

SECTION 08101 – WORK AT EXISTING OPENINGS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes a schedule, in PART 3, indicating:
 - 1. Demolition of existing doors, frames, glazing, hardware and other items at existing openings.
 - 2. New doors, frames, glazing, hardware and other work at existing openings.
- B. This Section includes also the following work, not indicated on schedules:
 - 1. Removal and replacement of cylinders and key cores at all existing mortise and cylindrical locks indicated to remain, including locks with trim and without trim. Specification of cylinders is indicated in Division 8 Section "Door Hardware".
- C. Related Sections include the following:
 - 1. Division 1 Section "Renovation Procedures" for renovation requirements, including cleaning and preparation for refinishing of existing doors and frames.
 - 2. Division 1 Section "Selective Demolition" for demolition relating to existing openings.
 - 3. Division 8 Sections "Steel Doors and Frames", "Flush Wood Doors" and "Stile and Rail Wood Doors" for specification of new doors and frames at existing openings as indicated in this Section.
 - 4. Division 8 Section "Door Hardware" for specification of hardware products at existing openings as indicated in this Section.
 - 5. Division 8 Section "Glazing" for replacement of glazing at existing openings as scheduled in this Section.
 - 6. Division 9 Section "Painting" for field painting of existing doors and frames, including clear finish where existing doors or frames are have clear finish existing.

1.3 EXISTING CONDITIONS AND INVENTORY OF DOORS, FRAMES AND HARDWARE

- A. The Schedule at the end of this Section indicates the conditions existing at each opening at time of bid, including functional hardware, guards or grilles, condition of glazing and other items. Existing items not indicated to be changed as part of the Work are to remain and shall be protected. The Architect will use this schedule document to determine completion of the work of this section; the contractor shall ensure that all items not indicated to be changed are present and in their condition at time of bid. This requirement is intended specifically to anticipate the possibility that items at existing openings (for example glazing) may be damaged by the contract

work, and to advise the contractor of the conditions at each opening for which he will be held responsible at Substantial Completion.

- B. If the Contractor believes that conditions at existing openings are, at the start date of the contract work, materially different from those indicated on the Schedule in this Section, he shall submit a report in writing to the Architect within sixty (60) days of that start date, citing specific locations and conditions. Conditions at openings where work is performed less than thirty (30) days after the submission of such a report shall be considered to conform to the Schedule unless the Contractor shall have received written acknowledgment from the Architect in writing.
- C. Dimensions indicated for existing openings are approximate; contractor shall field-verify any dimensions required for the Work, including dimensions for new door leafs indicated for existing openings.
 - 1. At openings where thresholds are indicated to be reduced and a new door leaf is indicated, provide new door with specified clearances from reduced threshold surface.

1.4 DEFINITIONS

- A. "Remain" means the existing item is to remain in place.
- B. "Replace" means remove existing item and furnish and install new item as indicated.
 - 1. New hardware items: New item shall conform to requirements of Division 8 Sections "Door Hardware", "Steel Doors and Frames" and "Flush Wood Doors". Description of existing hardware item, where indicated, is for information only and does not supersede product requirements for new hardware.
 - 2. Metal finish on new items: Unless indicated otherwise, match finish metal of existing items indicated to remain at each opening. Hardware finish at existing openings varies, and includes both brass and chrome finishes.
- C. "Remove" means remove existing item, and patch or repair frame or leaf if no new item is scheduled.
- D. "Provide" means furnish and install new item, including preparation of frame and/or leaf.
 - 1. Lever retrofit: Where "provide new levers" is indicated, provide all work and hardware components as required to coordinate new levers with existing lockset or latchset. New levers shall be level when not in use, shall operate latchbolt, shall fit neatly to existing hardware, and shall comply with applicable accessibility requirements.
- E. "Reduce height" of a threshold means field-modify height of existing threshold in place, for compliance with applicable accessibility requirements, as indicated in Part 3 of this section.

PART 2 - PRODUCTS

2.1 DOOR HARDWARE

- A. General: Hardware products identified by common names in this schedule are further defined in Section 08712.
- B. Hardware items for each leaf: Provide scheduled hardware for each leaf at each opening unless specifically indicated to be provided at one leaf only. Number, size and type of leaves is indicated on schedule.
- C. Product selection:
 - 1. Schedule notes in the "Remarks" column describe the new hardware item when work is "Replace" or "Provide", unless note specifically refers to existing item.
 - 2. Where continuous hinges are specified, provide fully concealed type.
 - 3. Where new locksets are specified, provide mortise locksets unless otherwise indicated.

PART 3 - EXECUTION

3.1 REPAIR AND REPLACEMENT PROCEDURES

- A. General: Provide the following work at existing door openings as required for existing items indicated to remain, in addition to work indicated in schedule:
 - 1. Remove all existing silencers at hollow metal frames, and provide new silencers.
 - 2. Clean and lubricate all hardware.
 - 3. Remove graffiti, paint, adhesives, signs, decorations and other applied items.
 - 4. Drive hinge pins down into butt hinges.
 - 5. Patch holes at doors and frames from removal of existing hardware, and holes already existing.
- B. Reduce Height of Threshold: Where scheduled, field-modify existing threshold in place, for compliance with applicable accessibility requirements. Existing thresholds indicated to be reduced are either wood or stone as indicated, and approximately one inch higher than surrounding finish floor. Within the width between the frame stops, remove threshold material more than one half inch higher than surrounding finish floor. Sand or grind surface smooth, ease height transition at jambs to reduce sharp edges.

3.2 SCHEDULE OF WORK AT EXISTING OPENINGS (on following pages)

- A. Schedule organization: The schedule consists of data for each opening, indicating the existing conditions and work to be performed, as follows:
 - 1. Identification: Columns at the left identify the location, dimensions and type of door and frame.

2. "Item" column: Indicates a checklist of typical items present; items specific to an individual opening appear at the bottom.
3. "Present/type" column: Indicates whether an item is present, or indicates the type of item. "Yes" indicates that an item is present; any other term in this column indicates that the item is present and further indicates the type.
4. "Work" column: Indicates contract work.
5. "Remarks" column: Indicates supplemental information about existing conditions, about reason for the Work, or provides more detail about an existing condition that is to remain.

B. Key to selected schedule terms:

1. HM: Hollow metal
2. Mtl: Metal
3. Mort.Lock, cyl.: Mortise lock with operable trim and removable cylinder and key core; typically a later addition to building or retrofit of original hardware..
4. Mort.Lock, skel.: Mortise lock with operable trim and keyway for skeleton key; typically original hardware. This type of lock does not have a removable cylinder or key core.
5. Surf.Lock, cyl: Deadlock or deadlatch without operable trim, with interior thumbturn or lever and with removable cylinder and key core. Typically supplemental to other lockset or latchset.
6. Cylindrical lock: Key-in-knob or key-in-lever type; also includes no-trim cylindrical (non-mortise) deadlocks or deadlatches where indicated.

SECTION 08110 - STEEL DOORS AND FRAMES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Standard hollow metal doors and frames.
- B. Related Sections:
 - 1. Division 4 Section "Unit Masonry Assemblies" for embedding anchors for hollow metal work into masonry construction.
 - 2. Division 8 Section "Door Hardware" for door hardware for hollow metal doors.
 - 3. Division 9 Sections "Painting" for field painting hollow metal doors and frames.

1.3 DEFINITIONS

- A. Minimum Thickness: Minimum thickness of base metal without coatings.
- B. Standard Hollow Metal Work: Hollow metal work fabricated according to ANSI/SDI A250.8.

1.4 SUBMITTALS

- A. Product Data: For each type of product indicated. Include construction details, material descriptions, core descriptions, fire-resistance rating, temperature-rise ratings, and finishes.
- B. Shop Drawings: Include the following:
 - 1. Elevations of each door design.
 - 2. Details of doors, including vertical and horizontal edge details and metal thicknesses.
 - 3. Frame details for each frame type, including dimensioned profiles and metal thicknesses.
 - 4. Locations of reinforcement and preparations for hardware.
 - 5. Details of each different wall opening condition.
 - 6. Details of anchorages, joints, field splices, and connections.
 - 7. Details of accessories.
 - 8. Details of moldings, removable stops, and glazing.
- C. Other Action Submittals:

1. Schedule: Provide a schedule of hollow metal work prepared by or under the supervision of supplier, using same reference numbers for details and openings as those on Drawings. Coordinate with door hardware schedule.
- D. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for each type of hollow metal door and frame assembly.

1.5 QUALITY ASSURANCE

- A. Source Limitations: Obtain hollow metal work from single source from single manufacturer.
- B. Fire-Rated Door Assemblies: Assemblies complying with NFPA 80 that are listed and labeled by a qualified testing agency, for fire-protection ratings indicated, based on testing at as close to neutral pressure as possible according to NFPA 252 or UL 10B.
 1. Oversize Fire-Rated Door Assemblies: For units exceeding sizes of tested assemblies, provide certification by a qualified testing agency that doors comply with standard construction requirements for tested and labeled fire-rated door assemblies except for size.
 2. Temperature-Rise Limit: At vertical exit enclosures and exit passageways, provide doors that have a maximum transmitted temperature end point of not more than 450 deg F above ambient after 30 minutes of standard fire-test exposure.
- C. Fire-Rated, Borrowed-Light Frame Assemblies: Assemblies complying with NFPA 80 that are listed and labeled, by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire-protection ratings indicated, based on testing according to NFPA 257 or UL 9. Label each individual glazed lite.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver hollow metal work palletized, wrapped, or crated to provide protection during transit and Project-site storage. Do not use nonvented plastic.
 1. Provide additional protection to prevent damage to finish of factory-finished units.
- B. Deliver welded frames with two removable spreader bars across bottom of frames, tack welded to jambs and mullions.
- C. Store hollow metal work under cover at Project site. Place in stacks of five units maximum in a vertical position with heads up, spaced by blocking, on minimum 4-inch- (102-mm-) high wood blocking. Do not store in a manner that traps excess humidity.
 1. Provide minimum 1/4-inch (6-mm) space between each stacked door to permit air circulation.

1.7 PROJECT CONDITIONS

- A. Field Measurements: Verify actual dimensions of openings by field measurements before fabrication.

1.8 COORDINATION

- A. Coordinate installation of anchorages for hollow metal frames. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors. Deliver such items to Project site in time for installation.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, [available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following]:
 1. Amweld Building Products, LLC.
 2. Benchmark; a division of Therma-Tru Corporation.
 3. Ceco Door Products; an Assa Abloy Group company.
 4. Curries Company; an Assa Abloy Group company.
 5. Deansteel Manufacturing Company, Inc.
 6. Firedoor Corporation.
 7. Fleming Door Products Ltd.; an Assa Abloy Group company.
 8. Habersham Metal Products Company.
 9. Kewanee Corporation (The).
 10. Mesker Door Inc.
 11. Pioneer Industries, Inc.
 12. Security Metal Products Corp.
 13. Steelcraft; an Ingersoll-Rand company.
 14. Windsor Republic Doors.

2.2 MATERIALS

- A. Cold-Rolled Steel Sheet: ASTM A 1008/A 1008M, Commercial Steel (CS), Type B; suitable for exposed applications.
- B. Hot-Rolled Steel Sheet: ASTM A 1011/A 1011M, Commercial Steel (CS), Type B; free of scale, pitting, or surface defects; pickled and oiled.
- C. Metallic-Coated Steel Sheet: ASTM A 653/A 653M, Commercial Steel (CS), Type B; with minimum A40 metallic coating.
- D. Frame Anchors: ASTM A 591/A 591M, Commercial Steel (CS), 40Z coating designation; mill phosphatized.

1. For anchors built into exterior walls, steel sheet complying with ASTM A 1008/A 1008M or ASTM A 1011/A 1011M, hot-dip galvanized according to ASTM A 153/A 153M, Class B.
- E. Inserts, Bolts, and Fasteners: Hot-dip galvanized according to ASTM A 153/A 153M.
- F. Powder-Actuated Fasteners in Concrete: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with clips or other accessory devices for attaching hollow metal frames of type indicated.
- G. Grout: ASTM C 476, except with a maximum slump of 4 inches, as measured according to ASTM C 143/C 143M.
- H. Mineral-Fiber Insulation: ASTM C 665, Type I (blankets without membrane facing); consisting of fibers manufactured from slag or rock wool with 6- to 12-lb/cu. ft. density; with maximum flame-spread and smoke-development indexes of 25 and 50, respectively; passing ASTM E 136 for combustion characteristics.
- I. Bituminous Coating: Cold-applied asphalt mastic, SSPC-Paint 12, compounded for 15-mil dry film thickness per coat. Provide inert-type noncorrosive compound free of asbestos fibers, sulfur components, and other deleterious impurities.

2.3 STANDARD HOLLOW METAL DOORS

- A. General: Provide doors of design indicated, not less than thickness indicated; fabricated with smooth surfaces, without visible joints or seams on exposed faces unless otherwise indicated. Comply with ANSI/SDI A250.8.
 1. Design: Flush panel.
 2. Core Construction: Manufacturer's standard kraft-paper honeycomb, polystyrene, polyurethane, polyisocyanurate, mineral-board, or vertical steel-stiffener core.
 - a. Fire Door Core: As required to provide fire-protection and temperature-rise ratings indicated.
 - b. Thermal-Rated (Insulated) Doors: At exterior locations provide doors fabricated with thermal-resistance value (R-value) of not less than 12.3 deg F x h x sq. ft./Btu when tested according to ASTM C 1363.
 3. Vertical Edges for Single-Acting Doors: Manufacturer's standard.
 - a. Beveled Edge: 1/8 inch in 2 inches.
 4. Vertical Edges for Double-Acting Doors: Round vertical edges with 2-1/8-inch radius.
 5. Top and Bottom Edges: Closed with flush or inverted 0.042-inch-thick, end closures or channels of same material as face sheets.
 6. Tolerances: Comply with SDI 117, "Manufacturing Tolerances for Standard Steel Doors and Frames."

- B. Exterior Doors: Face sheets fabricated from metallic-coated steel sheet. Provide doors complying with requirements indicated below by referencing ANSI/SDI A250.8 for level and model and ANSI/SDI A250.4 for physical performance level:
 - 1. Level 3 and Physical Performance Level A (Extra Heavy Duty), Model 2 (Seamless).
- C. Interior Doors: Face sheets fabricated from cold-rolled steel sheet. Provide doors complying with requirements indicated below by referencing ANSI/SDI A250.8 for level and model and ANSI/SDI A250.4 for physical performance level:
 - 1. Level 2 and Physical Performance Level B (Heavy Duty), Model 2 (Seamless).
- D. Hardware Reinforcement: Fabricate according to ANSI/SDI A250.6 with reinforcing plates from same material as door face sheets.
- E. Fabricate concealed stiffeners and hardware reinforcement from either cold- or hot-rolled steel sheet.

2.4 STANDARD HOLLOW METAL FRAMES

- A. General: Comply with ANSI/SDI A250.8 and with details indicated for type and profile.
- B. Exterior Frames: Fabricated from metallic-coated steel sheet.
 - 1. Fabricate frames with mitered or coped corners.
 - 2. Fabricate frames as full profile welded unless otherwise indicated.
 - 3. Frames for Level 3 Steel Doors: 0.053-inch-thick steel sheet.
- C. Interior Frames: Fabricated from cold-rolled steel sheet.
 - 1. Fabricate frames with mitered or coped corners.
 - 2. Fabricate frames as full profile welded unless otherwise indicated.
 - 3. Fabricate knocked-down, drywall slip-on frames for in-place gypsum board partitions.
 - 4. Frames for Level 3 Steel Doors: 0.053-inch-thick steel sheet.
 - 5. Frames for Wood Doors: 0.053-inch-thick steel sheet.
 - 6. Frames for Borrowed Lights: Same as adjacent door frame.
- D. Hardware Reinforcement: Fabricate according to ANSI/SDI A250.6 with reinforcement plates from same material as frames.

2.5 FRAME ANCHORS

- A. Jamb Anchors:
 - 1. Masonry Type: Adjustable strap-and-stirrup or T-shaped anchors to suit frame size, not less than 0.042 inch thick, with corrugated or perforated straps not less than 2 inches wide by 10 inches long; or wire anchors not less than 0.177 inch thick.
 - 2. Stud-Wall Type: Designed to engage stud, welded to back of frames; not less than 0.042 inch thick.

3. Compression Type for Drywall Slip-on Frames: Adjustable compression anchors.
 4. Postinstalled Expansion Type for In-Place Concrete or Masonry: Minimum 3/8-inch-diameter bolts with expansion shields or inserts. Provide pipe spacer from frame to wall, with throat reinforcement plate, welded to frame at each anchor location.
- B. Floor Anchors: Formed from same material as frames, not less than 0.042 inch thick, and as follows:
1. Monolithic Concrete Slabs: Clip-type anchors, with two holes to receive fasteners.
 2. Separate Topping Concrete Slabs: Adjustable-type anchors with extension clips, allowing not less than 2-inch height adjustment. Terminate bottom of frames at finish floor surface.

2.6 STOPS AND MOLDINGS

- A. Moldings for Glazed Lites in Doors: Minimum 0.032 inch thick, fabricated from same material as door face sheet in which they are installed.
- B. Fixed Frame Moldings: Formed integral with hollow metal frames, a minimum of 5/8 inch high unless otherwise indicated.
- C. Loose Stops for Glazed Lites in Frames: Minimum 0.032 inch thick, fabricated from same material as frames in which they are installed.

2.7 ACCESSORIES

- A. Mullions and Transom Bars: Join to adjacent members by welding or rigid mechanical anchors.
- B. Ceiling Struts: Minimum 1/4-inch-thick by 1-inch-wide steel.
- C. Grout Guards: Formed from same material as frames, not less than 0.016 inch thick.

2.8 FABRICATION

- A. Fabricate hollow metal work to be rigid and free of defects, warp, or buckle. Accurately form metal to required sizes and profiles, with minimum radius for thickness of metal. Where practical, fit and assemble units in manufacturer's plant. To ensure proper assembly at Project site, clearly identify work that cannot be permanently factory assembled before shipment.
- B. Tolerances: Fabricate hollow metal work to tolerances indicated in SDI 117.
- C. Hollow Metal Doors:
 1. Exterior Doors: Provide weep-hole openings in bottom of exterior doors to permit moisture to escape. Seal joints in top edges of doors against water penetration.
 2. Glazed Lites: Factory cut openings in doors.

3. Astragals: Provide overlapping astragal on one leaf of pairs of doors where required by NFPA 80 for fire-performance rating or where indicated. Extend minimum 3/4 inch (19 mm) beyond edge of door on which astragal is mounted.
- D. Hollow Metal Frames: Where frames are fabricated in sections due to shipping or handling limitations, provide alignment plates or angles at each joint, fabricated of same thickness metal as frames.
 1. Welded Frames: Weld flush face joints continuously; grind, fill, dress, and make smooth, flush, and invisible.
 2. Provide countersunk, flat- or oval-head exposed screws and bolts for exposed fasteners unless otherwise indicated.
 3. Grout Guards: Weld guards to frame at back of hardware mortises in frames to be grouted.
 4. Floor Anchors: Weld anchors to bottom of jambs and mullions with at least four spot welds per anchor.
 5. Jamb Anchors: Provide number and spacing of anchors as follows:
 - a. Masonry Type: Locate anchors not more than 18 inches from top and bottom of frame. Space anchors not more than 32 inches o.c. and as follows:
 - 1) Two anchors per jamb up to 60 inches high.
 - 2) Three anchors per jamb from 60 to 90 inches high.
 - 3) Four anchors per jamb from 90 to 120 inches high.
 - 4) Four anchors per jamb plus 1 additional anchor per jamb for each 24 inches or fraction thereof above 120 inches high.
 - b. Stud-Wall Type: Locate anchors not more than 18 inches from top and bottom of frame. Space anchors not more than 32 inches o.c. and as follows:
 - 1) Three anchors per jamb up to 60 inches high.
 - 2) Four anchors per jamb from 60 to 90 inches high.
 - 3) Five anchors per jamb from 90 to 96 inches high.
 - 4) Five anchors per jamb plus 1 additional anchor per jamb for each 24 inches or fraction thereof above 96 inches high.
 - 5) Two anchors per head for frames above 42 inches wide and mounted in metal-stud partitions.
 - c. Compression Type: Not less than two anchors in each jamb.
 - d. Postinstalled Expansion Type: Locate anchors not more than 6 inches from top and bottom of frame. Space anchors not more than 26 inches o.c.
 6. Door Silencers: Except on weather-stripped doors, drill stops to receive door silencers as follows. Keep holes clear during construction.
 - a. Single-Door Frames: Drill stop in strike jamb to receive three door silencers.
 - b. Double-Door Frames: Drill stop in head jamb to receive two door silencers.
- E. Fabricate concealed stiffeners, edge channels, and hardware reinforcement from either cold- or hot-rolled steel sheet.

- F. Hardware Preparation: Factory prepare hollow metal work to receive templated mortised hardware; include cutouts, reinforcement, mortising, drilling, and tapping according to the Door Hardware Schedule and templates furnished as specified in Division 8 Section "Door Hardware."
 - 1. Locate hardware as indicated, or if not indicated, according to ANSI/SDI A250.8.
 - 2. Reinforce doors and frames to receive nontemplated, mortised and surface-mounted door hardware.
 - 3. Comply with applicable requirements in ANSI/SDI A250.6 and ANSI/DHI A115 Series specifications for preparation of hollow metal work for hardware.
 - 4. Coordinate locations of conduit and wiring boxes for electrical connections with Division 16 Sections.

- G. Stops and Moldings: Provide stops and moldings around glazed lites where indicated. Form corners of stops and moldings with butted or mitered hairline joints.
 - 1. Single Glazed Lites: Provide fixed stops and moldings welded on secure side of hollow metal work.
 - 2. Multiple Glazed Lites: Provide fixed and removable stops and moldings so that each glazed lite is capable of being removed independently.
 - 3. Provide fixed frame moldings on outside of exterior and on secure side of interior doors and frames.
 - 4. Provide loose stops and moldings on inside of hollow metal work.
 - 5. Coordinate rabbet width between fixed and removable stops with type of glazing and type of installation indicated.

2.9 STEEL FINISHES

- A. Prime Finish: Apply manufacturer's standard primer immediately after cleaning and pretreating.
 - 1. Shop Primer: Manufacturer's standard, fast-curing, lead- and chromate-free primer complying with ANSI/SDI A250.10 acceptance criteria; recommended by primer manufacturer for substrate; compatible with substrate and field-applied coatings despite prolonged exposure.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Examine roughing-in for embedded and built-in anchors to verify actual locations before frame installation.
- C. For the record, prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work.
- D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Remove welded-in shipping spreaders installed at factory. Restore exposed finish by grinding, filling, and dressing, as required to make repaired area smooth, flush, and invisible on exposed faces.
- B. Prior to installation, adjust and securely brace welded hollow metal frames for squareness, alignment, twist, and plumbness to the following tolerances:
 - 1. Squareness: Plus or minus 1/16 inch, measured at door rabbet on a line 90 degrees from jamb perpendicular to frame head.
 - 2. Alignment: Plus or minus 1/16 inch, measured at jambs on a horizontal line parallel to plane of wall.
 - 3. Twist: Plus or minus 1/16 inch, measured at opposite face corners of jambs on parallel lines, and perpendicular to plane of wall.
 - 4. Plumbness: Plus or minus 1/16 inch, measured at jambs on a perpendicular line from head to floor.
- C. Drill and tap doors and frames to receive nontemplated, mortised, and surface-mounted door hardware.

3.3 INSTALLATION

- A. General: Install hollow metal work plumb, rigid, properly aligned, and securely fastened in place; comply with Drawings and manufacturer's written instructions.
- B. Hollow Metal Frames: Install hollow metal frames of size and profile indicated. Comply with ANSI/SDI A250.11.
 - 1. Set frames accurately in position, plumbed, aligned, and braced securely until permanent anchors are set. After wall construction is complete, remove temporary braces, leaving surfaces smooth and undamaged.
 - a. At fire-protection-rated openings, install frames according to NFPA 80.
 - b. Where frames are fabricated in sections because of shipping or handling limitations, field splice at approved locations by welding face joint continuously; grind, fill, dress, and make splice smooth, flush, and invisible on exposed faces.
 - c. Install frames with removable glazing stops located on secure side of opening.
 - d. Install door silencers in frames before grouting.
 - e. Remove temporary braces necessary for installation only after frames have been properly set and secured.
 - f. Check plumbness, squareness, and twist of frames as walls are constructed. Shim as necessary to comply with installation tolerances.
 - g. Field apply bituminous coating to backs of frames that are filled with grout containing antifreezing agents.
 - 2. Floor Anchors: Provide floor anchors for each jamb and mullion that extends to floor, and secure with postinstalled expansion anchors.

- a. Floor anchors may be set with powder-actuated fasteners instead of postinstalled expansion anchors if so indicated and approved on Shop Drawings.
 3. Metal-Stud Partitions: Solidly pack mineral-fiber insulation behind frames.
 4. Masonry Walls: Coordinate installation of frames to allow for solidly filling space between frames and masonry with grout.
 5. Concrete Walls: Solidly fill space between frames and concrete with grout. Take precautions, including bracing frames, to ensure that frames are not deformed or damaged by grout forces.
 6. In-Place Concrete or Masonry Construction: Secure frames in place with postinstalled expansion anchors. Countersink anchors, and fill and make smooth, flush, and invisible on exposed faces.
 7. In-Place Gypsum Board Partitions: Secure frames in place with postinstalled expansion anchors through floor anchors at each jamb. Countersink anchors, and fill and make smooth, flush, and invisible on exposed faces.
 8. Ceiling Struts: Extend struts vertically from top of frame at each jamb to overhead structural supports or substrates above frame unless frame is anchored to masonry or to other structural support at each jamb. Bend top of struts to provide flush contact for securing to supporting construction. Provide adjustable wedged or bolted anchorage to frame jamb members.
 9. Installation Tolerances: Adjust hollow metal door frames for squareness, alignment, twist, and plumb to the following tolerances:
 - a. Squareness: Plus or minus 1/16 inch, measured at door rabbet on a line 90 degrees from jamb perpendicular to frame head.
 - b. Alignment: Plus or minus 1/16 inch, measured at jambs on a horizontal line parallel to plane of wall.
 - c. Twist: Plus or minus 1/16 inch, measured at opposite face corners of jambs on parallel lines, and perpendicular to plane of wall.
 - d. Plumbness: Plus or minus 1/16 inch, measured at jambs at floor.
- C. Hollow Metal Doors: Fit hollow metal doors accurately in frames, within clearances specified below. Shim as necessary.
1. Non-Fire-Rated Standard Steel Doors:
 - a. Jambs and Head: 1/8 inch plus or minus 1/16 inch.
 - b. Between Edges of Pairs of Doors: 1/8 inch plus or minus 1/16 inch.
 - c. Between Bottom of Door and Top of Threshold: Maximum 3/8 inch.
 - d. Between Bottom of Door and Top of Finish Floor (No Threshold): Maximum 3/4 inch.
 2. Fire-Rated Doors: Install doors with clearances according to NFPA 80.
- D. Glazing: Comply with installation requirements in Division 8 Section "Glazing" and with hollow metal manufacturer's written instructions.
1. Secure stops with countersunk flat- or oval-head machine screws spaced uniformly not more than 9 inches o.c. and not more than 2 inches o.c. from each corner.

3.4 ADJUSTING AND CLEANING

- A. Final Adjustments: Check and readjust operating hardware items immediately before final inspection. Leave work in complete and proper operating condition. Remove and replace defective work, including hollow metal work that is warped, bowed, or otherwise unacceptable.
- B. Remove grout and other bonding material from hollow metal work immediately after installation.
- C. Prime-Coat Touchup: Immediately after erection, sand smooth rusted or damaged areas of prime coat and apply touchup of compatible air-drying, rust-inhibitive primer.
- D. Metallic-Coated Surfaces: Clean abraded areas and repair with galvanizing repair paint according to manufacturer's written instructions.

END OF SECTION

SECTION 08211 - FLUSH WOOD DOORS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Solid-core doors with wood-veneer faces.
2. Factory machining for hardware and fitting flush wood doors to frames.

B. Related Sections:

1. Division 8 Section "Glazing" for glass view panels in flush wood doors.
2. Division 8 Section "Work at Existing Openings" for new or repaired doors and frames indicated at existing openings.
3. Division 9 Section "Painting" for field finishing of doors.
4. Division 10 Section "Louvers" for louvers installed in flush wood doors as indicated in HVAC drawings.

1.3 SUBMITTALS

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

- B. Shop Drawings: Indicate location, size, and hand of each door; elevation of each kind of door; construction details not covered in Product Data; location and extent of hardware blocking; and other pertinent data.

1. Indicate dimensions and locations of mortises and holes for hardware.
2. Indicate dimensions and locations of cutouts.
3. Indicate requirements for veneer matching.
4. Indicate doors to be factory finished and finish requirements.
5. Indicate fire-protection ratings for fire-rated doors.

C. Samples for Verification:

1. Corner sections of doors, approximately 8 by 10 inches, with door faces and edges representing actual materials to be used.
 - a. Provide samples for each species of veneer and solid lumber required.
2. Frames for light openings, 6 inches long, for each material, type, and finish required.

- D. Warranty: Sample of special warranty.

1.4 QUALITY ASSURANCE

- A. Manufacturer Qualifications: A qualified manufacturer that is certified for chain of custody by an FSC-accredited certification body.
- B. Source Limitations: Obtain flush wood doors from single manufacturer.
- C. Quality Standard: In addition to requirements specified, comply with AWI's "Architectural Woodwork Quality Standards Illustrated."
 - 1. Provide AWI Quality Certification Labels or an AWI letter of licensing for Project indicating that doors comply with requirements of grades specified.
- D. Fire-Rated Wood Doors: Doors complying with NFPA 80 that are listed and labeled by a qualified testing agency, for fire-protection ratings indicated.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Comply with requirements of referenced standard and manufacturer's written instructions.
- B. Package doors individually.
- C. Mark each door on bottom rail with opening number used on Shop Drawings.

1.6 PROJECT CONDITIONS

- A. Environmental Limitations: Do not deliver or install doors until spaces are enclosed and weathertight, wet work in spaces is complete and dry, and HVAC system is operating and maintaining ambient temperature and humidity conditions at occupancy levels during the remainder of the construction period.

1.7 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace doors that fail in materials or workmanship within specified warranty period.
 - 1. Failures include, but are not limited to, the following:
 - a. Warping (bow, cup, or twist) more than 1/4 inch in a 42-by-84-inch section.
 - b. Telegraphing of core construction in face veneers exceeding 0.01 inch in a 3-inch span.
 - 2. Warranty shall also include installation and finishing that may be required due to repair or replacement of defective doors.
 - 3. Warranty Period for Solid-Core Interior Doors: Life of installation.

PART 2 - PRODUCTS

2.1 DOOR CONSTRUCTION, GENERAL

- A. Low-Emitting Materials: Provide doors made with adhesives and composite wood products that do not contain urea formaldehyde.
- B. WDMA I.S.1-A Performance Grade: Heavy Duty.
- C. Structural-Composite-Lumber-Core Doors:
 - 1. Structural Composite Lumber: WDMA I.S.10.
 - a. Screw Withdrawal, Face: 700 lbf .
 - b. Screw Withdrawal, Edge: 400 lbf.
- D. Fire-Protection-Rated Doors: Provide core specified or mineral core as needed to provide fire-protection rating indicated.
 - 1. Edge Construction: Provide edge construction with intumescent seals concealed by outer stile. Comply with specified requirements for exposed edges.
 - 2. Pairs: Provide fire-retardant stiles that are listed and labeled for applications indicated without formed-steel edges and astragals. Comply with specified requirements for exposed edges.
- E. Mineral-Core Doors:
 - 1. Core: Noncombustible mineral product complying with requirements of referenced quality standard and testing and inspecting agency for fire-protection rating indicated.
 - 2. Blocking: Provide composite blocking with improved screw-holding capability approved for use in doors of fire-protection ratings indicated as follows:
 - a. 5-inch top-rail blocking.
 - b. 5-inch bottom-rail blocking, in doors indicated to have protection plates.
 - c. 5-inch mid-rail blocking, in doors indicated to have exit devices.
 - 3. Edge Construction: At hinge stiles, provide laminated-edge construction with improved screw-holding capability and split resistance. Comply with specified requirements for exposed edges.

2.2 VENEERED-FACED DOORS FOR TRANSPARENT FINISH

- A. Wood Species and Cut for Transparent Finish: Wood Species and Cut: Red Oak (*Quercus rubra*) quarter sawn or cut, all heartwood.
- B. Doors:
 - 1. AWI Grade: Custom.

2. Species: Red Oak (*Quercus rubra*).
3. Veneer Thickness: 1/8" minimum.
4. Exposed Vertical Edges: Same species as faces.
5. Core: Glued wood stave unless Mineral Core required for fire rating.
6. Construction: Five ply.

2.3 DOORS FOR OPAQUE FINISH

A. Interior Solid-Core Doors:

1. AWI Grade: Custom.
2. Faces: Medium-density overlay.
3. Exposed Vertical Edges: Any closed-grain hardwood.
4. Core: Glued wood stave, unless Mineral Core required for fire rating.
5. Construction: Five ply.

2.4 FABRICATION

A. Factory fit doors to suit frame-opening sizes indicated. Comply with clearance requirements of referenced quality standard for fitting unless otherwise indicated.

1. Comply with requirements in NFPA 80 for fire-rated doors.

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

1. Coordinate with hardware mortises in metal frames to verify dimensions and alignment before factory machining.
2. Metal Astragals: Factory machine astragals and formed-steel edges for hardware for pairs of fire-rated doors.

C. Openings: Cut and trim openings through doors in factory.

1. Light Openings: Trim openings with moldings of material and profile indicated.
2. Glazing: Factory install glazing in doors indicated to be factory finished. Comply with applicable requirements in Division 8 Section "Glazing."
3. Louvers: Factory install louvers in prepared openings.

PART 3 - EXECUTION

3.1 EXAMINATION

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

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

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

3.2 INSTALLATION

- A. Hardware: For installation, see Division 8 Section "Door Hardware."
- B. Installation Instructions: Install doors to comply with manufacturer's written instructions and the referenced quality standard, and as indicated.
 - 1. Install fire-rated doors in corresponding fire-rated frames according to NFPA 80.
- C. Job-Fitted Doors: Align and fit doors in frames with uniform clearances and bevels as indicated below; do not trim stiles and rails in excess of limits set by manufacturer or permitted for fire-rated doors. Machine doors for hardware. Seal edges of doors, edges of cutouts, and mortises after fitting and machining.
 - 1. Clearances: Provide 1/8 inch at heads, jambs, and between pairs of doors. Provide 1/8 inch from bottom of door to top of decorative floor finish or covering unless otherwise indicated. Where threshold is shown or scheduled, provide 1/4 inch (6.4 mm) from bottom of door to top of threshold unless otherwise indicated.
 - a. Comply with NFPA 80 for fire-rated doors.
 - 2. Bevel non-fire-rated doors 1/8 inch in 2 inches at lock and hinge edges.
 - 3. Bevel fire-rated doors 1/8 inch in 2 inches at lock edge; trim stiles and rails only to extent permitted by labeling agency.
- D. Factory-Fitted Doors: Align in frames for uniform clearance at each edge.

3.3 ADJUSTING

- A. Operation: Rehang or replace doors that do not swing or operate freely.
- B. Finished Doors: Replace doors that are damaged or that do not comply with requirements. Doors may be repaired or refinished if work complies with requirements and shows no evidence of repair or refinishing.

END OF SECTION

SECTION 08212 - STILE AND RAIL WOOD DOORS

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Exterior stile and rail wood doors.
 - 2. Interior stile and rail wood doors.
 - 3. Fitting stile and rail wood doors to frames and machining for hardware.
- B. Related Sections:
 - 1. Division 8 Section "Door Hardware."
 - 2. Division 9 Section "Painting" for field refinishing of existing stile and rail doors.

1.3 SUBMITTALS

- A. Product Data: For each type of product indicated.
 - 1. Include details of construction and glazing.
- B. Shop Drawings: For stile and rail wood doors. Indicate location, size, and hand of each door; elevation of each kind of door; construction details not covered in Product Data, including those for stiles, rails, panels, and moldings (sticking); and other pertinent data, including the following:
 - 1. Dimensions of doors.
 - 2. Locations and dimensions of mortises and holes for hardware.
- C. Samples for Verification: Corner sections of doors, approximately 8 by 10 inches, with door faces and edgings representing typical range of color and grain for each species of veneer and solid lumber required.
- D. Warranty: Sample of special warranty.

1.4 QUALITY ASSURANCE

- A. Source Limitations: Obtain stile and rail wood doors from same fabricator as work in Division 6 Section "Interior Architectural Woodwork."

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

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Comply with manufacturer's written instructions and requirements of quality standard referenced in Part 2.
- B. Package doors individually in opaque plastic bags or cardboard cartons.
- C. Mark each door on top and bottom edge with opening number used on Shop Drawings.

1.6 PROJECT CONDITIONS

- A. Environmental Limitations: Do not deliver or install doors until spaces are enclosed and weathertight, wet work in spaces is complete and dry, and temporary HVAC system is operating and maintaining ambient temperature and humidity conditions at occupancy levels during the remainder of the construction period.

1.7 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace doors that fail in materials or workmanship, or have warped (bow, cup, or twist) more than 1/4 inch in a 42-by-84-inch section.
 - 1. Warranty shall also include installation and finishing that may be required due to repair or replacement of defective doors.
 - 2. Warranty shall be in effect during the following period of time from date of Substantial Completion:
 - a. Exterior Doors: Five years.
 - b. Interior Doors: Life of installation.
 - c. Insulating Glass Vision Panels: Five years.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. General: Use only materials that comply with referenced standards and other requirements specified.
 - 1. Assemble exterior doors and sidelites, including components, with wet-use adhesives complying with ASTM D 5572 for finger joints and with ASTM D 5751 for joints other than finger joints.

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

B. Panel Products: As indicated:

1. Veneer core plywood.
2. Clear softwood.

2.2 STILE AND RAIL WOOD DOORS

A. Stile and Rail Wood Doors: Custom doors complying with AWI's "Architectural Woodwork Quality Standards," and with other requirements specified.

1. Grade: Custom.
2. Stile and Rail Wood Species and Cut:
 - a. At interior doors visible from within the historic library: Red Oak (*Quercus rubra*) quarter sawn or cut, all heartwood.
 - b. At interior doors visible solely within the new construction: Any closed grain hardwood.
 - c. At exterior opaque finish door at garden level vestibule: Honduras Mahogany (*Swietenia macrophylla*).
3. Finish:
 - a. At doors visible from within the historic library: Satin transparent finish.
 - b. At interior doors visible solely within the new construction: Opaque finish matching color and gloss of architect's sample.
 - c. At exterior door at garden level vestibule: Opaque finish matching color and gloss of architect's sample.
4. Stile and Rail Construction:
 - a. For Transparent Finish: Clear lumber; may be edge glued for width. Select stock for similarity of grain and color, and arrange for optimum match between adjacent pieces.
 - b. For Opaque Finish: Clear lumber; may be edge glued for width.
5. Flat Panel Construction:
 - a. For Transparent Finish: Red Oak (*Quercus rubra*) quarter sawn veneered, wood-based panel product.
 - b. For Opaque Finish: MDO, resin impregnated fiber over wood-based panel product.
6. Panel Designs: Indicated by Drawings. Do not modify intended aesthetic effects, as judged solely by Architect, except with Architect's approval. If modifications are proposed, submit comprehensive explanatory data to Architect for review.
7. Stile and Rail Widths: As indicated.
8. Molding Profile: As indicated.

9. Panel Design: As indicated.
10. Glass for Openings at Interior Doors: Uncoated, clear, fully tempered float glass, 5.0 mm thick. See Division 8 Section "Glazing."
11. Glass for Openings at Exterior Doors: Uncoated, insulating-glass units made from two lites of 3.0-mm-thick, clear, fully tempered glass with 1/4-inch airspace.

2.3 STILE AND RAIL WOOD DOOR FABRICATION

- A. Fabricate stile and rail wood doors in sizes indicated for field fitting.
- B. Factory machine doors for hardware that is not surface applied. Locate hardware to comply with DHI-WDHS-3. Comply with final hardware schedules, door frame Shop Drawings, DHI A115-W Series standards, and hardware templates.
 1. Coordinate measurements of hardware mortises in metal frames to verify dimensions and alignment before factory machining.
- C. Glazed Openings: Trim openings indicated for glazing with solid wood moldings, with one side removable. Miter wood moldings at corner joints.
- D. Glazed Openings: Glaze doors at factory with glass of type and thickness indicated, complying with Division 8 Section "Glazing." Install glass using manufacturer's standard elastomeric glazing sealant complying with ASTM C 920. Secure glass in place with removable wood moldings. Miter wood moldings at corner joints.
- E. Transom and Side Panels: Fabricate panels to match adjoining doors in materials, finish, and quality of construction.
- F. Exterior Doors: Factory treat exterior doors after fabrication with water-repellent preservative to comply with WDMA I.S.4. Flash top of outswinging doors with manufacturer's standard metal flashing.

2.4 SHOP FINISHING TRANSPARENT FINISH DOORS

- A. Shop finish transparent finish stile and rail doors as follows:
 1. General: Comply with referenced quality standard's requirements for factory finishing.
 2. Finish wood doors at factory that are indicated to receive transparent finish.
 3. Transparent Finish: Comply with requirements indicated for grade, finish system, staining effect, and sheen.
 4. Grade: Custom.
 5. Finish: AWI System TR-4 conversion varnish.
 6. Staining: Match Architect's sample.
 7. Effect: Filled finish.
 8. Sheen: Satin.

2.5 FIELD FINISHING OPAQUE FINISH DOORS

- A. Shop prime and field finish opaque finish stile and rail doors in accordance with requirements of Division 9 Section "Painting."

PART 3 – EXECUTION

3.1 EXAMINATION

- A. Examine doors and substrates, with Installer present, for suitable conditions where wood stile and rail doors will be installed.
 - 1. Verify that installed frames comply with indicated requirements for type, size, location, and swing characteristics and have been installed with level heads and plumb jambs.
 - 2. Reject doors with defects.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Hardware: For installation, see Division 8 Section "Door Hardware."
- B. Install wood doors to comply with manufacturer's written instructions, AWI's "Architectural Woodwork Quality Standards," and other requirements specified.
- C. Field-Fitted Doors: Align and fit doors in frames with uniform clearances and bevels as indicated below; do not trim stiles and rails in excess of limits set by manufacturer or permitted with fire-rated doors. Machine doors for hardware. Seal cut surfaces after fitting and machining.
 - 1. Clearances: Provide 1/8 inch at heads, jambs, and between pairs of doors. Provide 1/8 inch from bottom of door to top of decorative floor finish or covering. Where threshold is shown or scheduled, provide 1/4 inch from bottom of door to top of threshold.
 - 2. Bevel non-fire-rated doors 1/8 inch in 2 inches at lock and hinge edges.
- D. Factory-Fitted Doors: Align in frames for uniform clearance at each edge.

3.3 ADJUSTING

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

END OF SECTION

SECTION 08311 - ACCESS DOORS AND FRAMES

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Access doors and frames for floors, walls and ceilings.
- B. Related Sections include the following:
 - 1. Division 9 Section "Acoustical Tile Ceilings" for suspended acoustical tile ceilings.
 - 2. Division 9 Section "Painting," for field painting of factory primed access doors.
 - 3. Division 15 Section "Duct Accessories" for heating and air-conditioning duct access doors.

1.3 SUBMITTALS

- A. Product Data: For each type of access door and frame indicated. Include construction details, fire ratings, materials, individual components and profiles, and finishes.
- B. Shop Drawings: Show fabrication and installation details of access doors and frames for each type of substrate. Include plans, elevations, sections, details, and attachments to other work.
- C. Access Door and Frame Schedule: Provide complete access door and frame schedule, including types, locations, sizes, latching or locking provisions, and other data pertinent to installation.
- D. Ceiling Coordination Drawings: Reflected ceiling plans, drawn to scale, on which ceiling-mounted items including access doors and frames, lighting fixtures, diffusers, grilles, speakers, sprinklers, and special trim are shown and coordinated with each other.

1.4 QUALITY ASSURANCE

- A. Source Limitations: Obtain access door(s) and frame(s) through one source from a single manufacturer.
- B. 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 listed and labeled by UL or another testing and inspecting agency acceptable to authorities having jurisdiction:

1. NFPA 252 or UL 10B for vertical access doors and frames.
 2. ASTM E 119 or UL 263 for horizontal access doors and frames.
- C. Size Variations: Obtain Architect's acceptance of manufacturer's standard-size units, which may vary slightly from sizes indicated.

1.5 COORDINATION

- A. Verification: Determine specific locations and sizes for access doors needed to gain access to concealed plumbing, mechanical, or other concealed work, and indicate in the schedule specified in "Submittals" Article.

PART 2 – PRODUCTS

2.1 STEEL MATERIALS FOR WALL AND CEILING DOORS

- A. Steel Sheet: Electrolytic zinc-coated, ASTM A 591/A 591M with cold-rolled steel sheet substrate complying with ASTM A 1008/A 1008M, Commercial Steel (CS), exposed.
- B. Steel Finishes: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
1. Surface Preparation for Steel Sheet: Clean surfaces to comply with SSPC-SP 1, "Solvent Cleaning," to remove dirt, oil, grease, or other contaminants that could impair paint bond.
 2. Factory-Primed Finish: Apply shop primer immediately after cleaning and pretreating.
- C. Drywall Beads: Edge trim formed from 0.0299-inch zinc-coated steel sheet formed to receive joint compound and in size to suit thickness of gypsum board.

2.2 STAINLESS-STEEL MATERIALS

- A. Stainless-Steel Sheet, Strip, Plate, and Flat Bars: ASTM A 666, Type 316. Remove tool and die marks and stretch lines or blend into finish.
1. Finish: Directional Satin Finish, No. 4.

2.3 MANUFACTURERS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
1. Acudor Products, Inc.
 2. Babcock-Davis; A Cierra Products Co.
 3. Bar-Co, Inc. Div.; Alfab, Inc.
 4. Bilco Company
 5. Dur-Red Products.

6. Elmdor/Stoneman; Div. of Acorn Engineering Co.
7. Jensen Industries.
8. J. L. Industries, Inc.
9. Karp Associates, Inc.
10. Larsen's Manufacturing Company.
11. MIFAB, Inc.
12. Milcor Inc.
13. Nystrom, Inc.

2.4 ACCESS DOORS AND FRAMES

A. Fire-Rated Floor Access Door: For use in Garden Storage Room.

1. Manufacturer:
Babcock-Davis
9300 73rd Ave. N
Brooklyn Park, MN 55428
Tel: 763.488.9247
Fax: 763.488.9248
2. Basis of Design Product: B-FCRM Series Insulated Aluminum Fire Door – 2 Hour.
3. Size: Custom size as indicated.
4. Door: 1/4" aluminum diamond-pattern tread plate, contains 3 inches of 3M Duct Wrap and 3 layers of 3M E-MAT insulation for thermal rating.
5. Frame: 1/4" extruded aluminum angle frame, contains fiberglass gasket on door stop for thermal rating and integral masonry anchor straps.
6. Hinge: Type 316 stainless steel butt hinge.
7. Latch: Type 316 stainless steel 2-point latch with inside pull handle and outside removable T-handle.
8. Finish: Mill finish. Frames provided with protective epoxy coating on areas that contact concrete.
9. Spring: Stainless steel gas springs to counterbalance door weight to achieve maximum 30lb lifting force. Springs also restrain door in 90 degree open position and allows door to close by gravity when closing is manually initiated.
10. Standard load capacity: Tested to 150 psf while subjected to the time temperature curve.
11. Testing Standards: NFPA 288 (formally known as ASTM E-119) (maximum temperature rise to 250 degrees F in 30 min.) 2 or 3-hour rating and NFPA 251 in floor/ceiling assembly. Subjected to hose stream test per NFPA 252, UL10(b), and UBC. Sizes up to and including 48 x 60 are rated for 2 or 3 hours.

B. Interior Flush Access Doors and Frames with Exposed Trim: For use within toilet rooms, fabricated from stainless-steel sheet.

1. Locations: Non-Rated walls with tiled surfaces.
2. Door: Minimum 0.060-inch-thick sheet metal, set flush with exposed face flange of frame.
3. Frame: Minimum 0.060-inch-thick sheet metal with 1-inch-wide, surface-mounted trim.
4. Hinges: Spring-loaded, concealed-pin type.
5. Latch: Cam latch operated by hex head wrench with interior release.

- C. Interior Flush Access Doors and Trimless Frames: For use on drywall surfaces, fabricated from factory primed steel sheet.
 - 1. Locations: Non-rated walls and ceilings with drywall surfaces.
 - 2. Door: Minimum 0.060-inch-thick sheet metal, set flush with surrounding finish surfaces.
 - 3. Frame: Minimum 0.060-inch-thick sheet metal with drywall bead flange.
 - 4. Hinges: Spring-loaded, concealed-pin type.
 - 5. Latch: Cam latch operated by hex head wrench with interior release.

- D. Interior Fire-Rated, Insulated, Flush Access Doors and Frames with Exposed Trim: For use within toilet rooms, fabricated from stainless-steel sheet.
 - 1. Locations: Fire-Rated walls with tiled surfaces.
 - 2. Fire-Resistance Rating: Not less than that of adjacent construction.
 - 3. Temperature Rise Rating: 250 deg F at the end of 30 minutes.
 - 4. Door: Flush panel with a core of mineral-fiber insulation enclosed in sheet metal with a minimum thickness of 0.036 inch.
 - 5. Frame: Minimum 0.060-inch-thick sheet metal with 1-inch wide, surface-mounted trim.
 - 6. Hinges: Concealed-pin type.
 - 7. Automatic Closer: Spring type.
 - 8. Latch: Self-latching device operated by flush key with interior release.

- E. Interior Fire-Rated, Insulated, Flush Access Doors and Trimless Frames: For use on drywall surfaces, fabricated from factory primed steel sheet.
 - 1. Locations: Fire-Rated walls and ceilings with drywall surfaces.
 - 2. Fire-Resistance Rating: Not less than that of adjacent construction.
 - 3. Temperature Rise Rating: 250 deg F at the end of 30 minutes.
 - 4. Door: Flush panel with a core of mineral-fiber insulation enclosed in sheet metal with a minimum thickness of 0.036 inch.
 - 5. Frame: Minimum 0.060-inch-thick sheet metal with drywall bead.
 - 6. Hinges: Concealed-pin type.
 - 7. Automatic Closer: Spring type.
 - 8. Latch: Self-latching device operated by flush key with interior release.

2.4 FABRICATION

- A. General: Provide access door and frame assemblies manufactured as integral units ready for installation.

- B. Metal Surfaces: For metal surfaces 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.

- C. Doors and Frames: Grind exposed welds smooth and flush with adjacent surfaces. Furnish attachment devices and fasteners of type required to secure access panels to types of supports indicated.
 - 1. Exposed Flanges: Nominal 1 to 1-1/2 inches wide around perimeter of frame.

2. For trimless frames with drywall bead, provide edge trim for gypsum board securely attached to perimeter of frames.
 3. Provide mounting holes in frames for attachment of units to metal or wood framing.
- D. Latching Mechanisms: Furnish number required to hold doors in flush, smooth plane when closed.

PART 3 – EXECUTION

3.1 INSTALLATION

- A. Comply with manufacturer's written instructions for installing access doors and frames.
- B. Set frames accurately in position and attach securely to supports with plane of face panels aligned with adjacent finish surfaces.
- C. Install doors flush with adjacent finish surfaces or recessed to receive finish material.

3.2 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.

END OF SECTION

SECTION 08361 - SECTIONAL OVERHEAD DOORS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes electrically operated sectional overhead doors.
- B. Related Sections include the following:
 - 1. Division 5 Section "Metal Fabrications" for miscellaneous steel supports.
 - 2. Division Section "Door Hardware" for cylinders for door locks.
 - 3. Division 9 Section "Painting" for finishing of sectional overhead doors.
 - 4. Division 16 Sections for electrical service and connections for powered operators and accessories.

1.3 PERFORMANCE REQUIREMENTS

- A. Structural Performance: Provide sectional overhead doors capable of withstanding the effects of gravity loads and the following loads and stresses without evidencing permanent deformation of door components:
 - 1. Wind Loads: Uniform pressure (velocity pressure) of 30 psf, acting inward and outward.
 - 2. Air Infiltration: Maximum Rate: 0.08 cfm at 15 mph.
- B. Operation-Cycle Requirements: Provide sectional overhead door components and operators capable of operating for not less than 20,000 cycles.

1.4 SUBMITTALS

- A. Product Data: For each type and size of sectional overhead door and accessory.
- B. Shop Drawings: Show dimensioned plans and elevations, large-scale details, attachment devices, and other components.
 - 1. Show locations and sizes of furring, blocking, and hanging strips, including concealed blocking and reinforcement specified in other Sections.
- C. Samples: For each exposed material.

1.5 QUALITY ASSURANCE

- A. Installer Qualifications: Manufacturer's authorized representative who is trained and approved for both installation and maintenance of units required for this Project.
- B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - 1. Wood Doors with Custom Panels:
 - a. Designer Doors
183 East Pomeroy Street
River Falls, WI 54022

2.2 WOOD DOOR SECTIONS

- A. Match the elevations, profiles and details of the sectional overhead garage doors as indicated in the drawings. Provide manufacturer's "Severe Weather Package."
- B. Panel-Type Sections: Stiles and rails of clear, vertical-grain, straight, kiln-dried Western Red Cedar, not less than 1-3/4 inches thick.
- C. Flush-Type Sections: Top, bottom, and end closures of clear, vertical-grain, straight, kiln-dried Western Red Cedar. Provide wood blocking to receive hardware, end stiles, and frames for glazing, glued and doweled in place. Form meeting rails to provide rabbeted weathertight-seal joint.

2.3 TRACKS, SUPPORTS, AND ACCESSORIES

- A. Tracks: Manufacturer's standard, stainless steel track system, sized for door size and weight, designed for lift type indicated and clearances shown, including brackets, bracing, and reinforcement for rigid support of ball-bearing roller guides for required door type and size. Weld or bolt to track supports.
 - 1. Provide tracks configured for the following lift types:
 - a. Standard.
 - 2. Track Reinforcement and Supports: Stainless steel supporting members to provide strength and rigidity during opening and closing of doors.

- B. Weatherseals: Replaceable, adjustable, continuous, compressible weather-stripping gaskets of flexible vinyl, rubber, or neoprene fitted to bottom and top of overhead door.
 - 1. Provide motor-operated doors with combination bottom weatherseal and sensor edge.
 - 2. Provide continuous flexible seals at door jambs for a weathertight installation.

2.4 HARDWARE

- A. General: Provide heavy-duty, corrosion-resistant hardware to suit door type.
- B. Hinges: Heavy-duty stainless steel hinges at each end stile and at each intermediate stile. Attach hinges to door sections through stiles and rails. Provide double-end hinges where required and for doors exceeding 16 feet in width.
- C. Rollers: Heavy-duty rollers with steel ball bearings in case-hardened steel races.
- D. Locking device assembly with lock, dead bolt, operating handle, and adjustable locking bar to engage through slots in tracks.
 - 1. Locking Bars: Full-disc cremone type, both jamb sides operable from inside and outside.
 - 2. Lock cylinder is specified in Division 8 Section "Door Hardware."
- E. Chain Lock Keeper: Suitable for padlock.
- F. Provide safety interlock switch to disengage power supply when door is locked.

2.5 COUNTERBALANCE MECHANISM

- A. Torsion Spring: Fabricated from oil-tempered-steel wire, mounted on a cross-header tube or steel shaft. Connect to door with galvanized aircraft-type lift cables with cable safety factor of at least 5 to 1. Provide springs calibrated for a minimum of 20,000 cycles.
- B. Bracket: Provide anchor support bracket as required to connect stationary end of spring to the wall and to level shaft and prevent sag.
- C. Provide a spring bumper at each horizontal track to cushion door at end of opening operation.

2.6 MANUAL DOOR OPERATORS FOR EMERGENCY USE

- A. Reduction-Drive, Chain-Hoist Operation: Provide side-mounted unit for use during power failure.

2.7 ELECTRIC DOOR OPERATORS

- A. General: Provide electric door operator assembly of size and capacity recommended and provided by door manufacturer for door and operation-cycle requirements specified, and accessories required for proper operation.

- B. Disconnect Device: Hand-operated disconnect device for automatically engaging chain-and-sprocket operator and releasing brake for emergency manual operation while disconnecting motor without affecting timing of limit switch. Mount disconnect device and operator so they are accessible from floor level. Include interlock device to automatically prevent motor from operating when emergency operator is engaged.
- C. Provide control equipment, maximum 24-V, ac or dc.
- D. Door-Operator Type: Unit consisting of electric motor, trolley or drawbar type, and floor-level quick release for manual operation.
- E. Electric Motors: High-starting torque, reversible, continuous-duty, with overload protection, sized to start, accelerate, and operate door in either direction from any position.
 - 1. Coordinate wiring requirements and electrical characteristics of motors with building electrical system.
- F. Remote-Control Station: Momentary-contact, three-button control station with push-button controls labeled "Open," "Close," and "Stop."
- G. Obstruction Detection Device: Automatic safety sensor capable of protecting full width of door opening. Activation of sensor immediately stops and reverses downward door travel.
- H. Limit Switches: Adjustable switches interlocked with motor controls and set to automatically stop door at fully opened and fully closed positions.
- I. Radio Control: Radio control system.

PART 3 - EXECUTION

3.1 INSTALLATION

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

3.2 STARTUP SERVICES

- A. Engage a factory-authorized service representative to perform startup services.

3.3 ADJUSTING

- A. Lubricate bearings and sliding parts; adjust doors to operate easily, free of warp, twist, or distortion and with weathertight fit around entire perimeter.
- B. Touch-up Painting: Immediately after welding galvanized track to track supports, clean field welds and abraded galvanized surfaces and repair galvanizing to comply with ASTM A 780.

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END OF SECTION

SECTIONAL OVERHEAD DOORS
08361 - 5
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SECTION 08520 - ALUMINUM WINDOWS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes:
 - 1. New fixed windows at new openings:
 - 2. Custom aluminum cap extensions at heads, jambs and sills of windows where so shown.
- B. Related Sections include the following:
 - 1. Division 7 Section "Joint Sealants" for sealants at perimeters of systems specified herein.
 - 2. Division 7 Section "Joint Sealants" for joint sealant product specification for joint sealants provided and installed as part of this Section.
 - 3. Division 8 Section "Glazing" for glass product specification and installation requirements.
 - 4. Division 9 Section "Painting" for preparation and painting of interior and exterior

1.3 DEFINITIONS

- A. AW: Architectural.
- B. HC: Heavy Commercial.
- C. Performance grade number, included as part of the AAMA/NWWDA product designation code, is actual design pressure in pounds force per square foot used to determine structural test pressure and water test pressure.
- D. Structural test pressure, for uniform load structural test, is equivalent to 150 percent of design pressure.
- E. Minimum test size is smallest size permitted for performance class (gateway test size). Products must be tested at minimum test size or at a size larger than minimum test size to comply with requirements for performance class.
- F. Performance grade number according to AAMA/WDMA 101/I.S.2/NAFS:
 - 1. Design pressure number in pounds force per square foot (pascals) used to determine the structural test pressure and water test pressure.
- G. Structural Test Pressure: For uniform load structural test, is equivalent to 150 percent of the design pressure.

- H. Minimum Test Size: Smallest size permitted for performance class (gateway test size). Products must be tested at minimum test size or at a size larger than minimum test size to comply with requirements for performance class.

1.4 PERFORMANCE REQUIREMENTS

- A. General: Provide aluminum windows capable of complying with performance requirements indicated, based on testing manufacturer's windows that are representative of those specified, and that are of minimum test size indicated below:
 - 1. Size indicated on Drawings.
- B. Structural Performance: Provide aluminum windows capable of withstanding the effects of the following loads, based on testing units representative of those indicated for Project that pass AAMA/WDMA 101/I.S.2/NAFS, Uniform Load Structural Test:
- C. Structural Loads:
 - 1. Basic Wind Speed: 100 mph
 - 2. Components and Cladding Pressure on System (including internal pressure): 22 psf at center of building elevations. Adjust analysis to account for higher pressures at building corners.
 - 3. Importance Factor: 1.0.
 - 4. Exposure Category: B.
 - 5. Design Seismic Story Drift (with amplification factor): 2.5".
- D. Thermal Movements: Provide aluminum windows, including anchorage, that allow for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures by preventing buckling, opening of joints, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
 - 1. Temperature Change: 120 deg F, ambient; 180 deg F material surfaces.

1.5 SUBMITTALS

- A. Product Data: Include construction details, material descriptions, fabrication methods, dimensions of individual components and profiles, hardware, finishes, and operating instructions for each type of aluminum window indicated.
- B. Shop Drawings: Include plans, elevations, sections, details, hardware, attachments to other Work, operational clearances, and the following:
 - 1. Mullion details, including reinforcement and stiffeners.
 - 2. Joinery details.
 - 3. Expansion provisions.
 - 4. Flashing and drainage details.
 - 5. Weather-stripping details.
 - 6. Thermal-break details.

7. Custom extrusion sections.

- C. Samples for Verification: For aluminum window components required, prepared on Samples of size indicated below.
 - 1. Main Framing Member: 12-inch-long, full-size sections of extrusions with factory-applied color finish.
 - 2. Hardware: Full-size units with factory-applied finish.
 - 3. Architect reserves the right to require additional samples that show fabrication techniques, workmanship, and design of hardware and accessories.
- D. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for each type, grade, and size of aluminum window. Test results based on use of down-sized test units will not be accepted.
- E. Maintenance Data: For operable window sash and finishes to include in maintenance manuals.

1.6 QUALITY ASSURANCE

- A. Installer Qualifications: An installer acceptable to aluminum window manufacturer for installation of units required for this Project, with at least five years of previous experience in the installation of aluminum windows of similar scope.
- B. Product Options: Information on Drawings and in Specifications establishes requirements for assemblies' aesthetic effects and performance characteristics. Aesthetic effects are indicated by dimensions, arrangements, alignment, and profiles of components and assemblies as they relate to sightlines, to one another, and to adjoining construction.
 - 1. Do not revise intended aesthetic effects, as judged solely by Architect, except with Architect's approval. If revisions are proposed, submit comprehensive explanatory data to Architect for review.
- C. Fenestration Standard: Comply with AAMA/NWWDA 101/I.S.2, "Voluntary Specifications for Aluminum, Vinyl (PVC) and Wood Windows and Glass Doors," for minimum standards of performance, materials, components, accessories, and fabrication unless more stringent requirements are indicated.
 - 1. Provide AAMA-certified aluminum windows with an attached label.
- D. Mockups: Build mockups to verify selections made under sample Submittals and to demonstrate aesthetic effects and qualities of materials and execution.
 - 1. Build mockup of each new window type in building envelope wall.
 - 2. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.7 PROJECT CONDITIONS

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

1.8 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace aluminum windows that fail in materials or workmanship within specified warranty period. Failures include, but are not limited to, the following:
 - 1. Failure to meet performance requirements.
 - 2. Structural failures including excessive deflection.
 - 3. Water leakage, air infiltration, or condensation.
 - 4. Faulty operation of movable sash and hardware.
 - 5. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
 - 6. Insulating glass failure.
 - 7. Failures of operating hardware.
- B. Warranty Period: Ten years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Basis-of-Design Product: Subject to compliance with requirements, provide product by Kawneer.

2.2 MATERIALS, GENERAL

- A. Aluminum Extrusions: Alloy and temper recommended by aluminum window manufacturer for strength, corrosion resistance, and application of required finish, but not less than 22,000-psi ultimate tensile strength, not less than 16,000-psi minimum yield strength, and not less than 0.062-inch thickness at any location for the main frame and sash members. Certain extrusions indicated in the drawings may require custom extrusions. Fabricate dies for these extrusions and prepare and install extrusions as indicated.
- B. Fasteners: Aluminum, nonmagnetic stainless steel, epoxy adhesive, or other materials warranted by manufacturer to be noncorrosive and compatible with aluminum window members, trim, hardware, anchors, and other components. Cadmium-plated steel fasteners are not permitted.
 - 1. Reinforcement: Where fasteners screw-anchor into aluminum less than 0.125 inch thick, reinforce interior with aluminum or nonmagnetic stainless steel to receive screw threads, or provide standard, noncorrosive, pressed-in, splined grommet nuts.
 - 2. Exposed Fasteners: Unless unavoidable for applying hardware, do not use exposed fasteners. For application of hardware, use fasteners that match finish of member or hardware being fastened, as appropriate.
- C. Anchors, Clips, and Accessories: Aluminum, nonmagnetic stainless steel, or zinc-coated steel or iron complying with ASTM B 633 for SC 3 severe service conditions; provide sufficient strength to withstand design pressure indicated. Cadmium-plated steel anchors, clips, and accessories are not permitted.
- D. Reinforcing Members: Aluminum, nonmagnetic stainless steel, nickel/chrome-plated steel complying with ASTM B 456 for Type SC 3 severe service conditions, or zinc-coated steel or iron

complying with ASTM B 633 for SC 3 severe service conditions; provide sufficient strength to withstand design pressure indicated. Cadmium-plated steel reinforcing members are not permitted.

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

2.3 GLAZING

- A. Glass and Glazing Materials: Refer to Division 8 Section, "Glazing" for glass and glazing requirements applicable to glazed aluminum window units.

2.4 FABRICATION

- A. General: Fabricate aluminum windows, in sizes indicated, that comply with AAMA/NWWDA 101/I.S.2 for performance class and performance grade indicated. Include a complete system for assembling components and anchoring windows.
- B. Fabricate aluminum windows that are reglazable without dismantling sash or ventilator framing.
- C. Thermally Improved Construction: Fabricate aluminum windows with an integral, concealed, low-conductance thermal barrier; located between exterior materials and window members exposed on interior side; in a manner that eliminates direct metal-to-metal contact.
 - 1. Provide thermal-break construction that has been in use for not less than three years and has been tested to demonstrate resistance to thermal conductance and condensation and to show adequate strength and security of glass retention.
- D. Weep Holes: Provide weep holes and internal passages to conduct infiltrating water to exterior. Provide weep covers to prevent wind-blown water from entering weeps.
- E. Glazing Stops: Provide snap-on glazing stops coordinated with Division 8 Section "Glazing" and glazing system indicated. Provide glazing stops to match frames.

2.5 ALUMINUM FINISHES

- A. High-Performance Organic Finish: Four-coat fluoropolymer finish complying with AAMA 2605 and containing not less than 70 percent PVDF resin by weight in both color coat and clear topcoat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
 - 1. Color and Gloss: Two colors are required as follows:
 - a. Window frames and extrusions interior of the glazing plane shall be a "Statuary Bronze" color matching UC43347 "Duranar" Coating by PPG.
 - b. Window glazing caps and extrusions exterior of the glazing plane shall be a metallic "Pewter" color matching UC51713 XL "Duranar XL" Coating by PPG.

PART 3 - EXECUTION

3.1 EXAMINATION

1. Metal Surfaces: Dry; clean; free of grease, oil, dirt, rust, corrosion, and welding slag; without sharp edges or offsets at joints.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. General: Comply with manufacturer's written instructions for installing windows, hardware, accessories, and other components; Drawings; and Shop Drawings.
- B. Install metal clips, sub-frames or angles necessary for installation of windows. Install self-adhering, rubberized-asphalt composite strips necessary in order to integrate flashing of window sills or jambs with self-adhering waterproofing installed as part of Division 7 Section "Self-Adhering Waterproofing." Clean, prepare, and treat substrates according to asphalt membrane manufacturer's written instructions. Prime surfaces recommended by the membrane manufacturer for priming. Complete installation in order to integrate metal windows into the building's air and water barrier systems.
- C. Install windows level, plumb, square, true to line, without distortion or impeding thermal movement, anchored securely in place to structural support, and in proper relation to wall flashing and other adjacent construction.
- D. Set sill members in bed of sealant or with gaskets, as indicated, for weathertight construction.
- E. Install windows and components to drain condensation, water penetrating joints, and moisture migrating within windows to the exterior.
- F. Metal Protection: Separate aluminum and other corrodible surfaces from sources of corrosion or electrolytic action at points of contact with other materials by complying with requirements specified in "Dissimilar Materials" Paragraph in Appendix B in AAMA/NWWDA 101/I.S.2.

3.3 PROTECTION AND CLEANING

- A. Protect window surfaces from contact with contaminating substances resulting from construction operations. Clean aluminum surfaces immediately after installing windows. Avoid damaging protective coatings and finishes. Remove excess sealants, glazing materials, dirt, and other substances.

END OF SECTION

SECTION 08592 - TREATMENT OF HISTORIC WOOD WINDOWS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Window repair, replacement and patching of Garden Level Windows.
 - 2. Glazing repair.
 - 3. Scraping of loose paint from window members and frames.
 - 4. Window hardware repair and replacement.
 - 5. Interior storm windows at all existing wood windows.
- B. Related Sections include the following:
 - 1. Division 7 Section "Joint Sealants" for sealing joints in restored wood windows.
 - 2. Division 8 Section "Glazing" for replacement glass.
 - 3. Division 9 painting Sections for painting wood windows.

1.3 WINDOW SYSTEM DESCRIPTIONS

- A. Window System Component Descriptions: Window component terminology shall be as identified in AWI's "Architectural Woodwork Quality Standards," Section 1000.
- B. Wood window components for historic treatment work include the following:
 - 1. Frame Components: Head, jamb, and sill.
 - 2. Sash Components: Stile and rails, parting bead, stop, and muntins.
 - 3. Exterior Trim: Exterior casing, brick mould, and drip cap.
 - 4. Interior Trim: Casing, stool, and apron.
- C. Glazing includes glass, glazing points, glazing compounds, and gaskets.

1.4 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Replacement Member Shop Drawings: Show fabrication and installation of replacement wood window members. Indicate materials and profiles of each replacement member, joinery, finish, and method of splicing or attaching to existing wood window.

- C. Storm Window Shop Drawings: Show elevations, dimensions, details, profiles and colors for storm windows.
- D. Match to Existing: Work of this Section shall match appearance, dimensions, materials or other characteristics of existing assemblies at the building.

1.5 QUALITY ASSURANCE

- A. AWI Quality Standard: Comply with applicable requirements in AWI's "Architectural Woodwork Quality Standards" for construction, finishes, grades of wood windows, and other requirements.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver patching and repair compounds to Project site in manufacturer's original and unopened containers, labeled with description of contents and name of manufacturer.
- B. Comply with manufacturer's written instructions for minimum and maximum temperature requirements for storage of patching materials.

PART 2 - PRODUCTS

2.1 REPLACEMENT WOOD MATERIALS

- A. Wood: Clear fine-grained lumber; kiln dried to a moisture content of 6 to 12 percent at time of fabrication; free of visible finger joints, blue stain, knots, pitch pockets, and surface checks larger than 1/32 inch deep by 2 inches wide; and treated with water-repellent preservative.
- B. Exterior Trim and Frame Parts, Including Heads and Jambs: Ponderosa pine, eastern white pine, or Idaho white pine.
- C. Sash Parts: Ponderosa pine, eastern white pine, or Idaho white pine.

2.2 WOOD PATCHING MATERIALS

- A. Wood Pretreatment: Ready-to-use product designed for hardening and sealing soft fibers of wood materials that have deteriorated due to weathering and exposure and designed specifically to enhance the bond of wood patching compound to existing wood.
 - 1. Available Products:
 - a. Abatron, Inc.; Liquidwood.
 - b. Advanced Repair Technology; Primatrate.
 - c. Wood Care Systems; Liquid TIMBR.
- B. Wood Patching Compound: 2-part epoxy-resin wood compound with a 10- to 15-minute cure at 70 deg F, in knife grade formulation and recommended by manufacturer for type of wood repair

indicated. Compound shall be designed for filling damaged wood materials that have deteriorated due to weathering and exposure. Compound shall be capable of filling deep holes and capable of spreading to feather edge.

1. Available Products:

- a. Abatron, Inc.; Liquidwood with WoodEpoxy.
- b. Advanced Repair Technology; Primatrate with Flex-Tec HV.
- c. Wood Care Systems; Liquid TIMBR with TIMBR Flex.

2.3 GLAZING MATERIALS

- A. Glass: Glass for windows is specified in Division 8 Section "Glazing."
- B. Glazing System: Provide oil-based glazing putty and glazing points.

2.4 REPLACEMENT WINDOW HARDWARE FOR GARDEN LEVEL WINDOWS

- A. General: Provide complete sets of window hardware consisting of items indicated below for each window type. Retain all existing hardware, repair and refinish it. Replacement window hardware shall be designed to smoothly operate, tightly close, and securely lock wood windows and be sized to accommodate sash or ventilator weight and dimensions.
- B. Window Hardware:
 1. Material: Solid brass, no lacquer.
 2. Design: Provide hardware to match existing hardware.
- C. Typical hardware elements at double-hung sash windows:
 - a. Chains and counterweights
 - b. Sash locks
 - c. Lower sash lifts
- D. Available Manufacturers:
 - a. Ball and Ball.
 - b. Bronze Craft Corporation (The).
 - c. Craftsmen Hardware Co., Ltd.
 - d. Phelps Company Architectural Specialties.
- E. Spring-bronze-Type Weather Stripping: Provide weather stripping designed for permanently sealing under contact between sash and frame, and to be completely concealed when wood window is closed.
 1. Available Manufacturers:
 - a. National Guard Products, Inc.
 - b. Pemko Manufacturing Co., Inc.

- c. Reese Enterprises, Inc.
- d. Zero International, Inc.

2.5 WOOD STORM WINDOWS

- A. Storm Windows: Custom fabricated to match existing materials and profiles and as indicated in the drawings. Tight fitting and removable and with operating and latching hardware.
- B. Storm window frame shall not be visible from the exterior.
- C. Provide storm windows at each existing wood window to remain. Generally, each unit shall be the same size as the window, with the frame dimensions matching those of the adjoining sash.
- D. Storm windows shall be removable for cleaning or storage.
- E. Storm Windows: Custom fabricated to fit interior of wood windows.
 - 1. Finish: Paint.
 - 2. Color: Custom color to match Architect's sample.
 - 3. Shapes: Rectangular and half-round tops as indicated on drawings.
 - 4. Sizes: To match existing window sizes.
 - 5. Operation: Removable for cleaning.
 - 6. Hardware: Provide hardware to secure storm window frame to wood window frames.
 - 7. Glazing Material: Uncoated clear float glass.

2.6 FABRICATION OF REPLACEMENT MEMBERS

- A. General: Fabricate window replacement members and units to comply with AWI Section 1000 requirements for Custom grade.
 - 1. Molded Profiles of Replacement Members: Match existing profiles.
 - 2. Sash Members: Fabricate with mortise and tenon joints, coped, glued under pressure, and pinned. Half-lap muntin bars at intersections.
 - 3. Frame Members: Dado, rabbet, and plant assemble.
 - 4. Ease edges of replacement members as necessary to match existing members.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Protect adjacent materials from damage caused by historic treatment of wood windows.
- B. Clean existing wood windows of mildew, algae, moss, plant material, loose paint, grease, dirt, and other debris. Use bristle brush and mildewcide to kill mildew. After cleaning, rinse thoroughly with fresh water. Allow to dry before patching, repairing, or painting.

- C. Treat existing wood window members to remain in place with water-repellent preservative treatment; apply liberally by brush to all lap and butt joints, edges and ends of wood members, and bottoms of window frames. Apply treatment after wood members are patched and filled.
- D. Condition replacement wood members and replacement wood windows to prevailing conditions at installation areas before installing.

3.2 GLAZING

- A. Remove cracked and damaged glass.

3.3 WOOD WINDOW MEMBER AND FRAME PATCHING

- A. Patch wood members that have been damaged and exhibit depressions, holes, or similar voids, and that have limited rotted or decayed wood. Remove rotted or decayed wood down to sound wood.
- B. Apply patching compound to fill depressions, nicks, cracks, and other voids. Apply compound in layers as recommended by manufacturer until the void is completely filled. Sand patching compound smooth and flush, matching contour of existing wood member.
- C. Clean spilled compound from adjacent materials immediately.

3.4 WOOD WINDOW MEMBER AND FRAME REPAIR

- A. Repair by Wood Member Replacement: Custom fabricate new wood members to replace missing members or members deteriorated beyond repair. Either replace entire wood member or splice new wood member into existing member.
- B. Cut out deteriorated or damaged sections of wood members and replace them by splicing replacement wood members into existing remaining wood members.
 - 1. Anchor new wood members by nailing and adhesive.
 - 2. Install wood members with concealed fasteners. Fill nail holes and touch up the finish to match surrounding wood finish.
- C. Reinstall repaired units with new anchors into existing openings.

3.5 ADJUSTMENT

- A. Adjust existing and replacement operating sashes and hardware to provide a tight fit at contact points and with weather stripping, and to provide smooth operation and a weathertight closure. Lubricate hardware and moving parts as necessary.

3.6 CLEANING AND PROTECTION

- A. Protect window surfaces from contact with contaminating substances resulting from construction operations.
- B. Monitor window surfaces adjacent to and below exterior concrete and masonry surfaces during construction for presence of dirt, scum, alkaline deposits, stains, or other contaminants. If contaminating substances contact window surfaces, remove contaminants immediately according to glass manufacturer's written recommendations.
- C. Clean exposed surfaces immediately after historic treatment of wood windows. Avoid damaging coatings and finishes. Remove excess sealants, glazing and patching materials, dirt, and other substances.
- D. Remove and replace glass that has been broken, chipped, cracked, abraded, or damaged during construction period.

END OF SECTION

SECTION 08712 - DOOR HARDWARE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes the following
 - 1. Commercial door hardware for swinging doors.
 - 2. Performance requirements for access-controlled doors indicated on architectural and electrical contract documents; see Part 3.
- B. Related Sections include the following:
 - 1. Division 8 Section "Work at Existing Openings" for modifications and additions to doors, frames and hardware at existing openings.
 - 2. Division 8 Section "Steel Doors and Frames" for door silencers provided as part of hollow-metal frames.
 - 3. Division 8 Section "Access Doors and Frames" for access door hardware.
 - 4. Division 8 Section "Automatic Door Operators" for automatic door operators, which are scheduled in this Section.
 - 5. Division 16 Sections for connections to electrical power system and for low-voltage wiring work.

1.3 SUBMITTALS

- A. Product Data: Include construction and installation details, material descriptions, dimensions of individual components and profiles, and finishes.
- B. Samples for Verification: For exposed door hardware of each type, in specified finish, full size. Tag with full description for coordination with the door hardware sets. Submit Samples before, or concurrent with, submission of the final door hardware sets.
 - 1. Samples will be returned to Contractor. Units that are acceptable and remain undamaged through submittal, review, and field comparison process may, after final check of operation, be incorporated into the Work, within limitations of keying requirements.
- C. Qualification Data: For Installer.
- D. Other Action Submittals:

1. Door Hardware Sets: Prepared by or under the supervision of Installer, detailing fabrication and assembly of door hardware, as well as procedures and diagrams. Coordinate the final door hardware sets with doors, frames, and related work to ensure proper size, thickness, hand, function, and finish of door hardware.
 - a. Format: Use same door numbers as in the Contract Documents.
 - b. Content: Include the following information:
 - 1) Identification number, location, hand, fire rating, and material of each door and frame.
 - 2) Type, style, function, size, quantity, and finish of each door hardware item. Include description and function of each lockset and exit device.
 - 3) Complete designations of every item required for each door or opening including name and manufacturer.
 - 4) Fastenings and other pertinent information.
 - 5) Location of each door hardware set, cross-referenced to Drawings, both on floor plans and in door and frame schedule.
 - 6) Explanation of abbreviations, symbols, and codes contained in schedule.
 - 7) Mounting locations for door hardware.
 - 8) Door and frame sizes and materials.
 - 9) List of related door devices specified in other Sections for each door and frame.
2. Low-Voltage Access Control System: Hardware, software, system riser diagram and opening diagrams where components are specified. Include operational narrative and overview of complete system meeting performance requirements of this section.

1.4 QUALITY ASSURANCE

- A. Installer Qualifications: An employer of workers trained and approved by lock manufacturer.
 1. Installer's responsibilities include supplying and installing door hardware, and providing a qualified Architectural Hardware Consultant available during the course of the Work to consult with Contractor, Architect, and Owner about door hardware.
 2. Installer shall have warehousing facilities in Project's vicinity.
 3. Scheduling Responsibility: Preparation of door hardware and keying schedules.
- B. Source Limitations: Obtain each type and variety of door hardware from a single manufacturer, unless otherwise indicated.
- C. Fire-Rated Door Assemblies: Assemblies complying with NFPA 80 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire ratings indicated, based on testing according to NFPA 252.

1.5 DELIVERY, STORAGE, AND HANDLING

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

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

1.6 COORDINATION

- A. Templates: Distribute door hardware templates for doors, frames, and other work specified to be factory prepared for installing door hardware. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing door hardware to comply with indicated requirements.
- B. Existing Openings: Where new hardware components are scheduled for application to existing construction or where modifications to existing door hardware are required, field verify existing conditions and coordinate installation of door hardware to suit opening conditions and to provide for proper operation.

1.7 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of door hardware that fail in materials or workmanship within specified warranty period.
 - 1. Failures include, but are not limited to, the following:
 - a. Structural failures including excessive deflection, cracking, or breakage.
 - b. Faulty operation of operators and door hardware.
 - c. Deterioration of metals, metal finishes, and other materials beyond normal weathering and use.
 - 2. Warranty Period: Three years from date of Substantial Completion, except as follows:
 - a. Exit Devices: Two years from date of Substantial Completion.
 - b. Manual Closers: Ten years from date of Substantial Completion.

1.8 MAINTENANCE SERVICE

- A. Maintenance Tools and Instructions: Furnish a complete set of specialized tools and maintenance instructions as needed for Owner's continued adjustment, maintenance, and removal and replacement of door hardware.

PART 2 - PRODUCTS

2.1 SCHEDULED DOOR HARDWARE

- A. General: Provide door hardware for each door to comply with requirements in this Section and door hardware sets indicated in door and frame schedule.
- B. Designations: Hardware items are designated in hardware sets by descriptive names, for which products are specified in Part 2, either by naming manufacturer's products or by indicating performance standards and features.
- C. Named products: Hardware items are specified by identifying the product of one of the listed manufacturers ("Manufacturer's Product"). Comparable products of any of the listed manufacturers, or of other manufacturers, may be submitted provided they comply with the design, grade, function, finish, size, and other distinctive qualities of the identified product.

2.2 HINGES, GENERAL

- A. Quantity: Provide the following, unless otherwise indicated:
 - 1. Two Hinges: For doors with heights up to 60 inches.
 - 2. Three Hinges: For doors with heights 61 to 90 inches.
 - 3. Four Hinges: For doors with heights 91 to 120 inches.
 - 4. For doors with heights more than 120 inches, provide 4 hinges, plus 1 hinge for every 30 inches of door height greater than 120 inches.
- B. Template Requirements: Except for hinges and pivots to be installed entirely (both leaves) into wood doors and frames, provide only template-produced units.
- C. Hinge Weight: Unless otherwise indicated, provide the following:
 - 1. Entrance Doors: Heavy-weight hinges.
 - 2. Doors with Closers: Antifriction-bearing hinges.
 - 3. Interior Doors: Standard-weight hinges.
- D. Hinge Base Metal: Unless otherwise indicated, provide the following:
 - 1. Exterior Hinges: Brass, with stainless-steel pin body and brass protruding heads.
 - 2. Interior Hinges: Brass, with stainless-steel pin body and brass protruding heads.
 - 3. Hinges for Fire-Rated Assemblies: Steel, with steel pin.
- E. Fasteners: Comply with the following:
 - 1. Machine Screws: For metal doors and frames. Install into drilled and tapped holes.
 - 2. Wood Screws: For wood doors and frames.
 - 3. Threaded-to-the-Head Wood Screws: For fire-rated wood doors.
 - 4. Screws: Phillips flat-head; machine screws (drilled and tapped holes) for metal doors, wood screws for wood doors and frames. Finish screw heads to match surface of hinges.

2.3 HINGES

- A. Butts and Hinges: Listed under Category A in BHMA's "Certified Product Directory."
- B. Template Hinge Dimensions: BHMA A156.7.
- C. Manufacturer's Product: Hager Heavy Duty, ABB850.
- D. Available Manufacturers:
 - 1. Bommer Industries, Inc.
 - 2. Hager Companies.
 - 3. Stanley Commercial Hardware; Div. of The Stanley Works.

2.4 LOCKS AND LATCHES, GENERAL

- A. Accessibility Requirements: Where indicated to comply with accessibility requirements, comply with the U.S. Architectural & Transportation Barriers Compliance Board's "Americans with Disabilities Act (ADA), Accessibility Guidelines for Buildings and Facilities (ADAAG)", and FED-STD-795, "Uniform Federal Accessibility Standards."
 - 1. Provide operating devices that do not require tight grasping, pinching, or twisting of the wrist and that operate with a force of not more than 5 lbf.
- B. Latches and Locks for Means of Egress Doors: Latches shall not require more than 15 lbf to release the latch. Locks shall not require use of a key, tool, or special knowledge for operation.
- C. Lock Trim:
 - 1. Levers: Cast.
 - 2. Escutcheons (Roses): Cast.
- D. Lock Throw: Comply with testing requirements for length of bolts required for labeled fire doors, and as follows:
 - 1. Bored Locks: Minimum 1/2-inch latchbolt throw.
 - 2. Mortise Locks: Minimum 3/4-inch latchbolt throw.
 - 3. Deadbolts: Minimum 1-inch bolt throw.
- E. Backset: 2-3/4 inches, unless otherwise indicated.
- F. Strikes: Manufacturer's standard strike with strike box for each latchbolt or lock bolt, with curved lip extended to protect frame, finished to match door hardware set, and as follows:
 - 1. Strikes for Bored Locks and Latches: BHMA A156.2.
 - 2. Strikes for Mortise Locks and Latches: BHMA A156.13.
 - 3. Strikes for Interconnected Locks and Latches: BHMA A156.12.
 - 4. Strikes for Auxiliary Deadlocks: BHMA A156.5.
 - 5. Extra-Long-Lip Strikes: For locks used on frames with applied wood casing trim.

2.5 MORTISE LOCKS AND LATCHES

A. Mortise lockset/latchset:

1. Schlage, L series, Lever trim style: 07, 2 1/2" round rose
2. Functions:
 - a. Storeroom, L9080
 - b. Office, L9050
 - c. Entrance,
 - d. Classroom, L9070
 - e. Privacy, L9040
 - f. Passage latchset, L9010

B. Available Manufacturers:

1. Schlage.
2. Best Access Systems; Div. of The Stanley Works.
3. Yale Commercial Locks and Hardware; an ASSA ABLOY Group company.

2.6 DOOR BOLTS

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

1. Mortise Flush Bolts: Minimum 3/4-inch throw.

B. Dustproof Strikes: BHMA A156.16.

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

1. Manufacturer's Product: Glynn- Johnson 1600 series. Cast brass, with rod actuated by slide. Provide matching strike
2. Available Manufacturers:
 - a. Glynn-Johnson; an Ingersoll-Rand Company.
 - b. Hager Companies.
 - c. IVES Hardware; an Ingersoll-Rand Company.

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

1. Available Manufacturers:
 - a. Door Controls International.
 - b. Glynn-Johnson; an Ingersoll-Rand Company.
 - c. Hager Companies.
 - d. IVES Hardware; an Ingersoll-Rand Company.

2.7 EXIT DEVICES

- A. Exit Devices: BHMA A156.3, Grade 1.
- B. Exit Devices for Means of Egress Doors: Exit devices shall not require more than 15 lbf to release the latch. Locks shall not require the use of a key, tool, or special knowledge for operation.
- C. Panic Exit Devices: Listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for panic protection, based on testing according to UL 305.
- D. Fire Exit Devices: Devices complying with NFPA 80 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire and panic protection, based on testing according to UL 305 and NFPA 252.
- E. Manufacturer's Product: VonDuPrin 98 Touchbar series
 - 1. Type: Mortise, concealed vertical rod, or rim; at locations as indicated in door hardware schedule. For vertical rod type provide flush strike at threshold, roller strike at head.
 - 2. Function: Locking or non-locking, at locations as indicated in door hardware schedule.
 - 3. Outside trim:
 - a. Where lever is specified, match design for locksets and latchsets.
 - b. Where fixed pull is specified, provide straight or offset pull as indicated, using products as specified in Part 2.
- F. Dogging: For exit devices not indicated to be fire-rated, provide dogging function, by key cylinder if available from manufacturer, otherwise by hex key.

2.8 LOCK CYLINDERS

- A. Standard Lock Cylinders: BHMA A156.5, Grade 1.
- B. Cylinders: Manufacturer's standard tumbler type, constructed from brass or bronze, stainless steel, or nickel silver, and complying with the following:
 - 1. Number of Pins: Seven, or fewer if requested by Owner.
 - 2. Mortise Type: Threaded cylinders with rings and straight- or clover-type cam.
- C. Permanent Cores: Manufacturer's standard; finish face to match lockset; complying with the following:
 - 1. Interchangeable Cores: Core insert, removable by use of a special key; usable with other manufacturers' cylinders.
- D. Construction Keying: Comply with the following:
 - 1. Construction Master Keys: Provide cylinders with feature that permits voiding of construction keys without cylinder removal. Provide 10 construction master keys.

- a. Replace construction cores with permanent cores as directed by Owner.

E. Available Manufacturers:

1. Best Access Systems; Div. of The Stanley Works.
2. Medeco Security Locks, Inc.; an ASSA ABLOY Group company.
3. SARGENT Manufacturing Company; an ASSA ABLOY Group company.
4. Schlage Commercial Lock Division; an Ingersoll-Rand Company.
5. Yale Commercial Locks and Hardware; an ASSA ABLOY Group company.

2.9 OPERATING TRIM

- A. Flat Push Plates: 0.050 inch thick, 4 inches wide by 16 inches high; with square corners and beveled edges, secured with exposed screws.
- B. Straight Door Pulls (except where pulls are scheduled at exterior doors with exit devices):
 1. 3/4-inch constant-diameter pull, with minimum clearance of 1-1/2 inches from face of door; fastened at 12 inches o.c.
 2. Mounting: Through bolted with oval-head machine screws and countersunk washers.
- C. Traditional style door pulls and plates: At new doors at existing building as scheduled.
 1. Manufacturer's Products:
 - a. Rockwood "Classic Series" finial door pull, 16" center to center, through-bolted, 1" diameter tube, smooth surface.
 - 1) Provide pineapple style finial at exterior entry door at north side only.
 - b. Where push plates are specified at the same opening, provide Rockwood "Traditional" series cast plates.
 2. Other Available Manufacturers:
 - a. Baldwin
 - b. Ives

2.10 ACCESSORIES FOR PAIRS OF DOORS

- A. Rigid, Housed Astragals: Gasket material held in place by metal housing; fastened to face of door with screws.
 1. Gasket Material: Silicone bulb.
 2. Housing Material: Copper alloy.
- B. Weatherstripping Astragals for Exterior Doors: Pemko 313N.

2.11 CLOSERS

- A. General: Heavy-duty type, cast-iron body type. Provide 10-year warranty. Provide through-bolted units only. Aluminum body closers shall be prohibited. Closers shall not reduce headroom to less than 6'-6" clear.
- B. Accessibility Requirements: Where handles, pulls, latches, locks, and other operating devices are indicated to comply with accessibility requirements, comply with the U.S. Architectural & Transportation Barriers Compliance Board's "Americans with Disabilities Act (ADA), Accessibility Guidelines for Buildings and Facilities (ADAAG)", FED-STD-795, "Uniform Federal Accessibility Standards."
 - 1. Comply with the following maximum opening-force requirements:
 - a. Interior, Non-Fire-Rated Hinged Doors: 5 lbf applied perpendicular to door.
 - b. Fire Doors: Minimum opening force allowable by authorities having jurisdiction.
- C. Hold-open Feature: At non-fire-rated doors, provide closers with manufacturer's standard hold-open feature, activated by pushing the door leaf into a fully open position.
- D. Door Closers for Means of Egress Doors: Door closers shall not require more than 30 lbf to set door in motion and not more than 15 lbf to open door to minimum required width.
- E. Size of Units: Unless otherwise indicated, comply with manufacturer's written recommendations for size of door closers depending on size of door, exposure to weather, and anticipated frequency of use. Provide factory-sized closers, adjustable to meet field conditions and requirements for opening force.
- F. Surface Closers: BHMA A156.4, Grade 1. Provide type of arm required for closer to be located on non-public side of door, unless otherwise indicated.
 - 1. Manufacturer's Products:
 - a. Closer: Provide LCN 4010/4110 series with architectural metal cover, unless otherwise indicated.
 - b. Closer at mechanical and storage rooms, or where "utility closer" is indicated: Provide LCN 1460 series.

2.12 PROTECTIVE TRIM UNITS

- A. Size: 1-1/2 inches less than door width on push side and 1/2 inch less than door width on pull side, by height specified in door hardware sets.
- B. Fasteners: Manufacturer's standard machine or self-tapping screws.
- C. Metal Protective Trim Units: BHMA A156.6; beveled top and 2 sides; fabricated from material indicated in door hardware sets.
 - 1. Manufacturer's Products:

- a. Mop Plate: 6" high by 1 inch less than door width, Hager 193S
- b. Protection Plate 8" high by door width, with allowance for frame stops, Hager 193S.

2. Available Manufacturers:

- a. Hager Companies.
- b. IVES Hardware; an Ingersoll-Rand Company.
- c. Rockwood Manufacturing Company.

2.13 STOPS AND HOLDERS

- A. Silencers for Wood Door Frames: BHMA A156.16, Grade 1; neoprene or rubber, minimum 5/8 by 3/4 inch; fabricated for drilled-in application to frame.
- B. Silencers for Metal Door Frames: BHMA A156.16, Grade 1; neoprene or rubber, minimum diameter 1/2 inch; fabricated for drilled-in application to frame.
- C. Stop: Polished cast brass or aluminum with rubber bumper; 2-1/2-inch diameter, minimum 3/4-inch projection from wall, with backplate for concealed fastener installation; with convex bumper configuration.
- D. Hold-open hook type: Cast brass. Wall element has flange base, rubber stud for contact with door leaf, and hook for manual attachment to door; door element has brass ring to receive hook.

2.14 DOOR GASKETING

- A. Standard: BHMA A156.22.[Listed under Category J in BHMA's "Certified Product Directory."]
- B. General: Provide continuous weather-strip gasketing on exterior doors. Provide smoke, light, or sound gasketing on interior doors where indicated or scheduled. Provide noncorrosive fasteners for exterior applications and elsewhere as indicated.
 1. Perimeter Gasketing: Apply to head and jamb, forming seal between door and frame.
 2. Meeting Stile Gasketing: Fasten to meeting stiles, forming seal when doors are closed.
 3. Door Bottoms: Apply to bottom of door, forming seal with threshold when door is closed.
- C. Air Leakage: Not to exceed 0.50 cfm per foot of crack length for gasketing other than for smoke control, as tested according to ASTM E 283.
- D. Replaceable Seal Strips: Provide only those units where resilient or flexible seal strips are easily replaceable and readily available from stocks maintained by manufacturer.
- E. Gasketing Materials: ASTM D 2000 and AAMA 701/702.
- F. Manufacturer's Products:
 1. Perimeter soundstrip: Pemko 288 vinyl bulb.

2. Door bottom seal: Pemko 313N, resilient bulb mortised into door leaf.
3. Spring bronze weatherstrip: Reese B114.
4. Weatherstripping astragal: Pemko 313N, resilient bulb mortised into one leaf.

G. Available Manufacturers:

1. Pemko Manufacturing Co.
2. Reese Enterprises.
3. Zero International.

2.15 THRESHOLDS

A. Standard: BHMA A156.21.

B. Accessibility Requirements: Where thresholds are indicated to comply with accessibility requirements, comply with the U.S. Architectural & Transportation Barriers Compliance Board's "Americans with Disabilities Act (ADA), Accessibility Guidelines for Buildings and Facilities (ADAAG)" and FED-STD-795, "Uniform Federal Accessibility Standards."

1. Bevel raised thresholds with a slope of not more than 1:2.

C. Thresholds for Means of Egress Doors: Maximum 1/2 inch high.

D. Manufacturer's Product: Pemko 1665 series.

E. Available Manufacturers:

1. Hager Companies.
2. Pemko Manufacturing Co.
3. Reese Enterprises.
4. Zero International.

2.16 ELECTRIC STRIKES

A. Standard: BHMA A156.31, Grade 1.

B. General: Use fail-secure electric strikes with fire-rated devices.

1. Material: Steel.
2. Mounting: Mortised..
3. Monitoring: Mechanical latchbolt.

C. Available Manufacturers:

1. Adams Rite Manufacturing Co.
2. Folger Adam Security, Inc.; an ASSA ABLOY Group company.
3. Locknetics; an Ingersoll-Rand Company.
4. Von Duprin; an Ingersoll-Rand Company.

2.17 HARDWARE FOR LOW-VOLTAGE ACCESS CONTROL.

- A. General: Provide power supply units to transform power from line voltage to low voltage as required for approved hardware products.
- B. Products:
 - 1. Card reader: Wall-mount proximity reader type, shallow profile plastic housing.
 - 2. Request-to-exit: Overhead wall-mount proximity reader.
 - 3. Doorbell: Finger pushbutton for wall mounting; metal escutcheon.
 - 4. Doorbell chime: Wall-mount, single electronic chime signal.
 - 5. Alarm chime: Wall-mount, continuous electronic chime signal, different from doorbell.
 - 6. Door release button: For concealed mounting in kneespace or underside of desk.
 - 7. Power supply: As required for components scheduled at each opening.

2.18 FABRICATION

- A. Manufacturer's Nameplate: Do not provide products that have manufacturer's name or trade name displayed in a visible location except in conjunction with required fire-rated labels and as otherwise approved by Architect.
 - 1. Manufacturer's identification is permitted on rim of lock cylinders only.
- B. Base Metals: Produce door hardware units of base metal, fabricated by forming method indicated, using manufacturer's standard metal alloy, composition, temper, and hardness. Furnish metals of a quality equal to or greater than that of specified door hardware units and BHMA A156.18. Do not furnish manufacturer's standard materials or forming methods if different from specified standard.
- C. Fasteners: Provide door hardware manufactured to comply with published templates generally prepared for machine, wood, and sheet metal screws. Provide screws according to commercially recognized industry standards for application intended, except aluminum fasteners are not permitted. Provide Phillips flat-head screws with finished heads to match surface of door hardware, unless otherwise indicated.
 - 1. Concealed Fasteners: For door hardware units that are exposed when door is closed, except for units already specified with concealed fasteners. Do not use through bolts for installation where bolt head or nut on opposite face is exposed unless it is the only means of securely attaching the door hardware. Where through bolts are used on hollow door and frame construction, provide sleeves for each through bolt.
 - 2. Steel Machine or Wood Screws: For the following fire-rated applications:
 - a. Mortise hinges to doors.
 - b. Strike plates to frames.
 - c. Closers to doors and frames.
 - 3. Steel Through Bolts: For the following fire-rated applications unless door blocking is provided:
 - a. Surface hinges to doors.

- b. Closers to doors and frames.
 - c. Surface-mounted exit devices.
- 4. Spacers or Sex Bolts: For through bolting of hollow-metal doors.
 - 5. Fasteners for Wood Doors: Comply with requirements in DHI WDHS.2, "Recommended Fasteners for Wood Doors."

2.19 FINISHES

- A. Standard: BHMA A156.18.
 - 1. Finishes: Exposed components of all hardware shall have satin brass finish without lacquer unless otherwise indicated.
 - a. Hardware at interior of toilet rooms shall have satin chrome finish.
- B. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- C. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in the same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine doors and frames, with Installer present, for compliance with requirements for installation tolerances, labeled fire door assembly construction, wall and floor construction, and other conditions affecting performance.
- B. Examine roughing-in for electrical power systems to verify actual locations of wiring connections before electrified door hardware installation.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Steel Doors and Frames: Comply with DHI A115 Series.
 - 1. Surface-Applied Door Hardware: Drill and tap doors and frames according to ANSI A250.6.
- B. Wood Doors: Comply with DHI A115-W Series.

3.3 INSTALLATION

- A. Mounting Heights: Mount door hardware units at heights indicated as follows unless otherwise indicated or required to comply with governing regulations.
 - 1. Standard Steel Doors and Frames: DHI's "Recommended Locations for Architectural Hardware for Standard Steel Doors and Frames."
 - 2. Wood Doors: DHI WDHS.3, "Recommended Locations for Architectural Hardware for Wood Flush Doors."
- B. Install each door hardware item to comply with manufacturer's written instructions. Where cutting and fitting are required to install door hardware onto or into surfaces that are later to be painted or finished in another way, coordinate removal, storage, and reinstallation of surface protective trim units with finishing work specified in Division 9 Sections. Do not install surface-mounted items until finishes have been completed on substrates involved.
 - 1. Set units level, plumb, and true to line and location. Adjust and reinforce attachment substrates as necessary for proper installation and operation.
 - 2. Drill and countersink units that are not factory prepared for anchorage fasteners. Space fasteners and anchors according to industry standards.
- C. Thresholds: Set thresholds for exterior and acoustical doors in full bed of sealant complying with requirements specified in Division 7 Section "Joint Sealants."

3.4 ADJUSTING

- A. Initial Adjustment: Adjust and check each operating item of door hardware and each door to ensure proper operation or function of every unit. Replace units that cannot be adjusted to operate as intended. Adjust door control devices to compensate for final operation of heating and ventilating equipment and to comply with referenced accessibility requirements.
 - 1. Spring Hinges: Adjust to achieve positive latching when door is allowed to close freely from an open position of 30 degrees.
 - 2. Electric Strikes: Adjust horizontal and vertical alignment of keeper to properly engage lock bolt.
 - 3. Door Closers: Unless otherwise required by authorities having jurisdiction, adjust sweep period so that, from an open position of 70 degrees, the door will take at least 3 seconds to move to a point 3 inches from the latch, measured to the leading edge of the door.

3.5 CLEANING AND PROTECTION

- A. Clean adjacent surfaces soiled by door hardware installation.
- B. Clean operating items as necessary to restore proper function and finish.
- C. Provide final protection and maintain conditions that ensure that door hardware is without damage or deterioration at time of Substantial Completion.

3.6 LOW-VOLTAGE ACCESS CONTROL SYSTEMS

- A. General: Components of access control systems are indicated on architectural and electrical drawings and in this Section. The narratives below describe the intended operation of the complete system at each type of opening. Provide all work and connections as required to provide operations indicated.
- B. Types of systems: Note that access control systems include the following:
1. Interconnected components for unlocking at individual openings, as listed below. Contract work includes all work for operations at these openings as indicated in the narratives.
 - a. Proximity-type card reader
 - b. Electric strike
 - c. Request-to-exit sensor device
 - d. Doorbell button and chime
 - e. Local alarm chime
 - f. Door release button.
 - g. Power supplies
 2. Access cards. Provide two hundred cards.
 3. Computer software for central monitoring station, to establish and change authorization of individual cards, and to monitor and record activity at each controlled opening, including identity of individual cards. Computer workstation shall be provided by Owner. Contract work includes coordination with owner to confirm compatibility of proposed system with Owner's equipment and operating system, and activation, demonstration and training on installed access control system.
- C. Operation narratives:
1. Staff area door (at collections or staff-only room): Door has storage-type lockset and closer; will be always locked at outside and always open for passage from inside. Electric strike will open in response to authorized card at outside card reader. Request-to-exit device will authorize opening of the door but will not open the electric strike (since lever will be operable). Magnetic contact at door head will monitor door leaf movements and classify them as authorized (by card or request to exit) or unauthorized. Metal key will operate door lock cylinder but will not authorize opening via magnetic contact.
 2. Reading room door: Door has storage type lockset and closer; will be always locked at outside and always open for passage from inside, except that a local alarm will sound if opening of the door is not authorized by card reader or by manual release button at library staff desk. A doorbell button at the outside will activate a chime at the inside, to summon a staff member to open the door for a visitor. Electric strike will open in response to authorized card at outside card reader, authorized card at inside card reader, or manual operation of door release button. There is no request-to-exit device at this type of door. Magnetic contact at door head will monitor door leaf movements and classify them as authorized (by card or by manual release button) or unauthorized. Metal key will operate door lock cylinder but will not authorize opening via magnetic contact.

3.7 DOOR HARDWARE SETS

- A. General: Provide hardware for each door to comply with requirements of Section "Door Hardware," hardware set numbers indicated in door schedule, and in the following schedule of hardware sets. Provide items, in quantities indicated in this Section, at each leaf of each door unless otherwise indicated.
- B. Thresholds and weatherstripping: Provide the following at all exterior doors, in addition to hardware items indicated in hardware sets below:
 - 1. Threshold.
 - 2. Perimeter gasket.
 - 3. Weatherstripping astragal, for paired doors
 - 4. Door bottom sweep.
- C. Refer to drawings and schedules for indications of door and frame types, materials and details.
- D. Hardware sets:
 - 1. HS A: Push-pull, toilet rooms
 - Push plate
 - Straight pull
 - Closer
 - Mop plate, at wet side of room
 - 2. HS B: Push-pull with automatic operator, toilet rooms
 - Push plate
 - Straight pull
 - Mop plate, at wet side of room
 - Automatic operator, single leaf type, surface mount; activator button at inside only
 - 3. HS C: Push-pull, vestibule
 - Push plate
 - Straight pull
 - Closer
 - Kick plate
 - 4. HS D: Privacy, at single-fixture toilet room
 - Hinges
 - Privacy latchset
 - Stop
 - 5. HS E: Passage
 - Hinges
 - Passage latchset

- Stop
6. HS F: Office
- Hinges
Lockset, office function
Stop
7. HS G: Office with closer
- Hinges
Lockset, office function
Closer
Stop
8. HS H: Classroom
- Hinges
Lockset, classroom function
Closer
Stop
9. HS I: Storeroom, 1 leaf
- Hinges
Lockset, storeroom function
Stop
10. HS J: Storeroom, 1 leaf, with closer
- Hinges
Lockset, storeroom function
Closer
Stop
11. HS K: Staff-only room, 1 leaf, with closer; access-controlled door (permission to enter)
- Hinges
Lockset, storeroom function
Closer
Stop
Card reader
Electric strike
Request to exit
Magnetic contact
12. HS K2: Staff-only room, 2 leaves, with closer; access-controlled door (permission to enter)
- Hinges
Electric hinge, at inactive leaf
Lockset, storeroom function

Flushbolts (inactive leaf)
Closer (active leaf only)
Stop
Card reader
Electric strike (at inactive leaf)
Request to exit
Magnetic contact

13. HS L: Reading room, 1 leaf, with closer; access-controlled door (permission to exit and enter)

Hinges
Lockset, storeroom function
Closer
Stop
Card readers (one each side)
Electric strike
Doorbell button
Doorbell chime
Local alarm
Remote door release
Magnetic contact

14. HS L2: Reading room, 1 leaf, with closer; access-controlled door (permission to exit)

Hinges
Latchset, passage function
Closer
Stop
Card readers (one each side)
Electric strike
Doorbell button
Doorbell chime
Local alarm
Remote door release
Magnetic contact

15. HS L3: Reading room, 2 leaves, with closer; access-controlled door (permission to exit and enter)

Hinges
Electric hinge, at inactive leaf
Lockset, storeroom function
Flushbolts (inactive leaf only)
Closer (active leaf only)
Stop
Card readers (one each side)
Electric strike (at active leaf)
Doorbell button
Doorbell chime
Local alarm

- Remote door release
Magnetic contact
- 16. HS M: Storeroom, 2 leafs, with closer
 - Hinges
 - Lockset, storeroom function
 - Closer, at active leaf
 - Flushbolt, at inactive leaf
 - Stop
- 17. HS N: Interior exit, non-locking
 - Hinges
 - Exit device, rim type, operable lever trim, passage function
 - Closer
 - Stop
- 18. HS O: Interior exit, locking
 - Hinges
 - Exit device, rim type, operable lever trim, storeroom function
 - Closer
 - Stop
- 19. HS P: Interior exit, 2 leafs, locking
 - Hinges
 - Exit device, exposed vertical rod type
 - Straight pull
 - Closer
 - Stop
- 20. HS Q: Interior gate
 - Spring hinges
 - Neoprene silencer pad
- 21. HS R: Exterior entry/exit
 - Hinges
 - Exit device, rim type, locking entry function
 - Straight pull
 - Closer
 - Threshold
- 22. HS S: Exterior entry/exit with operator
 - Hinges
 - Exit device, rim type, locking entry function
 - Automatic operator

Threshold

23. HS T: Door to roof

Hinges
Mortise lockset, storeroom function
Closer
Threshold

24. HS U: Garden storage

See Division 8 Section "Sectional Overhead Doors"

25. HS T: Gate at garden storage

Heavy duty hinges
Exterior-duty keyed deadbolt

26. HS T2: Children's Gate

Heavy duty hinges
Exterior-duty keyed deadbolt
Hook-type hold open
Cane bolt
Lock hasp
Flush strike for cane bolt
(See also Division 5 sections and miscellaneous metal details at this opening)

END OF SECTION 08712

SECTION 08716 - AUTOMATIC DOOR OPERATORS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Power door operators.
- B. Related Sections include the following:
 - 1. Division 8 Sections for new and existing doors to receive automatic door operators and controls.
 - 2. Division 8 Section "Door Hardware" for door hardware that must be coordinated with automatic door operator fire-door package, and for hardware sets where automatic door operators are indicated.
 - 3. Division 16 Sections for electrical connections including conduit and wiring for automatic door operators.

1.3 PERFORMANCE REQUIREMENTS

- A. Opening and Closing Forces: Not more than 15 lbf (67 N applied) 1 inch (25 mm) from the latch edge of the door.

1.4 SUBMITTALS

- A. Product Data: Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for automatic door operators and activation and safety devices.
- B. Shop Drawings: Show fabrication and installation details for automatic door operators. Include locations and elevations of entrances showing activation and safety devices.
 - 1. Include plans, elevations, sections, details, and attachments to other work for guide rails.
- C. Samples for Verification: For exposed components and activation and safety devices with factory-applied color finishes.

- D. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for each product.
- E. Operation and Maintenance Data: For automatic door operators to include in emergency, operation, and maintenance manuals.
- F. Warranties: Special warranties specified in this Section.

1.5 QUALITY ASSURANCE

- A. Installer Qualifications: Manufacturer's authorized representative who is trained and approved for installation of units required for this Project.
- B. Source Limitations: Obtain automatic door operators through one source from a single manufacturer.
- C. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- D. UL Standard: Comply with UL 325.

1.6 PROJECT CONDITIONS

- A. Field Measurements: Verify door openings by field measurements before fabrication of exposed covers for automatic door operators and indicate measurements on Shop Drawings.

1.7 COORDINATION

- A. Templates: Obtain and distribute to the parties involved templates for doors, frames, and other work specified to be factory prepared for installing automatic door operators. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing automatic door operators to comply with indicated requirements.
- B. Electrical System Roughing-in: Coordinate layout and installation of automatic door operators with connections to power supplies.

1.8 WARRANTY

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

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

- a. Faulty or sporadic operation of automatic door operator or activation and safety devices.
 - b. Deterioration of metals, metal finishes, and other materials beyond normal weathering or use.
2. Warranty Period: Two years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
1. DORMA Architectural Hardware.
 2. EFCO Corporation.
 3. Horton Automatics.
 4. LCN Closers; an Ingersoll-Rand Company.

2.2 MATERIALS

- A. Aluminum: Alloy and temper recommended by manufacturer for type of use and finish indicated, complying with standards indicated below:
1. Sheet: **ASTM B 209** (ASTM B 209M).
 2. Extrusions: **ASTM B 221** (ASTM B 221M, Alloy 6063-T5 or T-6).
- B. Welding Rods and Bare Electrodes: AWS A5.10/A5.10M.

2.3 AUTOMATIC DOOR OPERATORS, GENERAL

- A. General: Provide operators of size recommended by manufacturer for door size, weight, and movement; for condition of exposure; and for long-term, maintenance-free operation under normal traffic load for type of occupancy indicated.
- B. Electromechanical Operating System: Unit powered by permanent-magnet dc motor; with closing speed controlled mechanically by gear train and dynamically by braking action of electric motor, and with manual operation including spring closing with power off.
1. Power Unit: Manufacturer's standard remote compressor unit, complete with tank, compressor, motor, regulator, safety valve, pressure cutoff switch, and automatic air-line filter drain.
- C. Hinge Operation: Refer to Division 8 Section "Door Hardware" to determine type of hinge for each door that door operator shall accommodate.

- D. Housing: Fabricated from 0.125-inch- (3.2-mm-) thick extruded or formed aluminum.
- E. Exposed Cover: Fabricated from 0.125-inch- (3.2-mm-) thick extruded aluminum; continuous over full width of door opening; with enclosed end caps, provision for maintenance access, and fasteners concealed when door is in closed position. Provide cover for head-mounted operator and separate cover piece for exposed operating arm, if any.
 - 1. Finish: For exposed operators at wood doors, provide primed finish for field painting.

2.4 POWER DOOR OPERATORS

- A. Standard: Comply with BHMA A156.10.
- B. Performance Requirements:
 - 1. Not more than 40 lbf (180 N applied) 1 inch (25 mm) from latch edge of door to prevent stopped door from opening or closing.
 - 2. If power fails, not more than 30 lbf (133 N applied) 1 inch (25 mm) from latch edge of door to manually open door.
- C. Operation: Power opening and power closing.
- D. Operating System: Electromechanical.
- E. Features:
 - 1. Adjustable opening and closing speed.
 - 2. Adjustable opening force.
 - 3. Adjustable backcheck.
 - 4. Adjustable hold-open time of not less than 0 to 30 seconds.
 - 5. Adjustable time delay.
 - 6. Adjustable acceleration.
 - 7. Adjustable limit switch.
 - 8. Obstruction recycle.
- F. Basis-of-Design Products:
 - 1. For surface mounting: LCN 9540 series, single leaf, overhead surface, push side mount.
 - 2. For concealed mounting: LCN 2810 series, single leaf, overhead concealed.

2.5 ACTIVATION AND SAFETY DEVICES

- A. Wall Push-Plate Switch: Manufacturer's standard door control switch; consisting of flat push plate; of material indicated; and actuator mounted in recessed junction box. Provide engraved message as indicated.
 - 1. Material: Stainless steel.
 - 2. Message: International symbol of accessibility.

3. Exterior switch, large plate type: 4 ½" round, flush mount in exterior wall or as indicated on drawings.
 4. Interior switch, narrow type: 1 ½" wide rectangular, flush or semi-recessed mount.
- B. Wireless Switch: Where indicated in schedules or on drawings, provide manufacturer's wireless switch system including wall mounted actuator, transmitter and receiver.
1. Basis of design product: LCN 7390 series.
- C. Electrical Interlocks: Unless units are equipped with self-protecting devices or circuits, provide electrical interlocks to prevent activation of operator when door is locked, latched, or bolted, or when any authorizing card readers or keypads require prior activation.

2.6 FINISHES, GENERAL

- A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
- B. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- C. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in the same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine conditions, with Installer present, for compliance with requirements for installation tolerances, door and frame supports, and other conditions affecting performance of automatic door operators.
- B. Examine roughing-in for electrical systems to verify actual locations of power connections before automatic door operator installation.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. General: Install complete automatic door operator system, including activation and safety devices, control wiring, and remote power units.
- B. Power Door Operator Installation Standard: Comply with BHMA A156.10 for installation.

- C. Low-Energy Power Door Operator Installation Standard: Comply with BHMA A156.19 for installation.
- D. Automatic Door Operators: Install door operator system, including control wiring, as follows:
 - 1. Refer to Division 16 Sections for connection to electrical power distribution system.
- E. Activation and Safety Devices: Install devices and wiring, including connections to automatic door operators, according to BHMA A156.10.
- F. Connect wiring according to Division 16 Section "Conductors and Cables."

3.3 ADJUSTING

- A. Adjust automatic door operators and activation and safety devices to operate smoothly, easily, and properly, and for safe operation and weathertight closure.
 - 1. Adjust doors with low-energy door operators to close according to BHMA A156.19.
- B. Lubricate operators, hardware, and other moving parts.
- C. After completing installation of exposed, factory-finished automatic door operators, inspect exposed finishes and repair damaged finishes.
- D. Readjust automatic door operators and activation and safety devices after repeated operation of completed installation equivalent to three days' use by normal traffic (100 to 300 cycles). Lubricate hardware, operating equipment, and other moving parts.

3.4 DEMONSTRATION

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain automatic door operators. Refer to Division 1 Section "Closeout Procedures."

END OF SECTION 08716

SECTION 08800 - GLAZING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Glass and glazing for wood framed borrowed lights and in wood casework.
 - 2. Glass and glazing for all doors.
 - 3. Glass floor slabs for work at existing stacks.
 - 4. Glazing sealants for the above.
 - 5. Glass and glazing specification for all glazed assemblies in the work, whether provided in this Section 08800 or in another Section.
- B. Related Sections include the following:
 - 1. Division 7 Section "Joint Sealants" for specification of sealants used in glazing not specified elsewhere.
 - 2. Division 8 Section "Aluminum Windows."
 - 3. Division 8 Section "Structural-Sealant-Glazed Curtainwalls."
 - 4. Framed mirrors are part of the work of Division 10 Section "Toilet Accessories".

1.3 SUBMITTALS

- A. General: Submit the following according to Conditions of Contract and Division 1 Specification Sections.
- B. Product data for each glass product and glazing material indicated.
- C. Provide the following samples:
 - 1. 12-inch square samples for verification purposes of each type of insulated window and door glass unit indicated.
 - 2. 12-inch square samples for verification of match to existing material of glass used at stack floors.
 - 3. 12-inch long samples of each color required (except black) for each type of sealant or gasket exposed to view. Install sealant or gasket sample between two strips of material representative in color of the adjoining framing system.
- D. Product certificates signed by glazing materials manufacturers certifying that their products comply with specified requirements.

- E. Compatibility and adhesion test reports from sealant manufacturer indicating that glazing materials were tested for compatibility and adhesion with glazing sealants. Include sealant manufacturer's interpretation of test results relative to sealant performance and recommendations for primers and substrate preparation needed for adhesion.
- F. Compatibility test report from manufacturer of insulating glass edge sealant indicating that glass edge sealants were tested for compatibility with other glazing materials including sealants, glazing tape, gaskets, setting blocks, and edge blocks.
- G. Product test reports for each type of glazing sealant and gasket indicated, evidencing compliance with requirements specified.
- H. Maintenance data for glass and other glazing materials to include in Operating and Maintenance Manual specified in Division 1.

1.4 QUALITY ASSURANCE

- A. Glazing Publications: Comply with published recommendations of glass product manufacturers and organizations below, except where more stringent requirements are indicated. Refer to these publications for glazing terms not otherwise defined in this Section or in referenced standards.
 - 1. FGMA Publications: "FGMA Glazing Manual."
 - 2. AAMA Publications: AAMA TIR-A7 "Sloped Glazing Guidelines" and "Glass Design for Sloped Glazing."
 - 3. LSGA Publications: "LSGA Design Guide."
 - 4. SIGMA Publications: TM-3000 "Vertical Glazing Guidelines" and TB-3001 "Sloped Glazing Guidelines."
- B. Safety Glass: Products complying with ANSI Z97.1 and testing requirements of 16 CFR Part 1201 for Category II materials.
 - 1. Subject to compliance with requirements, provide safety glass permanently marked with certification label of Safety Glazing Certification Council (SGCC) or other certification agency acceptable to authorities having jurisdiction.
- C. Fire-Resistive Glazing Products for Door Assemblies: Products identical to those tested per ASTM E 152, labeled and listed by UL or another testing and inspecting agency acceptable to authorities having jurisdiction.
- D. Insulating Glass Certification Program: Provide insulating glass units permanently marked either on spacers or at least one component lite of units with appropriate certification label of inspecting and testing agency indicated below:
 - 1. Insulating Glass Certification Council (IGCC).
 - 2. Associated Laboratories, Inc. (ALI).
 - 3. National Certified Testing Laboratories (NCTL).
- E. Labeling: Provide glass free of applied labels or stamp markings except for glass required by authorities having jurisdiction to have such applied labels or markings rather than separate documentation of compliance with requirements indicated.

- F. Single-Source Responsibility for Glass: Obtain glass from one source for each product indicated below:
 - 1. Primary glass of each (ASTM C 1036) type and class indicated.
 - 2. Heat-treated glass of each (ASTM C 1048) condition indicated.
 - 3. Laminated glass of each (ASTM C 1172) kind indicated.
 - 4. Insulating glass of each construction indicated.
- G. Single-Source Responsibility for Glazing Accessories: Obtain glazing accessories from one source for each product and installation method indicated.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Protect glazing materials to comply with manufacturer's directions and as needed to prevent damage to glass and glazing materials from condensation, temperature changes, direct exposure to sun, or other causes.

1.6 PROJECT CONDITIONS

- A. Environmental Conditions: Do not proceed with glazing when ambient and substrate temperature conditions are outside the limits permitted by glazing materials manufacturer or when glazing channel substrates are wet from rain, frost, condensation, or other causes.

1.7 WARRANTY

- A. General: Warranties specified in this Article shall not deprive the Owner of other rights the Owner may have under other provisions of the Contract Documents and will be in addition to and run concurrent with other warranties made by the Contractor under requirements of the Contract Documents.
- B. Manufacturer's Warranty on Glass Products: Submit written warranty signed by each glass manufacturer agreeing to furnish replacements for those glass units that deteriorate, f.o.b. point of manufacture, freight allowed Project site, within specified warranty period indicated below. Warranty covers only deterioration due to normal conditions of use and not to handling, installing, and cleaning practices contrary to glass manufacturer's published instructions.
 - 1. Warranty Period: Manufacturer's standard but not less than 10 years after date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PRIMARY FLOAT GLASS PRODUCTS

- A. Float Glass: ASTM C 1036, Type I (transparent glass, flat), Class as indicated below, and Quality q3 (glazing select). Class 1 (clear) unless otherwise indicated.

- B. Refer to requirements for sealed insulating glass units for performance characteristics of assembled units composed of tinted glass, coated or uncoated, relative to visible light transmittance, U-values, shading coefficient, and visible reflectance.

2.2 HEAT-TREATED FLOAT GLASS

- A. Fabrication Process: By horizontal (roller-hearth) process, free of tong marks.
- B. Uncoated, Clear, Heat-Treated Float Glass: ASTM C 1048, Condition A (uncoated surfaces), Type I (transparent glass, flat), Class 1 (clear), Quality q3 (glazing select).

2.3 LAMINATED GLASS PRODUCTS

- A. Laminated Glass Products: Comply with ASTM C 1172 for kinds of laminated glass indicated. Refer to primary and heat-treated glass requirements relating to properties of glass products comprising laminated glass products.
- B. Interlayer: Interlayer material as indicated below, in clear or colors, and of thickness indicated with a proven record of no tendency to bubble, discolor, or lose physical and mechanical properties after laminating glass lites and installation.
 - 1. Interlayer Material: Polyvinyl butyral sheets. Provide white translucent or clear transparent appearance as indicated in Glass Schedule at end of this Section.
- C. Laminating Process: Fabricate laminated glass to produce glass free of foreign substances and air or glass pockets. Laminate lites with polyvinyl butyral interlayer in autoclave with heat plus pressure.

2.4 INSULATING GLASS PRODUCTS

- A. Sealed Insulating Glass Units: Pre-assembled units consisting of organically sealed lites of glass separated by dehydrated air spaces complying with ASTM E 774 and with other requirements indicated, including those in Glazing Schedule at the end of this Section.
 - 1. For properties of individual glass lites making up units, refer to requirements specified elsewhere in this Section applicable to types, classes, kinds, and conditions of glass products comprising lites of insulating glass units.
 - 2. Provide heat-treated, float glass of kind indicated or, if not otherwise indicated, Kind HS (heat strengthened) where recommended by manufacturer to comply with system performance requirements specified and Kind FT (fully tempered) where safety glass is designated or required.

2.5 MIRRORS

- A. Glass for large unframed mirrors shall be Quality q2, Class a. Coat second surface of glass with successive layers of chemically deposited silver, electrically or chemically deposited copper, and manufacturer's standard protective organic coating to produce coating system that complies with

FS DD-M-0041, except with salt spray test period extended to 300 hours and undercutting, discolorations, blackening and silver impairment at mirror edges not greater than 1/8". At unframed mirrors, measure space before mirror fabrication, grind and polish all edges. Seal edges of mirrors after edge treatment to prevent chemical or atmospheric penetration of glass coating.

2.6 ELASTOMERIC GLAZING SEALANTS

- A. General: Provide products of type indicated, complying with the following requirements:
 - 1. Compatibility: Select glazing sealants and tapes of proven compatibility with other materials they will contact, including glass products, seals of insulating glass units, and glazing channel substrates, under conditions of installation and service, as demonstrated by testing and field experience.
 - 2. Suitability: Comply with sealant and glass manufacturer's recommendations for selecting glazing sealants and tapes that are suitable for applications indicated and conditions existing at time of installation.
- B. Elastomeric Glazing Sealant Standard: Provide manufacturer's standard chemically curing, elastomeric sealants of base polymer indicated that comply with ASTM C 920 requirements indicated on each Elastomeric Glazing Sealant Product Data Sheet at the end of this Section, including those referencing ASTM classifications for Type, Grade, Class and Uses.
- C. Glazing Sealant for Fire-Resistant Glazing Products: Identical to product used in test assembly to obtain fire-resistive rating.

2.7 GLAZING TAPES

- A. Back-Bedding Mastic Glazing Tape: Preformed, butyl-based elastomeric tape with a solids content of 100 percent, nonstaining and nonmigrating in contact with nonporous surfaces, with or without spacer rod as recommended by tape and glass manufacturers for application indicated, packaged on rolls with a release paper backing, and complying with AAMA 804.1.

2.8 MISCELLANEOUS GLAZING MATERIALS

- A. General: Provide products of material, size, and shape complying with referenced glazing standard, requirements of manufacturers of glass and other glazing materials involved for glazing application indicated, and with a proven record of compatibility with surfaces contacted in installation.
- B. Cleaners, Primers and Sealers: Type recommended by sealant or gasket manufacturer.
- C. Setting Blocks: Elastomeric material with a Shore A durometer hardness of 85 plus or minus 5.
- D. Spacers: Elastomeric blocks or continuous extrusions with a Shore A durometer hardness required by glass manufacturer to maintain glass lites in place for installation indicated.

- E. Edge Blocks: Elastomeric material of hardness needed to limit glass lateral movement (side-walking).
- F. Perimeter Insulation for Fire-Resistive Glazing: Identical to product used in test assembly to obtain fire-resistive rating.

2.9 FABRICATION OF GLASS AND OTHER GLAZING PRODUCTS

- A. Fabricate glass and other glazing products in sizes required to glaze openings indicated for Project, with edge and face clearances, edge and surface conditions, and bite complying with recommendations of product manufacturer and referenced glazing standard as required to comply with system performance requirements.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine glass framing, with glazier present, for compliance with the following:
 - 1. Manufacturing and installation tolerances, including those for size, squareness, offsets at corners.
 - 2. Presence and functioning of weep system.
 - 3. Minimum required face or edge clearances.
 - 4. Effective sealing at glazing pockets and between joints of glass-framing members.
- B. Do not proceed with glazing until unsatisfactory conditions have been corrected.

3.2 PREPARATION

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

3.3 GLAZING, GENERAL

- A. Comply with combined recommendations of manufacturers of glass, sealants, and other glazing materials, except where more stringent requirements are indicated, including those in referenced glazing publications.
- B. Glazing channel dimensions as indicated on Drawings provide necessary bite on glass, minimum edge and face clearances, and adequate sealant thicknesses, with reasonable tolerances. Adjust as required by Project conditions during installation.
- C. Protect glass from edge damage during handling and installation as follows:
 - 1. Use a rolling block in rotating glass units to prevent damage to glass corners. Do not impact glass with metal framing. Use suction cups to shift glass units within openings; do

- not raise or drift glass with a pry bar. Rotate glass lites with flares or bevels on bottom horizontal edges so edges are located at top of opening, unless otherwise indicated by manufacturer's label.
2. Remove damaged glass from Project site and legally dispose of off site. Damaged glass is glass with edge damage or other imperfections that, when installed, weaken glass and impair performance and appearance.
- D. Apply primers to joint surfaces where required for adhesion of sealants, as determined by preconstruction sealant-substrate testing.
- E. Install elastomeric setting blocks in sill rabbets, sized and located to comply with referenced glazing standard, unless otherwise required by glass manufacturer. Set blocks in thin course of compatible sealant suitable for heel bead.
- F. Do not exceed edge pressures stipulated by glass manufacturers for installing glass lites.
- G. Provide spacers for glass sizes larger than 50 united inches (length plus height) as follows:
1. Locate spacers inside, outside, and directly opposite each other. Install correct size and spacing to preserve required face clearances, except where gaskets and glazing tapes are used that have demonstrated ability to maintain required face clearances and comply with system performance requirements.
 2. Provide 1/8-inch (3 mm) minimum bite of spacers on glass and use thickness equal to sealant width. With glazing tape, use thickness slightly less than final compressed thickness of tape.
- H. Provide edge blocking to comply with requirements of referenced glazing publications, unless otherwise required by glass manufacturer.
- I. Set glass lites in each series with uniform pattern, draw, bow, and similar characteristics.

3.4 UNFRAMED MIRROR INSTALLATION

- A. Provide a minimum air space of 1/8 inch between back of mirrors and mounting surface for air circulation between back of mirrors and face of mounting surface.
- B. For wall-mounted mirrors, install mirrors with mastic and stainless steel clip mirror hardware.
1. Attach mirror hardware securely to mounting surfaces with mechanical fasteners installed with anchors or inserts as applicable. Install fasteners so heads do not impose point loads on backs of mirrors.
 2. Install bottom and top clips symmetrically placed and evenly spaced.
 3. At metal clips, place a felt or plastic pad between mirror and each clip to prevent spalling of mirror edges.
 4. Install mastic as follows:
 - a. Apply barrier coat to mirror backing where approved in writing by manufacturers of mirrors and backing material.
 - b. Apply mastic to comply with mastic manufacturer's written instructions for coverage and to allow air circulation between back of mirrors and face of mounting surface.

- c. After mastic is applied, align mirrors and press into place while maintaining a minimum air space of 1/8 inch between back of mirrors and mounting surface.

3.5 TAPE GLAZING FOR FACTORY GLAZING OF DOORS AND FIELD GLAZING OF INTERIOR SIDELIGHTS

- A. Position tapes on fixed stops so that, when compressed by glass, their exposed edges are flush with or protrude slightly above sightline of stops.
- B. Install tapes continuously, but not necessarily in one continuous length. Do not stretch tapes to make them fit opening.
- C. Cover vertical framing joints by applying tapes to heads and sills first and then to jambs. Cover horizontal framing joints by applying tapes to jambs and then to heads and sills.
- D. Place joints in tapes at corners of opening with adjoining lengths butted together, not lapped. Seal joints in tapes with compatible sealant approved by tape manufacturer.
- E. Do not remove release paper from tape until just before each glazing unit is installed.
- F. Center glass lites in openings on setting blocks and press firmly against tape by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centers of openings.

3.6 TAPE AND SEALANT GLAZING (WET GLAZING) FOR FIELD GLAZING OF ALUMINUM CURTAINWALL AND WINDOWS

- A. Remove all dirt, dust, grease, oil and other coatings in the glazing pocket. All framing and glazing materials shall be dry and free of frost.
- B. Position tapes on fixed stops so that when compressed by glass their exposed edges are flush with or protrude slightly above sightline of stops.
- C. Install tapes continuously but not in one continuous length. Do not stretch tapes to make them fit opening. Do not overlap or fold tape at corners.
- D. Where framing joints are vertical, cover these joints by applying tapes to heads and sills first and then to jambs. Where framing joints are horizontal, cover these joints by applying tapes to jambs and then to heads and sills.
- E. Place joints in tapes at corners of opening with adjoining lengths butted together, not lapped. Seal joints in tapes with compatible sealant approved by tape manufacturer.
- F. Do not remove release paper from tape until just before each lite is installed.
- G. Apply heel bead of elastomeric sealant. Sealant shall make contact with tape and back of glazing pocket and shall be sufficiently proud of the tape face so that when glass is put in place the sealant will continuously wet the edge of the glass making a completely sealed joint. Take care to keep weep holes clear of sealant. Place setting blocks at quarter points. Position glass into rabbet with forward pressing motion to produce the proper adhesive bond to the tape taking

care to center with equal edge clearances at all edges between glass and frame. Apply glazing stops. Insure that metal edged insulating glazing will have metal edge completely covered by glazing materials.

- H. Install continuous spacers between glass lites and glazing stop (pressure plate) to maintain glass face clearances and to prevent sealant from extruding into glass channel weep systems. Secure spacers in place and in position to control depth of installed sealant relative to edge clearance for optimum sealant performance.
- I. Tighten pressure plates as required by glazing manufacturer. Apply sealant at hairline joints in pressure plates. Install snap-on cover over pressure plate.
- J. Force clear sealant into space between cover plate and glazing to eliminate voids and to ensure complete wetting or bond of sealant to glass and aluminum framing surfaces (pressure plate and snap-on cover). Form a small fillet of sealant on the top of cover plate but do not coat entire top of cover with sealant. Tool exposed surface of sealant to provide a wash away from glass.
- K. Trim sealant and remove any excess sealant from glass. Do not scratch glass or aluminum.

3.7 PROTECTION AND CLEANING

- A. Protect exterior glass from breakage immediately after installation by attaching crossed streamers to framing held away from glass. Do not apply markers to glass surface. Remove nonpermanent labels, and clean surfaces.
- B. Protect glass from contact with contaminating substances resulting from construction operations including weld splatter. If, despite such protection, contaminating substances do come into contact with glass, remove them immediately as recommended by glass manufacturer.
- C. Examine glass surfaces adjacent to or below exterior concrete and other masonry surfaces at frequent intervals during construction, but not less than once a month, for build-up of dirt, scum, alkali deposits, or stains, and remove as recommended by glass manufacturer.
- D. Remove and replace glass that is broken, chipped, cracked, abraded, or damaged in any way, including natural causes, accidents and vandalism, during construction period.
- E. Wash glass on both faces in each area of Project not more than 4 days prior to date scheduled for inspections that establish date of Substantial Completion. Wash glass as recommended by glass manufacturer.

3.8 GLAZING SCHEDULE: Provide the specified glass types in the following locations, unless otherwise indicated.

- A. Typical exterior glazing at aluminum windows or curtainwall: 1" insulating unit with clear 1/4" inner and outer lites. At hazardous locations, and as required by applicable authorities, provide Kind FT fully tempered inner and/or outer lites.:
 - 1. Overall Unit Thickness: 1".
 - 2. Interspace Content: Argon.

3. Outdoor Lite: 1/4" Class 1 (clear).
 4. Indoor Lite: 1/4" Class 1 (clear).
 5. Film: Coated film suspended in the interspace, "Twin Coated" on both surfaces of the film, equivalent to "Heat Mirror" TC88 Clear/Clear.
 6. U Value: 0.21
 7. Shading Coefficient: 0.55
 8. Solar Heat Gain coefficient: 0.48
 9. UV Transmittance: 0.5%
- B. Typical interior glass: 1/4" clear float. Typical interior glass in hazardous locations, according to applicable codes: 1/4" clear Kind FT fully tempered.
- C. Typical historic storm window glass: 3/16" clear float.
- D. Typical glazed exterior door: 5/8" insulating unit with clear Kind FT fully tempered in both layers.
- E. Typical glazed interior door: 1/4" clear Kind FT fully tempered glass.
- F. Interior Unframed Mirrors: 1/4" as specified above.
- G. New and modified areas of glass "stack floors:"
1. Nominal 1" thick clear annealed cast glass with one "sand-cast" textured surface. Match existing surfaces for finishes.

END OF SECTION

SECTION 08912 - STRUCTURAL-SEALANT-GLAZED CURTAIN WALLS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Field-glazed, two-sided structural-sealant-glazed curtain-wall assemblies.
 - 2. Custom aluminum cap extensions at heads, jambs and sills, where so shown.
- B. Related Sections:
 - 1. Division 5 Section "Formed Metal Fabrications" for aluminum panels, metal cornice and other formed metal fabrications associated with curtain wall systems.
 - 2. Division 7 Section "Joint Sealants" for sealants at perimeters of systems specified herein.
 - 3. Division 8 Section "Aluminum Windows" for windows at lowest building level.
 - 4. Division 8 Section "Glazing" for glass product specification and installation requirements.

1.3 ALLOWANCES

- A. Provide field quality-control testing as part of testing and inspecting allowance.

1.4 PERFORMANCE REQUIREMENTS

- A. General Performance: Comply with performance requirements specified, as determined by testing manufacturer's standard of structural-sealant-glazed curtain walls representing those indicated for this Project without failure due to defective manufacture, fabrication, installation, or other defects in construction.
 - 1. Structural-sealant-glazed curtain walls shall withstand movements of supporting structure including, but not limited to, story drift, twist, column shortening, long-term creep, and deflection from uniformly distributed and concentrated live loads.
 - 2. Failure also includes the following:
 - a. Thermal stresses transferring to building structure.
 - b. Glass breakage.
 - c. Noise or vibration created by wind and thermal and structural movements.
 - d. Loosening or weakening of fasteners, attachments, and other components.
 - e. Failure of operating units.

- B. Delegated Design: Design structural-sealant-glazed curtain walls, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.
- C. Structural Loads:
 - 1. Basic Wind Speed: 100 mph
 - 2. Components and Cladding Pressure on System (including internal pressure): 22 psf at center of building elevations. Adjust analysis to account for higher pressures at building corners.
 - 3. Importance Factor: 1.0.
 - 4. Exposure Category: B.
 - 5. Design Seismic Story Drift (with amplification factor): 2.5”.
- D. Structural-Test Performance: Provide structural-sealant-glazed curtain walls tested according to ASTM E 330 as follows:
 - 1. When tested at positive and negative wind-load design pressures, assemblies do not evidence deflection exceeding specified limits.
 - 2. When tested at 150 percent of positive and negative wind-load design pressures, assemblies, including anchorage, do not evidence material failures, structural distress, and permanent deformation of main framing members exceeding 0.2 percent of span.
 - 3. Test Durations: As required by design wind velocity, but not less than 10 seconds.
- E. Deflection of Framing Members: At design wind pressure, as follows:
 - 1. Deflection Normal to Wall Plane: Unless other performance requirements require stricter limits, limit deflection to edge of glass in a direction perpendicular to glass plane not exceeding L/175 of the glass edge length for each individual glazing lite or an amount that restricts edge deflection of individual glazing lites to 3/4 inch, whichever is less.
 - 2. Deflection Parallel to Glazing Plane: Limited to L/360 of clear span or 1/8 inch, whichever is smaller.
- F. Seismic Performance: Structural-sealant-glazed curtain walls shall withstand the effects of earthquake motions determined according to SEI/ASCE 7.
- G. Curtain Wall System Performance Requirements:
 - 1. Air Infiltration: The test specimen shall be tested in accordance with ASTM E 283. Air infiltration rate shall not exceed 0.06 cfm/ft² (0.3 l/s-m²) at a static air pressure differential of 6.24 psf (300 Pa).
 - 2. Water Resistance, (static): The test specimen shall be tested in accordance with ASTM E 331. There shall be no leakage at a static air pressure differential of 12 psf (575 Pa) as defined in AAMA 501.
 - 3. Water Resistance, (dynamic): The test specimen shall be tested in accordance with AAMA 501.1. There shall be no leakage at an air pressure differential of 12 psf (575 Pa) as defined in AAMA 501.
 - 4. Uniform Load: A static air design load of 40 psf (1915 Pa) shall be applied in the positive and negative direction in accordance with ASTM E 330. There shall be no deflection in excess of L/175 of the span of any framing member at design load. At structural test load equal to 1.5 times the specified design load, no glass breakage or permanent set in the framing members in excess of 0.2% of their clear spans shall occur.

5. Thermal Transmittance (U-factor): When tested to AAMA Specification 1503, the thermal transmittance (U-factor) shall not be more than: 0.57 (clear).
 6. Condensation Resistance (CRF): When tested to AAMA Specification 1503, the condensation resistance factor shall not be less than 68_{frame} and 59_{glass} (clear), or Condensation Index (I): when tested to CSA-A440-00, the Condensation Index shall not be less than 65_{frame} and 50_{glass} (clear).
- H. Thermal Movements: Allow for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures:
1. Temperature Change (Range): 120 deg F, ambient; 180 deg F, material surfaces.
- I. Structural Sealant: Capable of withstanding tensile and shear stresses imposed by structural-sealant-glazed curtain walls without failing adhesively or cohesively. When tested for preconstruction adhesion and compatibility, cohesive failure of sealant shall occur before adhesive failure.
1. Adhesive failure occurs when sealant pulls away from substrate cleanly, leaving no sealant material behind.
 2. Cohesive failure occurs when sealant breaks or tears within itself but does not separate from each substrate because sealant-to-substrate bond strength exceeds sealant's internal strength.
- J. Structural-Sealant Joints:
1. Designed to produce tensile or shear stress of less than 20 psi.
 2. Design reviewed and approved by structural-sealant manufacturer.
- 1.5 PRECONSTRUCTION TESTING
- A. Preconstruction Testing Service: Provide structural-sealant-glazed curtain walls that comply with test-performance requirements indicated, as evidenced by reports of tests performed on manufacturer's standard assemblies by a qualified testing agency.
- 1.6 SUBMITTALS
- A. Product Data: For each type of product indicated. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.
- B. Shop Drawings: For structural-sealant-glazed curtain walls. Include plans, elevations, sections, full-size details, and attachments to other work.
1. Include details of provisions for assembly expansion and contraction and for draining moisture occurring within the assembly to the exterior.
 2. Include full-size isometric details of each vertical-to-horizontal intersection of structural-sealant-glazed curtain walls, showing the following:
 - a. Joinery, including concealed welds.
 - b. Anchorage.
 - c. Expansion provisions.

- d. Glazing.
 - e. Flashing and drainage.
 - f. Custom extrusion sections.
 - C. Samples for Initial Selection: For units with factory-applied color finishes.
 - D. Samples for Verification: For each type of exposed finish required, in manufacturer's standard sizes.
 - E. Fabrication Sample: Of each vertical-to-horizontal intersection of assemblies, made from 12-inch lengths of full-size components and showing details of the following:
 - 1. Joinery, including concealed welds.
 - 2. Anchorage.
 - 3. Glazing.
 - F. Delegated-Design Submittal: For structural-sealant-glazed curtain walls indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
 - G. Qualification Data: For qualified Installer and testing agency.
 - H. Seismic Qualification Certificates: For structural-sealant-glazed curtain walls, accessories, and components, from manufacturer.
 - 1. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.
 - I. Energy-Performance Certificates: For structural-sealant-glazed curtain walls, accessories, and components, from manufacturer.
 - 1. Basis for Certification: NFRC-certified energy-performance values for each structural-sealant-glazed curtain wall.
 - J. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified preconstruction testing agency, for structural-sealant-glazed curtain walls, indicating compliance with performance requirements.
 - K. Maintenance Data: For structural-sealant-glazed curtain walls to include in maintenance manuals. Include ASTM C 1401 recommendations for postinstallation-phase quality-control program.
 - L. Warranties: Sample of special warranties.
- 1.7 QUALITY ASSURANCE
- A. Installer Qualifications: Manufacturer's authorized representative who is trained and approved for installation of units required for this Project.
 - B. Testing Agency Qualifications: Qualified according to ASTM E 699 for testing indicated.

- C. Product Options: Information on Drawings and in Specifications establishes requirements for assemblies' aesthetic effects and performance characteristics. Aesthetic effects are indicated by dimensions, arrangements, alignment, and profiles of components and assemblies as they relate to sightlines, to one another, and to adjoining construction.
 - 1. Do not revise intended aesthetic effects, as judged solely by Architect, except with Architect's approval. If revisions are proposed, submit comprehensive explanatory data to Architect for review.
- D. Structural-Sealant Glazing: Comply with ASTM C 1401 for design and installation of structural-sealant-glazed curtain walls.
- E. Energy-Performance Standards: Comply with NFRC for minimum standards of energy performance, materials, components, accessories, and fabrication. Comply with more stringent requirements if indicated.
 - 1. Provide NFRC-certified, structural-sealant-glazed curtain walls with an attached label.
- F. Mockups: Build mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for fabrication and installation.
 - 1. Build mockups of typical wall areas.
 - 2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
 - 3. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.
- G. Pre-installation Conference: Conduct conference at Project site.

1.8 PROJECT CONDITIONS

- A. Field Measurements: Verify actual locations of structural supports for structural-sealant-glazed curtain walls by field measurements before fabrication and indicate measurements on Shop Drawings.

1.9 WARRANTY

- A. Special Assembly Warranty: Standard form in which manufacturer agrees to repair or replace components of structural-sealant-glazed curtain walls that do not comply with requirements or that fail in materials or workmanship within specified warranty period.
 - 1. Failures include, but are not limited to, the following:
 - a. Structural failures including, but not limited to, excessive deflection.
 - b. Noise or vibration created by wind and thermal and structural movements.
 - c. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
 - d. Water penetration through fixed glazing and framing areas.
 - e. Failure of operating components.

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

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Basis-of-Design Product: Subject to compliance with requirements, provide Kawneer 1600, Wall System 2.

2.2 MATERIALS

- A. Aluminum: Alloy and temper recommended by manufacturer for type of use and finish indicated.
 1. Sheet and Plate: ASTM B 209 (ASTM B 209M).
 2. Extruded Bars, Rods, Profiles, and Tubes: ASTM B 221 (ASTM B 221M).
 3. Extruded Structural Pipe and Tubes: ASTM B 429.
 4. Structural Profiles: ASTM B 308/B 308M.
 5. Welding Rods and Bare Electrodes: AWS A5.10/A5.10M.
- B. Steel Reinforcement: Manufacturer's standard zinc-rich, corrosion-resistant primer, complying with SSPC-PS Guide No. 12.00; applied immediately after surface preparation and pretreatment. Select surface preparation methods according to recommendations in SSPC-SP COM and prepare surfaces according to applicable SSPC standard.
 1. Structural Shapes, Plates, and Bars: ASTM A 36/A 36M.
 2. Cold-Rolled Sheet and Strip: ASTM A 1008/A 1008M.
 3. Hot-Rolled Sheet and Strip: ASTM A 1011/A 1011M.

2.3 FRAMING

- A. Framing Members: Manufacturer's extruded-aluminum framing members of thickness required and reinforced as required to support imposed loads.
- B. Special Extrusions: The drawings indicate framing system caps which may not be standard shapes. If so, provide shapes shown by preparing custom extrusions.
- C. Fasteners and Accessories: Manufacturer's standard corrosion-resistant, nonstaining, non-bleeding fasteners and accessories compatible with adjacent materials.
 1. Use self-locking devices where fasteners are subject to loosening or turning out from thermal and structural movements, wind loads, or vibration.
 2. Reinforce members as required to receive fastener threads.
 3. Avoid use of exposed fasteners. If exposed fasteners cannot be avoided, and are approved in advance in the shop drawings, use exposed fasteners with countersunk Phillips screw heads, finished to match framing system.

- D. Anchors: Three-way adjustable anchors, with minimum adjustment of 1 inch, that accommodate fabrication and installation tolerances in material and finish and are compatible with adjoining materials and recommended by manufacturer.
 - 1. Concrete and Masonry Inserts: Hot-dip galvanized cast-iron, malleable-iron, or steel inserts complying with ASTM A 123/A 123M or ASTM A 153/A 153M requirements.
- E. Concealed Flashing: Manufacturer's standard corrosion-resistant, nonstaining, nonbleeding flashing compatible with adjacent materials.
- F. Framing Sealants: Manufacturer's standard sealants with VOC content of 250g/L or less when calculated according to 40 CFR 59, Subpart D (EPA method 24).

2.4 GLAZING

- A. Glazing: Comply with Division 8 Section "Glazing."
- B. Glazing Gaskets, Spacers, Setting Blocks, Sealant Backings, and Bond Breakers: Manufacturer's standard permanent, nonmigrating types compatible with sealants and suitable for joint movement and assembly performance requirements.
- C. Glazing Gaskets, Spacers, Setting Blocks, Sealant Backings, and Bond Breakers: As specified in Division 8 Section "Glazing."
- D. Glazing Sealants: For structural-sealant-glazed curtain walls, as recommended by manufacturer for joint type, and as follows:
 - 1. Structural Sealant: ASTM C 1184, chemically curing silicone formulation that is compatible with system components with which it comes in contact, specifically formulated and tested for use as structural sealant and approved by structural-sealant manufacturer for use in curtain-wall assembly indicated.
 - a. Provide sealants for use inside of the weatherproofing system that have a VOC content of 100 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
 - b. Color: As selected by Architect from manufacturer's full range of colors.
 - 2. Weatherseal Sealant: ASTM C 920 for Type S; Grade NS; Class 25; Uses NT, G, A, and O; chemically curing silicone formulation that is compatible with structural sealant and other system components with which it comes in contact; recommended by structural-sealant, weatherseal-sealant, and structural-sealant-glazed curtain-wall manufacturers for this use.
 - a. Provide sealants for use inside of the weatherproofing system that have a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
 - b. Color: Matching structural sealant.

2.5 ACCESSORY MATERIALS

- A. Bituminous Paint: Cold-applied asphalt-mastic paint complying with SSPC-Paint 12 requirements except containing no asbestos, formulated for 30-mil (0.762-mm) thickness per coat.
- B. Cleaning Agent and Cloth: As recommended by structural-sealant manufacturer.

2.6 FABRICATION

- A. Form or extrude aluminum shapes before finishing.
- B. 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.
- C. Fabricate components that, when assembled, have the following characteristics:
 - 1. Profiles that are sharp, straight, and free of defects or deformations.
 - 2. Accurately fitted joints with ends coped or mitered.
 - 3. Physical and thermal isolation of glazing from framing members.
 - 4. Accommodations for thermal and mechanical movements of glazing and framing to maintain required glazing edge clearances.
 - 5. Fasteners, anchors, and connection devices that are concealed from view to greatest extent possible.
 - 6. Provisions for field replacement of glazing from exterior. Include accommodations for using temporary support device (dutchman) to retain glazing in place while sealant cures.
 - 7. Internal guttering systems or other means to drain water passing joints, condensation occurring within framing members, and moisture migrating within structural-sealant-glazed curtain wall to exterior.
- D. Factory-Assembled Frame Units:
 - 1. Rigidly secure nonmovement joints.
 - 2. Prepare surfaces that will contact structural sealant according to sealant manufacturer's written instructions to ensure compatibility and adhesion.
 - 3. Preparation includes, but is not limited to, cleaning and priming surfaces.
 - 4. Seal joints watertight unless otherwise indicated.
 - 5. Install glazing to comply with requirements in Division 8 Section "Glazing."
- E. After fabrication, clearly mark components to identify their locations in Project according to Shop Drawings.

2.7 ALUMINUM FINISHES

- A. High-Performance Organic Finish: Four-coat fluoropolymer finish complying with AAMA 2605 and containing not less than 70 percent PVDF resin by weight in both color coat and clear topcoat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
 - 1. Color and Gloss: Two colors are required as follows:

- a. Curtainwall frames and extrusions interior of the glazing plane shall be a "Statuary Bronze" color matching UC43347 "Duranar" Coating by PPG.
- b. Curtainwall glazing caps and extrusions exterior of the glazing plane shall be a metallic "Pewter" color matching UC51713 XL "Duranar XL" Coating by PPG.

2.8 SOURCE QUALITY CONTROL

- A. Perform quality-control procedures complying with ASTM C 1401 recommendations including, but not limited to, assembly material qualification procedures, sealant testing, and assembly fabrication reviews and checks.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. General:
 1. Comply with manufacturer's written instructions.
 2. Do not install damaged components.
 3. Fit joints to produce hairline joints free of burrs and distortion.
 4. Rigidly secure nonmoving joints.
 5. Install anchors with separators and isolators to prevent metal corrosion, electrolytic deterioration, and impediments to movement of joints.
 6. Seal joints watertight unless otherwise indicated.
- B. Metal Protection:
 1. Where aluminum will contact dissimilar metals, protect against galvanic action by painting contact surfaces with primer, applying sealant or tape, or installing nonconductive spacers as recommended by manufacturer for this purpose.
 2. Where aluminum will contact concrete or masonry, protect against corrosion by painting contact surfaces with bituminous paint.
- C. Install components to drain water passing joints, condensation occurring within framing members, and moisture migrating within structural-sealant-glazed curtain walls to exterior.
- D. Install components plumb and true in alignment with established lines and grades.
- E. Install glazing as specified in Division 8 Section "Glazing." Prepare surfaces that will contact structural sealant according to sealant manufacturer's written instructions to ensure

compatibility and adhesion. Preparation includes, but is not limited to, cleaning and priming surfaces.

- F. Install weatherseal sealant according to Division 7 Section "Joint Sealants" and according to sealant manufacturer's written instructions to produce weatherproof joints. Install joint filler behind sealant as recommended by sealant manufacturer.

3.3 ERECTION TOLERANCES

- A. Erection Tolerances: Install to comply with the following nonaccumulating maximum tolerances:
 - 1. Plumb: 1/8 inch in 10 feet; 1/4 inch in 40 feet.
 - 2. Level: 1/8 inch in 20 feet; 1/4 inch in 40 feet.
 - 3. Alignment:
 - a. Where surfaces abut in line or are separated by reveal or protruding element up to 1/2 inch wide, limit offset from true alignment to 1/16 inch.
 - b. Where surfaces are separated by reveal or protruding element from 1/2 to 1 inch wide, limit offset from true alignment to 1/8 inch.
 - c. Where surfaces are separated by reveal or protruding element of 1 inchwide or more, limit offset from true alignment to 1/4 inch.
 - 4. Location: Limit variation from plane to 1/8 inch in 12 feet; 1/2 inch over total length.

3.4 FIELD QUALITY CONTROL

- A. Testing Agency: Engage a qualified independent testing agency to perform field quality-control testing indicated.
- B. Structural-Sealant Adhesion: Test structural sealant according to recommendations in ASTM C 1401, Destructive Test Method A, "Hand Pull Tab (Destructive)," Appendix X2.
 - 1. Test a minimum of two areas on each building facade.
 - 2. Repair installation areas damaged by testing.
- C. Test the entire curtain wall assembly for leakage.
- D. Water Spray Test: After completing the installation of glazed system, test the entire system for water penetration according to Architectural Aluminum Manufacturers Association (AAMA) 501.2, *Field Check of Metal Storefronts, Curtain Walls, and Sloped Glazing Systems for Water Leakage*. Perform the test using a standard Monarch B-25 nozzle at 12" from the wall surface and at a hose pressure of 35 psi. Any water penetration into the interior shall be considered a failure of the test. Provide scaffolding or man-lift necessary to allow spray test, and cooperate with inspector in his review.
- E. Systems will be considered defective if they do not pass tests and inspections.
- F. Repair or remove and replace Work that does not meet requirements or that is damaged by testing; replace and retest to establish conformance to specified requirements.

- G. Prepare test and inspection reports.

3.5 ADJUSTING AND CLEANING

- A. Remove excess sealant and glazing compounds, and dirt from surfaces.
- B. Repair to Architect's satisfaction, or replace, any aluminum work with marred or damaged finishes.

3.6 PROTECTION

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

END OF SECTION