where intended for dry-pipe service, coupling assembly shall be UL listed for such service.

C. Grooved-End, Schedule 10 Steel Pipe: ASTM A 135 or ASTM A 795, Schedule 10 in NPS 5 (DN 125) and smaller; and NFPA 13-specified wall thickness in NPS 6 to NPS 10 (DN 150 to DN 250); with factory- or field-formed, roll-grooved ends.
1. Grooved-End Fittings: UL-listed, ASTM A 536, ductile-iron casting with OD matching steel-pipe OD.
2. Grooved-End-Pipe Couplings: UL 213 and AWWA C606, flexible and rigid pattern, unless otherwise indicated; gasketed fitting matching steel-pipe OD. Include ductile-iron housing with keys matching steel-pipe and fitting grooves, prelubricated rubber gasket listed for use with housing, and steel bolts and nuts.
a. Where intended for dry-pipe service, coupling assembly shall be UL listed for such service.

2.4 SPRINKLER SPECIALTY FITTINGS

A. Sprinkler specialty fittings shall be UL listed or FMG approved, with 175-psig (1200-kPa) minimum working-pressure rating, and made of materials compatible with piping.

B. Sprinkler Drain and Alarm Test Fittings: Cast- or ductile-iron body; with threaded or locking-lug inlet and outlet, test valve, and orifice and sight glass.

2.5 LISTED FIRE-PROTECTION VALVES

A. General: Valves shall be UL listed or FMG approved, with 175-psig (1200 kPa) minimum pressure rating.

B. Check Valves NPS 2 (DN 50) and Larger: UL 312, swing type, cast-iron body with flanged or grooved ends.
1. Valve body to include a ball drip port where automatic upstream drainage is required.

C. Gate Valves: UL 262, OS&Y type.
1. NPS 2 (DN 50) and Smaller: Bronze body with threaded ends.
2. NPS 2-1/2 (DN 65) and Larger: Cast-iron body with flanged ends.

D. Indicating Type Butterfly Valves: UL 1091, with integral indicating device and ends matching connecting piping.

1. Indicator: Electrical, 115-V ac, prewired, 2-circuit, supervisory switch] [Electrical, 115-V ac, prewired, 2-circuit, supervisory switch.
2. NPS 2 (DN 50) and Smaller: Ball or butterfly valve with bronze body and threaded ends.
3. NPS 2-1/2 (DN 65) and Larger: Butterfly valve with cast- or ductile-iron body, wafer type or with flanged or grooved ends.

2.6 UNLISTED GENERAL-DUTY VALVES

A. Ball Valves NPS 2 (DN 50) and Smaller: MSS SP-110, 2-piece copper-alloy body with chrome-plated brass ball, 600-psig (4140-kPa) minimum CWP rating, blowout-proof stem, and threaded ends.

B. Check Valves NPS 2 (DN 50) and Smaller: MSS SP-80, Type 4, Class 125 minimum, swing type with bronze body, nonmetallic disc, and threaded ends.

C. Gate Valves NPS 2 (DN 50) and Smaller: MSS SP-80, Type 2, Class 125 minimum, with bronze body, solid wedge, and threaded ends.

D. Globe Valves NPS 2 (DN 50) and Smaller: MSS SP-80, Type 2, Class 125 minimum, with bronze body, nonmetallic disc, and threaded ends.

2.7 BACKFLOW PREVENTERS

A. General: ASSE Standard, bronze, cast-iron, steel, or stainless-steel body with flanged ends.
1. End Option: Where allowed by the local water authority, grooved end backflow preventers for 2-1/2-inch and larger applications are acceptable.
2. Interior Lining: AWWA C550 or FDA-approved, epoxy coating for backflow preventers having cast-iron or steel body.
3. Interior Components: Corrosion-resistant materials.

B. Configuration: Provide horizontal units unless otherwise called for on the Drawings. Where vertical or alternate configuration type units are provided, these units must be designed, constructed, and listed for such usage. Approval must be provided by the local water authority for the use of these units.

C. Supervision: Backflow Preventer shut-off valves shall be equipped with supervisory switches.

D. Double-Check Backflow Prevention Assemblies: ASSE 1015, suitable for continuous pressure application. Include shutoff valves on inlet and outlet, and strainer on inlet, test cocks; and two positive-seating check valves.
1. Pressure Loss: 5 psig (35 kPa) maximum, at system maximum design flow.

2.8 SPECIALTY VALVES

A. Alarm Check Valves, General: UL listed or FMG approved, cast- or ductile-iron body with flanged or grooved ends, and 175-psig (1200-kPa) minimum pressure rating.
   1. Main Alarm Option: A flow switch located downstream of the alarm valve may be used in lieu of the pressure switch and retarding chamber listed below if the flow switch can be set to mitigate false alarms caused by municipal system pressure fluctuations.

B. Wet-Pipe Alarm Check Valves: UL 193, designed for horizontal or vertical installation, with bronze grooved seat with O-ring seals, single-hinge pin, and latch design. Include trim sets for bypass, drain, electrical sprinkler alarm switch, pressure gages, retarding chamber, and fill-line attachment with strainer.
   1. Drip Cup Assembly: Pipe to main drain piping.

C. Automatic Drain Valves: UL 1726, NPS 3/4 (DN 20), ball-check device with threaded ends.

2.9 SPRINKLERS

A. General: Sprinklers shall be UL listed or FMG approved, with 175-psig (1200-kPa) minimum pressure rating.
   1. Sprinklers shall be quick response type, K=5.6, 155°F rated, nominal ½-inch orifice, unless otherwise stated.
      a. Option: Contractor may propose the use of sprinkler heads with alternate K factor and orifice size, pending available project flow and pressure requirements can satisfy their requirements.
   2. Not Allowed: Sprinklers that employ O-ring seals and sprinklers recently involved in the recent Central Sprinkler recall.

B. Heat Responsive Elements shall comply with the following:
   1. UL 199, for nonresidential applications.
   2. UL 1626, for residential applications.
   3. UL 1767, for early-suppression, fast-response applications.

C. Recessed pendent type with matching push-on escutcheon plate:
   1. Finish: White enamel.
   2. Escutcheon: White enamel.
   3. Fusible Link: Glass bulb type, temperature rated for the specific hazard.

D. Concealed pendent type with matching push-on cover plate:
   1. Finish: Rough bronze.
   2. Cover: White enamel, unless otherwise noted in Part 3 Section, "Sprinkler Applications."
   3. Fusible Link: Glass bulb type, temperature rated for the specific hazard.

E. Standard upright type.
   1. Finish: Rough bronze.
   2. Fusible Link: Glass bulb type, temperature rated for the specific hazard.

F. Recessed horizontal sidewall type with matching push-on escutcheon plate.

1. Finish: White enamel.
2. Escutcheon: White enamel.
3. Fusible Link: Glass bulb type, temperature rated for the specific hazard.

G. Dry Barrel Type, recessed pendent or horizontal type with matching push-on escutcheon plate. Dry barrel to be a minimum of 24-inches long. Coordinate exact length with construction requirements.
1. Finish: White enamel.
2. Escutcheon: White enamel.
3. Fusible Link: Solder type, temperature rated for the specific hazard.

H. Specialty Sprinklers: Vertical pendent sidewall window type, Central model #WS, or equal.
1. Finish: White enamel.
2. Escutcheon: White enamel.
3. Fusible Link: Glass bulb type, temperature rated for the specific hazard.

I. Sprinkler Guards: Wire-cage type, including fastening device for attaching to sprinkler.

J. Sprinkler Cabinets: As furnished by the same manufacturer as the heads.

2.10 FIRE DEPARTMENT CONNECTIONS

A. Wall-Type, Fire Department Connection: UL 405, 175-psig (1200-kPa) minimum pressure rating; with corrosion-resistant-metal body with brass inlets, brass wall escutcheon plate, brass lugged caps with gaskets and brass chains, and brass lugged swivel connections. Include inlets with threads according to NFPA 1963 and matching local fire department sizes and threads, outlet with pipe threads, extension pipe nipples, check devices or clappers for inlets, and escutcheon plate with marking similar to "AUTO SPKR & STANDPIPE."
1. Type: As per local Fire Department requirements.
2. Finish: Polished Brass.

2.11 ALARM DEVICES

A. General: Alarm-device types shall match piping and equipment connections.

B. Water-Motor-Operated Alarm, (Gong): UL 753, mechanical-operation type with pelton-wheel operator with shaft length, bearings, and sleeve to suit wall construction and 10-inch- (250-mm-) diameter, cast-aluminum alarm gong with red-enamel factory finish. Include NPS 3/4 (DN 20) inlet and NPS 1 (DN 25) drain connections.

C. Electrically Operated Alarm, (Bell): UL 464, with 6-inch- (150-mm-) minimum diameter, vibrating-type, metal alarm bell with red-enamel factory finish and suitable for outdoor use.

D. Water-Flow Indicator: UL 346, electrical-supervision, paddle-operated-type, water-flow detector with a 250-psig (1725-kPa) pressure rating and designed for horizontal or vertical installation. Include two single-pole, double-throw circuit switches for isolated alarm and auxiliary contacts, 7 A, 125-V ac and 0.25 A, 24-V dc; complete with factory-set, field-

adjustable retard element to prevent false signals and tamperproof cover that sends signal if removed.

E. Pressure Switch: UL 753, electrical-supervision-type, water-flow switch with retard feature. Include single-pole, double-throw, normally closed contacts and design that operate on rising pressure and signals water flow.

F. Valve Supervisory, (Tamper) Switch: UL 753, electrical, single-pole, double-throw switch with normally closed contacts. Include design that signals controlled valve is in other than fully open position.

2.12 PRESSURE GAGES

A. Description: UL 393, 3-1/2- to 4-1/2-inch- (90- to 115-mm-) diameter, dial pressure gage with range of 0 to 250 psig (0 to 1725 kPa) minimum.
1. Water System Piping: Include caption "WATER" or "AIR/WATER" on dial face.
2. Air System Piping: Include retard feature and caption "AIR" or "AIR/WATER" on dial face.

PART 3 - EXECUTION

3.1 PREPARATION

A. Perform fire-hydrant flow test according to NFPA 13 and NFPA 291. Use results for system design calculations required in Part 1 "Quality Assurance" Article.
1. The Architect can provide a standard report form if requested.

B. Report test results promptly and in writing.

3.2 EARTHWORK

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

3.3 EXAMINATION

A. Examine roughing-in for hose connections and stations to verify actual locations of piping connections before installation.

B. Examine walls and partitions for suitable thicknesses, fire- and smoke-rated construction, framing for hose-station cabinets, and other conditions where hose connections and stations are to be installed.

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

3.4 PIPING APPLICATIONS, GENERAL

A. Shop weld pipe joints where welded piping is indicated.

B. Do not use welded joints for galvanized-steel pipe.

C. Flanges, flanged fittings, unions, nipples, and transition and special fittings with finish and pressure ratings same as or higher than system's pressure rating may be used in aboveground applications, unless otherwise indicated.

D. Above Ground Piping between Fire Department Connections and Check Valves: Schedule 40 galvanized steel pipe with grooved ends; grooved-end fittings; grooved-end-pipe couplings; and grooved joints.

E. Service-Entrance Piping, (Underground and up to point of connection to the system backflow preventer): Cement-lined ductile-iron, mechanical-joint pipe and fittings and restrained joints.
1. Include corrosion-protective encasement where required by local water authorities.

F. Standard-Pressure, Wet-Pipe Systems, 175-psig (1200-kPa) Maximum Working Pressure:

1. NPS 2 and Smaller: Threaded-end, black, schedule 40, steel; cast- or malleable-iron threaded fittings; and threaded joints.
2. NPS 2-1/2 and Larger: Grooved-end, black, schedule 10 steel pipe with roll-grooved ends; grooved-end fittings; grooved-end-pipe couplings; and grooved joints.
   a. Threadable Light wall piping systems not allowed.
   b. NPS 8 and Larger Option: Grooved-end, black, schedule 30 steel pipe with roll-grooved ends; grooved-end fittings; grooved-end-pipe couplings; and grooved joints.

3.5 VALVE APPLICATIONS

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

1. Listed Fire-Protection Valves: UL listed and FMG approved for applications where required by NFPA Standards.
   a. Shutoff Duty: Use butterfly, or gate valves.

2. Unlisted General-Duty Valves: For applications where UL-listed and FMG-approved valves are not required by NFPA Standards.
   a. Shutoff Duty: Use ball, butterfly, or gate valves.
   b. Throttling Duty: Use ball or globe valves.

3.6 JOINT CONSTRUCTION

A. Refer to Section 13900, "Basic Fire Protection Materials and Methods" for basic piping joint construction.

B. Threaded Joints: Do not thread pipe with wall thickness less than Schedule 40.

C. Grooved Joints: Assemble joints with listed coupling and gasket, lubricant, and bolts.
1. Steel Pipe: Square-cut or roll-groove piping as indicated. Use grooved-end fittings and rigid, grooved-end-pipe couplings, unless otherwise indicated.
2. Dry-Pipe Systems: Use fittings and gaskets listed for dry-pipe service.

D. Dissimilar-Metal Piping Joints: Construct joints using dielectric fittings compatible with both piping materials.

1. NPS 2 (DN 50) and Smaller: Use dielectric unions, couplings, or nipples.
2. NPS 2-1/2 to NPS 4 (DN 65 to DN 100): Use dielectric flanges.
3. NPS 5 (DN 125) and Larger: Use dielectric flange insulation kits.

3.7 SERVICE-ENTRANCE PIPING

A. Connect fire-suppression piping to exterior water-service piping of size and in location indicated for service entrance to building. Refer to Division 2 Section "Water Distribution" for exterior piping.

B. Install shutoff valve, backflow preventer, pressure gage, drain, and other accessories indicated at connection to water-service piping.

3.8 PIPING INSTALLATION

A. Refer to Section 13900, "Basic Fire Protection Materials and Methods" for basic piping installation.

B. Locations and Arrangements: Drawing plans, schematics, and diagrams indicate general location and arrangement of piping. Install piping as indicated, as far as practical.

1. Deviations from approved working plans for piping require written approval from authorities having jurisdiction. File written approval with Architect before deviating from approved working plans.

C. Use approved fittings to make changes in direction, branch takeoffs from mains, and reductions in pipe sizes.

D. Install unions adjacent to each valve in pipes NPS 2 (DN 50) and smaller. Unions are not required on flanged devices or in piping installations using grooved joints.

E. Install flanges or flange adapters on valves, apparatus, and equipment having NPS 2-1/2 (DN 65) and larger connections.

F. Install "Inspector's Test Stations" in sprinkler system piping, complete with shutoff valve, sized and located according to NFPA 13, the local Fire Department, and the Drawings.

G. Install sprinkler piping with drains for complete system drainage.

H. Install ball drip valves to drain piping between fire department connections and check valves. Drain to floor drain or outside building.

I. Install alarm devices in piping systems.

J. Hangers and Supports: Comply with NFPA 13 for hanger materials.
   1. Install sprinkler system piping according to NFPA 13.
   2. Seismic Restraints: Install piping according to NFPA 13 to protect from earthquake damage.

K. Install pressure gages on riser or feed main, at each sprinkler test connection. Include pressure gages with connection not less than NPS 1/4 (DN 8) and with soft, metal-seated globe valve, arranged for draining pipe between gage and valve. Install gages to permit removal, and install where they will not be subject to freezing.

L. Exterior Appurtenance Installation: Install items on the building exterior in a neat and orderly fashion, aligned vertically. Exterior piping components to be galvanized. Items for installation include, but are not limited to the following;
   1. Electric Bell.
   2. Water Motor Gong.
   3. Fire Department Connection.
   4. Drain Termination.

M. Fill wet-pipe systems with water.

3.9 VALVE INSTALLATION

A. Install listed fire-protection valves, unlisted general-duty valves, specialty valves and trim, controls, and specialties according to NFPA Standards and authorities having jurisdiction.

B. Install listed fire-protection shutoff valves supervised-open, located to control sources of water supply except from fire department connections. Install permanent identification signs indicating portion of system controlled by each valve.

C. Install backflow preventers in accessible locations with a minimum of 3-feet of clearance space in front. Install units at 36 – 48-inches above finished floor.

D. Specialty Valves:

   1. Alarm Check Valves: Install in vertical position for proper direction of flow, including bypass check valve and retarding chamber drain-line connection.

3.10 SPRINKLER APPLICATIONS

A. Drawings indicate sprinkler types to be used. Where specific types are not indicated, use the following sprinkler types:
   1. Rooms without Ceilings: Upright sprinklers.
      a. Install guards on heads located in Mechanical and storage rooms.

2. Rooms with Suspended Ceilings: Recessed pendent sprinklers.
3. Rooms with Hard Drywall, (or similar) Ceilings: Concealed sprinklers.
4. Wall Mounting: Sidewall sprinklers. Use recessed sidewalls in finished spaces.
5. Spaces Subject to Freezing: Dry-barrel type heads, (sidewall or pendent with finishes matching adjacent heads.

3.11 SPRINKLER INSTALLATION

A. General: Install sprinklers in obvious patterns with other ceiling mounted devices, (lights, diffusers, etc.). Do not "randomly" install sprinkler heads in hard ceilings.
   1. Refer to the Drawings for other sprinkler placement requirements, (Architectural reflected ceiling plans).
   2. Install sprinklers centered in suspended ceiling tiles.

B. Upright Heads: Install heads using a 1x1/2-inch reducer, 1-inch nipple and 1-inch tee. Do not use a branch size x ½-inch tee to supply heads.

C. Pendent Heads: Install pendent heads using 1-inch arm overs, or return bends. Directly dropping off branch lines is unacceptable.
   1. Option: Where allowed by AHJ's, pendent heads may be supplied using 1-inch flexible hose and mounting assemblies in lieu of arm overs.

D. Dry Heads: Do not install pendent or sidewall, wet-type sprinklers in areas subject to freezing. Use dry-type sprinklers with water supply from heated space.
   1. Dry pendent heads to be "tee'ed" directly into a drainable branch line such that a column of water is not stagnant on top of the dry barrel.

3.12 FIRE DEPARTMENT CONNECTION INSTALLATION

A. Install wall-type, fire department connections in vertical wall.

B. Install ball drip valve at each check valve for fire department connection.

3.13 CONNECTIONS

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

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

C. Connect water-supply piping to fire-suppression piping. Include a backflow preventer.

D. Install ball drip valves at each check valve for fire department connection. Drain to floor drain or outside building.

E. Connect piping to specialty valves, hose valves, specialties, fire department connections, and accessories.

F. Electrical Connections: Power wiring, bonding and grounding to be performed by the Electrical Contractor per Division 16 Sections.

G. Alarm Connections: Fire Alarm wiring to be performed by the Fire Alarm Contractor per Division 16 Sections.

3.14 FIELD QUALITY CONTROL

A. Perform the following field tests and inspections and prepare test reports:

1. Leak Test: After installation, charge system and test for leaks. Repair leaks and retest until no leaks exist.
2. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
3. Energize circuits to electrical equipment and devices.
4. Start and run excess-pressure pumps.
5. Start and run air compressors.
6. Flush, test, and inspect sprinkler systems according to NFPA 13, "Systems Acceptance" Chapter.
7. Coordinate with fire alarm tests. Operate as required.
8. Verify that equipment hose threads are same as local fire department equipment.

B. Report test results promptly and in writing to Architect and authorities having jurisdiction.

3.15 CLEANING AND PROTECTION

A. Clean dirt and debris from sprinklers.

B. Remove and replace sprinklers with paint other than factory finish, except where painted with exposed structure.

C. Protect sprinklers from damage until Substantial Completion.

END OF SECTION

SECTION 14240

HYDRAULIC ELEVATORS

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 hydraulic passenger elevators.

B. Related Sections include the following:
1. Division 3 Section "Cast-in-Place Concrete" for setting sleeves, inserts, and anchoring devices in concrete.
2. Division 5 Section "Metal Fabrications" for the following:
    a. Attachment plates and angle brackets for supporting guide-rail brackets.
    b. Divider beams.
    c. Structural-steel shapes for subsills.
    d. Pit ladders.
3. Division 9 Section "Painting" for field painting of hoistway entrances.
4. Division 9 Section "Linoleum" for finish flooring in elevator cars.
5. Division 16 Sections for electrical service for elevators to and including disconnect switches at machine room door if allowances are used for elevator car finishes.

1.3 DEFINITIONS

A. Defective Elevator Work: Operation or control system failures; performances below specified ratings; excessive wear; unusual deterioration or aging of materials or finishes; unsafe conditions; the need for excessive maintenance; abnormal noise or vibration; and similar unusual, unexpected, and unsatisfactory conditions.

1.4 SUBMITTALS

A. Product Data: Include capacities, sizes, performances, operations, safety features, finishes, and similar information.

B. Shop Drawings: Show plans, elevations, sections, and large-scale details indicating service at each landing, machine room layout, coordination with building structure, relationships with other construction, and locations of equipment and signals. Indicate variations from specified

requirements, maximum dynamic and static loads imposed on building structure at points of support, and maximum and average power demands.

C. Manufacturer Certificates: Signed by elevator manufacturer certifying that hoistway, pit, and machine room layout and dimensions, as shown on Drawings, and electrical service, as shown and specified, are adequate for elevator system being provided.

D. Maintenance Manuals: Include operation and maintenance instructions, parts listing with sources indicated, recommended parts inventory listing, emergency instructions, and similar information. Include diagnostic and repair information available to manufacturer's and Installer's maintenance personnel. Submit for Owner's information at Project closeout as specified in Division 1.

E. Inspection and Acceptance Certificates and Operating Permits: As required by authorities having jurisdiction for normal, unrestricted elevator use.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: Elevator manufacturer or an experienced installer approved by elevator manufacturer who has completed elevator installations similar in material, design, and extent to that indicated for this Project and with a record of successful in-service performance.

B. Regulatory Requirements: In addition to local governing regulations, comply with applicable provisions in ASME A17.1, "Safety Code for Elevators and Escalators."

1. Seismic Risk Zone: Project is located in Zone 2.

C. Accessibility Requirements: In addition to local governing regulations, comply with Section 4.10 in the U.S. Architectural & Transportation Barriers Compliance Board's "Americans with Disabilities Act (ADA), Accessibility Guidelines (ADAAG)."

1.6 COORDINATION

A. Coordinate installation of sleeves, block outs, and items that are embedded in concrete for elevator equipment. Furnish templates and installation instructions and deliver to Project site in time for installation.

B. Coordinate locations and dimensions of other work relating to hydraulic elevators including pit ladders, sumps, and floor drains in pits; entrance subsills; and electrical service, electrical outlets, lights, and switches in pits and machine rooms.

1.7 WARRANTY

A. Special Manufacturer's Warranty: Written warranty, signed by manufacturer agreeing to repair, restore, or replace defective elevator work within specified warranty period.

1. Warranty Period: 12 months from date of Substantial Completion.

1.8 MAINTENANCE SERVICE

A. Initial Maintenance Service: Beginning at Substantial Completion, provide three months' full maintenance service by skilled employees of the elevator Installer. Include monthly preventive maintenance, repair or replacement of worn or defective components, lubrication, cleaning, and adjusting as required for proper elevator operation at rated speed and capacity. Provide parts and supplies as used in the manufacture and installation of original equipment.

1. Perform maintenance, including emergency callback service, during normal working hours.
2. Include 24-hour-per-day, 7-day-per-week emergency callback service.

a. Response Time: Two hours or less.

B. Continuing Maintenance Proposal: Provide a continuing maintenance proposal from Installer to Owner, in the form of a standard yearly (or other period) maintenance agreement, starting on date initial maintenance service is concluded. State services, obligations, conditions, and terms for agreement period and for future renewal options.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering hydraulic elevators that may be incorporated into the Work include, but are not limited to, the following:
1. Otis Elevator Co.
2. Thyssen Elevator Group North America.

2.2 MATERIALS AND COMPONENTS

A. General: Provide manufacturer's standard elevator systems. Where components are not otherwise indicated, provide standard components, published by manufacturer as included in standard preengineered elevator systems and as required for a complete system.

B. Pump Units: Positive-displacement type with a maximum of 10 percent variation between no load and full load and with minimum pulsations. Provide the following:
1. Submersible pump, with submersible squirrel-cage induction motor, suspended inside tank from vibration isolation mounts.
2. Provide motor with solid-state starting.

C. Hydraulic Silencers: Provide hydraulic silencer containing pulsation-absorbing material in a blowout-proof housing at pump unit.

D. Piping: Provide size, type, and weight piping recommended by manufacturer, and provide flexible connectors to minimize sound and vibration transmissions from power unit.

1. Provide dielectric couplings at plunger/cylinder units.

E. Inserts: Furnish required concrete inserts and similar anchorage devices for installing guide rails, machinery, and other components of elevator work where installation of devices is specified in another Specification Section.

F. Car Frame and Platform: Welded steel units.

2.3 OPERATION SYSTEMS

A. Passenger Elevators: Provide manufacturer's standard microprocessor operation system for each elevator or group of elevators as required to provide type of operation system indicated.
1. Single Elevator: Provide "selective collective automatic operation" as defined in ASME A17.1.

B. Auxiliary Operations: In addition to primary operation system features, provide the following operational features for elevators where indicated.
1. Battery-Powered Lowering: When power fails, cars are lowered to the lowest floor, open their doors, and shut down. System includes rechargeable battery and automatic recharging system.

C. Security Features: In addition to above operational features, provide the following security features, where indicated. Security features shall not affect emergency firefighters' service.

1. Keyswitch Feature: Car and hall push buttons are activated and deactivated by security keyswitches. Key is removable only in deactivated position.

2.4 SIGNAL EQUIPMENT

A. General: Provide signal equipment for each elevator or group of elevators with hall-call and car-call buttons that light when activated and remain lit until call has been fulfilled. Fabricate lighted elements of acrylic or other permanent, nonyellowing translucent plastic.

B. Swing-Return Car Control Stations: Provide car control stations fully recessed in hinged return panel adjacent to car door.

1. Include call buttons for each landing served and other buttons, switches, and controls required for specified car operation.
2. Mark buttons and switches with manufacturer's standard identification for required use or function that complies with ASME A17.1.
3. Mount controls at heights complying with the U.S. Architectural & Transportation Barriers Compliance Board's "Americans with Disabilities Act (ADA), Accessibility Guidelines (ADAAG)."

C. Emergency Communication System: Provide system that complies with ASME A17.1 and the U.S. Architectural & Transportation Barriers Compliance Board's "Americans with Disabilities Act (ADA), Accessibility Guidelines (ADAAG)." On activation, system dials preprogrammed number of monitoring station and identifies elevator location to monitoring station. System provides two-way voice communication without using a handset and provides visible signals that indicate when system has been activated and when monitoring station has responded.

System is contained in flush-mounted cabinet, with identification, instructions for use, and battery backup power supply.

D. Fire Department Communication System: Provide flush-mounted cabinet in each car and required conductors in traveling cable for fire department communication system specified in Division 16 Sections.

E. Car Position Indicator: For passenger elevator cars, provide illuminated-signal type, digital-display type, or segmented type, located above car door or above car control station. Also provide audible signal to indicate to passengers that car is either stopping at or passing each of the floors served.

1. Include travel direction arrows if not provided in car control station.

F. Hall Push-Button Stations: Provide one hall push-button station at each landing for each elevator or group of elevators, but not less than one station for each four elevators in a group. For each group of passenger elevators, locate between two elevators at center of group or at location most convenient for approaching passengers.

G. Hall Push-Button Stations: Provide hall push-button stations at each landing for each elevator or group of elevators as indicated.

1. Provide units with flat faceplate for mounting with body of unit recessed in wall.
2. Provide units with direction-indicating buttons; two buttons at intermediate landings; one button at terminal landings.

H. Hall Lanterns: Provide units with illuminated arrows, but provide single arrow at terminal landings.

1. Provide units with flat faceplate for mounting with body of unit recessed in wall and with illuminated elements projecting from faceplate for ease of angular viewing.
2. Place lanterns either above or beside each hoistway entrance, unless otherwise indicated. Mount at a minimum of 72 inches (1829 mm) above finished floor.
3. Place lanterns in both jambs of entrance frame for each elevator. Mount at a minimum of 72 inches (1829 mm) above finished floor.

a. At manufacturer's option, for single elevators or for only two cars in a group, lanterns may be located in car doorjambs instead of entrance jambs.

4. With each lantern, provide audible signals indicating car arrival and direction of travel. Signals sound once for up and twice for down.

a. At manufacturer's option, audible signals may be placed on each car.

I. Hall Position Indicators: Provide illuminated-signal type or digital-display type, located above each hoistway entrance at ground floor. Provide units with flat faceplate for mounting with body of unit recessed in wall.

1. Integrate ground-floor hall lanterns with hall position indicators.

2.5 DOOR REOPENING DEVICES

A. Infrared Array: Provide door reopening devices with a uniform array of 36 or more microprocessor-controlled, infrared light beams projecting across car entrance. Interruption of one or more of the light beams shall cause doors to stop and reopen.

B. Door Edge Device: Provide retractable edge shoes on elevator entrance doors that cause doors to stop and reopen upon contacting an obstruction. Include photoelectric device with timed cutout that projects dual-light beams across car entrance at 5- and 29-inch (127- and 737-mm) heights; the beams, when interrupted, cause doors to stop and reopen.

1. Nudging Feature: After car doors are prevented from closing for a predetermined adjustable time, through activating door reopening device, a loud buzzer shall sound and doors shall begin to close at reduced kinetic energy.

2.6 PASSENGER ELEVATOR CAR ENCLOSURES

A. General: Provide manufacturer's standard enameled-steel car enclosures with removable wall panels, suspended ceiling, trim, accessories, access doors, doors, power door operators, sills (thresholds), lighting, and ventilation.

1. Floor finish is specified in another Section.
2. Plastic-Laminate Wall Panels: Plastic laminate adhesively applied to 1/2-inch (13-mm) fire-retardant-treated particleboard with plastic-laminate panel backing complying with NEMA LD 3, Type BKV and manufacturer's standard protective edge trim. Panels have a flame-spread rating of 25 or less, when tested according to ASTM E 84.
3. Fabricate car with recesses and cutouts for signal equipment.
4. Fabricate car door frame integrally with front wall of car.
5. Sills: Extruded metal, with grooved surface, 1/4 inch (6.4 mm) thick. Provide polished finish on bronze.
6. Luminous Ceiling: Fluorescent light fixtures and ceiling panels of translucent acrylic or other permanent rigid plastic complying with flammability requirements.
7. Handrails: Manufacturer's standard handrails, of metal indicated.

2.7 PASSENGER HOISTWAY ENTRANCES

A. General: Provide manufacturer's standard horizontal-sliding, door-and-frame hoistway entrances complete with track systems, hardware, sills, and accessories. Provide frame size and profile to coordinate with hoistway wall construction.

1. Where gypsum board wall construction is indicated, provide self-supporting frames with reinforced head sections.

B. Materials and Fabrication: Provide manufacturer's standards but not less than the following:

1. Enameled-Steel Frames: Formed steel sheet.
2. Enameled-Steel Doors: Flush, hollow-metal construction.
3. Sills: Extruded metal, with grooved surface, 1/4 inch (6.4 mm) thick. Provide polished finish on bronze.

4. Nonshrink, Nonmetallic Grout: Factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C 1107.

2.8 PASSENGER ELEVATORS

A. Elevator:

1. Type: Under-the-car single cylinder.
2. Type: Holeless, telescoping, beside-the-car, single cylinder.
3. Rated Load: 2500 lb (1135 kg).
4. Rated Speed: 125 fpm (0.64 m/s).
5. Operation System: Selective collective automatic operation.
6. Auxiliary Operations:
   a. Battery-powered lowering.
7. Security Features: Keyswitch feature.
8. Car Enclosures: As follows:
   a. Inside Width: 80 inches (2032 mm).
   b. Inside Depth: 51 inches (1295 mm).
   c. Inside Height: 96 inches.
   d. Front Walls: Satin bronze with integral car door frames.
   e. Car Fixtures: Satin bronze.
   f. Side and Rear Wall Panels: Plastic laminate.
   g. Reveals: Satin bronze.
   h. Door Faces (Interior): Satin bronze.
   i. Door Sills: Bronze.
   j. Ceiling: Luminous ceiling.
   k. Handrails: Satin bronze, at side and rear walls.
   l. Floor prepared to receive linoleum tile (specified in Division 9 Section "Linoleum Floor Covering").
9. Hoistway Entrances: As follows:
   a. Width: 36 inches (914 mm).
   b. Height: 84 inches (2134 mm).
   c. Type: Single-speed side sliding.
   d. Frames: Enameled steel.
   e. Doors: Enameled steel.
   f. Sills: Bronze.
10. Hall Fixtures: Satin bronze.
11. Additional Requirements: As follows:
   a. Provide inspection certificate in each car, mounted under acrylic cover with satin bronze frame.
   b. Provide protective blanket hooks in all four cars and two complete sets of full-height blankets.

3.1 EXAMINATION

A. Examine elevator areas, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance. Verify critical dimensions, and examine supporting structure and other conditions under which elevator work is to be installed. Proceed with installation only after unsatisfactory conditions have been corrected.

1. For the record, prepare a written report, endorsed by Installer, listing dimensional discrepancies and conditions detrimental to performance.

3.2 INSTALLATION

A. Install cylinders plumb and accurately centered for elevator car position and travel. Anchor securely in place, supported at pit floor. Seal between protective casing and pit floor with 4 inches (100 mm) of nonshrink, nonmetallic grout.

B. Welded Construction: Provide welded connections for installing elevator work where bolted connections are not required for subsequent removal or for normal operation, adjustment, inspection, maintenance, and replacement of worn parts. Comply with AWS standards for workmanship and for qualifications of welding operators.

C. Sound Isolation: Mount rotating and vibrating equipment on vibration-isolating mounts designed to effectively prevent transmission of vibrations to structure and thereby eliminate sources of structure-borne noise from elevator system.

D. Install piping above the floor, where possible. Where not possible, install underground piping in Schedule 40 PVC pipe casing assembled with solvent-cement fittings.

E. Lubricate operating parts of systems as recommended by manufacturers.

F. Alignment: Coordinate installation of hoistway entrances with installation of elevator guide rails for accurate alignment of entrances with cars. Where possible, delay installation of sills and frames until car is operable in shaft. Reduce clearances to minimum, safe, workable dimension at each landing.

G. Leveling Tolerance: 1/4 inch (6 mm), up or down, regardless of load and direction of travel.

H. Set sills flush with finished floor surface at landing. Fill space under sill solidly with nonshrink, nonmetallic grout.

3.3 FIELD QUALITY CONTROL

A. Acceptance Testing: On completion of elevator installation and before permitting use (either temporary or permanent) of elevators, perform acceptance tests as required and recommended by ASME A17.1 and by governing regulations and agencies.

B. Advise Owner, Architect, and authorities having jurisdiction in advance of dates and times tests are to be performed on elevators.

3.4 DEMONSTRATION

A. Instruct Owner's personnel in proper use, operations, and daily maintenance of elevators. Review emergency provisions, including emergency access and procedures to be followed at time of operational failure and other building emergencies. Train Owner's personnel in procedures to follow in identifying sources of operational failures or malfunctions. Confer with Owner on requirements for a complete elevator maintenance program.

B. Make a final check of each elevator operation with Owner's personnel present and before date of Substantial Completion. Determine that operation systems and devices are functioning properly.

3.5 PROTECTION

A. Temporary Use: Do not use elevators for construction purposes unless cars are provided with temporary enclosures, either within finished cars or in place of finished cars, to protect finishes from damage.

1. Provide full maintenance service by skilled, competent employees of elevator Installer for elevators used for construction purposes. Include preventive maintenance, repair or replacement of worn or defective components, lubrication, cleaning, and adjusting as required for proper elevator operation at rated speed and capacity. Use same parts and supplies as used in the manufacture and installation of original equipment.
2. Provide protective coverings, barriers, devices, signs, and other procedures to protect elevators. If, despite such protection, elevators become damaged, engage elevator Installer to restore damaged work so that no evidence remains of correction work. Return items that cannot be refinished in the field to the shop, make required repairs and refinish entire unit, or provide new units as required.

END OF SECTION 14240