

SECTION 08110

HOLLOW METAL DOORS AND FRAMES

PART 1 - GENERAL

1.01 DESCRIPTION:

- A. This section specifies providing metal doors and frames.
- B. Related Work Specified Elsewhere:
 - 1. Finish hardware: Section 08710.
 - 2. Glass and glazing: Section 08800.
 - 3. Field painting: Section 09920.

1.02 SUBMITTALS:

- A. Submit the following for approval in accordance with the General Requirements and with the additional requirements as specified for each:
 - 1. Shop Drawings:
 - a. Details of construction, connections, anchors, schedules, setting diagrams and interface with work of other trades.
 - b. Schedule of doors and frames using the same reference numbers for details and openings as those on the Contract Documents.
 - 2. Certification.

1.03 QUALITY ASSURANCE:

- A. Codes, Regulations, Reference Standards and Specifications:
 - 1. Comply with codes and regulations of the jurisdictional authorities.
 - 2. NFPA: 80 (Standard for Fire Doors and Fire Windows).
 - 3. UL: Building Materials Directory.
 - 4. NAAMM: Standards HMMA 861 and 862.
 - 5. SDI: 100.
 - 6. FS: TT-F-322.
 - 7. ASTM: A153, A366, A526, A569, A780, C236, C976.
 - 8. DHI (Door and Hardware Institute): A115, Recommended Locations for Builder's Hardware.
 - 9. ADA (Americans With Disabilities Act).
- B. Fire-Rated Assemblies: Where UL-listing, UL-label or UL Building Materials Directory is specified, another testing and inspection agency acceptable to the Engineer and to authorities having jurisdiction may be used.

1.04 PRODUCT, DELIVERY, STORAGE AND HANDLING:

- A. Deliver products to the jobsite in original unopened containers or wrappings clearly labeled with manufacturer's name and brand designation, door schedule number, referenced specification number, type, class and rating as applicable.
- B. Store products in an approved dry area, protect from contact with soil and from exposure to the elements.
- C. Handle products so as to prevent breakage of containers and damage to products.

PART 2 - PRODUCTS

2.01 MATERIALS:

- A. Hot-Rolled Steel Sheets and Strip: Commercial quality carbon steel, pickled and oiled, complying with ASTM A569, free of scale, pitting or surface defects.
- B. Cold-Rolled Steel Sheets: Commercial quality, level, carbon steel, complying with ASTM A366.
- C. Galvanized Steel Sheets: Zinc-coated carbon steel sheets of commercial quality, complying with ASTM A526, G60 zinc coating, mill phosphatized.
- D. Shop-Applied Primer: Rust-inhibitive baked-on primer, suitable as base for specified finish paint systems.
- E. Finish Paint Systems: Section 09920.
- F. Supports and Anchors: Sheet steel, gauge in accordance with HMMA reference standards, unless specified otherwise. After fabricating, galvanize units to be built into or attached to exterior walls, wet areas such as doors to toilet rooms and janitor's room, or attached to slabs on grade; complying with ASTM A153, Class B.
- G. Inserts, Bolts and Fasteners: Manufacturer's standard units unless specified otherwise. Hot-dip galvanized items to be used in exterior walls, wet areas such as doors to toilet rooms and janitor's rooms, or attached to slabs on grade; complying with ASTM A153, Class C or D as applicable.
- H. Metallic Filler: FS TT-F-322.
- I. Galvanizing Repair Compound: Stick form, melting point 600F to 650F, GALVABAR or equal.

2.02 FABRICATION, GENERAL:

- A. Fabricate hollow metal door and frame units to be rigid, neat in appearance, and free from defects, warp or buckle. Wherever practicable, fit and assemble units in manufacturer's plant. Clearly identify work that cannot be permanently factory-assembled before shipment, to ensure proper assembly at project site.
- B. Galvanize exterior door and frame assemblies, and wet area door and frame assemblies such as at toilet room and janitor's room; including but not limited to face sheets, reinforcements, closures, dust covers, mortar shields, glazing and louver beads, clips, anchor bolts, screws, rivets and welds.
- C. Exposed fasteners are not allowed on door frames and door faces; elsewhere, provide countersunk flat philips heads for exposed screws and bolts.
- D. Door Hardware Preparation:
 - 1. Prepare and reinforce doors and frames to receive mortised and concealed hardware in accordance with final Hardware Schedule and templates provided by hardware supplier. Comply with applicable requirements of DHI A115-series, Steel Door Prep Standards, for door and frame preparation for hardware.
 - 2. Reinforce doors and frames to receive surface-applied hardware. Drilling and tapping for surface-applied hardware may be done at project site.

3. Locate hardware as indicated on approved shop drawings or, if not indicated, in accordance with ADA requirements pertaining to operating hardware locations, and the Recommended Locations for Builder's Hardware, published by the DHI.
- E. Shop Painting:
1. Clean, treat and paint exposed surfaces of steel door and frame units, including galvanized surfaces.
 2. Chemically clean steel surfaces of mill scale, rust, oil, grease, dirt and other foreign materials before application of paint.
 3. Apply phosphate conversion pretreatment coating.
 4. Apply shop coat of prime paint of even consistency to provide a uniformly finished surface ready to receive finish paint. Apply primer immediately after surface preparation and pretreatment.
- F. Insulated Metal Assemblies: Where schedules, provide doors and frames fabricated as thermal-insulating assemblies and tested according to ASTM C236 or ASTM C976.

2.03 FRAMES:

- A. General:
1. Fabricate frames to uniform profile as shown of full-welded unit construction, with corners mitered and reinforced. Continuously weld full depth and width of frame, except for knock-down frames.
 2. Mullions and Transom Bars: Provide closed or tubular mullions and transom bars where indicated.
 - a. Fasten mullions and transom bars at crossings and to jambs by butt welding, except for knock-down frames.
 - b. Reinforce joints between frame members with concealed clip angles or sleeves of the same metal and thickness as frame.
 3. Jamb anchors: Provide in accordance with NAAMM Standards HMMA 861 and 862:
 - a. Provide T-type anchors or strap-and-stirrup type anchors at new masonry.
 - b. Provide Z-type anchors at metal stud partitions.
 - c. Provide bolt-type anchors with pipe spacers at in-place construction.
 4. Floor anchors: Provide floor anchors for each jamb and mullion that extends to floor, formed of galvanized steel sheet, as follows:
 - a. Monolithic concrete slabs: Clip-type anchors, with two holes to receive fasteners, welded to bottom of jambs and mullions.
 - b. Separate topping concrete slabs: Adjustable type with extension clips, allowing not less than two-inch height adjustment. Terminate bottom of frames at finish floor surface.
 5. Head anchors: Provide two anchors at head of frames exceeding 42 inches wide for frames mounted in steel stud walls.
 6. Head strut supports:
 - a. Provide 3/8-inch by two-inch vertical steel struts extending 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.
 - b. Bend top of struts to provide flush contact for securing to supporting construction above.
 - c. Provide adjustable bolted anchorage to frame jamb members.
 7. Structural reinforcing members: Provide structural reinforcing members as a part of frame assembly, where indicated at mullions, transoms or other locations which are to be built into frame.
 8. Spreader bars: Across bottom of welded frames, provide removable spreader bar, tack welded to jambs and mullions.
 9. Door silencers:

- a. Drill stop to receive three silencers on single door frames and two silencers on double door frames.
 - b. Install plastic plugs to keep holes clear during construction.
- 10. Plaster guards: Provide 18-gauge steel plaster guards or dust-cover boxes (galvanized at exterior locations), welded to frame, at back of hardware cutouts, where mortar or other materials might obstruct hardware installation or operation and to close off interior of openings.
- B. Interior Hollow Metal Frames: NAAMM Standard HMMA 861, Guide Specifications for Commercial Hollow Metal Doors and Frames except as follows:
 - 1. Openings over four feet wide: 12-gauge.
 - 2. Cart-storage rooms and other doors as indicated: Use security hollow metal frames specified below.
 - 3. Knock-down frames may be used in drywall construction as specified below.
- C. Exterior and Security Hollow Metal Frames: NAAMM Standard HMMA 862, Guide Specifications for Security Hollow Metal Doors and Frames, except as follows:
 - 1. Use for exterior doors and for indicated security doors including cart-storage room.
 - 2. Cart-storage-room frame anchors: Hot-dipped galvanized anchor bolts, not less than 1/2-inch by six inches, inaccessible from the safety walk, eight per frame.
- D. Interior Knock-Down Hollow Metal Frames: SDI 100, and as follows:
 - 1. Knock-down frames may be used only in interior drywall construction.
 - 2. Openings four foot wide or less: 16-gauge.
 - 3. Openings over four feet wide: 12-gauge.

2.04 DOORS:

- A. Thermal Insulation: Provide exterior doors and panels with internal thermal insulation of extruded polystyrene. Aged R-value of door or panel is to be 5.0 or greater.
- B. Interior Hollow Metal Doors: NAAMM Standard HMMA 861, Guide Specifications for Commercial Hollow Metal Doors and Frames except for cart-storage room and other doors as indicated.
- C. Exterior and Security Hollow metal Doors: NAAMM Standard HMMA 862, Guide Specifications for Security Hollow Metal Doors and Frames.
 - 1. Use for exterior doors and for indicated security doors including cart-storage room.

2.05 FIRE-DOOR ASSEMBLIES:

- A. Where fire-rated door and frame assemblies are required for code compliance, or are otherwise indicated, provide door, frame and hardware assemblies in compliance with NFPA 80, which are labeled and listed by UL.
- B. Fabrication and assembly requirements necessary to obtain labels will take precedence over requirements shown or specified, except where requirements shown or specified exceed sizes or gauges required for labeling.
- C. Where oversized fire doors are required, furnish manufacturer's certification that assembly has been constructed with materials and methods equivalent to labeled construction.
- D. Louvers: Equip louvers in fire-rated doors with UL-listed self-closing fire dampers with fusible links.

- E. Identify each fire door and frame with permanent UL labels, indicating the applicable fire rating of both the door and the frame. Secure labels to vertical edge of doors and frames where readily visible. Protect labels from painting operations.

2.06 TRANSOM ASSEMBLIES:

- A. Removable Transom Bar: Formed as shown of same material as frame, with manufacturer's standard bolted connection.
- B. Removable Transom Panel: Formed as shown of the same construction as the door or doors below, through-bolted to frame eight inches on-center maximum.

PART 3 - EXECUTION

3.01 INSTALLATION:

- A. Deliver work, ready to set up and erect in place as rapidly as general construction work permits. Set work in place in accordance with approved shop drawings, plumb and level, strongly secured against displacement and with built-in anchors. In masonry construction, set frames in advance of masonry work. Limit field-cutting, drilling and punching to minimum necessary.
- B. Anchor metal frames in accordance with NAAMM Standards HMMA 861 and 862.
- C. Anchor fire-door assemblies in accordance with NFPA 80.
- D. Install doors after masonry work has been completed; accurately fit and adjust to work properly.
- E. Maintain installation clearances and tolerances in accordance with NAAMM Standards HMMA 861 and 862.
- F. Coat field welds and repair damage to zinc-coated surfaces in accordance with ASTM A780 and as follows:
 - 1. Wire-brush welds and other repair areas to bright metal.
 - 2. Apply galvanizing repair compound at rate of two ounces per square foot.
- G. Touch-up shop applied primer as recommended by manufacturer for compatibility with finish paint system.
- H. Application of finish hardware: Section 08710.
- I. Glazing materials and installation: Section 08800.

3.02 CLEAN UP:

- A. Upon completion of installation, clean surfaces of doors and frames as recommended by door manufacturer.
- B. Remove from the site rubbish and debris caused by this work.
- C. Leave areas surrounding openings in broom-clean condition.

END OF SECTION

SECTION 08305

ACCESS DOORS AND FRAMES

PART 1 - GENERAL

1.01 DESCRIPTION:

- A. This section specifies providing wall and ceiling access doors and frames, fire-rated wall access doors and frames, access hatches, tile covered access hatches and passenger emergency-egress hatches.
- B. Work Specified Elsewhere:
 - 1. Cast-In-Place Concrete: Section 03300.
 - 2. Mortar, Grout and Masonry Accessories: Section 04050.
 - 3. Brick Masonry: Section 04125.
 - 4. Concrete Unit Masonry: Section 04220.
 - 5. Structural Steel: Section 05120.
 - 6. Roof Hatches: Section 07730.
 - 7. Finish Hardware: Section 08710.
 - 8. Tile: Section 09320.
 - 9. Paver Tile: Section 09340.
 - 10. Acoustical Panel Ceilings: Section 09511.
 - 11. Field Painting: Section 09920.

1.02 SUBMITTALS:

- A. Submit the following for approval in accordance with the General Requirements and with the additional requirements as specified for each:
 - 1. Product Data: For each type of door and frame indicated. Include construction details relative to materials, individual components and profiles, finishes, and fire ratings (if required) for access doors and frames.
 - 2. Shop Drawings: Show fabrication and installation details. Include plans, elevations, sections, hardware, fittings, fastenings, details, and attachments to other Work. Manufacturer's standard drawings may be submitted in lieu of Contractor prepared shop drawings if manufacturer's standard drawings show required details.
 - 3. Samples: For each door face material, at least 3 by 5 inches in size, in specified finish.
 - 4. Schedule: Provide complete door and frame schedule, including types, general locations, sizes, construction details, latching or locking provisions, and other data pertinent to installation.
 - 5. Coordination Drawings: Reflected ceiling plans drawn to scale and coordinating penetrations and ceiling-mounted items with concealed framing, suspension systems, piping, ductwork, and other construction. Show the following:
 - a. Method of attaching door frames to surrounding construction.
 - b. Ceiling-mounted items including access doors and frames, lighting fixtures, diffusers, grilles, speakers, sprinklers, and special trim.
 - 6. Certification:
 - a. Certification from manufacturer of steel gratings verifying that gratings are capable of supporting loading as shown.
 - b. Certified test reports of successful factory testing performed on passenger emergency-egress hatches. Certification of previous successful testing of hatches of same design furnished under similar Authority contracts acceptable in lieu of specified testing.
 - c. Certification that welding personnel are currently qualified in accordance

with AWS D1.1.

1.03 QUALITY ASSURANCE:

- A. Codes, Regulations, Reference Standards and Specifications:
 - 1. Comply with codes and regulations of the jurisdictional authorities.
 - 2. AASHTO: Standard Specifications for Highway Bridges: HS-20-44 Loading.
 - 3. AGA: The Design and Fabrication of Galvanized Products.
 - 4. AISC: Specification for Structural Steel for Buildings-Allowable Stress Design
 - 5. ASTM: A36, A53, A90, A123, A143, A153, A167, A193, A276, A307, A384, A413, A501, A588, A593, A633, A666, A780, A786, B221, B633, D1187, F594.
 - 6. AWS: D1.1, D1.2, D1.3, D1.4.
 - 7. FS; FF-B-588, FF-P-395, FF-S-325, RR-G-661, TT-P-664.
 - 8. MS: MIL-P-21305.
 - 9. NAAMM: Metal Finishes Manual for Architectural Metal Products
 - 10. NFPA: 101 (Fire Exit Hardware), 252 (Standard Method of Fire Tests for Door Assemblies)
 - 11. SSPC: SP 11, Paint 12.
 - 12. UL: 10B (Fire Tests of Door Assemblies)

- B. Source Limitations: Obtain doors and frames through one source from a single manufacturer.

- C. Fire-Rated Access Doors and Frames: Units complying with NFPA 80 that are identical to access door and frame assemblies tested for fire-test-response characteristics per the following test method and that are labeled and listed by UL, ITS, or another testing and inspecting agency acceptable to authorities having jurisdiction:
 - 1. [NFPA 252] [or] [UL 10B] for vertical access doors.

- D. Size Variations: Obtain the Engineer's acceptance of manufacturer's standard-size units, which may vary slightly from sizes indicated.

- E. Welding: Qualify procedures and personnel according to the following:
 - 1. AWS D1.1, "Structural Welding Code-Steel."
 - 2. AWS D1.2, "Structural Welding Code-Aluminum."
 - 3. AWS D1.3, "Structural Welding Code-Sheet Steel."
 - 4. AWS D1.4, "Structural Welding Code-Reinforcing Steel."
 - 5. Certify that each welder has satisfactorily passed AWS qualification tests for welding processes involved and, if pertinent, has undergone recertification. Such certification is to remain in force for the duration of the welding operations under this Contract.

- F. Passenger Emergency-Egress Hatches Meeting AASHTO HS-20-44 Loading:
 - 1. Performance Requirements:
 - a. Design exit hardware so that:
 - 1) Force of not more than 15 pounds on pull ring will actuate release bar and latches and outward force of not exceeding 30 pounds will open hatch.
 - 2) Force of not more than 50 pounds on pull ring will actuate release bar and latches when latched leaf is subjected to outward force of 250 pounds applied against latching edge adjacent to latch or to flush grip handle in direction in which latch opens.
 - b. Provide one-inch minimum distance between bar and other door parts, when bar has traveled to fully open position.
 - c. Provide sufficient supports on latch bars to prevent damage and misalignment.

- d. Design and provide sufficient latch bar springs for proper operation.
 - e. Coordinate design with design-specialty applications which interface with hatch design
 - f. Make recommendations for specialty-design actions to be performed by other specialties.
2. Factory testing:
- a. Perform endurance testing in which hatch leaf is attached to frame assembly and, complete with exit hardware, is subjected to 1,000 opening-and-closing cycles. Hatch, including release mechanism, exit hardware and latches, to operate without failure and show no signs of excessive wear.
 - b. Perform opening tests in which hatch leaf is subjected to the 15-pound test before and after endurance test and in which hatch leaf is subjected to 250-pound-outward-force test after endurance test. With spring scales, or by other approved means, test and record force required to open hatch. Opening force not to exceed 30 pounds for normal test and 50 pounds for 250-pound-outward-force test.
 - c. Test data to be recorded and certified by the manufacturer.
 - d. Notify the Authority at least 14 calendar days prior to each test.
3. Covers: Shall be reinforced to support a minimum live load of 300 psf (1464 kg/m²) with a maximum deflection of 1/150th of the span. Operation shall be smooth and easy with controlled operation throughout the entire arc of opening and closing. Operation shall not be affected by temperature.
4. AASHTO-HS-20-44 load or higher load if required by the jurisdictional authority where the hatch is installed: Structural steel plate with load-carrier beams.

1.04 PROJECT CONDITIONS:

- A. Field Measurements: Where doors and hatches are indicated to fit in walls and other construction, verify dimensions by field measurements before fabrication and indicate measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.
 - 1. Established Dimensions: Where field measurements cannot be made without delaying the Work, establish dimensions and proceed with fabricating metal fabrications without field measurements. Coordinate construction to ensure that actual dimensions correspond to established dimensions. Allow for trimming and fitting.

1.05 PRODUCT DELIVERY, STORAGE AND HANDLING:

- A. Deliver products undamaged
- B. Store products so as to prevent rust
- C. Handle products so as to prevent damage.
- D. After completion of factory testing, package and ship hatches as directed.

1.06 COORDINATION:

- A. Verification: Determine specific locations and sizes for access doors needed to gain access to concealed equipment, and indicate on a schedule.
- B. Concrete Work: Coordinate with concrete work so that frames are available for placing integrally with floor slabs or concrete walls unless frames are to be installed during related interior floor work.

PART 2 - PRODUCTS

2.01 MATERIALS:

- A. General Requirements:
 - 1. Insofar as practicable, furnish similar products of a single manufacturer.
 - 2. Metal Surfaces, General: For metal fabrications exposed to view in the completed Work, provide materials with smooth, flat surfaces without blemishes. Do not use materials with exposed pitting, seam marks, roller marks, rolled trade names, or roughness.

2.02 FERROUS METALS:

- A. Structural Steel: Plates, shapes, bars and angles: ASTM A36.
- B. Rolled-Steel Floor Plate: ASTM A786/A786M, raised pattern floor plates from rolled-steel floor plate, galvanized after fabrication, of thickness and in pattern indicated below:
 - 1. Thickness: Minimum 1/4 inch, unless otherwise shown or calculated.
 - 2. Pattern: No. 2, or as selected from manufacturer's standard patterns; flat back.
- C. Load-carrier beams: ASTM A588.
- D. Structural Tubing: ASTM A501.
- E. Steel Pipe: ASTM A53, standard weight (Schedule 40), unless another weight is indicated or required by structural loads. Galvanized unless otherwise shown or specified.
- F. Pipe Sleeves and Pipe Fittings: ASTM A53. Galvanized unless otherwise shown or specified.
- G. Stainless Steel Sheets, Strips, Plates, Shapes, and Flat Bars: ASTM A666, Type 304. Type 316L for corrosive environments.
- H. Stainless Steel Bars and Shapes: ASTM A276, Type 304. Type 316L for corrosive environment.
- I. Guard Chain: ASTM A413, Class Grade 28, galvanized steel, 9/32-inch thick, complete with stainless steel eyes, spring-loaded catches and mounting components.
- J. Grating: Steel, bar and crossbar type shown, hot-dipped galvanized after fabrication and sizing, FS RR-G-661, Type 1, Class 1 or 2.

2.03 ALUMINUM:

- A. Aluminum Extrusions: ASTM B221, Alloy 6063.
- B. Aluminum-Alloy Rolled Tread Plate: ASTM B 632, alloy 6061.

2.04 FASTENERS:

- A. General: Provide Type 302 or 316 stainless steel fasteners for exterior use and zinc-plated fasteners complying with ASTM B633, Class Fe/Zn 5, where built into exterior walls. Select fasteners for type, grade, and class required.
- B. Screws: Material, type and size to suit purpose; steel, except stainless., cadmium-plated.

1. Stainless steel, ASTM A193, Alloy S30400.
- C. Machine Bolts: Material, type and size best suited to the purpose. Minimum tensile strength 60,000 psi.
1. Carbon steel: ASTM A307, Grade B, galvanized.
 2. Stainless steel: ASTM A193, Class 1A.
- D. Toggle bolt: FS FF-B-588.
- E. Drive stud: FS FF-S-325, Group 6.
- F. Expansion shield: FS FF-S-325 Group I, Type 2, Class 2, Style 1; Group II, Type 3, Class 1; Group IV, Type 1; best suited to the purpose.
- G. Screw anchors: Lead or plastic for wood or metal screws.
- H. Anchor bolt sleeve: Corrugated high-density polyethylene plastic.
- I. Powder actuated: FS FF-P-395.
- J. Expansion Anchors: Anchor bolt and sleeve assembly of material indicated below with capability to sustain, without failure, a load equal to six times the load imposed when installed in unit masonry and equal to four times the load imposed when installed in concrete, as determined by testing per ASTM E488, conducted by a qualified independent testing agency.
1. Material: Alloy Group 1 or 2 stainless steel bolts complying with ASTM F593 and nuts complying with ASTM F594.

2.05 CONCRETE AND GROUT:

- A. Nonshrink Grout: Section 04050.
- B. Surface hardener: Water-soluble, inorganic fluosilicate compound for curing, hardening and dustproofing fresh concrete.

2.06 COATINGS:

- A. Shop Primer for Ferrous Metals: Fast-curing, lead- and chromate-free, universal modified-alkyd primer complying with performance requirements in FS TT-P-664; selected for good resistance to normal atmospheric corrosion, compatibility with finish paint systems indicated, and capability to provide a sound foundation for field-applied topcoats despite prolonged exposure.
- B. Galvanizing (zinc-coating by hot-dipped process): ASTM A90, ASTM A123, or ASTM A143, ASTM A153 or ASTM A384, as applicable.
- C. Zinc-rich paint: MS MIL-P-21305.
- D. Electro deposited zinc coating: ASTM B633.
- E. Galvanizing Repair Compound: Stick form, melting point 600-degree F to 650-degree F, GALVABAR or equal.
- F. Bituminous Coating: Cold-applied asphalt mastic complying with SSPC Paint 12, except containing no asbestos fibers, or cold-applied asphalt emulsion complying with ASTM D1187.

2.07 FABRICATION, GENERAL:

- A. Shop Assembly: Preassemble items in shop to greatest extent possible to minimize field splicing and assembly. Disassemble units only as necessary for shipping and handling limitations. Use connections that maintain structural value of joined pieces. Clearly mark units for reassembly and coordinated installation.
- B. Provide access door assemblies manufactured as integral units ready for installation.
- C. Fabricate and prepare products required to be galvanized in accordance with recommendations of AGA.
- D. Provide material that is free from mill scale, flake rust and mill pitting.
- E. Cut, reinforce, drill and tap metal fabrications as indicated to receive finish hardware, screws, and similar items. Provide plates welded on for mounting hardware.
- F. Shear and punch metals cleanly and accurately. Remove burrs.
- G. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners whenever possible. Use exposed fasteners of type indicated or, if not indicated, Phillips flat-head (countersunk) screws or bolts. Locate joints where least conspicuous.
- H. Ease exposed edges to a radius of approximately 1/32 inch, unless otherwise indicated. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing work.
- I. Provide for anchorage of type indicated; coordinate with supporting structure. Fabricate and space anchoring devices to secure metal fabrications rigidly in place and to support indicated loads.
- J. Where miscellaneous access openings, with exception of gratings, occur in finished floor areas, include stainless steel edge rims of depth to accommodate floor finishing materials.
- K. Welding corners and seams continuously to comply with the following:
 - 1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
 - 2. Obtain fusion without undercut or overlap.
 - 3. Remove welding flux immediately.
 - 4. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing and contour of welded surface matches that of adjacent surface.
- L. Fabricate joints that will be exposed to weather in a manner to exclude water, or provide weep holes where water may accumulate.
- M. Form exposed work true to line and level with accurate angles and surfaces and straight sharp edges.
- N. Remove sharp or rough areas on exposed traffic surfaces.
- O. Painting: Shop paint (prime) before shipment. Phosphatize galvanized surfaces before priming.

2.08 WALL AND CEILING ACCESS DOORS AND FRAMES:

- A. Access Doors: Steel, baked-enamel prime coat; 12-inches square, minimum size.
 - 1. Wall-mounted, sheet steel type: Sizes under four square feet.
 - a. Door:
 - 1) Fixed: 1/4-inch steel plate screwed to frame 18 inches on centers maximum, with flathead, countersunk, tap screws.
 - 2) Operable: Equipped with spring hinges and lockset conforming to requirements of Section 08710; locks keyed into group with mechanical rooms.
 - b. Frame: Structural steel shapes and corners mitered and welded. Strap anchors places not more than 18 inches on centers and extending 18 inches minimum into masonry or concrete.
 - 2. Wall-mounted, hollow metal type: Size over four square feet.
 - a. Door and frame: Conform to the requirements of Section 08110; galvanized in exterior walls.
 - b. Hardware: Equipped with spring hinges and lockset conforming to requirements of Section 08710; locks keyed into group with mechanical rooms.
 - c. Fire rated: UL 1-1/2 hour B-Label, with labeled hardware.
 - 3. Ceiling mounted: Galvanized steel, door and frame 16-gauge minimum; continuous piano hinge; with sleeve and plastic grommet for screwdriver from the room side; for gypsum board ceiling.
 - a. Door and frame: Flush with ceiling surface; flush metal door fitting neatly into the frame.
 - b. Size and locations: As required to access equipment indicated or as shown.
 - c. Insulation: Provide upper side of doors with one-inch thick mineral fiberboard permanently cemented in place.
 - d. Manufactured by the C. M. Walsh Company of Boston, Massachusetts, or equal.
 - 4. Wall or ceiling mounted in plaster walls or ceilings: Size 16 inches square.
 - a. Flush door panel mounted to frame on concealed spring hinges opening to 175 degrees.
 - b. Fire rated: UL 1-1/2 hour B-Label, with key operated flush lock.
 - c. Manufactured by MILCOR, K-access door or equal.

2.09 ACCESS HATCH, TYPE A:

- A. Fabricated by a manufacturer regularly engaged in the production of access hatches; and designed to meet the requirements of AASHTO-HS-20-44 load or higher load if required by the jurisdictional authority where the hatch is installed.
- B. Door:
 - 1. Grating: Steel, ASTM A36.
 - 2. Side Plate: Floor plate, diamond pattern, flat back.
 - 3. Bearing bars: 2-1/2 inches by 1/4 inch at 13/16-inch on centers and cross bars at four inches on centers.
- C. Frame: Structural steel angle framed on three sides, formed steel plate on the hinge side.
- D. Ferrous-metal components: Galvanized after fabrication.
- E. Hardware:
 - 1. Hinges: Forged brass with stainless steel pins.
 - 2. Lifting mechanism: Stainless steel compression-spring mechanism balancing door leaves through entire arc acting as check to downward motion. Force necessary to open the hatch not to exceed 50 pounds.

3. Hold-open devices: Automatic, 90-degree hold-open arms with vinyl-covered release handles.
4. Locking devices: Snap locks with handles on the underside and removable key handles on top side. Include removable plugs for concealing key holes.

2.10 PASSENGER EMERGENCY-EGRESS HATCH:

- A. Fabricated by a manufacturer regularly engaged in the production of access hatches; and designed to meet the following requirements:
- B. Door leaves: Fabricated in accordance with approved shop drawings.
 1. 250 pounds per-square-foot loading: Rolled Steel Floor plate, diamond pattern, flat back. Galvanized after fabrication.
- C. Frame: 1/4-inch structural steel with formed gutters with drainage couplings. Frames welded to eight-inch supporting channels on four sides with full flange around perimeter. Galvanized after fabrication.
- D. Drain Coupling: Provide a 1-1/2" drain coupling located in the right front corner of the channel frame (note: can be placed at a different location if directed by the Engineer).
- E. Hardware:
 1. Hinges: Forged brass or Type 316 stainless steel. Hinge pins of stainless steel. Each hinge equipped with two pressure-lubrication fittings, Lincoln No. 5012, or equal.
 2. Lifting Mechanism: Stainless steel compression-spring mechanism balancing door leaves through entire arc acting as check to downward motion. Force necessary to open the hatch when applied to inner edge of exit release bar not to exceed 30 pounds. Manufacturer shall provide the required number and size of compression spring operators enclosed in telescopic tubes to provide, smooth, easy, and controlled cover operation throughout the entire arc of opening and to act as a check in retarding downward motion of the cover when closing. The upper tube shall be the outer tube to prevent accumulation of moisture, grit, and debris inside the lower tube assembly. The lower tube shall interlock with a flanged support shoe fastened to a formed 1/4" gusset support plate.
 3. Hold-open devices: Covers shall be equipped with a hold open arm which automatically locks the covers in the open position.
 4. Locking devices:
 - a. Interior: Stainless steel panic bar fabricated and installed to meet NFPA 101 requirements.
 - b. Exterior: A removable exterior turn/lift handle with a spring loaded ball detent shall be provided to open the leaf and the latch release shall be protected by a flush, gasketed, removable screw plug.
 - c. Miscellaneous: Flush grip handles, pull rings with removable caps, handrails on leaves and guard chains of type standard with manufacturer.

2.11 TILE-COVERED FLOOR HATCH:

- A. General: Commercially manufactured to support a uniformly distributed live load of 150 psf and a maximum deflection of 1/150 of the span. Custom sized heavy duty aluminum frame and cover with aluminum or brass exposed edges, and complete with reinforcing, support beams (where necessary), and related accessories.
- B. Aluminum Frames and Covers: Extruded aluminum, ASTM B 221, alloy 6063-T6, with

mitered and keyed corners and factory coated with zinc chromate primer or manufacturer's standard protective paint where surfaces will be in contact with concrete.

1. Exposed Edge Finishes: Mill finish, No. 385 alloy bronze.
 2. Cover Reinforcing: ASTM A 185 (mesh) or ASTM A 615 (bars), factory engineered to meet design load requirements for medium and heavy duty applications.
- C. Steel Support Beams: ASTM A 36, factory engineered to meet design load requirements where maximum spans for single cover are exceeded and elsewhere when required. 1. Furnish steel beam pocket and bearing plate for support beams
- D. Hardware:
1. Lifting/Locking Device: Lifting blocks (one each corner typically) secured to hatch cover and fitted with threaded bolt
 - a. Furnish threaded handle for lifting, with integral hex head drive for removing securing bolt (for covers equipped with double seals) or blanking bolt (for non-sealed covers).
 2. Seals: Continuous EPDM perimeter seal.
 3. Concrete Fill: Section 0330
- E. Fabrication:
1. Shop fabricate floor access hatches and covers in sizes and configurations shown for single unit pit access, or multiple unit trench access.
 2. Sizes (Single Unit Maximum): 48 inches square (clear opening).
 - a. Where size requirements exceed those shown, multiple covers can be joined together to obtain the desired sizes.
 - b. Where very large covers are required, a small inspection cover may be integrated into the large cover for convenience.
 3. Sizes (Multiple Units Maximum): 36 inches square (clear opening).
 4. Furnish reinforcement assembly loose for field positioning.
 5. All aluminum surfaces in contact with concrete shall receive a factory applied primer or protective paint.
 6. Dissimilar metals shall be protected against electrolytic action.

2.12 FINISHES:

- A. General:
1. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
 2. Finish metal fabrications after assembly.
 3. Galvanize ferrous metal unless other finish is shown or specified.
- B. Galvanizing:
1. Clean ferrous metal thoroughly before applying zinc coating.
 2. Apply zinc coating to products after fabrication, by hot-dip method, using coating weighing not less than two ounces per-square-foot.
- C. Shop Paint:
1. Ferrous metal thoroughly cleaned as recommended by primer manufacturer and in accordance with SSPC SP11 and, except for items to be encased in concrete, given prime coat of paint.
 2. Zinc yellow iron-oxide primer or red-lead based primer applied so as to thoroughly cover surfaces without leaving runs or sags
- D. Stainless Steel: Remove tool and die marks and stretch lines or blend into finish. Grind and polish surfaces to produce uniform, directionally textured, polished finish indicated, free of

- E. cross scratches. Run grain with long dimension of each piece.
Aluminum: AA-M10 (Mechanical Finish: as fabricated, unspecified).

PART 3 - EXECUTION

3.01 PREPARATION:

- A. Advise installers of other work about specific requirements relating to access door and floor door installation, including sizes of openings to receive access door and frame, as well as locations of supports, inserts, and anchoring devices.
- B. Examine the substrates and conditions under which the work is to be performed, and notify the General Contractor in writing of conditions detrimental to the proper and timely completion of the work. Do not proceed with the installation until unsatisfactory conditions have been corrected.
- C. Remove foreign substances from surfaces to receive metal items.
- D. Protect surrounding surfaces from damage while performing the work of this section.

3.02 INSTALLATION, GENERAL:

- A. Coordinate placement of doors with the work of other trades
- B. Comply with manufacturer's written instructions for installing all access doors and hatches.
- C. Fastening to In-Place Construction: Provide anchorage devices and fasteners where necessary for securing metal fabrications to in-place construction. Include threaded fasteners for concrete and masonry inserts, toggle bolts, through-bolts, lag bolts, wood screws, and other connectors.
- D. Cutting, Fitting and Placement: Perform cutting, drilling, and fitting required for installing doors and hatches. Set frames, doors and hatches accurately in location, alignment, and elevation; with edges and surfaces level, plumb, true, and free of rack; and measured from established lines and levels.
- E. Provide temporary bracing or anchors in formwork for items that are to be built into concrete, masonry or similar construction.
- F. Provide anchors and inserts in sufficient numbers for proper fastening of doors and hatches.
- G. Provide bar anchors with turned ends extending six inches minimum into concrete and 12 inches minimum into masonry. Lay anchors flat in masonry joints.
- H. Embed anchors accurately in concrete to permit aligning door in proper position.
- I. For fabricated items, use fastenings and anchors of size and type shown on approved shop drawings or manufacturer's standard drawings.

3.03 INSTALLING PASSENGER EMERGENCY-EGRESS HATCH:

- A. Lift hatches by means of slings attached at four corners of each hatch frame.
- B. Set hatch in framed opening; shim as necessary to ensure even support of hatch and alignment with adjoining work and in accordance with manufacturer's recommendations. Shim pattern, as shown

- C. After shimming, ensure hatch is not racked and weld in place as shown.
- D. After welding is completed, repair damaged zinc-coating and abraded shop coatings.
- E. Field-weld steel inserts to hatch frame and opening frame at hatch hinge points and coat completely with galvanizing repair compound at rate of two ounces per-square-foot.
- F. Fill space between hatch and frame and framed opening with nonshrink grout.
- G. Install 1-1/2 inch steel, Schedule 40, piping from hatch frame drain to floor drain, or if no drain, to floor. Piping not to encroach on egress pathway or headroom clearance (six-feet,eight-inches, minimum). Drain not to discharge into egress pathway.

3.04 TILE-COVERED ACCESS HATCHES:

- A. Set aluminum frames in recess, level and in proper relationship to adjacent finished flooring. For multiple covers and where maximum span for single covers is exceeded, install beam pockets and set support beams on base plates grouted to required heights. Grout frames solid with Portland cement concrete.
- B. Place cover in frame properly aligned. Clip reinforcement assembly into proper position and fill cover with Portland cement concrete to height necessary to receive scheduled finish flooring material. Hand trowel to smooth dense surface.

3.05 PAINTING AND REPAIRING COATED SURFACES:

- A. Before erection or enclosing construction, paint items that support masonry or will be concealed in finish work, except items encased in concrete.
- B. Where shop coat is abraded or burned by welding, clean and touch-up.
- C. Touch-up primed surfaces with same material as coating.
- D. Where aluminum parts come in contact with concrete or steel, coat contact surfaces of aluminum with bituminous coating.
- E. Coat field welds and repair damage to zinc-coated surfaces in accordance with ASTM A780 and as follows:
 - 1. Wire brush areas to be coated to bright metal.
 - 2. Apply galvanizing repair compound at rate of two ounces per-square-foot.

3.06 FIELD QUALITY CONTROL OF PASSENGER EMERGENCY-EGRESS HATCH:

- A. Field Testing of Passenger Emergency-Egress Hatch:
 - 1. Upon completion of installation of passenger emergency-egress hatch, verify with spring scales that each leaf of each access hatch will open when force of 30 pounds or less is applied at inner end of exit release bar.
 - 2. Operate leaf no less than three times. Record opening force required each time. If adjustments are necessary to achieve specified results, repeat the test.
 - 3. Perform field tests in the presence of the Engineer.
 - 4. At the time of final inspection for substantial completion, repeat field tests as specified.
 - 5. If hatch fails field tests, make necessary adjustments until it operates as specified.
 - 6. During the life of the Contract, check operation of hatch leaves at periods not

exceeding 90 days. Lubricate moving parts and check for proper operation.

3.07 ADJUSTING AND CLEANING:

- A. Adjust doors and hardware after installation for proper operation.
- B. Remove and replace doors and frames that are warped, bowed, or otherwise damaged.
- C. Tile-Covered Access Hatches: If necessary for alignment after finish flooring is installed, exposed edges of frame and cover may be ground to remove up to 1/8 inch and provide flush surface.

END OF SECTION

SECTION 08331

OVERHEAD COILING DOORS

PART 1 - GENERAL

1.01 DESCRIPTION:

- A. This section specifies providing overhead coiling doors.
- B. Related Work Specified Elsewhere:
 - 1. Miscellaneous Metal: Section 05500.
 - 2. Finish Hardware: Section 08710.
 - 3. Field Painting: Section 09920.

1.02 DEFINITIONS:

- A. Operation Cycle: One complete cycle of a door begins with the door in the closed position. The door is then moved to the open position and back to the closed position.

1.03 PERFORMANCE REQUIREMENTS:

- A. Structural Performance: Provide overhead coiling doors capable of withstanding the effects of gravity loads and the following loads and stresses without evidencing permanent deformation of door components:
 - 1. Wind Load: Uniform pressure (velocity pressure) of 20 lbf/sq. ft., acting inward and outward.
- B. Operation-Cycle Requirements: Design overhead coiling door components and operator to operate for not less than 20,000 cycles.

1.04 SUBMITTALS:

- A. Submit the following for approval in accordance with the General Requirements and with the additional requirements as specified for each:
 - 1. Product Data: For each type and size of overhead coiling door and accessory. Include details of construction relative to materials, dimensions of individual components, profiles, and finishes. Provide roughing-in diagrams, operating instructions, and maintenance information. Include the following:
 - a. Setting drawings, templates, and installation instructions for built-in or embedded anchor devices.
 - b. Summary of forces and loads on walls and jambs.
 - c. Motors: Show nameplate data and ratings; characteristics; mounting arrangements; size and location of winding termination lugs, conduit entry, and grounding lug; and coatings.
 - d. Fire-Rated Doors: Information describing fire-release system, including testing and resetting instructions.
 - 2. Shop Drawings: For special components and installations not dimensioned or detailed in manufacturer's data sheets.
 - a. Wiring Diagrams: Detail wiring for power, signal, and control systems. Differentiate between manufacturer-installed and field-installed wiring and between components provided by door manufacturer and those provided by others.
 - 3. Samples for Initial Selection: Manufacturer's color charts showing the full range of colors available for units with factory-applied finishes.

4. Samples for Verification: Of each type of exposed finish required, prepared on Samples of size indicated below and of same thickness and material indicated for Work. Where finishes involve normal color and texture variations, include Sample sets showing the full range of variations expected.
 - a. Curtain Slats: 12-inch length.
 - b. Bottom Bar: 6-inch length
 - c. Guides: 6-inch length.
 - d. Brackets: 6 inches square.
 - e. Hood: 6 inches square.
5. Installer Certificates: Signed by manufacturer certifying that installers comply with specified requirements.

1.05 QUALITY ASSURANCE:

- A. Codes, Regulations, Reference Standards and Specifications:
 1. Comply with codes and regulations of the jurisdictional authorities.
 2. ASTM: A36, A123, A653, E84.
 3. NAAMM: Metal Finishes Manual for Architectural and Metal Products.
 4. NEMA: ICS 1, ICS 2, ICS 6, MG-1.
 5. NFPA: 70, 80.
 6. UL: 10B.
- B. Installer Qualifications: Engage an experienced installer who is an authorized representative of the overhead coiling door manufacturer for both installation and maintenance of units required for this Project.
- C. Source Limitations: Obtain overhead coiling doors through one source from a single manufacturer.
 1. Obtain operators and controls from the overhead coiling door manufacturer.
- D. Fire-Rated Door Assemblies: Provide assemblies complying with NFPA 80 that are identical to door and frame assemblies tested for fire-test-response characteristics per UL 10b, and that are labeled and listed for fire ratings by UL, FM, ITS/Warnock Hersey, or another testing and inspection agency acceptable to authorities having jurisdiction.
- E. Listing and Labeling: Provide electrically operated fixtures specified in this Section that are listed and labeled.
 1. The Terms "Listed" and "Labeled": As defined in NFPA 70, Article 100.

1.06 PRODUCT DELIVERY, HANDLING AND STORAGE:

- A. Deliver products in the original unopened packages, containers or bundles each bearing name of manufacturer, brand designation, referenced number, type and class as applicable.
- B. Store materials inside, under cover, and dry, protected from weather, direct sunlight, surface contamination, aging, corrosion, and damage from construction traffic and other causes. Use platforms or other means to protect products and materials from contact with the soil. Do not store materials on finished floors.
- C. Handle materials so as to preclude breakage of packages or containers and damage to materials.

PART 2 - PRODUCTS

2.01 DOOR CURTAIN MATERIALS AND CONSTRUCTION:

- A. Door Curtain: Fabricate overhead coiling door curtain of interlocking slats, designed to withstand wind loading indicated, in a continuous length for width of door without splices. Unless otherwise indicated, provide slats of material thickness recommended by door manufacturer for performance, size, and type of door indicated, and as follows:
 - 1. Steel Door Curtain Slats: Structural-quality, cold-rolled galvanized steel sheets complying with ASTM A653, with G90 zinc coating.
 - a. Provide manufacturer's standard flat-profile slats.
 - 2. Insulation: Fill slat with manufacturer's standard rigid cellular polystyrene or polyurethane-foam-type thermal insulation with minimum aged R-value of 5.0 complying with maximum flame-spread and smoke-developed indices of 75 and 450, respectively, according to ASTM E84. Enclose insulation completely within metal slat faces.
 - 3. Inside Curtain Slat Face: To match material of outside metal curtain slat and as follows:
 - a. Galvanized Steel Sheet Thickness: Not less than 0.028 inch.
- B. Endlocks: Malleable-iron castings galvanized after fabrication, secured to curtain slats with galvanized rivets, or high-strength nylon. Provide locks on not less than alternate curtain slats for curtain alignment and resistance against lateral movement.
- C. Windlocks: Malleable-iron castings secured to curtain slats with galvanized rivets or high-strength nylon, as required to comply with wind load.
- D. Bottom Bar: Consisting of 2 angles, each not less than 1-1/2 by 1-1/2 by 1/8 inch thick, galvanized to suit type of curtain slats.
 - 1. Astragal: Provide a replaceable, adjustable, continuous, compressible gasket of flexible vinyl, rubber, or neoprene, between angles or fitted to shape, as a cushion bumper for interior door.
 - 2. Provide motor-operated doors with combination bottom astragal and sensor edge.
- E. Curtain Jamb Guides: Fabricate curtain jamb guides of steel angles, or channels and angles, with sufficient depth and strength to retain curtain, to allow curtain to operate smoothly, and to withstand loading. Build up units with not less than 3/16-inch-thick, galvanized steel sections complying with ASTM A36, and ASTM A123. Slot bolt holes for guide adjustment. Provide removable stops on guides to prevent overtravel of curtain and a continuous bar for holding windlocks.
- F. Wicket doors where shown, equipped with cylinder locks capable of operating with cylinders specified in Section 08710. Provide construction cylinders.
- G. Supports: Galvanized structural steel tubing and fastenings as shown and as specified in Section 05500.

2.02 HOODS AND ACCESSORIES:

- A. Hood: Form to entirely enclose coiled curtain and operating mechanism at opening head and act as weatherseal. Contour to suit end brackets to which hood is attached. Roll and reinforce top and bottom edges for stiffness. Provide closed ends for surface-mounted hoods and fascia for any portion of between-jamb mounting projecting beyond wall face. Provide intermediate support brackets for doors over 14 feet in width or as required to prevent sag.
 - 1. Fabricate steel hoods, for steel doors, of not less than 0.028-inch-thick, hot-dip galvanized steel sheet with G90 zinc coating, complying with ASTM A653.
 - 2. Include automatic drop baffle to guard against passage of smoke or flame.

- B. Smoke Seals: Provide UL-listed and -tested smoke-seal perimeter gaskets.
- C. Weatherseals: Provide replaceable, adjustable, continuous, compressible weather-stripping gaskets fitted to bottom and at top of exterior doors, unless otherwise indicated. At door head, use 1/8-inch-thick, replaceable, continuous sheet secured to inside of curtain coil hood.
 - 1. Provide motor-operated doors with combination bottom weatherseal and sensor edge.
 - 2. In addition, provide replaceable, adjustable, continuous, flexible, 1/8-inch-thick seals of flexible vinyl, rubber, or neoprene at door jambs for a weathertight installation.
- D. Windows: Provide windows of 1/4-inch clear, transparent acrylic sheet, of size and in arrangement shown. Set glazing in vinyl, rubber or neoprene glazing channel secured to curtain slats.
- E. Slide Bolt: Fabricate with side locking bolts to engage through slots in tracks for locking by padlock, located on both left and right jamb sides, operable from coil side.
- F. Cylinder Locks: Provide cylinder locks capable of operating with cylinders specified in Section 08710. Provide construction cylinders.
- G. Chain Lock Keeper: Suitable for padlock.
- H. Where door unit is power operated, provide safety interlock switch to disengage power supply when door is locked.
- I. Provide automatic-closing device inoperative during normal operations, with governor unit complying with requirements of NFPA 80, with easily tested and reset release mechanism, and designed to be activated by the following:
 - 1. Governor: Oscillating type.
 - 2. Temperature rise and melting point of 165 deg F replaceable fusible links, interconnected and on both sides of wall of door opening.
 - 3. Building fire alarm and detection system and door-holder-release devices.

2.03 COUNTERBALANCING MECHANISM:

- A. General: Counterbalance doors by means of adjustable-tension steel helical torsion spring, mounted around a steel shaft and contained in a spring barrel connected to door curtain with required barrel rings. Use grease-sealed bearings or self-lubricating graphite bearings for rotating members.
- B. Counterbalance Barrel: Fabricate spring barrel of hot-formed, structural-quality, welded or seamless carbon-steel pipe, of sufficient diameter and wall thickness to support rolled-up curtain without distortion of slats and to limit barrel deflection to not more than 0.03 in./ft. of span under full load.
- C. Provide spring balance of one or more oil-tempered, heat-treated steel helical torsion springs. Size springs to counterbalance weight of curtain, with uniform adjustment accessible from outside barrel. Provide cast-steel barrel plugs to secure ends of springs to barrel and shaft.
- D. Fabricate torsion rod for counterbalance shaft of cold-rolled steel, sized to hold fixed spring ends and carry torsional load.
- E. Brackets: Provide mounting brackets of manufacturer's standard design, 1/4-inch minimum thickness, galvanized cold-rolled steel plate with bell-mouth guide groove for curtain.

2.04 FINISHES, GENERAL:

- A. General: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
- B. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in the same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

2.05 STEEL AND GALVANIZED STEEL FINISHES:

- A. Factory Primer for Field Finish: Apply manufacturer's standard primer, compatible with field-applied finish according to coating manufacturer's written instructions for cleaning, pretreatment, application, and minimum dry film thickness. Field applied finish specified in Section 09920.
- B. Thermoset Finish: Apply manufacturer's standard baked finish consisting of primer and thermosetting topcoat according to coating manufacturer's written instructions for cleaning, pretreatment, application, thermosetting, and minimum dry film thickness.
- C. Field Painting: Section 07900.

2.06 MANUAL DOOR OPERATORS:

- A. Provide manual operators, unless electric door operators are indicated. When not shown, provide chain-hoist operator unit.
- B. Chain-Hoist Operator: Provide manual chain-hoist operator consisting of endless steel hand chain, chain pocket wheel and guard, and gear-reduction unit with a maximum 35-lbf effort for door operation, equipped with weatherproof enclosure when mounted in exterior locations. Provide alloy steel hand chain with chain holder secured to operator guide.

2.07 ELECTRIC DOOR OPERATORS:

- A. General: Provide electric door operator assembly of size and capacity recommended and provided by door manufacturer for door and operational life specified, with electric motor and factory-prewired motor controls, starter, gear-reduction unit, solenoid-operated brake, clutch, remote-control stations, control devices, integral gearing for locking door, and accessories required for proper operation
- B. Comply with NFPA 70.
- C. Disconnect Device: Provide hand-operated disconnect or mechanism for automatically engaging sprocket-chain operator and releasing brake for emergency manual operation while disconnecting motor, without affecting timing of limit switch. Mount disconnect and operator so they are accessible from floor level. Include interlock device to automatically prevent motor from operating when emergency operator is engaged.
- D. Design operator so motor may be removed without disturbing limit-switch adjustment and without affecting emergency auxiliary operator.
- E. Provide control equipment complying with NEMA ICS 1, NEMA ICS 2, and NEMA ICS 6, with NFPA 70 Class 2 control circuit, maximum 24-V, ac.

- F. Door-Operator Type: Provide wall-, hood-, or bracket-mounted, jackshaft, gear-head hoist-type door operator unit consisting of electric motor, enclosed worm-gear running-in-oil primary drive, chain and sprocket secondary drive, and auxiliary chain-hoist for manual operation with interlock to prevent motor operation when chain is engaged; operable with maximum chain pulling force of 35-lbf and floor level disconnect.
- G. Electric Motors: Provide high-starting torque, reversible, continuous-duty, Class A insulated, electric motors, complying with NEMA MG 1, with overload protection, sized to start, accelerate, and operate door in either direction, from any position, at 2/3 fps, without exceeding nameplate ratings or considering service factor, from a push-button station, minimum 3/4 HP, 460-volt ac, three-phase.
 - 1. Geared limit switches and solenoid-operated brakes.
 - 2. Motor removable without affecting chain operation or limit-switch setting.
 - 3. Weatherproof enclosure for use when mounted in exterior locations.
 - 4. Electric control for motor-operated unit: 24-volt, ac.
 - 5. Coordinate wiring requirements and electric characteristics of motors with building electrical system
- H. Remote-Control Station: Provide momentary-contact, 3-button control station with push-button controls labeled "Open," "Close," and "Stop."
 - 1. Provide interior units, full-guarded, surface-mounted, heavy-duty type, with general-purpose NEMA ICS 6, Type 1 enclosure.
 - 2. Provide exterior units, full-guarded, standard-duty, surface-mounted, weatherproof type, NEMA ICS 6, Type 4 enclosure, key operated.
- I. Obstruction Detection Device: Provide each motorized door with indicated external automatic safety sensor able to protect full width of door opening. Activation of sensor immediately stops and reverses downward door travel.
 - 1. Photoelectric Sensor: Manufacturer's standard system designed to detect an obstruction in door opening without contact between door and obstruction.
 - a. Self-Monitoring Type: Provide self-monitoring sensor designed to interface with door operator control circuit to detect damage to or disconnection of sensing device. When self-monitoring feature is activated, door operates to close only with constant pressure on close button.
- J. Limit Switches: Provide adjustable switches, interlocked with motor controls and set to automatically stop door at fully opened and fully closed positions.

PART 3 - EXECUTION

3.01 PREPARATION:

- A. Verify dimensions before proceeding; obtain measurements at structure for work to be fitted to other construction, including wall-to-wall dimensions, floor-to-ceiling dimensions and those controlled by other trades.
- B. Remove foreign substances from surfaces receiving doors.

3.02 INSTALLATION:

- A. Coordinate work of this section with work of other trades.

- B. Install door and operating equipment complete with necessary hardware, jamb and head mold strips, anchors, inserts, hangers, and equipment supports according to approved Shop Drawings, manufacturer's written instructions, and as specified.
- C. Install fire-rated doors to comply with NFPA 80.

3.03 ADJUSTING:

- A. Lubricate bearings and sliding parts; adjust doors to operate easily, free from warp, twist, or distortion and fitting weathertight for entire perimeter.

3.04 DEMONSTRATION:

- A. Startup Services: Engage a factory-authorized service representative to perform startup services and to train Owner's maintenance personnel as specified below:
 - 1. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
 - a. Test door closing when activated by detector or alarm connected fire-release system. Reset door-closing mechanism after successful test.
 - 2. Train Owner's maintenance personnel on procedures and schedules related to startup and shutdown, troubleshooting, servicing, preventive maintenance, and procedures for testing and resetting release devices.
 - 3. Review data in the maintenance manuals.

3.05 CLEANING:

- A. Remove from site rubbish and debris caused by this work..
- B. Leave areas surrounding doors in broom-clean condition.

END OF SECTION

SECTION 08334

OVERHEAD COILING GRILLES

PART 1 - GENERAL

1.01 DESCRIPTION:

- A. This section specifies providing overhead coiling grilles.
- B. Related Work Specified Elsewhere:
 - 1. Lock cylinders: Section 08710.

1.02 PERFORMANCE REQUIREMENTS:

- A. Operation-Cycle Requirements: Design overhead coiling grille components and operator to operate for not less than 20,000 cycles.

1.03 SUBMITTALS:

- A. Submit the following for approval in accordance with the General Requirements and with the additional requirements as specified for each:
 - 1. Product Data: For each type and size of overhead coiling grille and accessory. Include details of construction relative to materials, dimensions of individual components, profiles, and finishes. Provide roughing-in diagrams, operating instructions, and maintenance information. Include the following:
 - a. Setting drawings, templates, and installation instructions for built-in or embedded anchor devices.
 - b. Summary of forces and loads on walls and jambs.
 - c. Motors: Show nameplate data and ratings; characteristics; mounting arrangements; size and location of winding termination lugs, conduit entry, and grounding lug; and coatings.
 - 2. Shop Drawings: For special components and installations not dimensioned or detailed in manufacturer's data sheets.
 - a. Wiring Diagrams: Detail wiring for power, signal, and control systems. Differentiate between manufacturer-installed and field-installed wiring and between components provided by grille manufacturer and those provided by others.
 - 3. Samples for Verification: Of each type of exposed finish required, prepared on Samples of size indicated below and of same thickness and material indicated for Work. Where finishes involve normal color and texture variations, include Sample sets showing the full range of variations expected.
 - a. Grille Curtain: 12 inches square.
 - b. Grille Curtain with Glazed Panels: Not less than 12 inches square, with full-size panels.
 - c. Bottom Bar: 6-inch length
 - d. Guides: 6-inch length
 - e. Brackets: 6 inches square.
 - f. Hood: 6 inches square.
 - 4. Certification.

1.04 QUALITY ASSURANCE:

- A. Reference Codes and Specifications:
 - 1. Comply with codes and regulations of the jurisdictional authorities.

2. NFPA 70.
 3. NAAMM.
 4. ASTM: A666.
 5. NEMA.
 6. ADA.
- B. Installer Qualifications: Engage an experienced installer who is an authorized representative of the overhead coiling grille manufacturer for both installation and maintenance of units required for this Project.
- C. Source Limitations: Obtain overhead coiling grilles through one source from a single manufacturer.
1. Obtain operators and controls from the overhead coiling grille manufacturer.

1.05 PRODUCT DELIVERY, STORAGE, AND HANDLING:

- A. Deliver products to the jobsite in original unopened containers clearly labeled with manufacturer's name and brand designation, referenced specification number, type and class as applicable.
- B. Store products in an approved area, protect from contact with soil and from exposure to the elements. Keep products dry.
- C. Handle products so as to prevent breakage of containers and damage to products.

PART 2 - PRODUCTS

2.01 GRILLE CURTAIN MATERIALS AND CONSTRUCTION:

- A. General: Fabricate overhead coiling grille curtain consisting of a network of 5/16-inch minimum diameter horizontal rods, or rods covered with tube spacers, spaced as indicated. Interconnect rods by vertical links approximately 5/8 inch wide, spaced as indicated and rotating on rods.
1. Space rods at approximately 2 inches o.c.
 2. Space links in line at approximately 9 inches apart.
 3. Stainless-Steel Grilles: ASTM A 666, Type 300 series.
- B. Endlocks: Continuous end links, chains, or other devices at ends of rods, locking and retaining grille curtain in guides against excessive pressures, maintaining curtain alignment, and preventing lateral movement.
- C. Bottom Bar: Manufacturer's standard continuous channel, tubular shape, or 2 angles, finished to match grille.
1. Astragal: Provide a replaceable, adjustable, continuous, compressible gasket of flexible vinyl, rubber, or neoprene, between angles or fitted to shape, as a cushion bumper for interior grille.
 2. Provide motor-operated grilles with combination bottom astragal and sensor edge.
- D. Curtain Jamb Guides: Manufacturer's standard extruded-aluminum shape having curtain groove with return lips or bars to retain curtain. Provide continuous integral wear strips to prevent metal-to-metal contact and minimize noise of travel. Provide removable stops on guides to prevent overtravel of curtain.

2.02 HOODS AND ACCESSORIES:

- A. Hood: Form to entirely enclose coiled curtain and operating mechanism at opening head. Contour to suit end brackets to which hood is attached. Roll and reinforce top and bottom edges for stiffness. Provide closed ends for surface-mounted hoods and fascia for any portion of between-jamb mounting projecting beyond wall face. Provide intermediate support brackets as required to prevent sag.
 - 1. Fabricate hoods of stainless-steel sheet, complying with ASTM A 666, Type 300 series, and not less than 0.025-inch thick, for stainless-steel grilles..
 - 2. Provide removable metal soffit when hood is mounted above ceiling of same material and finish of curtain, unless otherwise indicated.
- B. Fabricate locking device assembly with lock, spring-loaded dead bolt, operating handle, cam plate, and adjustable locking bar to engage through slots in tracks.
 - 1. Locking Bars: Single-jamb side, operable from inside only.
 - 2. Lock cylinder is specified in another Section 08710.
- C. Chain Lock Keeper: Suitable for padlock.
- D. Where grille unit is power operated, provide safety interlock switch to disengage power supply when grille is locked.

2.02 COUNTERBALANCING MECHANISM:

- A. General: Counterbalance grille by means of adjustable-tension steel helical torsion spring, mounted around a steel shaft and contained in a spring barrel connected to the curtain. Use grease-sealed bearings or self-lubricating graphite bearings for rotating members.
- B. Counterbalance Barrel: Fabricate spring barrel of hot-formed, structural-quality, welded or seamless carbon-steel pipe, of sufficient diameter and wall thickness to support rolled-up curtain without distortion of curtain and to limit barrel deflection to not more than 0.03 in./ft. of span under full load.
- C. Provide spring balance of one or more oil-tempered, heat-treated steel helical torsion springs. Size springs to counterbalance weight of curtain, with uniform adjustment accessible from outside barrel. Provide cast-steel barrel plugs to secure ends of springs to barrel and shaft.
- D. Fabricate torsion rod for counterbalance shaft of case-hardened steel, sized to hold fixed spring ends and carry torsional load.
- E. Brackets: Provide mounting brackets of manufacturer's standard design, either cast-iron or cold-rolled steel plate.

2.03 FINISHES, GENERAL:

- A. General: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
- B. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in the same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast. Revise Article title below if galvanized surfaces are not finish painted. Always retain priming of bare steel.

2.04 STAINLESS-STEEL FINISHES:

- A. General: Remove or blend tool and die marks and stretch lines into finish.
 - 1. Grind and polish surfaces to produce uniform, directional textured, polished finish indicated, free of cross scratches. Run grain with long dimension of each piece.
- B. No. 4 Finish.
- C. When polishing is completed, passivate and rinse surfaces. Remove embedded foreign matter and leave surfaces chemically clean.

2.05 ELECTRIC GRILLE OPERATORS:

- A. General: Provide electric grille operator assembly of size and capacity recommended and provided by grille manufacturer for grille and operational life specified, with electric motor and factory-prewired motor controls, starter, gear-reduction unit, solenoid-operated brake, clutch, remote-control stations, control devices, integral gearing for locking grille, and accessories required for proper operation.
- B. Comply with NFPA 70.
- C. Disconnect Device: Provide hand-operated disconnect or mechanism for automatically engaging sprocket-chain operator and releasing brake for emergency manual operation while disconnecting motor, without affecting timing of limit switch. Mount disconnect and operator so they are accessible from floor level. Include interlock device to automatically prevent motor from operating when emergency operator is engaged.
- D. Design operator so motor may be removed without disturbing limit-switch adjustment and without affecting emergency auxiliary operator.
- E. Provide control equipment complying with NEMA ICS 1, NEMA ICS 2, and NEMA ICS 6, with NFPA 70 Class 2 control circuit, maximum 24-V, ac or dc.
- F. Grille-Operator Type: Provide wall-, hood-, or bracket-mounted, jackshaft, gear-head hoist-type grille operator unit consisting of electric motor, enclosed worm-gear running-in-oil primary drive, chain and sprocket secondary drive, and auxiliary chain hoist and floor level disconnect.
- G. Electric Motors: Provide high-starting torque, reversible, continuous-duty, Class A insulated, electric motors, complying with NEMA MG 1, with overload protection, sized to start, accelerate, and operate grille in either direction, from any position, at not less than 2/3 fps and not more than 1 fps, without exceeding nameplate ratings or considering service factor.
 - 1. Type: single phase.
 - 2. Service Factor: According to NEMA MG 1, unless otherwise indicated.
 - 3. Coordinate wiring requirements and electric characteristics of motors with building electrical system.
 - 4. Provide open dripproof-type motor, and controller with NEMA ICS 6, Type 1 enclosure.
- H. Remote-Control Station: Provide momentary-contact, 3-button control station with push-button controls labeled "Open," "Close," and "Stop."
 - 1. Provide exterior units, full-guarded, standard-duty, surface-mounted, weatherproof type, NEMA ICS 6, Type 4 enclosure, key operated.
- I. Obstruction Detection Device: Provide each motorized grille with indicated external automatic safety sensor able to protect full width of grille opening. Activation of sensor immediately stops and reverses downward grille travel.

1. Sensor Edge: Provide each motorized grille with an automatic safety sensor edge, located within astragal or weather stripping mounted to bottom bar. Contact with sensor immediately stops and reverses downward grille travel. Connect to control circuit using manufacturer's standard take-up reel or self-coiling cable.
 - a. Provide pneumatically actuated automatic bottom bar.
- J. Limit Switches: Provide adjustable switches, interlocked with motor controls and set to automatically stop grille at fully opened and fully closed positions.
- K. Provide electric operators with ADA-compliant audible alarm and visual indicator lights.
- L. Emergency Egress Release: Provide grille with flush, wall-mounted handle mechanism, for ADA-compliant egress feature, not dependent on electric power, that allows grille to open to permit passage and automatically resets motor drive, without affecting limit switches, with return of handle to original position.

PART 3 - EXECUTION

3.01 INSTALLATION:

- A. General: Install grilles and operating equipment complete with necessary hardware, according to Shop Drawings, manufacturer's written instructions, and as specified.

3.02 ADJUSTING:

- A. Lubricate bearings and sliding parts; adjust grilles to operate easily, free from warp, twist, or distortion and fitting tight for entire perimeter.

3.03 DEMONSTRATION:

- A. Startup Services: Engage a factory-authorized service representative to perform startup services and to train Owner's maintenance personnel as specified below.
 1. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
 2. Train Authority's personnel on procedures and schedules related to startup and shutdown, troubleshooting, servicing, preventive maintenance, and procedures for testing and resetting release devices.
 3. Review data in the approved maintenance manuals.

END OF SECTION

SECTION 08410

ALUMINUM ENTRANCES AND STOREFRONTS

PART 1 -GENERAL

1.01 SUMMARY:

- A. This Section specifies provision of exterior aluminum entrances and storefronts including doors, hardware, weatherstripping, and framing members.
- B. Related Work Specified Elsewhere:
 - 1. Section 08800: Glass and Glazing.
 - 2. Section 08710: Finish Hardware.

1.02 QUALITY ASSURANCE:

- A. Installer Qualifications: Engage an experienced installer to assume engineering responsibility and perform work of this Section who has specialized in installing entrances similar to those required for this Project and who is acceptable to manufacturer.

1.03 DESCRIPTION:

- A. General: Provide aluminum entrances and storefronts capable of withstanding loads and thermal and structural movement requirements indicated without failure. Failure includes the following:
 - 1. Air infiltration and water penetration exceeding specified limits.
 - 2. Framing members transferring stresses, including those caused by thermal and structural movement, to glazing units.
- B. Glazing: Physically and thermally isolate glazing from framing members.
- C. Thermally Broken Construction: Provide aluminum entrances and storefronts that isolate aluminum exposed to exterior from aluminum exposed to interior with a material of low thermal conductance.
- D. Wind Loads: Provide aluminum entrances and storefronts, including anchorage, capable of withstanding wind-load design pressures calculated according to requirements of authorities having jurisdiction or the American Society of Civil Engineers' ASCE 7, "Minimum Design Loads for Buildings and Other Structures," 6.4.2, "Analytical Procedure," whichever are more stringent.
 - 1. Deflection of framing members in a direction normal to wall plane is limited to 1/175 of clear span or 3/4 inch whichever is smaller, unless otherwise indicated.
 - 2. Static-Pressure Test Performance: Provide aluminum entrances and storefronts that do not evidence material failures, structural distress, failure of operating components to function normally, or permanent deformation of main framing members exceeding 0.2 percent of clear span when tested according to ASTM E 330.
 - a. Pressure: 150 percent of inward and outward wind-load design pressures.
 - b. Duration: As required by design wind velocity; fastest 1 mile of wind for relevant exposure category.
- E. Dead Loads: Provide entrance-members that do not deflect an amount which will reduce glazing bite below 75 percent of design dimension when carrying full dead load.

1. Provide a minimum 1/8-inch clearance between members and top of glazing or other fixed part immediately below.
- F. Air Infiltration: Provide aluminum entrances and storefronts with permanent resistance to air leakage through fixed glazing and frame areas of not more than 0.06 cfm/sq. ft. of fixed wall area when tested according to ASTM E 283 at a static-air-pressure difference of 1.57 lbf/sq. ft
- G. Water Penetration: Provide aluminum entrances and storefronts that do not evidence water leakage through fixed glazing and frame areas when tested according to ASTM E331 at minimum differential pressure of 20 percent of inward-acting wind-load design pressure as defined by ASCE 7, "Minimum Design Loads for Buildings and Other Structures," but not less than 6.24 lbf/sq. ft. Water leakage is defined as follows:
1. Uncontrolled water infiltrating aluminum entrances and storefronts or appearing on normally exposed interior surfaces from sources other than condensation. Water controlled by flashing and gutters that is drained back to the exterior and cannot damage adjacent materials or finishes is not water leakage.
- H. Thermal Movements: Provide aluminum entrances and storefronts, including anchorage, that accommodate thermal movements of aluminum entrances and storefronts and supporting elements resulting from the following maximum change (range) in ambient and surface temperatures without buckling, damaging stresses on glazing, failure of joint sealants, damaging loads on fasteners, failure of doors or other operating units to function properly, and other detrimental effects.
1. Temperature Change (Range): 120 deg F, ambient; 180 deg F, material surfaces.
- I. Structural-Support Movement: Provide aluminum entrances and storefronts that accommodate structural movements including, but not limited to, sway and deflection.
- J. Condensation Resistance: Provide aluminum entrances and storefronts with condensation resistance factor (CRF) of not less than 45 when tested according to AAMA 1503.1.
- K. Dimensional Tolerances: Provide aluminum entrances and storefronts that accommodate dimensional tolerances of building frame and other adjacent construction.

1.04 SUBMITTALS:

Submit the following in accordance with requirements elsewhere in this Contract and with the additional requirements as specified for each:

- A. Product Data: For each product specified. Include details of construction relative to materials, dimensions of individual components, profiles, and finishes.
- B. Shop Drawings: For aluminum entrances and storefronts show details of fabrication and installation, including plans, elevations, sections, details of components, glazing provisions for expansion and contraction, and attachments to other work.
 1. For aluminum entrances and storefronts, include hardware schedule and indicate operating hardware types, quantities, and location
- C. Samples for Initial Selection: Manufacturer's color charts showing the full range of colors available for factory-applied color finishes.
- D. Samples for Verification: Of each type of exposed finish required. Where finishes involve normal color and texture variations, include Sample sets showing the full range of variations expected.

- E. Cutaway Sample: Of vertical-to-horizontal framing intersection, made from minimum 6-inch lengths of full-size components and showing details of the following:
 - 1. Joinery.
 - 2. Anchorage.
 - 3. Expansion provisions.
 - 4. Glazing.
 - 5. Flashing and drainage.

1.05 WARRANTY:

- A. Warranty Period: 1 year in addition to the warranty requirements specified elsewhere in this Contract, for a total of 2 years from date of Substantial Completion.
 - 1. Failures include, but are not limited to, the following:
 - 2. Failure of aluminum entrances and storefronts to meet performance requirements.
 - 3. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
 - 4. Failure of operating components to function normally.
 - 5. Water leakage through fixed glazing and frame areas.

PART 2 - PRODUCTS

2.01 MATERIALS:

- A. Aluminum: Alloy and temper recommended by manufacturer for type of use and finish indicated, complying with the requirements of standards indicated below.
 - 1. Sheet and Plate: ASTM B 209.
 - 2. Extruded Bars, Rods, Shapes, and Tubes: ASTM B 221.
 - 3. Extruded Structural Pipe and Tubes: ASTM B 429.
 - 4. Bars, Rods, and Wire: ASTM B 211.
 - 5. Aluminum Finish: Dark bronze integral color anodized Class 1 finish, NAAMM AA-M12C22A44.
 - a. Provide all material, free of scratches and surfaces blemishes.
- B. Glazing as specified in Section 08800.
- C. Glazing Gaskets: Manufacturer's standard pressure-glazing system of black, resilient glazing gaskets, setting blocks, and shims or spacers, fabricated from an elastomer of type and in hardness recommended by system and gasket manufacturer to comply with system performance requirements. Provide gasket assemblies that have corners sealed with sealant recommended by gasket manufacturer. Insert specific gasket-material requirements, if any.
- D. Bituminous Paint: Cold-applied asphalt-mastic paint complying with SSPC-Paint 12 requirements, except containing no asbestos, formulated for 30-mil thickness per coat.
- E. Sill Mastic: Butyl: Polymerized butyl rubber and inert fillers (pigments), solvent-based with minimum 75-percent solids, non-sag consistency, tack-free time of 24 hours or less, paintable, non-staining, and complying with FS TT-S-001657.

2.02 COMPONENTS:

- A. Doors: Provide manufacturer's standard 1-3/4-inch thick glazed doors with minimum 0.125-inch-thick, extruded tubular rail and stile members as approved. Mechanically fasten corners with reinforcing brackets that are deep penetration and fillet welded or that incorporate concealed tie-rods.

1. Glazing Stops and Gaskets: Provide manufacturer's standard snap-on extruded-aluminum glazing stops and preformed gaskets, as approved.
 2. Stile Design: As shown.
- B. Brackets and Reinforcements: Provide manufacturer's standard brackets and reinforcements that are compatible with adjacent materials, as approved. Provide nonstaining, nonferrous shims for aligning components as approved.
- C. Fasteners and Accessories: Manufacturer's standard corrosion-resistant, nonstaining, nonbleeding fasteners and accessories compatible with adjacent materials, as approved.
1. Reinforce members as required to retain fastener threads.
 2. Do not use exposed fasteners, except for hardware application. For hardware application, use countersunk Phillips flat-head machine screws finished to match framing members or hardware being fastened, unless otherwise indicated.
- D. Concealed Flashing: Manufacturer's standard corrosion-resistant, nonstaining, nonbleeding flashing, compatible with adjacent materials, and of type approved.
- E. Weather Stripping: ANSI/BHMA A156.22, Finish 628 (satin aluminum clear anodized) with stainless steel sheet-metal screws and as follows:
1. Head and jamb: Head and jamb type, stop-applied; National Guard A626 or equal. Provide nylon brush gasketing or equal.
 2. Sill: Drip strip at sill; National Guard 15 or equal.
 3. Sweep: Door sweep type, surface mounted at bottom of door; National Guard D608 nylon brush gasketing or equal. Provide sweep on side opposite to drip strip where scheduled.

2.03 FINISH HARDWARE:

- A. General: Provide heavy-duty hardware units indicated in sizes, number, and type recommended by manufacturer for entrances indicated as specified in Section 08710, and as approved. Finish exposed parts to match door finish, unless otherwise indicated.
- B. Offset Pivots where approved: ANSI/BHMA A156.4, Grade 1 with exposed parts of cast-aluminum alloy. Provide top, bottom, and intermediate pivots at each door leaf.
- C. Ball-Bearing Butts: ANSI/BHMA A156.1, Grade 1, 5-knuckle, ball-bearing butts. Provide nonremovable pins at hinges exposed to door outside and provide full-mortise Type 1 slip-in nonferrous hinges for applications exposed to weather. Provide 3 hinges at each leaf for doors up to 36 inches wide and 80 inches tall; provide 4 hinges at each leaf for taller doors.
- D. Closers, General: Comply with manufacturer's recommendations for closer size, depending on door size, exposure to weather, and anticipated frequency of use.
1. Closing Cycle: Comply with requirements of authorities having jurisdiction or the Americans with Disabilities Act (ADA), "Accessibility Guidelines for Buildings and Facilities (ADAAG)," whichever are more stringent.
 2. Opening Force: Comply with the following maximum opening-force requirements for locations indicated:
 - a. Exterior Doors: 15 lbf.
 3. Surface Mounted Overhead Closers: ANSI/BHMA 156.4, Grade 1, provide cover and the following:
 - a. Mounting: parallel arm, interior locations (room side of door unless otherwise specified).
 - b. Cushion stop: Adjustable at angle directed by the Engineer from manufacturer's standard options.

4. Door Stops: ANSI/BHMA A156.16, Grade 1, floor- or wall-mounted door stop, as appropriate for door location indicated, with integral rubber bumper. Retain appropriate cylinder requirements below.
- E. Cylinders and Keying for Yard Buildings: Match the Authority's existing keying and interchangeable core system as follows and at no additional cost to the Authority.
1. Cylinders: Finish 630.
 - a. For locksets: ANSI/BHMA A156.5, interchangeable-core type, designed to accept the Authority's existing Russwin Recore System. One core furnished for each lock, stamped with visual key control.
 - b. High security: Interlocking-pin type, Emhart High-Security Locking System or equal
 2. Construction cores: Provide construction cylinders until final cylinders and keying is approved and installed.
 3. Keys and keying:
 - a. Keys: Stamped with the inscription TRANSIT AUTHORITY - DO NOT DUPLICATE and with visual key-control data.
 - b. Quantity: Three keys for each core plus blanks equal to 10-percent of total keys furnished.
 4. Key tags and holders: ANSI/BHMA A156.5, inscribed with key-change number and key-control symbol.
 5. Cylinder Guard: Manufacturer's standard hardened-steel security ring with retainer plate for inside stile wall that protects lock cylinder from removal by wrenches, prying, or sawing.
- F. Deadlatch Locks: Manufacturer's standard mortise deadlatch with minimum 1/2-inch-12.7-mm- long latch bolt and auxiliary bolt located below latch bolt and complying with ANSI/BHMA A156.5, Grade 1 requirements.
1. Lever Handles: Manufacturer's standard cast-aluminum-alloy, inside-lever, deadlatch operating unit.
 2. Latch Paddle Devices: Manufacturer's standard extruded-aluminum deadlatch operating paddle.
 - a. Provide units for push applications.
 - b. Provide units for push and pull applications. Hook-bolt locks are recommended for pairs of doors, since they provide additional resistance to prying.
 3. Lockset Faceplates: Manufacturer's standard extruded-aluminum faceplate for lock type indicated that lays flush with door stile.
 - a. Provide radiused faceplate with weather sweep extending full length of lock at meeting stiles of pairs of doors.
 4. Flat Face Strikes: Manufacturer's standard stainless-steel, flat face strike with steel mounting plate and black-plastic dustbox.
 5. Retain one flush-bolt requirement below if required for inactive leaf of pairs of doors. Model codes prohibit manual flush bolts on means of egress doorways. If exit devices are not required, consider specifying 2- or 3-point locking systems listed above or inserting requirements for automatic flush bolts that comply with requirements of authorities having jurisdiction.
 6. Manual Flush Bolts: ANSI/BHMA A156.16, edge-mortised, lever-extension-type flush bolts.
 - a. Locate flush bolts at bottom of inactive leaf of pairs of doors.
 - b. Locate flush bolts at top and bottom of inactive leaf of pairs of doors.
- G. Pull Handles: Aluminum pull handles as indicated on Drawings.
- H. Push Bars: Aluminum push bars as indicated on Drawings.

- I. Thresholds: At exterior doors, provide manufacturer's standard threshold with cutouts coordinated for operating hardware, with anchors and jamb clips, and not more than 5/16-inch, with beveled edges providing a floor level change with a slope of not more than 1:2, and in the following material:
 - 1. Material: Aluminum, mill finish.
- J. Weatherstripping: ANSI/BHMA A156.22, Finish 628 (satin aluminum clear anodized) with stainless steel sheet-metal screws and as follows:
 - 1. Head and jamb: Head and jamb type, stop-applied; National Guard A626 or equal or compression type gasketing as approved.
 - 2. Sill: Drip strip at sill; National Guard 15 or equal.
 - 3. Sweep: Door sweep type, surface mounted at bottom of door; National Guard D608 nylon brush gasketing or equal. Provide sweep on side opposite to drip strip where scheduled.
- K. Special Security Alarmed Exit Device for Parking Structures: To sound alarm at unauthorized entry or exit at locations indicated and as required and approved.

2.04 FABRICATION:

- A. General: Fabricate components that, when assembled, will have accurately fitted joints with ends coped or mitered to produce hairline joints free of burrs and distortion. After fabrication, clearly mark components to identify their locations in Project according to Shop Drawings.
- B. Forming: Form shapes with sharp profiles, straight and free of defects or deformations, before finishing.
- C. Prepare components to receive concealed fasteners and anchor and connection devices.
- D. Fabricate components to drain water passing joints and condensation and moisture occurring or migrating within the aluminum entrances and storefronts to the exterior.
- E. Welding: Weld components to comply with referenced AWS standard. Weld before finishing components to greatest extent possible. Weld in concealed locations to greatest extent possible to minimize distortion or discoloration of finish. Remove weld spatter and welding oxides from exposed surfaces by descaling or grinding.
- F. Glazing Channels: Provide minimum clearances for thickness and type of glass indicated according to FGMA's "Glazing Manual."
- G. Metal Protection: Where aluminum will contact dissimilar metals, protect against galvanic action by painting contact surfaces with primer or by applying sealant or tape recommended by manufacturer for this purpose.
- H. Entrances: Fabricate door framing in profiles indicated. Reinforce as required to support imposed loads. Factory assemble door and frame units and factory install hardware to greatest extent possible. Reinforce door and frame units as required for installing hardware indicated. Cut, drill, and tap for factory-installed hardware before finishing components.
 - 1. Exterior Doors: Provide nylon brush gasketing or compression weather stripping where indicated as approved.

PART 3 - EXECUTION

3.01 EXAMINATION:

- A. Examine areas, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of aluminum entrances and storefronts. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.02 INSTALLATION:

- A. General: Protect and handle aluminum entrances and storefronts components to prevent damage; do not install damaged components. Fit frame joints to produce hairline joints free of burrs and distortion. Rigidly secure nonmovement joints. Seal joints watertight.
- B. Metal Protection: Where aluminum will contact dissimilar metals, protect against galvanic action by painting contact surfaces with primer or by applying sealant or tape recommended by manufacturer for this purpose.
- C. Install components to drain water passing joints and condensation and moisture occurring or migrating within the aluminum entrances and storefronts to the exterior.
- D. Set continuous sill members and flashing in a full sealant bed to provide weathertight construction, unless otherwise indicated. Comply with requirements as specified in Section 07900.
- E. Install framing components plumb and true in alignment with established lines and grades without warp or rack of framing members.
- F. Install entrances plumb and true in alignment with established lines and grades without warp or rack. Lubricate operating hardware and other moving parts according to hardware manufacturers' written instructions.
 - 1. Install surface-mounted hardware in accordance with Section 08710 and according to manufacturer's written instructions using concealed fasteners to greatest extent possible.
- G. Install glazing to comply with requirements of Section 08800, unless otherwise indicated. Delete subparagraphs below if no structural-sealant-glazed systems.
- H. Install perimeter sealant to comply with manufacturer's requirements and Section 08800, unless otherwise indicated.
- I. Erection Tolerances: Install entrance and storefront aluminum entrances and storefronts to comply with the following maximum tolerances:
 - 1. Variation from Plane: Limit variation from plane or location shown to 1/8 inch in 12 feet 1/4 inch over total length.
 - 2. Alignment: Where surfaces abut in line, limit offset from true alignment to 1/16 inch. Where surfaces meet at corners, limit offset from true alignment to 1/32 inch.
 - 3. Diagonal Measurements: Limit difference between diagonal measurements to 1/8 inch.

3.03 FIELD QUALITY CONTROL:

- A. Water Spray Test: After completing the installation of test areas indicated, test aluminum entrances and storefronts for water penetration according to AAMA 501.2 requirements.
- B. Repair or remove and replace Work as directed by the Engineer that does not meet requirements or that is damaged by testing; replace to conform to specified requirements.

3.04 ADJUSTING:

- A. Adjust doors and hardware to provide tight fit at contact points and weather stripping, smooth operation, and weathertight closure.

3.05 PROTECTION:

- A. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and Installer, that ensure aluminum entrances and storefronts are without damage or deterioration at the time of Substantial Completion.

END OF SECTION

SECTION 08481

METAL CONCAVE MANDOORS

PART 1 - GENERAL

1.01 DESCRIPTION:

- A. This section specifies providing and installing metal concave mandoors, frames and hardware.
- B. Related Work Specified Elsewhere:
 - 1. Mortar, Grout and Masonry Accessories: Section 04050.
 - 2. Metal Doors and Frames: Section 08110.
 - 3. Finish Hardware: Section 08710.

1.02 SUBMITTALS:

- A. Submit the following for approval in accordance with the General Requirements and with additional requirements as specified for each:
 - 1. Shop-Drawings:
 - a. Details of construction, connections, anchors schedules, setting diagrams and interface with work of other trades.
 - 2. Certifications.

1.03 QUALITY ASSURANCE:

- A. Codes, Regulations, Reference Standards and Specifications.
 - 1. Codes and regulations of the jurisdictional authorities.
 - 2. ASTM: A36, A90, A366.
 - 3. UL: Building Materials Directory.
 - 4. NFPA: 80.
- B. Loading: Positive and Negative Air Pressure; 10 psi.
- C. Manufacturer and installer must have experience in the manufacturing and successful installations of high static pressure doors and frames.
- D. Fire-Rated Assemblies: Where UL-listing, UL-label or UL Building Materials Directory is specified, another testing and inspection agency acceptable to the Engineer and to authorities having jurisdiction may be used.

1.04 PRODUCT DELIVERY, STORAGE AND HANDLING:

- A. Deliver products to the job site in original unopened containers or wrappings clearly labeled with manufacturer's name and brand designation, door schedule number, referenced specification number, type, class and rating as applicable.
- B. Store products in an approved dry area, protect from contact with soil and from exposure to the elements.
- C. Handle products so as to prevent damage to products.

PART 2 - PRODUCTS

2.01 MATERIALS:

- A. Door Frames:
 - 1. Basic Materials: ASTM A36 structural steel for frames.
 - 2. Hardware Reinforcement: Steel
 - a. Torsion spring closing assembly constructed of stainless steel 2-5/8" inside diameter by 0.235" thickness by 6". Aluminum alloy spring fitting shall provide for adjustment of the spring to ensure proper door closing at all times.
 - b. Upper and lower door supports constructed of 1/4" mild steel plate, 1" stainless steel shafts and heavy-duty self aligning flange bearings.
 - 3. Door Stops: 1/8 inch minimum thickness steel stops. Stops shall be provided on both sides of door.
 - 4. Finish: Hot dipped galvanized coating unless indicated otherwise.
- B. Doors:
 - 1. Door panel: Constructed of 1/8" mild roll-formed steel sheet, ASTM A366. Upper and lower panel supports constructed of 1/4" mild steel plate and are to be secured to the door panel by a continuous weld.
 - 2. Door Frame: Constructed of structural steel ASTM A36 with 1" x 1" x 1/8" welded angles to control maximum door travel.
 - 3. Push/pull handle: 3/8 inch minimum thickness. Handle allows ease of rotating door to facilitate access.
 - 4. Bearings: The door shall be equipped with sealed support bearing at both the top and bottom of the door.
 - 5. All components of doors shall be hot dipped galvanized.
- C. Clips, Anchors, Bolts, Screws and Rivets: Hot dipped galvanized Steel types standard with manufacturer.
- D. Concave Mandoor Locking Mechanism:
 - 1. Locking mechanism, shall be Adams Rite Latch paddle device 4590. Paddle shall be extruded aluminum (satin anodized). Escutcheon to be zinc alloy (black) to house steel operating mechanism. Dead latch shall be Adams Rite 4722. Case shall be steel, plated for corrosion, resistance, and aluminum faceplate shall be satin anodized. Latch bolt shall be all metal construction with hardened steel pin. Mortise cylinder cam to be provided. See Section 802 for lock cylinder. Provide temporary lock cylinders.

2.02 FABRICATION:

- A. Frame:
 - 1. Formed to be installed into walls and locations shown.
 - 2. Welded for installation into wall of sheet steel construction.
 - 3. Corners and connections continuously welded with exposed welds ground flush and smooth.
 - 4. Reinforcement continuously welded in place as necessary for hardware application. Provide cutouts for hardware.
- B. Door:
 - 1. Hardware reinforcement continuously welded in place to support hardware application.

2.03 HOT DIPPED GALVANIZED:

- A. Galvanizing (zinc coating by hot dip process): ASTM A90 or similar galvanizing process.
- B. Galvanizing repair compound: Stick form, melting point 600F to 650F, GALVABAR or equal.

2.04 FINISH HARDWARE COORDINATION:

- A. The metal door and frame shall be prepared at factory for application of finish hardware at job site. Obtain templates from finish hardware manufacturer to ensure accurate preparation of doors and frames in accordance with hardware specified.

PART 3 - EXECUTION

3.01 INSTALLATION:

- A. Deliver work , ready to set up and erect in place as rapidly as general construction work permits. Set work in place in accordance with approved shop drawings, plumb and level, strongly secured against displacement and with built-in anchors. Limit field-cutting, drilling and punching to minimum necessary
- B. Anchor metal frames to slab with angle clips and minimum of two expansion bolts in each clip.
- C. Provide four adjustable anchors on each jamb. See Section 04050 for grouting of door frame.
- D. Install doors after hardware installation; accurately fit and adjust to work properly.
- E. Seal open joints at bottom of door frames, and between door frames and adjoining concrete.
- F. Install fire-rated door assemblies in accordance with NFPA 80.
- G. Upon completion of installations clean surfaces of doors and frame as recommended by door manufacturer.
 - 1. Remove from the site rubbish and debris caused by this work.
 - 2. Leave areas surrounding openings in broom-clean condition.

END OF SECTION

SECTION 08520

ALUMINUM WINDOWS

PART 1 - GENERAL

1.01 DESCRIPTION:

- A. This section specifies providing extruded aluminum windows with fixed and operating sash.
- B. Related Work Specified Elsewhere:
 - 1. Seals and Sealants: Section 07900.
 - 2. Glass and Glazing: Section 08800.
 - 3. Aluminum Entrances and Storefronts: Section 08410.

1.02 QUALITY ASSURANCE:

- A. Codes, Regulations, Reference Standards and Specifications:
 - 1. Codes and regulations of the jurisdictional authorities.
 - 2. AAMA: 608.1, 101.
 - 3. ASTM: A123, B221.
 - 4. FS: RR-W-365.
 - 5. SSPC: 20.

1.03 SUBMITTALS:

- A. Shop Drawings:
 - 1. Product Data: Provide component dimensions, anchorage and fasteners, glass, internal drainage details.
 - 2. Shop Drawings: Indicate opening dimensions, framed opening tolerances, affected related work; installation requirements
 - 3. Submit two samples 12 x 12 inches in size illustrating window frame section, mullion section screen and frame, factory finished aluminum surfaces, glass units and glazing materials.
 - 4. Submit two samples of operating hardware.

1.04 DELIVERY, STORAGE, AND PROTECTION:

- A. Transport, handle, store, and protect products.
- B. Handle work of this section in accordance with AAMA - Curtain Wall Manual #10.
- C. Protect factory finished aluminum surfaces with wrapping strippable coating. Do not use adhesive papers or sprayed coatings that bond when exposed to sunlight or weather.

PART - PRODUCTS

2.01 MATERIALS:

- A. Extruded Aluminum: ASTM B221, 6063 alloy, T5 temper.
- B. Steel Sections: Profiled to suit mullion sections.
- C. Fasteners: Stainless steel.

2.02 COMPONENTS:

- A. Frames: thermally broken with interior portion of frame insulated from exterior portion flush glass stops of snap-on type
- B. Reinforced Mullion: extruded aluminum with integral reinforcement of shaped steel structural section.
- C. Sills: extruded aluminum; sloped for positive wash: one piece full width of opening.
- D. Insect Screen Frame: Rolled aluminum steel frame of rectangular sections; fit with adjustable hardware; nominal size similar to operable glazed unit.
- E. Insect Screens: FS RR-W-365, woven aluminum mesh 14/18 mesh size.
- F. Operable Sash Weather Stripping: Wool pile permanently resilient, profiled to effect weather seal.
- G. Fasteners: Stainless steel.
- H. Window Washing Anchors: Stainless steel.
- I. Insulated Metal Infill Panels: Section 08410.

2.03 GLASS AND GLAZING MATERIALS:

- A. Glass and Glazing Materials: Insulating glass units as specified in Section 08800.

2.04 SEALANT MATERIALS:

- A. Sealant and Backing Materials: Section 07900.

2.05 HARDWARE:

- A. Operator: Lever action handle fitted to projecting sash arms with limit stops.
- B. Projecting Sash Arms: Cadmium Zinc plated steel, friction pivot joints with nylon bearings, removable pivot clips for cleaning.
- C. Sash lock: Lever handle with cam lock.

2.06 FABRICATION:

- A. Fabricate components with minimum clearances and shim spacing around perimeter of assembly, yet enabling installation and dynamic movement of perimeter seal.
- B. Accurately fit and secure joints and corners. Make joints flush, hairline, and weatherproof.
- C. Prepare components to receive anchor devices. Fabricate anchors.
- D. Arrange fasteners and attachments to ensure concealment from view.
- E. Prepare components with internal reinforcement for operating hardware.
- F. Provide internal reinforcement in mullions with galvanized steel members to maintain rigidity.

- G. Permit internal drainage weep holes and channels to migrate moisture to exterior. Provide internal drainage of glazing spaces to exterior through weep holes.
- H. Assemble insect screen frame, miter and reinforced frame corners. Fit mesh taut into frame and secure. Fit frame with retainers.
- I. Double weatherstrip operable units.

2.07 FINISHES:

- A. Finish Coatings: Conform to AAMA 608.1.
- B. Exposed Aluminum Surfaces: AA A44 anodized to Dark Bronze color.
- C. Operator and Exposed Hardware: Enameled to color as selected.
- D. Touch-Up Primer for Galvanized Steel Surfaces: SSPC Paint 20 zinc rich.
- E. Concealed Steel Items: Galvanized in accordance with ASTM A123 to 2.0 oz/sq ft.
- F. Apply coats of bituminous paint to concealed aluminum and steel surfaces in contact with treated wood, cementitious, or dissimilar materials.

PART 3 - EXECUTION

3.01 EXAMINATION:

- A. Verification of existing conditions before starting work.
- B. Verify wall openings and adjoining air and vapor seal materials are ready to receive work of this Section.

3.02 INSTALLATION

- A. Install window assembly in accordance with AAMA 101.
- B. Attach window frame and shims to perimeter opening to accommodate construction tolerances and other irregularities.
- C. Align window plumb and level, free of warp or twist. Maintain dimensional tolerances and alignment with adjacent work.
- D. Install sill.
- E. Provide thermal isolation where components penetrate or disrupt building insulation. Pack fibrous insulation in shim spaces at perimeter of assembly to maintain continuity of thermal barrier.
- F. Coordinate attachment and seal of perimeter air barrier and vapor retarder materials.
- G. Install operating hardware.
- H. Install glass and infill panels in accordance with Section 08800 and Section 08410.
- I. Install perimeter sealant backing materials, and installation criteria in accordance with Section 07900.

3.03 CLEANING

- A. Remove protective material from factory finished aluminum surfaces.
- B. Wash surfaces by method recommended and acceptable to sealant and window manufacturer; rinse and wipe surfaces clean.
- C. Remove excess sealant by moderate use of mineral spirits or other solvent acceptable to sealant and window manufacturer.

END OF SECTION

SECTION 08710

FINISH HARDWARE

PART 1 - GENERAL

1.01 DESCRIPTION:

- A. This section specifies providing finish hardware.
- B. Related Work Specified Elsewhere:
 - 1. Access Doors and Frames including locks and cylinders: Section 08305.
 - 2. Overhead Coiling Doors: Section 08331.
 - 3. Overhead Coiling Grilles: Section 08334.
 - 4. Cremone bolt to receive lock and chain provided under this section: Section 02877.
 - 5. Hollow Metal Doors and Frames: Section 08110.
 - 6. Aluminum Entrances and Storefronts: Section 08410.
 - 7. Metal Concave Mandoors: Section 08481.

1.02 QUALITY ASSURANCE:

- A. Codes, Regulations, Reference Standards and Specifications:
 - 1. Comply with codes and regulation of the jurisdictional authorities.
 - 2. ANSI/BHMA: A156-Series Standards for Builders Hardware.
 - 3. ASTM: A413
 - 4. FS: TT-S-001657.
 - 5. ADA: ADAAG.
 - 6. NFPA: 80, 101, 130.
 - 7. DHI: Recommended Locations for Builders Hardware for Standard Steel Doors and Frames, Recommended Locations for Builders Hardware for Custom Steel Doors and Frames.
- B. Hardware Supplier Qualifications: A recognized architectural finish hardware supplier, with warehousing facilities in the Project's vicinity, that has a record of successful in-service performance for supplying finish hardware similar in quantity, type, and quality to that indicated for this Project and that employs an experienced architectural hardware consultant (AHC) who is available to the Engineer and Contractor, at reasonable times during the course of the Work for consultation.
 - 1. Require supplier to have his AHC develop the hardware schedule.
 - 2. Require supplier's AHC to meet with the Engineer to discuss and finalize lock-functions and keying requirements.
- C. Fire-Rated Openings: Provide hardware for fire-rated openings that complies with NFPA 80 and requirements of authorities having jurisdiction. Provide only items of hardware that are listed and are identical to products tested by UL, Warnock Hersey, FM, or other testing and inspecting organization acceptable to authorities having jurisdiction for use on types and sizes of doors indicated in compliance with requirements of fire-rated door and door frame labels.
 - 1. Equip labeled doors with hinges of steel or stainless steel base metal, closers, and automatic latching devices in addition to the hardware requirements in the specified hardware sets.
 - 2. If a conflict appears between this paragraph and the hardware sets scheduled, the requirements of this paragraph govern.

- D. Americans With Disabilities Act (ADA): Comply with the ADA Accessibility Guidelines (ADAAG).

1.03 SUBMITTALS:

Submit the following for approval in accordance with the General Requirements and with the additional requirements as specified for each:

A. Shop Drawings:

1. Product Data: Manufacturers' technical literature and catalog cuts, edited as necessary to indicate each item of hardware, model, selected options, finish, installation instructions, maintenance of operating parts and finish, and other information necessary to show compliance with requirements. Make coordinated submittals packages complete with all supporting data.
2. Hardware Schedule: Hardware schedule coordinated with doors, frames, gates and related work to ensure proper size, thickness, hand, function, design and finish of hardware. Base Hardware Schedule on hardware sets indicated in PART 3 of this section. Indicate complete designations of each item required for each door or opening, including the following information:
 - a. Explanation of each abbreviation, symbol, and code contained in hardware schedule. Schedules with unidentified notations will be rejected without review.
 - b. Door and frame number, size, and materials.
 - c. Type, style, function, size, and finish of each hardware item. Include lockset functions, angle of closer operation, lever and handle designs, lengths of flush bolts, types of stops, sizes of armor and kick plates, and other such data.
 - d. Name and manufacturer of each item.
 - e. Fastenings and other pertinent information.
 - f. Location of each hardware set cross-referenced to indications on Drawings, both on floor plans and in door schedule.
 - g. Mounting locations for hardware.
 - h. Keying information.
3. Submittal sequence: Submit hardware schedule at earliest possible date particularly where acceptance of hardware schedule must precede fabrication of other work that is critical in the Project construction schedule. Include with hardware schedule the product data, samples, shop drawings of work affected by finish hardware, and other information essential to a coordinated review of hardware schedule.
4. Templates: Transmit hardware templates directly to trades fabricating related work specified to be prepared for the installation of finish hardware under this section. Submit record copy of these transmittals to the Engineer.
5. Coordinating hardware preparation by other trades: Check shop drawings of other trades to ensure that correct provisions from transmitted templates are made for locating and installing finish hardware to comply with indicated requirements.

B. Samples:

1. Finishes: Two, minimum four-inch squares of each finish to be furnished. Submit with shop drawings.
2. Hardware units: Each type of exposed hardware unit in approved finish and tagged with full description for coordination with hardware schedule. Submit unit samples prior to submission of final hardware schedule.
 - a. When requested, samples will be returned to the supplier. Accepted units that remain undamaged through the submittal, review, and field-comparison process may, after final check of operation, be used in the Work, within limitations of keying coordination requirements.

- b. Submit the following:
 - 1) One sample of a lockset including, trim, escutcheon, strike box, lever, cylinder, and key.
 - 2) One sample of hinge.
 - 3) One sample of each miscellaneous item of finish hardware.
 - 4) Provide finishes so that color and surface finish or polish of various items of the same designated finish match throughout the work. Hardware with non-matching finishes will be rejected.
- c. The Authority reserves the right to require samples of each specific item to be furnished.

C. Certification.

D. Documentation:

- 1. Construction keying schedule.

1.04 PRODUCT DELIVERY, STORAGE AND HANDLING:

- A. Deliver products to jobsite in original unopened packages, clearly labeled with manufacturer's name, brand, specification identification data and identification as shown on approved hardware schedule.
- B. Store products in an approved dry area, protect from contact with soil and from exposure to the elements. Keep products dry.
- C. Handle products so as to prevent breakage of containers and damage to products.

1.05 MAINTENANCE TOOLS AND INSTRUCTIONS:

- A. Furnish a complete set of specialized tools and maintenance instructions as needed for the Authority's continued adjustment, maintenance, removal and replacement of hardware.

PART 2 - PRODUCTS

2.01 HARDWARE TYPES:

- A. General:
 - 1. Hardware grade: Provide only Grade 1 hardware in accordance with ANSI/BHMA A156-Series Standards and with the additional requirements specified in this section, except where otherwise specified or approved in writing by the Engineer for each specific door number.
 - 2. Fire-rated hardware: Where applied to fire-rated labeled doors and frames, provide fire-rated listed hardware, tested by a fire-rating testing agency acceptable to authorities having jurisdiction.
 - 3. Finishes: Finish designations are ANSI/BHMA A156.18 standards and are subject to approval for color, texture and appearance.
 - a. Finish 630 (Formerly US 32D): Except where otherwise indicated, provide finish 630, satin-polish stainless steel on stainless steel base metal, matching sample on file with the Engineer.
 - b. Finish 626 (Formerly US 26D): Where indicated, provide finish 626, satin-polish chromium plated over nickel on brass or bronze base metal, matching finish 630 as specified above.
 - c. Finish 628 (Formerly US 28): Where indicated, provide finish 628, satin-polish aluminum clear anodized over aluminum base metal.

- d. Finish 652 (Formerly US 26D): Where indicated, provide finish 652, satin-polish chromium plated over nickel on steel base metal, matching finish 630 as specified above.
 - e. Finish 719 (Formerly US27): Mill finish aluminum uncoated.
 - f. Finish 613 (Formerly US10B): Where indicated, provide finish 613, satin-finish statuary bronze.
 - g. Finish 630 may be substituted for Finish 626 or Finish 652 at no additional cost to the Authority.
4. Single Source: Obtain each type of hardware from a single manufacturer.
- B. Hinges: ANSI/BHMA A156.1, full mortise butt hinges, anti-friction bearings, button tips (not flush), unless otherwise specified for each specific door number. Extruded butts may be used in lieu of wrought butts.
- 1. Quantity required per door leaf:
 - a. Doors 61 inches to 90 inches in height: 1-1/2 pairs.
 - b. Doors 91 inches to 120 inches in height: Two pairs.
 - 2. Types:
 - a. Exterior doors, doors from public passageways, and doors to wet areas such as showers: Stainless steel butts, Type A5111, finish 630.
 - b. Interior, non-public doors: Steel butts, Type A8111 (Grade 1), Finish 652.
 - c. Doors with reverse-bevel swing (out-swinging) having locks: Fit butts with non-removable pins effective when door is in closed position.
- C. Locksets:
- D. Hollow metal doors: ANSI/BHMA A156.13, full mortise, adjustable armored front, 3/4-inch-throw anti-friction latchbolt, one-inch-throw stainless steel deadbolt, Finish 630, Function as scheduled.
- 1. Trim design:
 - a. Cast lever handles, recurving to within 1/2-inch of door face, equal in appearance and dimensions to one of the following unless otherwise scheduled:

Series	Design	Producer
ML2200 Series	Newport NSA	Corbin/Russwin
8200 Series	KD rose, L lever	Sargent
8700 Series	PB lever, YK rose	Yale
 - b. Finish: 630 unless otherwise scheduled.
 - c. Roses: Concealed screw or screwless, 2-1/4 inch diameter.
 - d. Cylinder trim: Equip with flush or security-beveled solid cylinder collar as appropriate for flush or projecting cylinder.
 - 2. Aluminum doors in Yard Buildings:
 - a. Finish: 630 unless otherwise scheduled.
- E. Cylinders and Keying for all doors except aluminum doors in Parking Structures: Match the Authority's existing keying and interchangeable core system as follows and at no additional cost to the Authority.
- 1. Cylinders: Finish 630.
 - a. For locksets: ANSI/BHMA A156.5, interchangeable-core type, designed to accept the Authority's existing Russwin Recore System. One core furnished for each lock, stamped with visual key control.

- b. High security: Interlocking-pin type, Emhart High-Security Locking System or equal.
 - c. Construction cores: Provide construction cylinders until final cylinders and keying is approved and installed.
 - 2. Keys and keying:
 - a. Keys: Stamped with the inscription TRANSIT AUTHORITY - DO NOT DUPLICATE and with visual key-control data.
 - b. Quantity: Three keys for each core plus blanks equal to 10-percent of total keys furnished.
 - 3. Key tags and holders: ANSI/BHMA A156.5, inscribed with key-change number and key-control symbol.
- F. Push Plates and Door Pulls: ANSI/BHMA A156.6, Finish 630, with the following additional requirements:
 - 1. Push plate: 3/16 inch by 10 inches by 20 inches unless otherwise shown, with edges beveled.
 - 2. Door pull: 3/4-inch round bar, eight inches center-to-center, concealed fasteners; escutcheon plate same as push plate.
- G. Door Closers: ANSI/BHMA A156.4, Type C02xx1 (xx - indicates top-of-door-mounted, on interior side), Finish 630.
 - 1. Surface-mounted.
 - 2. Sweep period: Adjusted so that from an open position of 70 degrees, the door will take at least three seconds to move to a point 3 inches from the latch, measured to the leading edge of the door.
 - 3. Cover plate: Full metal cover, Finish 630.
 - 4. Parallel arms and drop brackets: Provide as necessary for mounting on interior side unless otherwise noted. Where hold-open feature is specified for closers, use type that permits doors to open 140 degrees, other conditions permitting.
 - 5. Maximum force for pushing or pulling open a door with closer (measured with a push-pull scale applied perpendicular to the door at the door opener or 30 inches from the hinged side, whichever is farther from the hinge):
 - a. Fire doors: Minimum opening force allowable by the jurisdictional authorities.
 - b. Interior hinged doors: 5 lbf.
- H. Stops:
 - 1. Overhead-type: ANSI/BHMA A156.8, Type C54511 holder/stop; holder deactivated on labeled doors, Finish 630.
 - 2. Wall-type: ANSI/BHMA A156.16, Type L02101, with vandal-resistant concealed fasteners, Finish 630. Use floor-type where wall-type is not practicable.
 - 3. Floor-type: ANSI/BHMA A156.16, Type L02141 or L02161 as necessary, with matching extender if necessary to properly engage door bottom, Finish 630.
- I. Flush Extension Bolts: ANSI/BHMA A156.8, Type L04081, Finish 630.
 - 1. Dustproof strikes, Type L04021, provided for bolts located at bottom of door leaf, except where metal thresholds are specified. Cut opening to suit bolt.
 - 2. Operating mechanism located approximately six feet from floor for top bolts and approximately 12 inches from floor for bottom bolts.
 - 3. Bolts located in edge of inactive leaf of pair of doors.
 - 4. Automatic Flush Bolts: Listed for 1-1/2 hour, B-labeled, Finish 630; Ives No. 559 or equal with strikes; with coordinator where recommended by manufacturer.
- J. Silencers: ANSI/BHMA A156.16, Type L03011. Provide silencers for each door:
 - 1. Three for each single door.

2. Two for each pair of doors.
- K. Exit Devices: ANSI/BHMA A156.3; complying with NFPA 80, listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction; lever trim as required for locksets; Finish 630.
1. Single door: Function F03 (mortise); latch bolt by push on crossbar inside and by key from outside; operation from outside is by lever.
 2. Double door: Active leaf Function F03 as above, inactive leaf (manual flush bolts) without outside trim.
 3. Maximum pushing force to operate exit device:
 - a. Fire doors: Minimum opening force allowable by the jurisdictional authorities.
 - b. Interior hinged doors: 5 lbf.
 4. Coordinators: ANSI/BHMA A156.3.
- L. Metal Thresholds: ANSI/BHMA A156.21; profiles as shown for each location; ADA compliant; metal thickness 0.125 inch; maximum height 5/16"; with countersunk matching screws.
1. Public passageways and mezzanines: Finish 630, stainless steel with abrasive finish or Finish 613, satin-finish statuary bronze.
 2. Other locations: Finish 719, mill finish aluminum with grooves.
- M. Weather Stripping /Smoke Seals: ANSI/BHMA A156.22, Finish 628 (satin aluminum clear anodized) with stainless steel sheet-metal screws and as follows:
1. Head and jamb: Head and jamb type, stop-applied; National Guard A626 or equal. Provide nylon brush gasketing or equal.
 2. Sill: Drip strip at sill; National Guard 15 or equal.
 3. Sweep: Door sweep type, surface mounted at bottom of door; National Guard D608 nylon brush gasketing or equal. Provide sweep in addition to drip strip where scheduled.
 4. Astragals: Provide nylon brush overlapping type: National Guard 600 or equal.
- N. Chain: ASTM A413, Class PT, case-hardened, carbon-steel security chain, 3/8-inch diameter.
- O. Padlock: Interchangeable-core type padlock, designed to accept the Authority's existing Russwin Recore System.
1. One core furnished for each lock, stamped with visual key control; with two keys, keyed and master-keyed as directed.
 2. Body: Solid extruded brass.
 3. Five-pin tumblers.
 4. Shackle: Hardened steel, zinc-plated, 1-3/4 inch opening height, self-locking spring-type.
- P. Deadlock: ANSI/BHMA A156.5 mortise dead lock, Grade 2 (1/2-inch minimum throw) with interchangeable-core cylinder; operation as scheduled.
- Q. Authority-Furnished Property:
1. Cross-bar lock: High-security locking bar with surface-mounted keepers, inside knob and high-security cylinder.

2.02 FASTENINGS:

- A. Provide hardware complete with screws, through-bolts and other fasteners of suitable type for secure anchorage to construction materials.

- B. Screws, through-bolts and other fasteners having spanner-type heads: As approved.
- C. Provide fasteners that harmonize in material, color and texture with finished appearance of hardware items.
- D. Provide concealed fastenings with door pull, flush pulls, wall door stops and other such items.
- E. Provide spanner-head through-bolts and hex bolts as applicable for surface-mounted hardware.
- F. Sheet-metal screws and self-tapping screws are prohibited except where specified.

2.03 TEMPLATES:

- A. Furnish templates of hardware to other trades, so that doors, frames and gates can be cut, reinforced and otherwise prepared in the shop for installation of finish hardware.

2.04 THRESHOLD SEALANT:

- A. Butyl: Polymerized butyl rubber and inert fillers (pigments), solvent-based with minimum 75 percent solids, non-sag consistency, tack-free time of 24 hours or less, paintable, non-staining, and complying with FS TT-S-001657.

PART 3 - EXECUTION

3.01 INSTALLATION:

- A. General:
 1. Coordinate work of this section with work of other trades.
 2. Install each hardware item in compliance with the manufacturer's instructions and recommendations.
 3. Apply finish hardware in a neat and workmanlike manner. Set units level, plumb, and true to line and location. Adjust and reinforce the attachment substrate as necessary for proper installation and operation.
 4. Cut mortises neat, clean and of proper net size. Drill and countersink units that are not factory prepared for anchorage fasteners. Space fasteners and anchors in accordance with industry standards.
 5. Where cutting and fitting is required to install hardware onto or into surfaces that are later to be painted or finished in another way, coordinate removal, storage, and reinstallation or application of surface protection with finishing work specified in other sections. Do not install surface-mounted items until finishes have been completed on the substrates involved.
 6. Provide keying in accordance with keying schedule prepared by and for the Contractor in accordance with the Authority's keying system. Deliver keying schedule and keys to the Engineer prior to final acceptance.
- B. Mounting Heights: Mount hardware units at heights indicated in the following publications, except as specifically indicated or required to comply with governing regulations and except as otherwise directed by the Engineer:
 1. Recommended Locations for Builders Hardware for Standard Steel Doors and Frames by DHI.
 2. Recommended Locations for Builders Hardware for Custom Steel Doors and Frames by DHI.
 3. ADA Accessibility Guidelines (ADAAG).

- C. Exterior Thresholds: Set thresholds for exterior doors in full bed of specified butyl sealant.
- D. Weatherstripping /*Smoke Seals*: Install weatherstripping around entire perimeter of door frame to form a complete seal and in accordance with manufacturers instructions.
 - 1. Position and install head and jamb weatherstripping so that door closes snugly against seal but does not inhibit latching of lockset.
 - 2. Position and install sill weatherstripping to seal snugly against threshold without inhibiting latching of lockset.
 - 3. Note that at fire-rated doors, lockset is to latch by closer operation only, without manual assistance.
- E. Adjustment: Adjust hardware to operate as designed and replace hardware that is missing, scratched, marred or otherwise damaged.
 - 1. Adjust and check each operating item of hardware and each door to ensure proper operation or function of every unit. Replace units that cannot be adjusted to operate freely and smoothly or as intended for the application made.
 - 2. Where door hardware is installed more than one month prior to acceptance or occupancy of a space or area, return to the installation during the week prior to acceptance or occupancy and make final check and adjustment of hardware items in such space or area. Clean operating items as necessary to restore proper function and finish of hardware and doors. Adjust door control devices to compensate for final operation of heating and ventilating equipment.
 - 3. Clean adjacent surfaces soiled by hardware installation.
- F. Instruction: At a time prescribed by the Engineer, have the hardware installer or knowledgeable operating-hardware-manufacturers' representatives instruct the Authority's personnel in the proper adjustment and maintenance of hardware and hardware finishes.

3.02 CLEAN-UP:

- A. Remove from the site rubbish and debris caused by this work.
- B. Leave areas surrounding doors in broom-clean condition.

3.03 HARDWARE SETS:

- A. Hardware Sets:
 - 1. Provide hardware sets in accordance with door schedule and the following set schedule.
 - 2. Provide the number of pairs of butt hinges in accordance with previously specified requirements.
 - 3. Designations used to describe hardware items by using a manufacturer's product name and number are for the purpose of describing a general level of quality and function. Products that are equal, complying with the requirements specified in this section may be used.

SET NO. 1

Quantity	Hardware
Previously Specified	Butt Hinges, 4-1/2 by 4-1/2
1 Each	Lockset, Function F09
1 Each	Door Closer
1 Each	Wall-Type Stop
1 Each	Metal Threshold

SET NO. 2

Quantity	Hardware
Previously Specified	Butt Hinges, 4-1/2 by 4-1/2
1 Each	Lockset, Function F07
1 Each	Door Closer
1 Each	Wall-Type Stop

SET NO. 3

Quantity	Hardware
As Necessary	Lock Cylinders *

* Provide proper cam to engage lock mechanism by other trade.

SET NO. 4

Quantity	Hardware
1 Each	Deadlock, E06082

SET NO. 5

Quantity	Hardware
Previously Specified	Butt Hinges, 4-1/2 by 4-1/2
1 Each	Latchset, Function F01
1 Each	Door Closer
1 Each	Wall-Type Stop

SET NO. 6

Quantity	Hardware
Previously Specified	Butt Hinges, 4-1/2 by 4-1/2
1 Each	Exit Device, Function F03
1 Each	Door Closer
1 Each	Wall-Type Stop

SET NO. 7

Quantity	Hardware
Previously Specified	Butt Hinges, 4-1/2 by 4-1/2
1 Each	Lockset, Function F13
1 Each	Door Closer with Hold-Open
1 Each	Wall-Type Stop
1 Each	Cross-Bar Lock

SET NO. 8

Quantity	Hardware
Previously Specified	Butt Hinges, 4-1/2 by 4-1/2
1 Each	Lockset, Function F07
2 Each	Door Closer
2 Each	Wall-Type or Floor-Type Stop
2 Each	Automatic Flush Bolt
1 Each	Coordinator

SET NO. 9

Quantity	Hardware
Previously Specified	Butt Hinges, 4-1/2 by 4-1/2
1 Each	Lockset, Function F07
2 Each	Door Closer
2 Each	Overhead-Type Stop
1 Each	Metal Threshold
2 Each	Automatic Flush Bolt
1 Each	Coordinator
1 Set	Weatherstripping

SET NO. 10

Quantity	Hardware
Previously Specified	Butt Hinges, 4-1/2 by 4-1/2
2 Each	Door Pulls
2 Each	Door Closer with Hold-Open
2 Each	Wall-Type or Floor-Type Stop, As Necessary

SET NO. 11

Quantity	Hardware
Previously Specified	Butt Hinges, 4-1/2 by 4-1/2
1 Each	Lockset, Function F09
2 Each	Door Closer
1 Each	Wall-Type Stop
1 Each	Metal Threshold
2 Each	Automatic Flush Bolt
1 Each	Coordinator

SET NO. 12

Quantity	Hardware
Previously Specified	Butt Hinges, 4-1/2 by 4-1/2
1 Each	Lockset, Function F07
1 Each	Door Closer
1 Each	Overhead-Type Stop
1 Each	Metal Threshold
1 Set	Weatherstripping

SET NO. 13

Quantity	Hardware
Previously Specified	Butt Hinges, 4-1/2 by 4-1/2
1 Each	Lockset, Function F14
1 Each	Door Closer
1 Each	Overhead-Type Stop
1 Each	Metal Threshold
1 Set	Weatherstripping

END OF SECTION

SECTION 08800

GLASS AND GLAZING

PART 1 - GENERAL

1.01 DESCRIPTION:

- A. This section specifies providing glass and glazing (sealing) of glass areas.
- B. Related Work Specified Elsewhere:
 - 1. Elevators: Division 14. ^{*1}
 - 2. Granite edge: Section 04415.

1.02 QUALITY ASSURANCE:

- A. Codes, Regulations, Reference Standards and Specifications:
 - 1. Comply with codes and regulations of the jurisdictional authorities.
 - 2. ANSI: Z97.1.
 - 3. ASTM: C509, C542, C864, C920, C1036, C1048, C1172, C1281, D635, D1044, D1925, E774, E1300.
 - 4. CPSC: 16 CFR 1201, Category II.
 - 5. UL: 9, 10B.

1.03 SUBMITTALS:

- A. Submit the following for approval in accordance with the General Requirements and with the additional requirements as specified for each:
 - 1. Samples:
 - a. Three each of the following:
 - 1) Glass and safety plastic: 12 inches square, each material and type.
 - 2) Cast glass lens.
 - 3) Glazing compound: Pint containers.
 - 4) Setting blocks and edge blocks.
 - 5) Sealant: Cured color samples.
 - a) Sealant for sealing platform granite edge glass lenses: Clear silicone sealant, one six-inch long bead.
 - 6) Gasket material: 12 inches long.
 - 2. Certification:
 - a. When glass is not cut to size by manufacturer and is furnished unlabeled from local stock, submit certification stating location to be installed, quality, thickness, type and manufacturer of each unit of glass furnished.
 - b. All tempered safety and laminated tempered safety glass to be permanently marked with the name or trademark of the manufacturer and designation of the applicable safety glazing standard.

1.04 PRODUCT DELIVERY, STORAGE AND HANDLING:

- A. Deliver products to the jobsite in original unopened containers clearly labeled with manufacturer's name and brand designation, referenced specification number, type, class and rating as applicable. Deliver glass with each light bearing manufacturer's label showing strength, grade, thickness, type, quality and safety marking. Do not remove labels from glass until it has been set and inspected.

- B. Store products in approved dry area; protect from contact with soil and from exposure to the elements.
- C. Handle products to prevent breakage of containers and damage to products.

1.05 JOB CONDITIONS:

- A. Environmental Requirements:
 - 1. Do not install glass when the ambient temperature is below 40F or expected to fall below 40F, unless otherwise approved.
 - 2. Do not apply glazing materials to unprotected surfaces in wet weather or to surfaces on which ice, frost, water or dampness is visible.

PART 2 - PRODUCTS

2.01 MATERIALS:

- A. Glass:
 - 1. Plate glass: ASTM C1036, Type I (transparent glass, flat), Class 1 (clear), Quality q3.
 - 2. Safety glass: CPSC 16 CFR 1201, Category II and ANSI Z97.1 and as follows:
 - a. Tempered: ASTM C1048, Kind FT (fully tempered), Condition A (uncoated surfaces), Type I (transparent glass, flat), Class 1 (clear), Quality q3; 1/4-inch thick unless otherwise shown.
 - b. Laminated: ASTM C1172, Kind LT (fully tempered), 0.060-inch thick polyvinyl-butylal (PVB) interlayer factory-laminated between two pieces of tempered safety glass with protective edgecoat on the assembly to prevent contact of interlayer with water or joint materials; edgecoat such as Edgeseal by PPG, special polyurethane seal on Solaflex glazing by Monsanto, Sommer Macca Urethane E#2 by SX Chemical Company, or equal.
 - c. Laminated fritted glass:
 - 1) Construction: ASTM C1172, Kind LT, Laminated glass consisting of two pieces of fully tempered clear glass with one of the following fritting methods to make the laminated assembly translucent but not transparent:
 - a) A hue-white fritted surface permanently fused onto the laminated surface of one piece of glass with a clear 0.60-inch polyvinyl-butylal (PVB) interlayer between.
 - b) Two pieces of clear glass with a hue-white 0.30-inch PVB interlayer (fritting) sandwiched between two 0.15-inch clear PVB interlayers.
 - 2) Opacity: 80 percent coverage of translucent white fritting. Pattern of fritting to be selected by the Engineer from manufacturer's whole range of fritting patterns.
 - 3) Provide protective edgecoat to prevent contact of interlayers with water or joint materials.
 - 3. Wired: ASTM C1036, Type II (wired), Class 1 (translucent), Form 1 (wired, polished both sides), Quality q8; Mesh m1 (diamond), unless otherwise shown.
 - 4. Fire-rated glass (without wire): CPSC 16 CFR 1201 and ANSI Z97.1; fire-rated clear glass without wire; polished both sides.
 - a. Rating: 45 minutes or as shown, tested in accordance with UL9 (door assemblies) and UL10B (window assemblies).
 - b. Label: Each piece of glass bearing UL label for fire resistance.

- c. Thickness: As necessary to achieve the required fire rating; thickness coordinated with submitted shop drawings for the related doors and windows.
 - d. Sources: Subject to meeting the requirements, provide one of the following or equal:
 - 1) Premium FireLite by Nippon Electric Glass Company, Ltd. and distributed by Technical Glass Products, Kirkland, WA; 800/426-0279.
 - 2) Contraflam by Saint-Gobain and distributed by Euroglass Glasrep Corp., White Plains, NY; 914/683-6704.
 - 3) Inferno-Lite by Globe Amerada Glass Co., Elk Grove Village, IL; 800/323-8776.
- B. Insulating Glass: ASTM E774, Class CBA; factory preassembled, sealed insulating glass units with 1/2-inch air space; aluminum spacer tube with desiccant held captive within, and dual seal construction.
- 1. Outer lite: 1/4-inch clear plate glass or tempered safety glass as shown or specified, with low-emissivity (low-E) coating equal to Viracon's Solarscreen 80 on the number-two (inside) surface.
 - 2. Inner lite: 1/4-inch clear plate glass or tempered safety glass as shown or specified.
- C. Safety Plastic: Clear, monolithic polycarbonate sheet complying with the following:
- 1. Abrasion resistance: Maximum 3.1 percent change in haze when tested in accordance with ASTM D1044 for both surfaces.
 - 2. UV-resistance: Maximum 2.0 yellowing index after three years exposure per ASTM D1925.
 - 3. Flammability: Meet BOCA combustibility classification C1: Horizontal burn rate of one inch per minute or less when tested at a nominal thickness of 0.060 inch, or in the thickness intended for use, in accordance with ASTM D635.
- D. Glass Lens: Cast, clear glass, flat top with light sandblast texture, or acid etched if approved, to make it translucent, not transparent; vertical side (perimeter) roughened; top outer perimeter edge chamfered to 1/16 inch. Corning Glass Works, Pittsburgh Plate Glass Co., Blenko Glass Company distributed by Southern Plate Glass Company, or equal. Match texture, quality limiting defects, and translucency of existing units within the Metro system as directed by Engineer.
- 1. Defects shall be limited to a maximum of six air bubbles of 3/16 inch diameter or less with not more than three air bubbles occurring within the central three-inch diameter of lens.
 - 2. Single-component clear silicone sealant: ASTM C920, Type S, Grade NS, Class 25, Use T; as manufactured by Dow, GE and Pecora, or approved equal.
 - 3. Lead shims or lead rope: Section Shims die-cut from soft sheet lead; sized to suit field conditions, generally 6-1/2 inch outside diameter, five-inch inside diameter; 1/16-inch and 1/8-inch thicknesses as approved; ropes of lead wool may be substituted for shims as approved; fabricated to ensure that glass lenses can be set flush with granite.
- E. Glazing Accessories:
- 1. Sealant: Multi-component polyurethane; ASTM C920, Type M, Grade NS, Class 25, Use G; colored as required to match framing system in which installed.
 - 2. Glazing compound: Single-component polyurethane; ASTM C920, Type S, Grade NS, Class 25, Use G; colored as required to match framing system in which installed.
 - 3. Glazing tape: Preformed butyl tape, ASTM C1281; 100 percent solids, nonstaining and nonmigrating in contact with nonporous surfaces; with or without spacer rod (pre-shimming) as recommended in writing by tape and glass manufacturers for

application indicated; packaged on rolls with a release paper backing; by 3M Company, Tremco Manufacturing Co., or equal.

4. Pressure-sensitive tape: Vinyl electrical tape, 3M Company or equal.
5. Lock-Strip Gaskets: ASTM C542 dense neoprene extrusions; profile shown or required.
6. Compression Seal Gaskets: ASTM C864 neoprene extrusions; profile and hardness as shown or as required to maintain watertight seal.
7. Setting blocks: ASTM C864 neoprene extrusions, 70-90 durometer Shore A hardness; approximately full channel width, four inches long and high enough to afford correct cover and 3/8-inch edge clearance for the glass.
8. Edge blocks (spacers): ASTM C864 neoprene extrusions, 40-50 durometer Shore A hardness; approximately full channel width, three inches long and providing 3/8-inch edge clearance for the glass.
9. Glazing clips and points: Type, material and quantities as required and recommended by the manufacturers of the glazing media.
10. Glazing (face) gasket: Neoprene, formulated of compound meeting or exceeding physical property requirements of ASTM C509, continuous, 50 durometer hardness, providing 3/16-inch face clearance inside and outside.
11. Lead-shim ring: Continuous ring of sheet lead, of thickness required to bring top of cast glass lens level with surrounding granite.
12. Dielectric screw shield: Nylon expansion anchor, round head, sized to ensure snug fit in predrilled hole and to accommodate size of screw used.

PART 3 - EXECUTION

3.01 PREPARATION:

- A. Verify dimensions before proceeding; obtain measurements at structure for work to be fitted to other construction, including wall-to-wall dimensions, floor-to-ceiling dimensions and those controlled by other trades.
- B. Remove dirt, dust, oil, moisture and other foreign substances from surfaces to receive glass and glazing accessories.
- C. Clean glass surfaces and wipe dry.

3.02 INSTALLATION:

- A. Coordinate work of this section with work of other trades.
- B. Use only tempered safety glass in doors, sidelights and transoms.
- C. Use only fire-rated glass in doors and windows located in fire-rated wall construction, except where wire glass is shown.
- D. Size glass by measuring actual frames or sash. Sizes shown are approximate and are intended for estimating purposes only. Cut glass to form 3/8-inch bite on all sides, except as otherwise required by manufacturer's product data as submitted and approved.
- E. Install glass or plastic using glazing gaskets or other glazing accessories as shown.
- F. Set glass on setting blocks at each quarter point of sill with equal bearing for entire width of each panel. Accurately cut glass to fit frames and provide smooth edges with no sharp or ragged surfaces. Provide edge blocks to prevent glass from contact with side frames.

- G. Unless otherwise shown, set glass in metal interior frames and doors or by back-face glazing with glazing compound; tape to prevent rattling. Reset glazing beads, if necessary, without marring or injuring finish.
- H. Tape Glazing:
 1. Position tape on fixed stops so that, when compressed by glass, exposed edges of tape are flush with or protrude slightly above sightline of stops.
 2. Install tape continuously, but not necessarily in one continuous length. Do not stretch tape to make it fit opening. Do not overlap butt ends. Cut tape with sharp shears. Place joints in tape at corners of opening with adjoining lengths butted together, not lapped.
 3. Seal joints in tape with compatible sealant approved by tape manufacturer.
 4. Where framing joints are vertical, cover these joints by applying tape to head and sill first and then to jambs. Where framing joints are horizontal, cover these joints by applying tape to jambs and then to head and sill.
 5. Place spacer or centering shims, three inches in length, 3/16 inch in height and 3/32 inch in thickness, every 18 inches under tape. Hold spacers in position by gently placing them in contact with underedge of tape.
 6. Position setting blocks for installation of glass. Use setting blocks 1/4 inch in height.
 7. Do not remove release paper from tape until just before each glazing unit is installed.
 8. Align glass carefully to opening and press glass firmly in place. Apply removable stops and repeat application of spacers or centering shims. Ensure that they are seated as deeply as possible in channel. Fill interior opening in conventional manner with glazing compound.
 9. Apply cap bead of sealant over exterior exposed edge of tape.
- I. Set glass in exterior metal windows and doors with neoprene setting blocks at quarter points and neoprene spacers two inches long placed 18 inches on center, and glaze with sealants.
- J. Install glass and glazing accessories in accordance with manufacturer's recommendations. Neatly apply sealants, compounds and tapes in straight lines parallel with glazing rebates and as shown.
- K. Perform direct glazing in dry weather, 40F or warmer.
- L. Tape edges of laminated glass and insulating glass with pressure-sensitive tape if sealant or glazing tape is incompatible with interlayer or seals of insulating glass. Do not expose edges of laminated glass to solvents, cleaners or prolonged contact with water.
- M. Set lead-shim rings on lips at bottom of openings and glass lenses. Set glass lenses to bring flat face level with the top of granite, centered in openings. Use spacers to maintain lenses in position while filling the annular space with backer rod and sealant as shown.

3.03 INSTALLATION OF ELEVATOR HOISTWAYS:

- A. Install glazing at elevator hoistways as shown and in accordance with applicable requirements for glass and glazing.
- B. Size screw holes for dielectric screw shields to permit installation so as to prevent metal-to-metal contact between screws and frame.
- C. Apply sealant around entire frame, inside and outside of exterior hoistways only, and at other areas where metals are joined resulting in unfilled space. ²

- D. Apply sealant around entire frame, inside and outside, and at other areas where metals are joined resulting in unfilled space. ^{*3}

3.04 INSTALLATION/RE-INSTALLATION OF PLATFORM GRANITE EDGE GLASS LENSES:

- A. Install lead shims or lead rope.
- B. Install glass lenses.
- C. Apply sealant.

3.05 FIELD QUALITY CONTROL:

- A. Hose Tests:
 - 1. Upon completion of glazing and sealing, perform hose test against exterior glazing and framing members in the presence of the Engineer.
 - 2. Use 5/8-inch minimum diameter hose operated at 40-psi pressure for a minimum of 10 minutes. Repair leaks as soon as surfaces are dry; retest until approved.
- B. Breakage: Prior to final acceptance, replace damaged glass.
- C. Dielectric Testing:
 - 1. After installation at elevator hoistways, test for electrical isolation between screws and hoistway metal, using ohmmeter.
 - 2. Resistance requirement: 10,000 ohms.
 - 3. Replace screws and shields that do not meet resistance requirements and retest as for initial installation. Repeat as necessary until all screws meet resistance requirement.

3.06 CLEAN-UP:

- D. At completion of work, remove labels, except fire labels, clean glass and remove excess glazing compound and sealant from frames and surrounding finish work.
- E. Remove from site rubbish and debris resulting from work of this section.
- F. Leave areas surrounding work in broom-clean condition.

SEE ENDNOTES BELOW. THEY ARE AN ESSENTIAL PART OF THIS SECTION UNTIL EDITED BY SECTION DESIGNER.

ENDNOTES

***1.** Add 1.1 B. including 1. modification to all contracts requiring glass and glazing work for elevator hoistways.

***2.** Use first version of 3.3 C. for all contracts requiring glass and glazing work for elevator hoistways.

***3.** Use second version of 3.3 C. for all contracts not requiring glass and glazing work for elevator hoistways.

END OF SECTION