Division 08

SECTION 081113

HOLLOW METAL DOORS AND FRAMES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Exterior Hollow Metal Doors and Frames
2. Hollow Metal Doors and Frames
3. Hollow Metal Frames for Flush Wood Doors

B. Related Requirements:

1. Section 081416 “Flush Wood Doors” for wood doors installed in hollow-metal frames.
2. Section 087100 "Door Hardware" for door hardware for hollow-metal doors.
3. Section 088000 “Glazing” for glazing installed in hollow-metal doors.

1.3 DEFINITIONS

A. Minimum Thickness: Minimum thickness of base metal without coatings in accordance with NAAMM-HMMA 803 or ANSI/SDI A250.8.

1.4 COORDINATION

A. Coordinate anchorage installation 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.

B. Coordinate requirements for installation of door hardware, electrified door hardware, and access control and security systems.

1.5 ACTION SUBMITTALS

A. Product Data Submittals: For each product.

1. Include construction details, material descriptions, core descriptions, fire-resistance ratings, and finishes.

B. Shop Drawings: Include the following:

1. Elevations of each door type.
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 electrical raceway and preparation for electrified hardware, access control systems, and security systems.
7. Details of anchorages, joints, field splices, and connections.
8. Details of accessories.
9. Details of moldings, removable stops, and glazing.
10. Product Schedule: For hollow-metal doors and frames, prepared by or under the supervision of supplier, using same reference numbers for details and openings as those on Drawings. Coordinate with final door hardware schedule.

1.6 CLOSEOUT SUBMITTALS

A. Record Documents: For fire-rated doors, list of door numbers and applicable room name and number to which door accesses.

1.7 DELIVERY, STORAGE, AND HANDLING

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

B. Provide additional protection to prevent damage to factory-finished units.

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

D. Store hollow-metal doors and frames vertically under cover at Project site with head up. Place on minimum 4-inch-high wood blocking. Provide minimum 1/4-inch space between each stacked door to permit air circulation.

PART 2 - PRODUCTS

2.1 HOLLOW METAL DOORS AND FRAMES

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. Ceco Door; AADG, Inc.; ASSA ABLOY.

a. Frames:

1) Masonry Walls: Series SU

2) Gypsum Board Walls: Series BQ

b. Doors:

1) Exterior: Legion

2) Interior: Madellion

2. Curries, AADG, Inc.; ASSA ABLOY Group.

3. Republic Doors and Frames; an Allegion brand.

4. Steelcraft; Allegion plc.

2.2 PERFORMANCE REQUIREMENTS

A. Thermally Rated Door Assemblies: Provide door assemblies with U-factor of not more than 0.45 deg Btu/F x h x sq. ft. when tested in accordance with ASTM C1363 or ASTM E1423.

B. Maximum Air Leakage: .30 CFM/sq. ft. when tested in accordance with AAMA/WDMA/ CSA101/I.S.2/A440 at 6.24 psf.

C. Fire-Rated Door Assemblies: Assemblies complying with NFPA 80 that are listed and labeled by a qualified testing agency acceptable to authorities having jurisdiction for fire-protection ratings indicated on Drawings, based on testing at positive pressure in accordance with NFPA 252 or UL 10C.

1. Smoke- and Draft-Control Door Assemblies: Listed and labeled for smoke and draft control by a qualified testing agency acceptable to authorities having jurisdiction, based on testing in accordance with UL 1784 and installed in compliance with NFPA 105.

2.3 EXTERIOR HOLLOW METAL DOORS AND FRAMES

A. Construct hollow-metal doors and frames to comply with standards indicated for materials, fabrication, hardware locations, hardware reinforcement, tolerances, and clearances, and as specified.

B. Extra-Heavy-Duty Doors and Frames: ANSI/SDI A250.8, Level 3; ANSI/SDI A250.4, Level A.

1. Doors:

a. Type: As indicated on Drawings.

b. Thickness: 1-3/4 inches.

c. Face: Metallic-coated steel sheet, minimum thickness of 0.053 inch (nom. 16 ga), with minimum A60 coating.

d. Edge Construction: Model 2, Seamless.

e. Edge Bevel: Provide manufacturer's standard beveled or square edges.

f. Top Edge Closures: Close top edges of doors with flush closures of same material as face sheets. Seal joints against water penetration.

g. Bottom Edges: Close bottom edges of doors where required for attachment of weather stripping with end closures or channels of same material as face sheets. Provide weep-hole openings in bottoms of exterior doors to permit moisture to escape.

h. Core: Foam-In-Place Polyurethane Maximum-Duty, ANSI/SDI A250.8, Level 4.

2. Frames:

a. Materials: Metallic-coated steel sheet, minimum thickness of 0.067 inch (nom. 14 ga), with minimum A60 coating.

b. Construction: Full profile welded.

3. Exposed Finish: Prime.

2.4 INTERIOR HOLLOW METAL DOORS AND FRAMES

A. Construct hollow-metal doors and frames to comply with standards indicated for materials, fabrication, hardware locations, hardware reinforcement, tolerances, and clearances, and as specified.

B. Extra-Heavy-Duty Doors and Frames: ANSI/SDI A250.8, Level 3; ANSI/SDI A250.4, Level A.

1. Doors:

a. Type: As indicated in the Door and Frame Schedule on Drawings.

b. Thickness: 1-3/4 inches.

c. Face: Uncoated steel sheet, minimum thickness of 0.053 inch.

d. Edge Construction: Model 2, Seamless.

e. Edge Bevel: Provide manufacturer's standard beveled or square edges.

f. Core: Fiberglass with 18 ga. vertical steel stiffeners, 6” apart welded.

g. Fire-Rated Core: Manufacturer's standard laminated mineral board core for fire-rated doors.

2. Frames:

a. Materials: Uncoated steel sheet, minimum thickness of 0.053 inch.

b. Construction: Full profile welded.

3. Exposed Finish: Prime.

2.5 BORROWED LITES

A. Fabricate of uncoated steel sheet, minimum thickness of 0.053 inch.

B. Construction: Full profile welded.

C. Fabricate in one piece except where handling and shipping limitations require multiple sections. Where frames are fabricated in sections due to shipping or handling limitations, provide alignment plates or angles at each joint, fabricated of metal of same or greater thickness as metal as frames.

D. Provide countersunk, flat- or oval-head exposed screws and bolts for exposed fasteners unless otherwise indicated.

2.6 FRAME ANCHORS

A. Jamb Anchors:

1. Type: Anchors of minimum size and type required by applicable door and frame standard, and suitable for performance level indicated.

2. Quantity: Minimum of three anchors per jamb, with one additional anchor for frames with no floor anchor. Provide one additional anchor for each 24 inches of frame height above 7 feet.

3. Post-installed Expansion Anchor: Minimum 3/8-inch-diameter bolts with expansion shields or inserts, with manufacturer's standard pipe spacer.

B. Floor Anchors: Provide floor anchors for each jamb and mullion that extends to floor.

C. Floor Anchors for Concrete Slabs with Underlayment: Adjustable-type anchors with extension clips, allowing not less than 2-inch height adjustment. Terminate bottom of frames at top of underlayment.

D. Material: ASTM A879/A879M, Commercial Steel (CS), 04Z coating designation; mill phosphatized.

1. For anchors built into exterior walls, steel sheet complying with ASTM A1008/A1008M or ASTM A1011/A1011M; hot-dip galvanized in accordance with ASTM A153/A153M, Class B.

2.7 MATERIALS

A. Cold-Rolled Steel Sheet: ASTM A1008/A1008M, Commercial Steel (CS), Type B; suitable for exposed applications.

B. Hot-Rolled Steel Sheet: ASTM A1011/A1011M, Commercial Steel (CS), Type B; free of scale, pitting, or surface defects; pickled and oiled.

C. Inserts, Bolts, and Fasteners: Hot-dip galvanized in accordance with ASTM A153/A153M.

D. Power-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.

E. Mineral-Fiber Insulation: ASTM C665, Type I (blankets without membrane facing); consisting of fibers manufactured from slag or rock wool; with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively; passing ASTM E136 for combustion characteristics.

F. Glazing: Comply with requirements in Section 088000 "Glazing".

2.8 FABRICATION

A. Hollow-Metal Frames: Fabricate in one piece except where handling and shipping limitations require multiple sections. Where frames are fabricated in sections, provide alignment plates or angles at each joint, fabricated of metal of same or greater thickness as frames.

1. Provide countersunk, flat- or oval-head exposed screws and bolts for exposed fasteners unless otherwise indicated.
2. Door Silencers: Except on weather-stripped frames, 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.

B. Hardware Preparation: Factory prepare hollow-metal doors and frames to receive templated mortised hardware, and electrical wiring; include cutouts, reinforcement, mortising, drilling, and tapping in accordance with ANSI/SDI A250.6, the Door Hardware Schedule on Drawings, and templates.

1. Reinforce doors and frames to receive nontemplated, mortised, and surface-mounted door hardware.
2. Comply with BHMA A156.115 for preparing hollow-metal doors and frames for hardware.

C. Glazed Lites: Provide stops and moldings around glazed lites where indicated. Form corners of stops and moldings with mitered hairline joints.

1. Provide stops and moldings flush with face of door, and with beveled stops unless otherwise indicated.

2. Provide fixed frame moldings on secure side of interior doors and frames. Provide loose stops and moldings on inside of hollow-metal doors and frames.

3. Coordinate rabbet width between fixed and removable stops with glazing and installation types indicated.

4. Provide stops for installation 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.

2.9 STEEL FINISHES

A. Prime Finish: Clean, pretreat, and apply manufacturer's standard primer.

1. Shop Primer: Manufacturer's standard, fast-curing, lead- and chromate-free primer complying with ANSI/SDI A250.10; recommended by primer manufacturer for substrate; compatible with substrate and field-applied coatings despite prolonged exposure.

PART 3 - EXECUTION

3.1 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. Touch up factory-applied finishes where spreaders are removed.

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

3.2 INSTALLATION

A. Install hollow-metal doors and frames plumb, rigid, properly aligned, and securely fastened in place. Comply with approved Shop Drawings and with manufacturer's written instructions.

B. Hollow-Metal Frames: 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 without damage to completed Work.

a. Where frames are fabricated in sections, field splice at approved locations by welding face joint continuously; grind, fill, dress, and make splice smooth, flush, and invisible on exposed faces. Touch-up finishes.

b. Install frames with removable stops located on secure side of opening.

2. Fire-Rated Openings: Install frames in accordance with NFPA 80.

3. Floor Anchors: Secure with postinstalled expansion anchors.

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

4. Solidly pack mineral-fiber insulation inside frames.

5. 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.

6. Installation Tolerances: Adjust hollow-metal frames 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 and adjust hollow-metal doors accurately in frames, within clearances specified below.

1. Non-Fire-Rated Steel Doors: Comply with ANSI/SDI A250.8.
2. Fire-Rated Doors: Install doors with clearances in accordance with NFPA 80.
3. Smoke-Control Doors: Install doors in accordance with NFPA 105.

D. Glazing: Comply with installation requirements in Section 08 80 00 "Glazing" and with hollow-metal manufacturer's written instructions.

3.3 REPAIR

A. 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.

END OF SECTION 081113

SECTION 08 14 16

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 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Solid-Core Doors with Wood Veneer-Faced Doors.

B. Related Requirements:

1. Section 081113 “Hollow Metal Doors and Frames” for hollow metal frames.
2. Section 087100 “Door Hardware”
3. Section 088000 "Glazing" for glass view panels in flush wood doors.

1.3 ACTION SUBMITTALS

A. Product Data Submittals: For each product, including the following:

1. Door core materials and construction.
2. Door edge construction
3. Door face type and characteristics.

4. Factory-finishing specifications.

B. Shop Drawings: Indicate location, size, and hand of each door; elevation of each type of door; construction details not covered in Product Data; and the following:

1. Door schedule indicating door location, type, size, fire protection rating, and swing.
2. Door elevations, dimension and locations of hardware, lite and louver cutouts, and glazing thicknesses.
3. Details of electrical raceway and preparation for electrified hardware, access control systems, and security systems.
4. Dimensions and locations of blocking for hardware attachment.
5. Dimensions and locations of mortises and holes for hardware.
6. Clearances and undercuts.
7. Requirements for veneer matching.
8. Doors to be factory finished and application requirements.

C. Samples for Initial Selection: For factory-finished door frames.

D. Samples for Verification:

1. Factory finishes applied to actual door face materials, approximately 8 by 10 inches, for each material and finish. For each wood species and transparent finish, provide set of three Samples showing typical range of color and grain to be expected in finished Work.

1.4 DELIVERY, STORAGE, AND HANDLING

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

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

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

1.5 FIELD CONDITIONS

A. Environmental Limitations:

1. Do not deliver or install doors until building is enclosed and weathertight, wet work is complete, and HVAC system is operating and maintaining temperature between 60 and 90 deg F and relative humidity between 25 and 55 percent during remainder of construction period.

1.6 WARRANTY

A. Special Warranty: 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. Delamination of veneer.

b. Warping (bow, cup, or twist) more than 1/4 inch in a 42-by-84-inch section.

c. Telegraphing of core construction in face veneers exceeding 0.01 inch in a 3-inch span.

2. Warranty also includes 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 PERFORMANCE REQUIREMENTS

A. Fire-Rated Wood Door and Frame Assemblies: Assemblies complying with NFPA 80 that are listed and labeled by a qualified testing agency acceptable to authorities having jurisdiction, for fire-protection ratings indicated on Drawings, based on testing at positive pressure in accordance with UL 10C or NFPA 252.

B. Smoke- and Draft-Control Door Assemblies: Listed and labeled for smoke and draft control by a qualified testing agency acceptable to authorities having jurisdiction, based on testing in accordance with UL 1784 and installed in compliance with NFPA 105.

2.2 MANUFACTURERS

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

1. Masonite.
2. Eggers Industries.

2.3 FLUSH WOOD DOORS, GENERAL

A. Quality Standard: In addition to requirements specified, comply with ANSI/WDMA I.S. 1A.

1. Provide labels and certificates from AWI certification program indicating that doors comply with requirements of grades specified.

2.4 SOLID-CORE WOOD VENEER-FACED DOORS FOR TRANSPARENT FINISH

A. Interior Doors, Solid-Core Veneer-Faced:

1. Architectural Woodwork Standards Quality Grade: Premium.
2. Faces: Single-plywood veneer not less than 1/50 inch thick, Grade AA.
    a. Species: Red Oak
    b. Cut: Plain sliced (flat sliced)
    c. Match between Veneer Leaves: Book match
    d. Assembly of Veneer Leaves on Door Faces: Center-balance match
    e. Pair and Set Match: Provide for doors hung in same opening.
    f. Room Match:

1) Match door faces within each separate room or area of building. Corridor-door faces do not need to match where they are separated by 10 feet or more.

3. Exposed Vertical and Top Edges: Same species as faces - Architectural Woodwork Standards edge Type A.

a. Fire-Rated Single Doors: Provide edge construction with intumescent seals concealed by outer stile. Comply with specified requirements for exposed vertical edges.

b. Fire-Rated Pairs of Doors:

1) Provide formed-steel edges and astragals with intumescent seals.

a) Finish steel edges and astragals with baked enamel same color as doors.

4. Construction: Five plies, hot-pressed bonded (vertical and horizontal edging is bonded to core), with entire unit abrasive planed before veneering.

B. Door Core: AWI AWS Section 9

1. Solid Core, Non-Fire Rated:

a. Type: SCL; structural composite lumber.

2. Solid Core, Fire Rated: Category A for positive pressure fire test.

a. Type FD; fire resistive composite.

2.5 LIGHT FRAMES

A. Wood Beads for Light Openings in Wood Doors: Provide manufacturer's standard wood beads unless otherwise indicated.

1. Wood Species: Same species as door faces.

2. Profile: Manufacturer's standard shape.

B. Wood-Veneered Beads for Light Openings in Fire-Rated Doors: Manufacturer's standard wood-veneered noncombustible beads matching veneer species of door faces and approved for use in doors of fire-protection rating indicated on Drawings. Include concealed metal glazing clips where required for opening size and fire-protection rating indicated.

2.6 FABRICATION

A. Factory fit doors to suit frame-opening sizes indicated.

1. Comply with clearance requirements of referenced quality standard for fitting unless otherwise indicated.

2. Comply with NFPA 80 requirements for fire-rated doors.

B. Factory machine doors for hardware that is not surface applied.

1. Locate hardware to comply with DHI-WDHS-3.

2. Comply with final hardware schedules, door frame Shop Drawings, ANSI/BHMA-156.115-W, and hardware templates.

3. Coordinate with hardware mortises in metal frames, to verify dimensions and alignment before factory machining.

4. For doors scheduled to receive electrified locksets, provide factory-installed raceway and wiring to accommodate specified hardware.

5. Metal Astragals: Factory machine astragals and formed-steel edges for hardware for pairs of fire-rated doors.

C. Openings: Factory cut and trim openings through doors.

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 Section 08 80 00 "Glazing."

2.7 FACTORY FINISHING

A. Comply with referenced quality standard for factory finishing.

1. Complete fabrication, including fitting doors for openings and machining for hardware that is not surface applied, before finishing.
2. Finish faces, all four edges, edges of cutouts, and mortises.

B. Factory finish doors.

C. Transparent Finish:

1. Architectural Woodwork Standards Grade: Premium.
2. Staining: As selected by Architect from manufacturer's full range.
3. Sheen: Semigloss.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine doors and installed door frames, with Installer present, before hanging doors.

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 Section 087100 "Door Hardware".

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

1. Install fire-rated doors in accordance with NFPA 80.
2. Install smoke- and draft-control doors in accordance with NFPA 105.

C. Job-Fitted Doors:

1. Align and fit doors in frames with uniform clearances and bevels as indicated below.
    a. Do not trim stiles and rails in excess of limits set by manufacturer or permitted for fire-rated doors.
2. Machine doors for hardware.
3. Seal edges of doors, edges of cutouts, and mortises after fitting and machining.
4. Clearances:
    a. Provide 1/8 inch at heads, jambs, and between pairs of doors.
    b. Provide 1/8 inch from bottom of door to top of decorative floor finish or covering unless otherwise indicated on Drawings.
    c. Where threshold is shown or scheduled, provide 1/4 inch from bottom of door to top of threshold unless otherwise indicated.
    d. Comply with NFPA 80 for fire-rated doors.
5. Bevel non-fire-rated doors 1/8 inch in 2 inches at lock and hinge edges.
6. 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.

E. Factory-Finished Doors: Restore finish before installation if fitting or machining is required at Project site.

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 081416

SECTION 083313

COILING COUNTER DOORS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Counter door assemblies.

1.3 REFERENCES

A. ASTM B 221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.

B. ASTM B 221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes (Metric).

C. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum).

D. NEMA ICS 2 - Industrial Control and Systems: Controllers, Contactors, and Overload Relays, Rated Not More Than 2000 Volts AC or 750 Volts DC.

E. NEMA MG 1 - Motors and Generators.

1.4 ACTION SUBMITTALS

A. Product Data: For each type and size of coiling counter door and accessory.

1. Include construction details, material descriptions, dimensions of individual components, profiles for slats, and finishes.

2. Include rated capacities, operating characteristics, electrical characteristics, and furnished accessories.

B. Shop Drawings: For each installation and for special components not dimensioned or detailed in manufacturer's product data.

1. Include plans, elevations, sections, and mounting details.

2. Include details of equipment assemblies, and indicate dimensions, required clearances, method of field assembly, components, and location and size of each field connection.

3. Include points of attachment and their corresponding static and dynamic loads imposed on structure.

4. Include diagrams for power, signal, and control wiring.

1.5 CLOSEOUT SUBMITTALS

A. Maintenance Data: For coiling counter doors to include in maintenance manuals.

1.6 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in performing Work of this section with a minimum of five years experience in the fabrication and installation of security closures.

B. Installer Qualifications: Company specializing in performing Work of this section with minimum three years and approved by manufacturer.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Store products in manufacturer's unopened packaging until ready for installation.

B. Protect materials from exposure to moisture. Do not deliver until after wet work is complete and dry.

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

1.8 PROJECT CONDITIONS

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

1.9 COORDINATION

A. Coordinate Work with other operations and installation of adjacent finish materials to avoid damage to installed materials.

1.10 WARRANTY

A. Warranty: Manufacturer’s limited door warranty for 2 years for all parts and components.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Source Limitations: Obtain operators and controls from coiling counter door manufacturer.

2.2 COUNTER DOOR ASSEMBLY

A. Counter Door: Coiling counter door formed with curtain of interlocking metal slats.

1. Manufacturers: Subject to compliance with requirements, provide products by the following:

    a. Overhead Door Corporation; 652 Series (Basis of Design).

B. Wall Mounting Condition:

    1. Face-of-wall mounting.

C. Curtain: Interlocking slats, Type F-158 fabricated of anodized aluminum. Endlocks attached to alternate slats to maintain curtain alignment and prevent lateral slat movement.

D. Finish:

    1. Anodized Finish:

        a. Slats and hood clear anodized aluminum.

E. Guides: Extruded aluminum.

F. Brackets: Steel plate to support counterbalance, curtain and hood.

G. Finish; Bottom Bar, Guides, Brackets:

    1. Black powder coat finish.

H. Counterbalance: Helical torsion spring type housed in a steel tube or pipe barrel.

I. Hood: Provided with intermediate support brackets as required and fabricated of:

    1. Aluminum.

J. Operation:

1. Electric Motor Operation: Provide UL listed electric operator, size as recommended by manufacturer to move door in either direction at not less than 2/3 foot nor more than 1 foot per second.

K. Sensing Edge Protection:

1. Electric sensing edge.

L. Operator Controls:

1. Push-button operated control stations with open, close, and stop buttons.
2. Controls for interior location.
3. Controls surface mounted.

2.3 MATERIALS, GENERAL

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

2.4 DOOR CURTAIN MATERIALS AND FABRICATION

A. Door Curtains: Fabricate coiling counter door curtain of interlocking metal slats in a continuous length for width of door without splices. Unless otherwise indicated, provide slats of thickness and mechanical properties recommended by door manufacturer for performance, size, and type of door indicated, and as follows:

1. Aluminum Door Curtain Slats: ASTM B209 sheet or ASTM B221 extrusions, alloy and temper standard with manufacturer for type of use and finish indicated; thickness of 0.050 inch; and as required.
2. Metal Interior Curtain-Slat Facing: Match metal of exterior curtain-slat face.

B. Curtain Jamb Guides: Manufacturer's standard angles or channels and angles of same material and finish as curtain slats unless otherwise indicated, with sufficient depth and strength to retain curtain, to allow curtain to operate smoothly, and to withstand loading. Slot bolt holes for guide adjustment. Provide removable stops on guides to prevent overtravel of curtain.

2.5 HOODS

A. General: Form sheet metal hood to entirely enclose coiled curtain and operating mechanism at opening head. Contour to fit end brackets to which hood is attached. Roll and reinforce top and bottom edges for stiffness. Form closed ends for surface-mounted hoods and fascia for any portion of between-jamb mounting that projects beyond wall face. Equip hood with intermediate support brackets as required to prevent sagging.

1. Aluminum: 0.040-inch-thick aluminum sheet complying with ASTM B209, of alloy and temper recommended by manufacturer and finisher for type of use and finish indicated.

2.6 COUNTERBALANCE MECHANISM

A. General: Counterbalance doors by means of manufacturer's standard mechanism with an adjustable-tension, steel helical torsion spring mounted around a steel shaft and contained in a spring barrel connected to top of curtain with barrel rings. Use grease-sealed bearings or self-lubricating graphite bearings for rotating members.

B. Counterbalance Barrel: Fabricate spring barrel of manufacturer's standard hot-formed, structural-quality, welded carbon-steel pipe, of sufficient diameter and wall thickness to support rolled-up curtain without distortion of slats and to limit barrel deflection to not more than 0.03 in./ft. of span under full load.

C. Counterbalance Spring: One or more oil-tempered, heat-treated steel helical torsion springs. Size springs to counterbalance weight of curtain, with uniform adjustment accessible from outside barrel. Secure ends of springs to barrel and shaft with cast-steel barrel plugs.

D. Torsion Rod for Counterbalance Shaft: Fabricate of manufacturer's standard cold-rolled steel, sized to hold fixed spring ends and carry torsional load.

E. Brackets: Manufacturer's standard mounting brackets of either cast iron or cold-rolled steel plate.

2.7 ELECTRIC DOOR OPERATORS

A. General: Electric door operator assembly of size and capacity recommended and provided by door manufacturer for door and operation-cycles requirement specified, with electric motor and factory-prewired motor controls, starter, gear-reduction unit, solenoid-operated brake, clutch, control stations, control devices, integral gearing for locking door, and accessories required for proper operation.

1. Comply with NFPA 70.

2. Control equipment complying with NEMA ICS 1, NEMA ICS 2, and NEMA ICS 6, with NFPA 70 Class 2 control circuit, maximum 24-V ac or dc.

B. Usage Classification: Electric operator and components capable of operating for not less than number of cycles per hour indicated for each door.

C. Door Operator Location(s): Operator location indicated for each door.

1. Wall Mounted: Operator is mounted to the inside front wall on the left or right side of door and connected to door drive shaft with drive chain and sprockets. Side room is required for this type of mounting. Wall-mounted operator can also be mounted above or below shaft; if above shaft, headroom is required.

D. Motors: Reversible-type motor with controller (disconnect switch) for motor exposure indicated for each door assembly.

1. Electrical Characteristics: Minimum as indicated for each door assembly. If not indicated, large enough to start, accelerate, and operate door in either direction from any position, at a speed not less than 8 in./sec. and not more than 12 in./sec., without exceeding nameplate ratings or service factor.

2. Operating Controls, Controllers, Disconnect Switches, Wiring Devices, and Wiring: Manufacturer's standard unless otherwise indicated.

3. Coordinate wiring requirements and electrical characteristics of motors and other electrical devices with building electrical system and each location where installed.

E. Limit Switches: Equip each motorized door with adjustable switches interlocked with motor controls and set to automatically stop door at fully opened and fully closed positions.

F. Obstruction-Detection Devices: External entrapment protection consisting of indicated automatic safety sensor capable of protecting full width of door opening. For non-fire-rated doors, activation of device immediately stops and reverses downward door travel.

1. Electric Sensor Edge: Automatic safety sensor edge, located within astragal mounted to bottom bar. Contact with sensor activates device. Connect to control circuit using manufacturer's standard take-up reel or self-coiling cable.

G. Control Station: Three-button control station in fixed location with momentary-contact push-button controls labeled "Open" and "Stop" and sustained- or constant-pressure push-button control labeled "Close."

1. Type: Full-guarded, surface-mounted, heavy-duty type, with general-purpose NEMA ICS 6, Type 1 enclosure.

H. Emergency Manual Operation: Equip each electrically powered door with capability for emergency manual operation. Design manual mechanism so required force for door operation does not exceed 25 lbf.

I. Emergency Operation Disconnect Device: Equip operator with hand-operated disconnect mechanism for automatically engaging manual operator and releasing brake for emergency manual operation while disconnecting motor without affecting timing of limit switch. Mount mechanism so it is accessible from floor level. Include interlock device to automatically prevent motor from operating when emergency operator is engaged.

J. Motor Removal: Design operator so motor may be removed without disturbing limit-switch adjustment and without affecting emergency manual operation.

2.8 GENERAL FINISH REQUIREMENTS

A. Comply with NAAMM/NOMMA 500 for recommendations for applying and designating finishes.

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

2.9 ALUMINUM FINISHES

A. Clear Anodic Finish: AAMA 611, AA-M12C22A31, Class II, 0.010 mm or thicker.

2.10 EXAMINATION

A. Examine substrates areas and conditions, with Installer present, for compliance with requirements for substrate construction and other conditions affecting performance of the Work.

B. Examine locations of electrical connections.

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

2.11 INSTALLATION, GENERAL

A. Install coiling counter doors and operating equipment complete with necessary hardware, anchors, inserts, hangers, and equipment supports; according to manufacturer's written instructions and as specified.

B. Install coiling counter doors, hoods, controls, and operators at the mounting locations indicated for each door.

2.12 STARTUP SERVICE

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

1. Complete installation and startup checks according to manufacturer's written instructions.
2. After electrical circuitry has been energized, operate doors to confirm proper motor rotation and door performance.
3. Test and adjust controls and safety devices. Replace damaged and malfunctioning controls and equipment.

2.13 ADJUSTING

A. Adjust hardware and moving parts to function smoothly so that doors operate easily, free of warp, twist, or distortion.

B. Lubricate bearings and sliding parts as recommended by manufacturer.

2.14 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain coiling counter doors.

END OF SECTION 083313

SECTION 083613

SECTIONAL DOORS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Sectional-door assemblies.

B. Related Requirements:

1. Section 055000 "Metal Fabrications" for miscellaneous steel supports.

1.3 ACTION SUBMITTALS

A. Product Data: For each type and size of sectional door and accessory.

1. Include construction details, material descriptions, dimensions of individual components, profile door sections, and finishes.

2. For power-operated doors, include rated capacities, operating characteristics, electrical characteristics, and furnished accessories.

B. Shop Drawings: For each installation and for components not dimensioned or detailed in manufacturer's product data.

1. Include plans, elevations, sections, and mounting details.

2. Include details of equipment assemblies. Indicate dimensions, required clearances, method of field assembly, components, and location and size of each field connection.

3. Include points of attachment and their corresponding static and dynamic loads imposed on structure.

4. Include diagrams for power, signal, and control wiring.

5. Include configuration of wind load resistance rating in pounds/SF on shop drawings.

C. Samples: Submit two (2) sets of color chips for each exposed product and for each color and texture specified, in manufacturer's standard size.

D. Manufacturer’s certificate that projects meet or exceed specified requirements.

E. Provide complete wiring schematics for Electrical Contractor tie-ins to building systems

F. Warranty: Submit sample manufacturer’s warranty.

1.4 CLOSEOUT SUBMITTALS

A. Maintenance Data: For sectional doors to include in maintenance manuals.

B. Operation Data: Include normal operation, troubleshooting, and adjusting.

C. Warranty: Submit manufacturer’s warranty with all forms completed in owner’s name and registered with manufacturer.

1.5 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum five (5) years of documented experience.

B. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer for both installation and maintenance of units required for this Project with minimum five (5) years of documented experience.

C. Regulatory Requirements: Comply with provisions in the U.S. Department of Justice's "2010 ADA Standards for Accessible Design" and ICC A117.1 applicable to sectional doors.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Pursuant to manufacturer's published instructions.

B. Store products in manufacturer's unopened packaging until ready for installation.

C. Protect against moisture exposure and damage.

1.7 FIELD CONDITIONS

A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results.

B. Do not install products under environmental conditions outside manufacturer's absolute limits.

1.8 WARRANTY

A. Manufacturer's Warranty: Manufacturer agrees to repair or replace components of sectional doors 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. Failure of components or operators before reaching required number of operation cycles.

c. Faulty operation of hardware.

d. Deterioration of metals, metal finishes, and other materials beyond normal weathering and use; rust through.

2. Warranty Period: Five (5) years from date of Substantial Completion.

B. Finish Warranty: Manufacturer agrees to repair or replace components that show evidence of deterioration of factory-applied finishes within specified warranty period.

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

C. Warranty: Include coverage for electric motor and transmission.

1. Electrical component parts to be free from defects in material and workmanship for a period of three (3) years from substantial completion date.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. General Performance: Provide sectional doors that comply with performance requirements specified without failure from defective manufacture, fabrication, installation, or other defects in construction and without requiring temporary installation of reinforcing components.

B. Structural Performance, Exterior Doors: Capable of withstanding the design wind loads.

1. Design Wind Load: Per NYSBC.

2. Deflection Limits: Design sectional doors to withstand design wind loads without evidencing permanent deformation or disengagement of door components.

a. Deflection of door sections in horizontal position (open) shall not exceed 1/120 of door width.

b. Deflection of horizontal track assembly shall not exceed 1/240 of door height.

C. Windborne-Debris Impact Resistance: Provide sectional doors complying with the following requirements:

1. Glazed Openings: Pass ASTM E1886 Large Missile Test and cyclic-pressure tests in accordance with ASTM E1996 for basic protection and Wind Zone.

2. Garage-Door Glazed Openings: Pass DASMA 115.

2.2 SECTIONAL DOOR ASSEMBLY **(D4 and D5)**

A. Aluminum Sectional Door: Provide sectional door formed with hinged sections and fabricated so that finished door assembly is rigid and aligned with tight hairline joints; free of warp, twist, and deformation; and complies with requirements in DASMA 102.

B. Basis of Design: Raynor Garage Doors, Aluma-View Series, AV300.

C. Air Infiltration: Maximum rate of 0.4 cfm/sq. ft. when tested in accordance with ASTM E283 or DASMA 105.

D. U-Value: 0.043 Btu/sq. ft. x h x deg F.

E. See drawings for panel/glass layout.

F. Door Components:

1. Doors:

a. Operation:

1) Provide doors designed for electric motor operation.

2) Provide doors with emergency hand chain operation.

2. Jamb Construction:

a. Steel Jambs on masonry - See Drawings

3. Structural Performance Requirements:

a. Wind Loads: Standard design wind load resistance of 20 psf.

b. Provide U-bars on all doors 14'-0" or wider.

4. Air Leakage Requirements:

a. Air Infiltration: Maximum air leakage of 0.4 cfm/ft2 is required. Testing shall be performed in accordance with DASMA 105 test procedure.

b. Raynor AV300 provides an air leakage rating of 0.24 cfm/ft2 with Project required optional energy conservation compliance package.

G. Aluminum Sections:

1. Material: 3 inches thick, 6063-T6 aluminum alloy stiles and rails joined together with 5/16-inch diameter screws. Aluminum panels 0.050 inch thick or glazing (when specified) fill the spaces between stiles and rails. Combined dimension of two adjoining intermediate meeting rails 5-1/2 inches. Bottom rail height 6-1/2 inches. Top rail height 6-1/2 inches. End stiles 3-5/16 inches or 6-1/2 inches wide as determined by overall door width. Center stiles 3-5/8 inches wide.

2. Finish: AAMA 2603 powder coat, Red.

3. Seals: Bottom of door to have flexible U-shaped vinyl seal retained in aluminum rail.

4. Bulb-type: Joint seal between sections.

5. Blade seal on top section to prevent airflow above header.

6. Weatherstripping:

a. Sill weatherstripping: Resilient flexible U-shaped vinyl, one-piece, encased in extruded aluminum retainer to conform to floor irregularities; fitted to bottom of door panel, full length contact.

b. Jamb Weatherstripping: Roll formed section full height of jamb, fitted with EPDM rubber blade-type weatherstripping, attached to track angle mounting with rigid vinyl snap-on extrusion.

c. Head Weatherstripping: EPDM rubber seal, one-piece, full length.

d. Panel Joint Weatherstripping: Dual durometer vinyl extrusion, one-piece full length to form an effective thermal break and a complete weather-tight seal along joint.

e. Weatherstripping shall be replaceable without removal of track, angle mounting, or door hardware.

7. Windows: Provide door sections with windows in lieu of aluminum filler panels. Locations to comply with Contract Drawings.

a. 1-inch insulating glazing: 1-inch Insulated Low E Tempered Glass consisting of two panes of 1/8 inch tempered insulated glass.

b. Full View Aluminum (square edge) lights of maximum allowable width and all of equal width; set in place sized according to door widths' CUSTOM configurations as shown on the Drawings.

H. Track:

1. Material: Hot-dipped galvanized steel (ASTM A 653), fully adjustable for adequate sealing of door to jamb or weatherseal.

2. Configuration Type: Incline.

3. Mounting: Track shall not be hung/supported from roof decking.

4. Track Size: 3 inches.

5. Jamb Type: Steel jamb wraps over masonry

a. Mounting: Floor-to-header angles. 13-gauge minimum continuous angles from floor to header. Angle Size: 3-1/2 x 5 inches on 3-inch track.

6. Lift Mechanism: Heavy-duty, oil-tempered wire torsion springs on a continuous ball-bearing cross head shaft, with heavy-duty oil-tempered braided galvanized, aircraft type steel lifting cables with a minimum safety factor of 5.

7. Emergency Manual Operation: Provide Operation Disconnect Device - Equip operator with hand-operated disconnect mechanism for automatically engaging manual operator and releasing brake for emergency manual operation while disconnecting motor without affecting timing of limit switch. Mount mechanism so it is accessible from floor level. Include interlock device to automatically prevent motor from operating when emergency operator is engaged. Provide emergency hand chain.

8. Counterbalance:

    a. Counterbalance System: Provided with aircraft-type, galvanized steel lifting cables with minimum safety factor of 5.

    b. Torsion Springs consisting of heavy-duty oil-tempered wire torsion springs on a continuous ball-bearing cross-header shaft.

    c. Spring Cycle Requirements: 50,000 cycles

9. Hardware:

    a. Hinges and Brackets: Fabricated from galvanized steel.

    b. Track Rollers: 3 inches diameter consistent with track size, with hardened steel ball bearings.

    c. Furnish door systems without locks.

2.3 ELECTRIC OPERATION

A. Operator, Controls, Actuators, and Safeties: Comply with UL 325; provide products listed by ITS (DIR), UL (DIR), or testing agency acceptable to authorities having jurisdiction.

    1. Provide interlock switches on motor operated units.

B. Electric Operators:

    1. Mounting: Side mounted on cross head shaft.

    2. Motor Enclosure:

        a. Continuous Duty Industrial - 1/2 hp.; manually operable in case of power failure, belt-drive, jackshaft with transit speed of 6 to 12 inches per second.

        b. 115/208V, single phase, 60 Hz.

    3. Motor Controller: NEMA ICS 2, full voltage, reversing magnetic motor starter.

4. Controller Enclosure: NEMA 250, Type 1.
5. Opening Speed: 6 to 12 inches per second.
6. Brake: Adjustable friction clutch type, activated by motor controller.
7. Manual override in case of power failure.
8. Refer to Section 26 00 10 “Electrical Work General” for electrical connections.
9. Duty Cycle: 30 cycles/hour.

C. Motor: NEMA MG1, Type 1; separate from reduction mechanism for ease of maintenance.

D. Motor Removal: Design operator so motor may be removed without disturbing limit-switch adjustment and without affecting emergency manual operation.

E. Roller Chain Drive - door shall be driven by roller chain at 6" to 12" per second.

F. Reduction Mechanism: V-belt drive from motor to full ball bearing power train with additional reduction by chain and sprockets. All power train shafts shall be minimum 3/4" diameter.

G. Adjustable Friction Clutch shall be provided to protect door and operator if door movement is obstructed.

H. Control Device: Provide standard three button (Open-Close-Stop) momentary-contact control device for each hoist operator complying with UL 325.

1. Raynor Model LCE-3 at every door opening (Basis of Design).
2. 24-volt circuit.
3. Recess-mounted, at interior door jamb.
4. Entrapment Protection Devices: Provide sensing devices and safety mechanisms complying with UL 325.

    a. Primary Device: Provide two (2) electric sensing edge, wireless sensing, NEMA 1 photo eye sensors, or NEMA 4X photo eye sensors per door as required with momentary-contact control device. "Low" device to be mounted at 6-inches AFF; "High" device to be mounted at midpoint height AFF of forwardmost part of Apparatus serving that door opening; verify with FD before mounting "high" device.

I. Electric Operator: Jackshaft; adjustable safety friction clutch; electro-mechanical type brake system actuated by solenoid motor starter; enclosed, positive chain drive screw type limit

switch, enclosed in electrical control box, easily accessible for precision setting; heavy duty, enclosed magnetic cross line reversing starter with mechanical interlock; auxiliary contact type SR2 wiring; mounting brackets and hardware; with hoist.

1. Product: 1/2 hp "Control Hoist 2.0 Standard, model number CSH - 223" as manufactured by Raynor.

2. Substitutions: Not permitted.

J. Obstruction Detection Devices:

1. Equip motorized door with indicated external automatic safety sensors capable of protecting full width of door opening. Activation of either device immediately stops and reverses downward door travel.

2. Safety Edge: Located at bottom of sectional door panel, full width; electro-mechanical sensitized type, wired to stop and reverse door direction upon striking object; hollow neoprene covered to provide weatherstrip seal.

    a. Self-Monitoring Type: Four-wire configured device designed to interface with door-operator control circuit to detect damage to or disconnection of safety edge.

    b. Locate within astragal or weather stripping mounted to bottom bar. Contact with sensor activates the device. Connect to control circuit using manufacturer's standard taker-up reel or self-coiling cable.

3. Photoelectric Sensor: Manufacturer's standard system designed to detect an obstruction in door opening without contact between door and obstruction.

    a. Self-Monitoring Type: Designed to interface with door operator control circuit to detect damage to or disconnection of sensor device. When self-monitoring feature is activated, door closes only with sustained pressure on close button.

    b. Provide one sensor at 6” height AFF and one at the mid-point height of the forwardmost part of apparatus of the truck using the door.

    c. Activation of device immediately stops and reverses downward door travel.

K. Master Control Station: Three button (open-close-stop) momentary contact-type control for each electric lifting hoist operator; Raynor Model PBS-3 (Basis of Design).

1. 24-volt circuit

2. Recess mounted.

a. Basis-of-Design: CUSTOM Configuration for Operator Pushbuttons - Flush Mounted Model PBS-3 in Watch Room.

3. Open override feature. Open button, and pneumatic safety edge will reverse door to open position when door is closing.

4. Provide recessed mounted control station in Watch Room wall per Architect's direction. Control stations shall operate all doors with open-close-stop from Watch Room. Provide individual switches with pilot lights for each door. Pilot lights to show door closed (red) and door open (green). Provide Long Wiring Kit to ensure proper voltage for multiple push button stations. Provide a brushed stainless-steel bezel with finished edges for installation of the switches.

   a. Product: Raynor Model PBS-3, 3-button, push button switch assembly.

   b. Substitutions: Not permitted.

L. Overload Protection: Provide manual reset for overload protection. All electrical components shall be in NEMA 1 enclosures.

M. Stop-Go Light: Red and green, stop-go lights at each door that indicate fully open-fully closed installed as semi-recessed application to assure in-wall installation of all low-voltage signal wiring from stop-go lights up to control board located on the electric motor hoist assembly; Model RGL24LY (Safety Yellow Housing) as manufactured by Lift Master.

1. One (1) required for every sectional door.

2. Substitutions: Not permitted.

N. Receivers and Transmitters

1. Receivers: Provide a receiver to operate each overhead door. Hand-Held Transmitter: Digital control, resettable; four channel, four button;

2. One (1) required for every sectional door.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that wall openings are ready to receive work and opening dimensions and tolerances are within specified limits. In the Record Documents, list unsatisfactory conditions and steps taken to correct them.

B. Verify that electric power is available and of the correct characteristics.

C. Correct unsatisfactory conditions before installing doors. Beginning installation shall constitute acceptance of related work and corrected existing conditions by Installer and Contractor.

3.2 INSTALLATION

A. Install sectional doors and operating equipment complete with necessary hardware, anchors, inserts, hangers, and equipment supports; in accordance with manufacturer's written instructions and NFPA 80.

B. Tracks:

1. Fasten vertical track assembly to opening jambs and framing with fasteners spaced not more than 24 inches apart.

2. Hang horizontal track assembly from structural overhead framing with angles or channel hangers attached to framing by welding or bolting, or both. Provide sway bracing, diagonal bracing, and reinforcement as required for rigid installation of track and door-operating equipment. No attachments to the roof deck are permitted.

3. Repair galvanized coating on tracks according to ASTM A780.

C. Anchor assembly to wall construction and building framing without distortion or stress.

D. Securely brace door tracks suspended from structure. Secure tracks to structural members only.

E. Fit and align door assembly including hardware.

F. Coordinate installation of electrical service. Complete power and control wiring from disconnect to unit components.

G. Complete door control, operating device, and unit component connections to other building systems.

H. Select, identify, and locate controls so safety of users and protection of property and vehicles is ensured.

I. Provide inserts, anchors, hangers, brackets, moldings, seal strips, and welding as needed to make door assembly secure against air pressure, operating loads and intrusion, and so that air infiltration is held to minimum.

J. Conceal bolt heads so that access cannot be made from outside.

K. Immediately after welding galvanized materials, clean welds and abraded galvanized surfaces. Repair galvanizing to comply with ASTM A780.

L. Accessibility: Install sectional doors, switches, and controls along accessible routes in compliance with regulatory requirements for accessibility.

M. Power-Operated Doors: Install in accordance with UL 325.

3.3 TOLERANCES

A. Maximum Variation from Plumb: 1/16 inch.

B. Maximum Variation from Level: 1/16 inch.

C. Longitudinal or Diagonal Warp: Plus or minus 1/8 inch from 10 ft straight edge.

D. Maintain dimensional tolerances and alignment with adjacent work.

3.4 STARTUP SERVICES

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

1. Complete installation and startup checks in accordance with manufacturer's written instructions as well as controls verification for CO monitoring and Apparatus Bay purge exhaust fan.

2. Test and adjust controls and safety devices. Replace damaged and malfunctioning controls and equipment.

3.5 ADJUSTING

A. Adjust door assembly for smooth operation and full contact with weatherstripping, maintaining airtightness and watertightness around the entire perimeter, under all conditions of normal and emergency use. Contractor will perform this task as needed until Final Completion of the project.

B. Adjust hardware and moving parts to function smoothly so that doors operate easily, free of warp, twist, or distortion.

C. Lubricate bearings and sliding parts as recommended by manufacturer.

D. Adjust doors and seals to provide weather-resistant fit around entire perimeter.

E. Have manufacturer's field representative present to confirm proper operation and identify adjustments to door assembly for specified operation.

F. Touchup Painting Galvanized Material: Immediately after welding galvanized materials, clean welds and abraded galvanized surfaces and repair galvanizing to comply with ASTM A780/A780M.

3.6 CLEANING

A. Comply with manufacturer's written recommendations for final cleaning and maintenance.

B. Clean doors and frames and glazing immediately after installation. Avoid damaging protective coatings and finishes.

C. Remove excess sealants, glazing materials, dirt, and other substances.

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

3.7 PROTECTION

A. Protect installed products from damage until date of substantial completion.

B. Replace door panels and accessories that may have been damaged during construction period.

C. Do not permit construction traffic through overhead door openings after adjustment and cleaning.

3.8 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain sectional doors.

END OF SECTION 083613

SECTION 08 41 13

ALUMINUM-FRAMED ENTRANCES AND STOREFRONTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Aluminum-framed storefront systems.
2. Aluminum-framed entrance door systems.

B. Related Requirements:

1. Section 087100 “Door Hardware” for door hardware.
2. Section 088000 “Glazing” for storefront glazing.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.

B. Shop Drawings: For aluminum-framed entrances and storefronts. 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 type of vertical-to-horizontal intersection of aluminum-framed entrances and storefronts, showing the following:

a. Joinery, including concealed welds.

b. Anchorage.

c. Expansion provisions.

d. Glazing.

e. Flashing and drainage.

3. Show connection to and continuity with adjacent thermal, weather, air, and vapor barriers.

4. Include point-to-point wiring diagrams showing the following:

a. Power requirements for each electrically operated door hardware.

b. Location and types of switches, signal device, conduit sizes, and number and size of wires.

C. Samples for Verification: For each type of exposed finish required, in manufacturer's standard sizes.

1.4 INFORMATIONAL SUBMITTALS

A. Certificates:

1. Energy Performance Certificates: For aluminum-framed entrances and storefronts, accessories, and components, from manufacturer.

a. Basis for Certification: NFRC-certified energy performance values for each aluminum-framed entrance and storefront.

1.5 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For aluminum-framed entrances and storefronts.

B. Maintenance Data for Structural Sealant: For structural-sealant-glazed storefront. Include ASTM C1401 recommendations for post-installation-phase quality-control program.

1.6 QUALITY ASSURANCE

A. Qualifications:

1. Manufacturer: Company specializing in manufacturing products specified in this section with minimum 15 years documented experience.
2. Installer: Company specializing in performing Work of this section with minimum five (5) years documented experience approved by Manufacturer.

1.7 WARRANTY

A. Special Warranty: Manufacturer agrees to repair or replace components of aluminum-framed entrances and storefronts 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, 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.

B. Special Finish Warranty, Anodized Finishes: Standard form in which manufacturer agrees to repair finishes or replace aluminum that shows evidence of deterioration of anodized finishes within specified warranty period.

1. Deterioration includes, but is not limited to, the following:

a. Color fading more than 5 Delta E units when tested in accordance with ASTM D 2244.

b. Chalking in excess of a No. 8 rating when tested in accordance with ASTM D 4214.

c. Cracking, peeling, or chipping.

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

1.8 PROJECT CONDITIONS

A. Field Measurements:

1. Verify-in-field actual dimensions of building support components and placement location measurements prior to fabrication.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Source Limitations: Obtain all components of aluminum-framed entrance and storefront system, including framing and accessories, from single manufacturer.

2.2 PERFORMANCE REQUIREMENTS

A. General Performance: Comply with performance requirements specified, as determined by testing of aluminum-framed entrances and storefronts representing those indicated for this Project without failure due to defective manufacture, fabrication, installation, or other defects in construction.

1. Aluminum-framed entrances and storefronts shall withstand movements of supporting structure, including, but not limited to, 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. Structural Loads:

1. Wind Loads: Design and size components to withstand dead loads and live loads caused by positive and negative wind loads acting normal to plane of wall, including building corners.

a. As calculated in accordance with applicable code, as measured in accordance with ASTM E330.

C. Deflection of Framing Members Supporting Glass: At design wind load, as follows:

1. Deflection Normal to Wall Plane: Limited to 1/175 of clear span for spans of up to 13 feet 6 inches and to 1/240 of clear span plus 1/4 inch for spans greater than 13 feet 6 inches.

D. Structural: Test in accordance with ASTM E330/E330M as follows:

1. When tested at positive and negative wind-load design pressures, storefront assemblies, including entrance doors, do not evidence deflection exceeding specified limits.

2. When tested at 150 percent of positive and negative wind-load design pressures, storefront assemblies, including entrance doors and anchorage, do not evidence material failures, structural distress, or 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. Water Penetration under Static Pressure: Test in accordance with ASTM E331 as follows:

1. No evidence of water penetration through fixed glazing and framing areas, including entrance doors, when tested in accordance with a minimum static-air-pressure differential of 20 percent of positive wind-load design pressure.

F. Energy Performance: Certified and labeled by manufacturer for energy performance as follows:

1. Thermal Transmittance (U-factor):

   a. Fixed Glazing and Framing Areas: U-factor for the system of not more than 0.36 Btu/sq. ft. x h x deg F as determined in accordance with NFRC 100.

   b. Entrance Doors: U-factor of not more than 0.77 Btu/sq. ft. x h x deg F as determined in accordance with NFRC 100.

2. Solar Heat-Gain Coefficient (SHGC):

   a. Fixed Glazing and Framing Areas: SHGC for the system of not more than 0.40 as determined in accordance with NFRC 200.

   b. Entrance Doors: SHGC of not more than 0.40 as determined in accordance with NFRC 200.

3. Air Leakage:

   a. Fixed Glazing and Framing Areas: Air leakage for the system of not more than 0.06 cfm/sq. ft. at a static-air-pressure differential of 1.57 psf when tested in accordance with ASTM E283.

b. Entrance Doors: Air leakage of not more than 1.0 cfm/sq. ft. at a static-air-pressure differential of 1.57 lbf/sq. ft.

G. Noise Reduction: Test in accordance with ASTM E90, with ratings determined by ASTM E1332, as follows.

1. Outdoor-Indoor Transmission Class: Minimum 26.

H. Thermal Movements: Allow for thermal movements resulting from ambient and surface temperature changes.

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

I. Structural-Sealant Joints:

1. Designed to carry gravity loads of glazing.

2.3 STOREFRONT SYSTEMS

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. EFCO Corporation.
2. Kawneer Company, Inc.; Arconic Corporation.
3. U.S. Aluminum; C.R. Laurence Co., Inc.; CRH Americas, Inc.

B. Framing Members: Manufacturer's extruded- or formed-aluminum framing members of thickness required and reinforced as required to support imposed loads.

1. Exterior Framing Construction: Thermally broken.
2. Glazing System: Retained mechanically with gaskets on four sides.
3. Glazing Plane: Front.
4. Finish: Clear anodic finish.

5. Fabrication Method: Field-fabricated stick system.

6. Aluminum: Alloy and temper recommended by manufacturer for type of use and finish indicated.

7. Steel Reinforcement: As required by manufacturer.

C. Backer Plates: Manufacturer's standard, continuous backer plates for framing members, if not integral, where framing abuts adjacent construction.

D. Brackets and Reinforcements: Manufacturer's standard high-strength aluminum with nonstaining, nonferrous shims for aligning system components.

2.4 ENTRANCE DOOR SYSTEMS

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. EFCO Corporation.

2. Kawneer Company, Inc.; Arconic Corporation.

3. U.S. Aluminum; C.R. Laurence Co., Inc.; CRH Americas, Inc.

B. Entrance Doors: Manufacturer's standard glazed entrance doors for manual-swing or automatic operation.

1. Door Construction: 2-inch overall thickness, with minimum 0.125-inch- thick, extruded-aluminum tubular rail and stile members. Mechanically fasten corners with reinforcing brackets that are deeply penetrated and fillet welded or that incorporate concealed tie rods.

a. Thermal Barrier:

1) All exterior aluminum shall be separated from interior aluminum by a rigid, structural thermal barrier. For purposes of this specification, a structural thermal barrier is defined as a system that shall transfer shear during

bending and, therefore, promote composite action between the exterior and interior extrusions.

2) The thermal barrier shall be thermal struts, consisting of glass reinforced polyamide nylon, mechanically crimped in raceways extruded in the exterior and interior extrusions.

3) Poured and debridged urethane thermal barriers shall not be permitted.

2. Door Design: Wide stile; 5-inch nominal width.

3. Glazing Stops and Gaskets: Beveled, snap-on, extruded-aluminum stops and preformed gaskets.

a. Provide nonremovable glazing stops on outside of door.

4. Finish: Match adjacent storefront framing finish.

2.5 ENTRANCE DOOR HARDWARE

A. Entrance Door Hardware: Hardware not specified in this Section is specified in Section 087100 "Door Hardware".

2.6 GLAZING

A. Glazing: Comply with Section 088000 "Glazing".

B. Glazing Gaskets: Comply with Section 088000 "Glazing".

C. Glazing Sealants: Comply with Section 088000 "Glazing".

2.7 MATERIALS

A. Sheet and Plate: ASTM B209.

B. Extruded Bars, Rods, Profiles, and Tubes: ASTM B221.

C. Structural Profiles: ASTM B308/B308M.

2.8 ACCESSORIES

A. Fasteners and Accessories: Manufacturer's standard corrosion-resistant, nonstaining, nonbleeding 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. Use exposed fasteners with countersunk Phillips screw heads, finished to match framing system.

B. Anchors: Three-way adjustable anchors with minimum adjustment of 1 inch that accommodate fabrication and installation tolerances in material and finish 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 A123/A123M or ASTM A153/A153M requirements.

C. Concealed Flashing: Manufacturer's standard corrosion-resistant, nonstaining, nonbleeding flashing compatible with adjacent materials.

D. Bituminous Paint: Cold-applied asphalt-mastic paint containing no asbestos, formulated for 30-mil thickness per coat.

E. Rigid PVC filler.

2.9 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. Provisions for field replacement of glazing from interior.
6. Fasteners, anchors, and connection devices that are concealed from view to greatest extent possible.

D. Mechanically Glazed Framing Members: Fabricate for flush glazing without projecting stops.

E. Entrance Door Frames: Reinforce as required to support loads imposed by door operation and for installing entrance door hardware.

1. At interior and exterior doors, provide compression weather stripping at fixed stops.

F. Entrance Doors: Reinforce doors as required for installing entrance door hardware.

1. At pairs of exterior doors, provide sliding-type weather stripping retained in adjustable strip and mortised into door edge.
2. Provide weather sweeps applied to door bottoms at exterior doors.

G. Entrance Door Hardware Installation: Factory install entrance door hardware to the greatest extent possible. Cut, drill, and tap for factory-installed entrance door hardware before applying finishes.

H. After fabrication, clearly mark components to identify their locations in Project in accordance with Shop Drawings.

2.10 ALUMINUM FINISHES

A. Clear Anodic Finish: AAMA 611, AA-M12C22A31, Class II, 0.010 mm or thicker.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas, 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, GENERAL

A. Comply with manufacturer's written instructions.

B. Do not install damaged components.

C. Fit joints to produce hairline joints free of burrs and distortion.

D. Rigidly secure nonmovement joints.

E. Install anchors with separators and isolators to prevent metal corrosion and electrolytic deterioration and to prevent impeding movement of moving joints.

F. Seal perimeter and other joints watertight unless otherwise indicated.

G. Metal Protection:

1. Where aluminum is in contact with dissimilar metals, protect against galvanic action by painting contact surfaces with materials recommended by manufacturer for this purpose or by installing nonconductive spacers.

2. Where aluminum is in contact with concrete or masonry, protect against corrosion by painting contact surfaces with bituminous paint.

H. Set continuous sill members and flashing in full sealant bed, as specified in Section 079200 "Joint Sealants", to produce weathertight installation.

I. Install joint filler behind sealant as recommended by sealant manufacturer.

J. Install components plumb and true in alignment with established lines and grades.

3.3 INSTALLATION OF GLAZING

A. Install glazing as specified in Section 088000 "Glazing".

3.4 INSTALLATION OF ALUMINUM-FRAMED ENTRANCE DOORS

A. Install entrance doors to produce smooth operation and tight fit at contact points.

1. Exterior Doors: Install to produce weathertight enclosure and tight fit at weather stripping.

3.5 ERECTION TOLERANCES

A. Install aluminum-framed entrances and storefronts to comply with the following 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 inch wide 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.

3.6 MAINTENANCE SERVICE

A. Entrance Door Hardware Maintenance:

1. 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 entrance door hardware.

2. Initial Maintenance Service: Beginning at Substantial Completion, provide six months' full maintenance by skilled employees of entrance door hardware Installer. Include quarterly preventive maintenance, repair or replacement of worn or defective components, lubrication, cleaning, and adjusting as required for proper entrance door hardware operation at rated speed and capacity. Use parts and supplies that are the same as those used in the manufacture and installation of original equipment.

END OF SECTION 084113

SECTION 085113

ALUMINUM WINDOWS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes aluminum windows for exterior locations.

B. Related Requirements:

1. Section 084113 "Aluminum-Framed Entrances and Storefronts" for coordinating finish among aluminum fenestration units.
2. Section 088000 “Glazing” for glazing.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include construction details, material descriptions, glazing and fabrication methods, dimensions of individual components and profiles, hardware, and finishes for aluminum windows.

B. Shop Drawings: For aluminum windows.

1. Include plans, elevations, sections, hardware, accessories, insect screens, operational clearances, and details of installation, including anchor, flashing, and sealant installation.

C. Samples: For each exposed product and for each color specified, 2 by 4 inches in size.

D. Product Schedule: For aluminum windows. Use same designations indicated on Drawings.

1.4 QUALITY ASSURANCE

A. Manufacturer Qualifications: A manufacturer capable of fabricating aluminum windows that meet or exceed performance requirements indicated and of documenting this performance by test reports and calculations.

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

1.5 WARRANTY

A. Manufacturer's Warranty: Manufacturer agrees to repair or replace aluminum windows that fail in materials or workmanship within specified warranty period.

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

a. Failure to meet performance requirements.

b. Structural failures including excessive deflection, water leakage, condensation, and air infiltration.

c. Faulty operation of movable sash and hardware.

d. Deterioration of materials and finishes beyond normal weathering.

e. Failure of insulating glass.

2. Warranty Period:

a. Window: 10 years from date of Substantial Completion.

b. Glazing Units: 10 years from date of Substantial Completion.

c. Aluminum Finish: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Source Limitations: Obtain aluminum windows from single source from single manufacturer.

2.2 WINDOW PERFORMANCE REQUIREMENTS

A. Product Standard: Comply with AAMA/WDMA/CSA 101/I.S.2/A440 for definitions and minimum standards of performance, materials, components, accessories, and fabrication unless more stringent requirements are indicated.

1. Window Certification: AAMA certified with label attached to each window.

2. Thermal test unit sizes shall be 48” x 72”.

B. Sliding Window

1. Life Cycle Testing:

a. Test in accordance with AAMA 910. There shall be no damage to fasteners, hardware parts, support arms, activating mechanisms, or any other damage that would cause the window to be inoperable. Air infiltration and water resistance tests shall not exceed specified requirements.

2. Air Infiltration Test:

a. With window sash closed and locked, test unit in accordance with ASTM E 283 at a static air pressure difference of 6.24 psf.

b. Air infiltration shall not exceed .10 cfm/SF of unit.

3. Water Resistance Test:

a. With window sash closed and locked, test unit in accordance with ASTM E 331/ASTM E 547 at a static air pressure difference of 12.0 psf.

b. There shall be no uncontrolled water leakage.

4. Uniform Load Deflection Test:

a. With window sash closed and locked, test unit in accordance with ASTM E 330 at a static air pressure difference of 50.0 psf, positive and negative pressure.

b. No member shall deflect over L/175 of its span.

5. Uniform Load Structural Test:

a. With window sash closed and locked, test unit in accordance with ASTM E 330 at a static air pressure difference of 82.5 psf, both positive and negative.

b. At conclusion of test there shall be no glass breakage, permanent damage to fasteners, hardware parts, support arms or actuating mechanisms, nor any other damage that would cause the window to be inoperable.

6. Forced Entry Resistance:

a. Windows shall be tested in accordance with ASTM F 588 or AAMA 1302.5 and meet the requirements of performance level 40.

7. Condensation Resistance Test (CRF):

a. Test unit in accordance with AAMA 1503.1.

b. Condensation Resistance Factor (CRF) shall not be less than 60 (frame) when glazed with 0.24 center of glass U-Factor.

8. Condensation Resistance (CR):

a. With ventilators closed and locked, test unit in accordance with NFRC 500-2010.

b. Condensation Resistance (CR) shall not be less than 37 when glazed with 0.24 center of glass U-Factor.

9. Thermal Transmittance Test (Conductive U-Factor)

a. With ventilators closed and locked, test unit in accordance with NFRC 100-2010.

b. Conductive thermal transmittance (U-Factor) shall not be more than 0.43 BTU/hr•ft2•°F when glazed with 0.24 center of glass U-Factor.

C. Fixed Window

1. Windows shall conform to all AAMA/WDMA/CSA 101/I.S.2/A440-17 requirements for the window type referenced in 1.01.B. In addition, the following specific performance requirements shall be met.

2. Air Infiltration Test

a. Test unit in accordance with ASTM E 283 at a static air pressure difference of 6.27 psf.

b. Air infiltration shall not exceed .10 cfm/SF of unit.

3. Water Resistance Test

a. Test unit in accordance with ASTM E 331/ASTM E 547 at a static air pressure difference of 15.0 psf.

b. There shall be no uncontrolled water leakage.

4. Uniform Load Structural Test

a. Test unit in accordance with ASTM E 330 at a static air pressure difference of 165.4 psf, both positive and negative.

b. At conclusion of test there shall be no glass breakage or permanent damage.

5. Forced Entry Resistance

    a. Windows shall be tested in accordance to ASTM F 588 or AAMA 1302.5 and meet the requirements of performance level 10.

6. Condensation Resistance Test (CRF)

    a. Test unit in accordance with AAMA 1503.1.

    b. Condensation Resistance Factor (CRF) shall not be less than 62 (frame) when glazed with 0.24 center of glass U-Factor.

7. Condensation Resistance (CR)

    a. With ventilators closed and locked, test unit in accordance with NFRC 500-2017.

    b. Condensation Resistance (CR) shall not be less than 48 when glazed with 0.24 center of glass U-Factor.

8. Thermal Transmittance Test (Conductive U-Factor)

    a. With ventilators closed and locked, test unit in accordance with NFRC 100-2017.

    b. Conductive thermal transmittance (U-Factor) shall not be more than 0.36BTU/hr•ft2•°F when glazed with 0.24 center of glass U-Factor.

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.

2.3 ALUMINUM WINDOWS

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. EFCO Corporation.

a. Fixed: Series 3900 Thermal AW-PG110-FW (Basis of Design).

b. Operable: Series 3500 Thermal AW-PG55-HS (Basis of Design).

2. Graham Architectural Products Corporation.

3. Peerless Products Inc.

4. Wausau Window and Wall Systems; Apogee Wausau Group, Inc.

5. Winco Window Company, Inc.

B. Types: Provide the following types in locations indicated on Drawings:

1. Horizontal sliding.

2. Fixed.

C. Frames and Sashes: Aluminum extrusions complying with AAMA/WDMA/CSA 101/I.S.2/A440.

1. Thermally Improved Construction: Fabricate frames, sashes, and muntins 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.

D. Glass: Sealed double pane units conforming to requirements in Section 088000 “Glazing”.

E. Hardware, General: Provide manufacturer's standard hardware fabricated from aluminum, stainless steel, carbon steel complying with AAMA 907, or other corrosion-resistant material compatible with adjacent materials; designed to smoothly operate, tightly close, and securely lock windows, and sized to accommodate sash weight and dimensions.

1. Exposed Hardware Color and Finish: As selected by Architect from manufacturer's full range.

F. Horizontal-Sliding Window Hardware:

1. Sill Cap/Track: Extruded-aluminum track with natural anodized finish of dimensions and profile indicated; designed to comply with performance requirements indicated and to drain to the exterior.

a. Sash shall ride on steel ball bearing rollers and a raised track, so dirt will not interfere with normal operation.

2. Locks and Latches: Allow unobstructed movement of the sash across adjacent sash in direction indicated and operated from the inside only.

a. Concealed plunger lock in the meeting rail with a flush mounted actuating handle.

3. Roller Assemblies: Low-friction design.

G. Weather Stripping: Provide full-perimeter weather stripping for each operable sash unless otherwise indicated.

H. Fasteners: Noncorrosive and compatible with window members, trim, hardware, anchors, and other components.

1. Exposed Fasteners: Do not use exposed fasteners to greatest extent possible. For application of hardware, use fasteners that match finish hardware being fastened.

2.4 INSECT SCREENS

A. General: Fabricate insect screens to integrate with window frame. Provide screen for each operable exterior sash. Screen wickets are not permitted.

1. Type and Location: Half, outside for sliding sashes.

B. Aluminum Frames: Manufacturer's standard aluminum alloy complying with SMA 1004 or SMA 1201. Fabricate frames with mitered or coped joints or corner extrusions, concealed fasteners, and removable PVC spline/anchor concealing edge of frame.

1. Tubular Framing Sections and Cross Braces: Roll formed from aluminum sheet.

2. Screen mesh shall be aluminum or fiberglass.

2.5 FABRICATION

A. General:

1. Sliding:

a. All aluminum frame and sash extrusions shall have a minimum wall thickness of .062". Frame sill members shall have a minimum wall thickness of .094".

b. Depth of frame shall not be less than 3-1/4".

c. Mechanical fasteners, welded components, and hardware items shall not bridge thermal barriers. Thermal barriers shall align at all frame and vent corners.

2. Fixed:

a. All aluminum frame extrusions shall have a minimum wall thickness of .090".

b. Depth of frame shall not be less than 3-1/4".

B. Fabricate aluminum windows in sizes indicated. Include a complete system for assembling components and anchoring windows.

C. Frame:

1. Frame components shall be mechanically fastened.

2. Frame and sash shall have a continuous interlock at the meeting rail.

D. Sash:

1. Sash vertical members shall telescope into the sash horizontals and be mechanically fastened.

2. The sash shall be double weather-stripped.

E. Glaze aluminum windows in the factory.

1. All lites (both sash and fixed) of the horizontal sliding window shall be inside glazed and weeped.

2. All units shall be glazed with the manufacturer's standard sealant process provided the glass is held in place by a removeable, extruded aluminum, glazing bead. The glazing bead must be isolated from the glazing material by a gasket.

3. All units shall be glazed with a minimum of 1/2" glass bite.

F. Weather strip each operable sash to provide weathertight installation.

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

H. Complete fabrication, assembly, finishing, hardware application, and other work in the factory to greatest extent possible. Disassemble components only as necessary for shipment and installation.

2.6 GENERAL FINISH REQUIREMENTS

A. Comply with NAAMM's "Metal Finishes Manual" 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: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

2.7 ALUMINUM FINISHES

A. Finish designations prefixed by AA comply with the system established by the Aluminum Association for designating aluminum finishes.

B. Class II, Clear Anodic Finish: AA-M12C22A31 (Mechanical Finish: nonspecular as fabricated; Chemical Finish: etched, medium matte; Anodic Coating: Architectural Class II, clear coating 0.010 mm or thicker) complying with AAMA 611.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine openings, substrates, structural support, anchorage, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Verify rough opening dimensions, levelness of sill plate, and operational clearances.

C. Examine wall flashings, vapor retarders, water and weather barriers, and other built-in components to ensure weathertight window installation.

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

3.2 INSTALLATION

A. Comply with manufacturer's written instructions for installing windows, hardware, accessories, and other components. For installation procedures and requirements not addressed in manufacturer's written instructions, comply with installation requirements in ASTM E2112.

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

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

D. Separate aluminum and other corrodible surfaces from sources of corrosion or electrolytic action at points of contact with other materials.

3.3 FIELD QUALITY CONTROL

A. Testing Services: Testing and inspecting of installed windows shall take place as follows:

1. Testing Methodology: Testing of windows for air infiltration and water resistance shall be performed according to AAMA 502.

2. Air-Infiltration Testing:

a. Test Pressure: That required to determine compliance with AAMA/WDMA/CSA 101/I.S.2/A440 performance class indicated.

b. Allowable Air-Leakage Rate: 1.5 times the applicable AAMA/WDMA/CSA 101/I.S.2/A440 rate for product type and performance class rounded down to one decimal place.

3. Water-Resistance Testing:

a. Test Pressure: Two-thirds times test pressure required to determine compliance with AAMA/WDMA/CSA 101/I.S.2/A440 performance grade indicated.

b. Allowable Water Infiltration: No water penetration.

4. Testing Extent: Three windows of each type as selected by Architect and a qualified independent testing and inspecting agency. Windows shall be tested after perimeter sealants have cured.

5. Test Reports: Prepared according to AAMA 502.

B. Windows will be considered defective if they do not pass tests and inspections.

C. Prepare test and inspection reports.

3.4 ADJUSTING, CLEANING, AND PROTECTION

A. Adjust operating sashes and hardware for a tight fit at contact points and weather stripping for smooth operation and weathertight closure.

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

1. Keep protective films and coverings in place until final cleaning.

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

D. Protect window surfaces from contact with contaminating substances resulting from construction operations. If contaminating substances do contact window surfaces, remove contaminants immediately according to manufacturer's written instructions.

END OF SECTION 085113

SECTION 087100

DOOR HARDWARE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Mechanical door hardware.
2. Thresholds.
3. Smoke and draft control seals.
4. Weatherstripping and gasketing.

B. Related Requirements:

1. Section 081113 "Hollow Metal Doors and Frames".
2. Section 081416 "Flush Wood Doors".
3. Section 083613 “Sectional Doors” for door hardware installed in Sectional Door assemblies.
4. Section 084113 "Aluminum-Framed Entrances and Storefronts".
5. Section 123216 “Manufactured Plastic-Laminate-Clad Casework” for cabinet door hardware provided with cabinets.

C. References: Comply with applicable requirements of the following standards. Where these standards conflict with other specific requirements, the most restrictive shall govern.

1. Builders Hardware Manufacturing Association (BHMA)
2. NFPA 101 Life Safety Code
3. NFPA 80 - Fire Doors and Windows
4. ANSI-A156.xx - Various Performance Standards for Finish Hardware
5. UL10C - Positive Pressure Fire Test of Door Assemblies
6. ANSI-A117.1 - Accessible and Usable Buildings and Facilities
7. DHI /ANSI A115.IG - Installation Guide for Doors and Hardware
8. ICC - International Building Code

D. Intent of Hardware Groups:

1. Should items of hardware not definitely specified be required for completion of the Work, furnish such items of type and quality comparable to adjacent hardware and appropriate for service required.
2. Where items of hardware aren't definitely or correctly specified, are required for completion of the Work, a written statement of such omission, error, or other discrepancy to be submitted to Architect, prior to date specified for receipt of bids for clarification by addendum; or furnish such items in the type and quality established by this specification, and appropriate to the service intended.

1.3 COORDINATION

A. Floor-Recessed Door Hardware: Coordinate layout and installation with floor construction.

1. Cast anchoring inserts into concrete.

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

C. Security: Coordinate installation of door hardware, keying, and access control with Owner's security consultant.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product. Include the following:

1. Construction details, material descriptions, dimensions of individual components and profiles, and finishes.
2. Detailed specification of construction and fabrication.
3. Manufacturer's installation instructions.

B. Samples: For each exposed product in each finish specified, in manufacturer's standard size. (If requested by Architect).

1. Tag Samples with full product description to coordinate Samples with door hardware schedule.

C. Door Hardware Schedule: Prepared by or under the supervision of Installer's Architectural Hardware Consultant. Coordinate door hardware schedule with doors, frames, and related work to ensure proper size, thickness, hand, function, and finish of door hardware.

1. Submittal Sequence: Submit door hardware schedule concurrent with submissions of Product Data, Samples, and Shop Drawings. Coordinate submission of door hardware schedule with scheduling requirements of other work to facilitate the fabrication of other work that is critical in Project construction schedule.
2. Format: Use same scheduling sequence and format and use same door numbers as in door hardware schedule in the Contract Documents.
3. Content: Include the following information:

a. Identification number, location, hand, fire rating, size, and material of each door and frame.

b. Locations of each door hardware set, cross-referenced to Drawings on floor plans and to door and frame schedule.

c. Complete designations, including name and manufacturer, type, style, function, size, quantity, function, and finish of each door hardware product.

d. Description of electrified door hardware sequences of operation and interfaces with other building control systems.

e. Fastenings and other installation information.

f. Explanation of abbreviations, symbols, and designations contained in door hardware schedule.

g. Mounting locations for door hardware.

h. List of related door devices specified in other Sections for each door and frame.

1.5 CLOSEOUT SUBMITTALS

A. Operating and Maintenance Manuals: Submit three (3) sets containing the following:

1. Complete information on care, maintenance, and adjustment, and data on repair and replacement parts, and information on preservation of finishes.

2. Catalog pages for each product.

3. Name, address, and phone number of local representatives for each manufacturer.

4. Parts list for each product.

B. Copy of final hardware schedule, edited to reflect, "As installed".

1.6 MAINTENANCE MATERIAL SUBMITTALS

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

1. One (1) Continuous Hinge.

2. One (1) Classroom Lockset.

3. One (1) Closer.

B. Extra Service Materials: Deliver to Owner extra materials from same production run as products installed. Package products with protective covering and identify with descriptive labels. Comply with Division 1 Closeout Submittals Section.

1. Special Tools: Provide special wrenches and tools applicable to each different or special hardware component.
2. Maintenance Tools: Provide maintenance tools and accessories supplied by hardware component manufacturer.
3. Delivery, Storage, and Protection: Comply with Owner's requirements for delivery, storage and protection of extra service materials.

1.7 QUALITY ASSURANCE

A. Installer Qualifications: Supplier of products and an employer of workers trained and approved by product manufacturers and of an Architectural Hardware Consultant who is available during the course of the Work to consult Contractor, Architect, and Owner about door hardware and keying.

1. Warehousing Facilities: In Project's vicinity, within 100 miles of project site.
2. Scheduling Responsibility: Preparation of door hardware schedule.

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

C. Regulatory Label Requirements: Provide testing agency label or stamp on hardware for labeled openings.

1. Provide UL listed hardware for labeled and 20-minute openings in conformance with requirements for class of opening scheduled.
2. Underwriters Laboratories requirements have precedence over this specification where conflict exists.

D. Single Source Responsibility: Except where specified in hardware schedule, furnish products of only one manufacturer for each type of hardware.

1.8 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 coordinated with the final door hardware schedule, and include installation instructions, templates, and necessary fasteners with each item or package.

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

1.9 PROJECT CONDITIONS:

A. Coordinate hardware with other work. Furnish hardware items of proper design for use on doors and frames of the thickness, profile, swing, security and similar requirements indicated, as necessary for the proper installation and function, regardless of omissions or conflicts in the information on the Contract Documents.

B. Review Shop Drawings for doors and entrances to confirm that adequate provisions will be made for the proper installation of hardware.

1.10 WARRANTY

A. Special Warranty: 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 doors and door hardware.

c. Deterioration of metals, metal finishes, and other materials beyond normal weathering and use.

2. Warranty Period: Two (2) years from date of Substantial Completion unless otherwise indicated below:

a. Locksets and Cylinders: Three (3) years from date of Substantial Completion.

b. Exit Devices: Five (5) years from date of Substantial Completion.

c. Manual Closers: 30-years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 GENERAL REQUIREMENTS

A. Provide specified door hardware as required to make doors fully functional, compliant with applicable codes, and secure to extent indicated.

B. Provide individual items of single type, of same model, and by same manufacturer.

2.2 MANUFACTURERS

A. Manufacturers:

1. Best Access Systems (BE)
2. By Related Section (BY)
3. Dorma Door Controls (DM)
4. National Guard (NA)
5. BEST Precision Exit Devices (PR)
6. BEST Hinges and Sliding (ST)
7. Trimco (TR)

8. Substitutions: Section 016000 - Product Requirements.

B. Source Limitations: Obtain each type of door hardware from single manufacturer.

2.3 PERFORMANCE REQUIREMENTS

A. Fire-Rated Door Assemblies: Where fire-rated doors are indicated, provide door hardware complying with NFPA 80 that is listed and labeled by a qualified testing agency, for fire-protection ratings indicated, based on testing at positive pressure in accordance with NFPA 252 or UL 10C.

B. Smoke- and Draft-Control Door Assemblies: Where smoke- and draft-control door assemblies are required, provide door hardware that complies with requirements of assemblies tested in accordance with UL 1784 and installed in compliance with NFPA 105.

C. Means of Egress Doors: Latches do not require more than 15 lbf to release the latch. Locks do not require use of a key, tool, or special knowledge for operation.

D. Accessibility Requirements: For door hardware on doors in an accessible route, comply with the USDOJ's "2010 ADA Standards for Accessible Design" and ICC A117.1.

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.
2. Comply with the following maximum opening-force requirements:
    a. Interior, Non-Fire-Rated Hinged Doors: 5 lbf applied perpendicular to door.
    b. Sliding or Folding Doors: 5 lbf applied parallel to door at latch.
    c. Fire Doors: Minimum opening force allowable by authorities having jurisdiction.
3. Bevel raised thresholds with a slope of not more than 1:2. Provide thresholds not more than 1/2 inch high.
4. Adjust door closer sweep periods so that, from an open position of 90 degrees, the door will take at least 5 seconds to move to a position of 12 degrees from the latch.
5. Adjust spring hinges so that, from an open position of 70 degrees, the door will take at least 1.5 seconds to move to the closed position.

2.4 HINGES

A. Products:

1. Butt Hinges:

a. Ball Bearing, Five (5) Knuckle.

2. Continuous Hinges:

a. Aluminum geared hinges.

B. Manufacturers:

1. Best (Basis of design, butt hinges)
2. Stanley (Basis of design, continuous hinges)
3. Pemko
4. Select
5. ABH

C. Properties:

1. Butt Hinges: As applicable to each item specified.

a. Heavy Weight Hinges: Minimum of four (4) permanently lubricated bearings.
b. Template screw hole locations.
c. Bearing assembly installed after plating.
d. Bearings: Exposed fully hardened bearings.
e. Bearing Shells: Shapes consistent with barrels.
f. Pins: Easily seated, non-rising pins.
g. Fully plate hinge pins.

h. Non-Removable Pins: Slotted stainless-steel screws.

i. UL 10C listed for fire-resistance-rated doors.

2. Continuous Geared Hinges: As applicable to each item specified.

a. Non-handed.

b. Anti-spinning through-fastener.

c. UL 10C listed for fire-resistance-rated doors.

1) Metal Door Installation: Rated up to 90 minutes.

2) Wood Door Installation: Rated up to 60 minutes.

d. Sufficient size to permit door to swing 180 degrees

D. Sizes: See Door Hardware Schedule.

1. Hinge Widths: As required to clear surrounding trim.

2. Sufficient size to allow 180 degree swing of door.

E. Finishes: See Door Hardware Schedule.

1. Fully polish hinges; front, back, and barrel.

F. Grades:

1. Butt Hinges: Comply with BHMA A156.1 and BHMA A156.7 for templated hinges.

2. Continuous Hinges: Comply with BHMA A156.26, Grade 1.

G. Material: Base metal as indicated for each item by BHMA material and finish designation.

H. Quantities:

1. Butt Hinges: Three (3) hinges per leaves up to 90 inches in height. Add one (1) for each additional 30 inches (762 mm) in height or fraction thereof.

    a. Hinge weight and size unless otherwise indicated in hardware sets:

    b. For doors up to 36 inches wide and up to 1-3/4 inches thick provide hinges with a minimum thickness of 0.134 inch and a minimum of 4-1/2 inches in height.

    c. For doors from 36 inches wide up to 42 inches wide and up to 1-3/4 inches thick provide hinges with a minimum thickness of 0.145 inch and a minimum of 4-1/2 inches in height.

    d. For doors from 42 inches wide up to 48 inches wide and up to 1-3/4 inches thick provide hinges with a minimum thickness of 0.180 inch and a minimum of 5 inches in height.

    e. For doors greater than 1-3/4 inches thick provide hinges with a minimum thickness of 0.180 inch and a minimum of 5 inches in height.

2. Continuous Hinges: One per door leaf.

I. Applications: At swinging doors.

1. Provide non-removable pins at out-swinging doors with locking hardware and all exterior doors.

2.5 MECHANICAL LOCKS AND LATCHES

A. Products:

1. Rim/mortise.

B. General Requirements:

1. Provide a lock for each door, unless it is indicated that lock is not required.

2. Trim: Provide lever handle or pull trim on outside of each lock, unless otherwise indicated.

3. Strikes:

a. Finish: To match lock or latch.

b. Curved-Lip Strikes: Provide as standard, with extended lip to protect frame, unless otherwise indicated.

c. Center Strick at Pair of Doors: 7/8” lip

4. Provide door pulls and push plates on doors without a lockset, latch set, exit device, or auxiliary lock, unless otherwise indicated.

a. On Solid doors, provide matching door pull and push plate on opposite faces.

C. Manufacturers:

1. BEST

2. No substitutions

D. Properties:

1. Lock Cylinders: Provide key access on outside of each lock, unless otherwise indicated.

a. Provide cylinders from same manufacturer as locking device.

b. Provide cams and/or tailpieces as required for locking devices.

c. Provide cylinders with appropriate format interchangeable cores where indicated.

E. Grades:

1. Standard Security Cylinders: Comply with BHMA A156.5.

F. Material:

1. Manufacturer's standard corrosion-resistant brass alloy.

G. Types: As applicable to each item specified.

1. Standard security small format interchangeable core (SFIC) type cylinders, with seven-pin , 6C cores.

H. Applications: At locations indicated in hardware sets, and as follows

1. As required for items with locking devices provided by other sections, including at elevator controls and cabinets.
2. When provisions for lock cylinders are referenced elsewhere in the Project Manual to this Section, provide compatible type of lock cylinder, keyed to building keying system, unless otherwise indicated.

I. MORTISE LOCKS

1. Mechanical Locks: Manufacturer's standard.
    a. Fitting modified ANSI A115.1 door preparation.
    b. Door Thickness Coordination Fitting 1-3/4 inch to 2-1/4 inch thick doors.
    c. Latch: Solid, one-piece, anti-friction, self-lubricating stainless steel.
    d. Latchbolt Throw: 3/4 inch, minimum.
    e. Auxiliary Deadlatch: One piece stainless steel, permanently lubricated.
    f. Backset: 2-3/4 inch.
    g. Lever Trim:
        1) Functionality: Allow the lever handle to move up to 45 degrees from horizontal position prior to engaging the latchbolt assembly.
        2) Strength: Locksets outside locked lever designed to withstand minimum 1,400 inch-lbs of torque. In excess of that, a replaceable part will shear. Key from outside and/or inside lever will still operate lockset.
        3) Spindle: Designed to prevent forced entry from attacking of lever.
        4) Independent spring mechanism for each lever.
        5) Trim to be self-aligning and thru-bolted.

6) Handles: Made of forged or cast brass, bronze, or stainless-steel construction. Levers that contain a hollow cavity are not acceptable.

7) Levers to operate a roller bearing spindle hub mechanism.

h. Provide locksets made in a manufacturing facility to compliant with ISO 9001-Quality Management and ISO 14001-Environmental Management.

J. CYLINDRICAL LOCKS

1. Mechanical Locks:

a. Fitting modified ANSI A115.2 door preparation.

b. Door Thickness Fit: 1-3/8 inches to 2-1/4 inches thick doors.

c. Construction: Hub, side plate, shrouded rose, locking pin to be a one-piece casting with a shrouded locking lug.

1) Through-bolted anti-rotational studs.

d. Cast stainless steel latch retractor with roller bearings for exceptionally smooth operation and superior strength and durability.

e. Bored Hole: 2-1/8 inch diameter.

f. Backset: 2-3/4 inches unless otherwise indicated.

g. Latch: Single piece tail-piece construction.

1) Latchbolt Throw: 9/16 inch, minimum.

h. Lever Trim:

1) Style: See Door Hardware Schedule.

2) Functionality: Allow the lever handle to move up to 45 degrees from horizontal position prior to engaging the latchbolt assembly.

3) Strength: Locksets outside locked lever designed to withstand minimum1,400 inch-lbs (158.2 Nm) of torque. In excess of that, a replaceable part will shear. Key from outside and/or inside lever will still operate lockset.

4) Independent spring mechanism for each lever.

a) Contain lever springs in the main lock hub.

5) Outside Lever Sleeve: Seamless one-piece construction.

6) Keyed Levers: Removable only after core is removed by authorized control key.

K. DOOR PULLS AND PUSH PLATES

1. Properties:

a. Pull Type: Straight, unless otherwise indicated.

b. Push Plate Type: Flat, with square corners, unless otherwise indicated.

c. Edges: Beveled, unless otherwise indicated.

2. Grades: Comply with BHMA A156.6.

3. Material: Stainless steel, unless otherwise indicated.

2.6 FLUSH BOLTS

A. Products:

1. Manual flush bolts.

B. Manufacturers:

1. Trimco (Basis of Design)

2. ABH

3. Burns

C. Properties:

1. Manual Flush Bolts: Manually latching upon closing of door leaf.

a. Bolt Throw: 3/4 inch (19 mm), minimum.

D. Dustproof Strikes: For bolting into floor, provide except at metal thresholds.

E. Extension Bolts: In leading edge of door, one bolt into floor, one bolt into top of frame.

2.7 EXIT DEVICES AND AUXILIARY ITEMS

A. Products:

1. Best 2000 Series.

B. Manufacturers:

1. Best (Basis of design)
2. Precision
3. Sargent
4. Von Duprin

C. Properties:

1. Actuation: Full-length touchpad.
2. Touchpads: 'T" style metal touchpads and rail assemblies with matching chassis covers end caps.
3. Latch Bolts: Stainless steel deadlocking with 3/4 inch (19 mm) projection using latch bolt.
4. Lever Design: Match project standard lockset trims.

5. Cylinder: Include where cylinder dogging or locking trim is indicated.
6. Strike as recommended by manufacturer for application indicated.
7. Sound dampening on touch bar.
8. Dogging:
    a. Non-Fire-Resistance-Rated Devices: Hex key 1/4 inch (6 mm) hex key dogging.
    b. Fire-Resistance-Rated Devices: Manual dogging not permitted.
9. Touch bar assembly on wide style exit devices to have a 1/4 inch (6.3 mm) clearance to allow for vision frames.
10. All exposed exit device components to be of architectural metals and “true” architectural finishes.
11. Handing: Field-reversible.
12. Fasteners on Back Side of Device Channel: Concealed - exposed fasteners not allowed.
13. Vertical Latch Assemblies' Operation: Gravity, without use of springs.

D. Grades: Complying with BHMA A156.3, Grade 1.

1. Provide exit devices tested and certified by UL or by a recognized independent laboratory for mechanical operational testing to 10 million cycles minimum with inspection confirming Grade 1 Loaded Forces have been maintained.

E. Code Compliance: As required by authorities having jurisdiction in the State in which the Project is located.

F. Options:

1. Furnish less bottom rod (LBR) at scheduled locations to eliminate use of floor mounted strikes.

2.8 ACCESSORIES FOR PAIRS OF DOORS

A. Coordinators: BHMA A156.3; consisting of active-leaf, hold-open lever and inactive-leaf release trigger; fabricated from steel with nylon-coated strike plates; with built-in, adjustable safety release.

B. Carry-Open Bars: BHMA A156.3; prevent the inactive leaf from opening before the active leaf; provide polished brass or bronze carry-open bars with strike plate for inactive leaves of pairs of doors unless automatic or self-latching bolts are used.

C. Astragals: BHMA A156.22.

2.9 SURFACE CLOSERS

A. General Requirements:

1. Provide a door closer on each exterior door, unless otherwise indicated.
2. Provide a door closer on each fire-rated and smoke-rated door.
3. Spring hinges are not an acceptable self-closing device, unless otherwise indicated.

B. Products:

1. Surface Mounted:

a. Best HD8000 Series.

C. Manufacturers:

1. Best (Basis of Design)
2. Norton
3. Dorma
4. LCN

D. Properties:

1. Surface Mounted Closers: Manufacturer's standard.
2. Construction: R14 high silicon aluminum alloy.
3. Maximum Projection from Face of Door: 2-7/16 inches (62 mm).
4. Mechanism: Separate tamper-resistant adjusting valves for closing and latching speeds.
    a. Include advanced backcheck feature.
    b. Include delayed action feature.
5. Hydraulic Fluid: All-weather type.
6. Arm Assembly: Standard for product specified.
    a. Include hold-open, integral stop, or spring-loaded stop feature, as specified in Door Hardware Schedule.
    b. Parallel arm to be a heavy-duty rigid arm.
    c. Where “IS” or “S-IS” arms are specified in hardware sets, if manufacturer does not offer this arm provide a regular arm mount closer in conjunction with a heavy-duty overhead stop equal to Dormakaba 900 Series.
7. Covers:
    a. Type: Standard for product selected.
        1) Full.
    b. Material: Plastic.
    c. Finish: Painted.

E. Grades:

1. Closers: Comply with BHMA A156.4, Grade 1.
2. Underwriters Laboratories Compliance:
    a. Product Listing: UL (DIR) and ULC for use on fire-resistance-rated doors.

1) UL 228 - Door Closers-Holders, With or Without Integral Smoke Detectors.

F. Code Compliance: As required by authorities having jurisdiction in the State in which the Project is located.

G. Types:

1. Rack-and-pinion, surface-mounted. 1-1/2 inches (38 mm) minimum bore.
2. Installation:
3. Mounting: Includes surface mounted installations.
4. Mount closers on non-public side of door and stair side of stair doors unless otherwise noted in hardware sets.
5. At outswinging exterior doors, mount closer on interior side of door.
6. Provide adapter plates, shim spacers, and blade stop spacers as required by frame and door conditions.
7. Where an overlapping astragal is included on pairs of swinging doors, provide coordinator to ensure door leaves close in proper order.

2.10 STOPS AND HOLDERS

A. Products:

1. Wall Bumpers.

B. Manufacturers:

1. Trimco (Basis of Design)
2. Burns
3. Rockwood

C. General: Provide overhead stop/holder when wall or floor stop is not feasible.

D. Grades:

1. Wall Bumpers: Comply with BHMA A156.16 and Resilient Material Retention Test as described in this standard.

E. Material: Base metal as indicated for each item by BHMA material and finish designation.

F. Types:

1. Wall Bumpers: Bumper, concave, convex, wall stop.

G. Installation:

1. Non-Masonry Walls: Confirm adequate wall reinforcement has been installed to allow lasting installation of wall bumpers.

2.11 OVERHEAD STOPS AND HOLDERS

A. General Requirements:

1. Provide stop for every swinging door, unless otherwise indicated.
2. Overhead Stop is not required if positive stop feature is specified for door closer. Postative stop feature of door closer is not an acceptable substitute for a stop unless otherwise indicated.
3. Overhead stop is not required if a floor or wall stop has been specified for the door.

B. Products:

1. Surface Overhead Stops and Holders:

a. Dormakaba 900 Heavy Duty.

2. Concealed Overhead Stops and Holders:

a. Dormakaba 910 Heavy Duty.

C. Manufacturers:

1. Dormakaba Group (Basis of Design)
2. ABH
3. Rixon

D. Properties:

1. Stop Settings: At 90 degrees opening.

a. Adjustable friction tension.

2. Sizes: Manufacturer's standard for the application.
3. Finishes:

a. Arms and Brackets: Zinc-plated.

E. Grades: As applicable to item specified.

F. Comply with BHMA A156.8, Grade 1.

G. Material: Base metal as indicated for each item by BHMA material and finish designation.

1. Track Channel: Extruded aluminum alloy.
2. Slide Block: Machined from solid brass alloy.

H. Types:

1. Surface-applied.
2. Concealed.

2.12 DOOR GASKETING

A. General Requirements:

1. Provide weatherstripping on each exterior door at head, jambs, and meeting stiles of door pairs, unless otherwise indicated.
2. Provide bottom door sweep on each exterior door, unless otherwise indicated.

B. Products:

1. Weatherstripping: See Door Hardware Schedule.
2. Door Bottom Seals:
    a. Door Sweeps: See Door Hardware Schedule.

C. Manufacturers:

1. National Guard Products, Inc (Basis of Design)
2. Reese
3. K.N. Crowder

D. Properties:

1. Adhesive-Backed Perimeter Gasketing: Silicone gasket material applied to frame with self-adhesive.
2. Rigid, Housed, Perimeter Gasketing: Silicone bulb gasket material held in place by aluminum housing; fastened to frame stop with screws.
3. Door Sweeps: Silicone gasket material held in place by flat aluminum housing or flange; surface mounted to face of door with screws.

E. Grades: Comply with BHMA A156.22.

2.13 THRESHOLDS

A. General Requirements:

1. Provide a threshold at each exterior door, unless otherwise indicated.

B. Products:

1. Thresholds.

C. Manufacturers:

1. National Guard Products, Inc (Basis of Design)
2. Reese
3. K.N. Crowder

D. Properties:

1. Threshold Surface: Fluted horizontal grooves across full width.

E. Grades: Thresholds: Comply with BHMA A156.21.

F. Types: As applicable to project conditions. Provide barrier-free type at every location where specified.

G. Bumper Seal Thresholds with Gasket: Use silicone gaskets.

2.14 PROTECTIVE TRIM UNITS

A. Products:

1. Kick-Mop Plates.

B. Manufacturers:

1. Trimco (Basis of Design)
2. Burns
3. Rockwood

C. Properties:

1. Kick Plates: Provide along bottom edge of push side of every door with closer, except aluminum storefront and glass entry doors, unless otherwise indicated.
2. Mop Plates: Provide along bottom edge of pull side of doors to provide protection from cleaning liquids and equipment damage to door surface.
3. Edges: Beveled, on four (4) unless otherwise indicated.

D. Grades: Comply with BHMA A156.6.

E. Material: As indicated for each item by BHMA material and finish designation.

1. Metal Properties: Stainless steel.

a. Metal, Standard Duty: Thickness 0.050 inch (1.27 mm), minimum.

F. Installation:

1. Fasteners: Countersunk screw fasteners

2.15 AUXILIARY DOOR HARDWARE

A. Products:

1. Silencers.

B. Manufacturers:

1. Trimco

C. Properties:

1. Silencers: Provide at equal locations on door frame to mute sound of door's impact upon closing.

a. Single Door: Provide three on strike jamb of frame.

b. Pair of Doors: Provide two on head of frame, one for each door at latch side.

c. Material: Rubber, gray color.

2.16 KEYS AND KEYING:

A. Provide keyed brass construction cores and keys during the construction period. Construction control and operating keys and core shall not be part of the Owner's permanent keying system or furnished in the same keyway (or key section) as the Owner's permanent keying system. Permanent cores and keys (prepared according to the accepted keying schedule) will be furnished to the Owner.

B. Cylinders, removable and interchangeable core system: Best CORMAX™ Patented 7-pin.

C. Permanent keys and cores: Stamped with the applicable key mark for identification. These visual key control marks or codes will not include the actual key cuts. Permanent keys will also be stamped "Do Not Duplicate".

D. Transmit Grand Masterkeys, Masterkeys and other Security keys to Owner by Registered Mail, return receipt requested.

E. Furnish keys in the following quantities:

1. One (1) each Grand Masterkeys.

2. Four (4) each Masterkeys.

3. Two (2) each Change keys each keyed core.

4. Fifteen (15) each Construction masterkeys.

5. One (1) each Control keys.

F. The Owner, or the Owner's agent, will install permanent cores and return the construction cores to the Hardware Supplier. Construction cores and keys remain the property of the Hardware Supplier.

G. Keying Schedule: Arrange for a keying meeting, and programming meeting with Architect Owner and hardware supplier, and other involved parties to ensure locksets and locking hardware, are functionally correct and keying and programming complies with project requirements. Furnish 3 typed copies of keying and programming schedule to Architect.

2.17 FABRICATION

A. Base Metals: Produce door hardware units of base metal indicated, 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.

B. Fasteners: Provide door hardware manufactured to comply with published templates prepared for machine, wood, and sheet metal screws. Provide screws that comply with 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. Fire-Rated Applications:

a. Wood or Machine Screws: For the following:

1) Hinges mortised to doors or frames; use threaded-to-the-head wood screws for wood doors and frames.

2) Strike plates to frames.

3) Closers to doors and frames.

b. Steel Through Bolts: For the following unless door blocking is provided:

1) Surface hinges to doors.

2) Closers to doors and frames.

3) Surface-mounted exit devices.

3. Spacers or Sex Bolts: For through bolting of hollow-metal doors.

4. Gasketing Fasteners: Provide noncorrosive fasteners for exterior applications and elsewhere as indicated.

2.18 FINISHES

A. Provide finishes complying with BHMA A156.18 as indicated in door hardware schedule.

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-rated door assembly construction, wall and floor construction, and other conditions affecting performance of the Work.

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

3.2 PREPARATION

A. Steel Doors and Frames: For surface-applied door hardware, drill and tap doors and frames in accordance with ANSI/SDI A250.6.

B. Wood Doors: Comply with door and hardware manufacturers' written instructions.

3.3 INSTALLATION

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

1. Standard Steel Doors and Frames: ANSI/SDI A250.8.

2. Wood Doors: DHI's "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. 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. Hinges: Install types in quantities indicated.

D. Lock Cylinders: Install construction cores to secure building and areas during construction period.

1. Replace construction cores with permanent cores as directed by Owner.

2. Furnish permanent cores to Owner for installation.

E. Key Control System:

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

2. Key Control System Software: Set up multiple-index system based on final keying schedule.

F. Thresholds: Set thresholds for exterior doors and other doors indicated in full bed of sealant complying with requirements specified in Section 07 92 00 "Joint Sealants".

3.4 FIELD QUALITY CONTROL

A. Independent Architectural Hardware Consultant: Engage a qualified independent Architectural Hardware Consultant to perform inspections and to prepare inspection reports.

1. Independent Architectural Hardware Consultant will inspect door hardware and state in each report whether installed work complies with or deviates from requirements, including whether door hardware is properly installed and adjusted.

3.5 ADJUSTING

A. Initial Adjustment: Adjust and check each operating item of door hardware and each door to ensure proper operation or function of every unit. Replace units that cannot be adjusted to operate as intended. Adjust door control devices to compensate for final operation of heating and ventilating equipment and to comply with referenced accessibility requirements.

1. Door Closers: Adjust sweep period to comply with accessibility requirements and requirements of authorities having jurisdiction.

2. Spring Hinges: Adjust to achieve positive latching when door is allowed to close freely from an open position of 70 degrees and so that closing time complies with accessibility requirements of authorities having jurisdiction.

B. Occupancy Adjustment: Approximately six months after date of Substantial Completion, Installer's Architectural Hardware Consultant shall examine and readjust each item of door hardware, including adjusting operating forces, as necessary to ensure function of doors, door hardware, and electrified door hardware.

3.6 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.

3.7 MAINTENANCE SERVICE

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

3.8 DOOR HARDWARE SCHEDULE

A. The following hardware sets are intended to establish type and standard of quality when used together with requirements of this section. Examine Drawings and Specifications and furnish proper hardware for door openings. It is the Bidder's responsibility to verify ALL existing conditions and provide all miscellaneous materials not specifically noted.

B. Contractor and Hardware Supplier shall meet with Architect before final approval of Hardware Schedule to visit each opening to coordinate any proposed hardware with existing hardware attachment locations to eliminate any attachment locations from being exposed.

C. Option List:

Code	**Description**
1/4-20 SSMS/EA	STAINLESS MACHINE SCREWS/EXPANSION ANC.
B4E-HEAVY-KP	BEVELED 4 EDGES - KICK PLATES
CORMAX PATENTED KEYING	Cormax Patented Keying
CSK	COUNTER SINKING OF KICK and MOP PLATES
FL	Fire Exit Hardware
LAR	LENGTH AS REQUIRED
LBR	LESS BOTTOM ROD
LDW	LESS DOOR WIDTH
VIB	Double Visual Indictor Option

D. Finish List:

Code	**Description**
26D	Satin Chrome
32D	Satin Stainless Steel
626	Satin Chromium Plated

630	Satin Stainless Steel
689	Aluminum Painted
AL	Aluminum
GREY	Grey

E. Door Hardware Schedule:

1. Continue to next page.

F. Opening List:

1. Refer to table at end of Section.

Set #001 - ALD EXTERIOR PAIR

Doors: 127

2	Continuous Hinge	661HD UL X LAR	AL	ST
1	Exit Device	2602 X 2902A	630	PR
1	Exit Device	2608 X 2908A	630	PR
1	Mortise Cylinder	1E-74 PATD CORMAX PATENTED KEYING	626	BE
2	Closer	HD8016 SDS	689	BE
1	Gasket	GASKETING BY ALUMINUM DOOR MANUFACTURER		BY
2	Door Sweep	200 SA X LAR		NA
1	Threshold	896 S X LAR 1/4-20 SSMS/EA	AL	NA

Set #002 - HMD EXTERIOR

Doors: 101b, 100g, 100i, 108, S1a, S2b

3	Hinges	FBB199 4.5" x 4.5" NRP	32D	ST
1	Storeroom Lockset	9K3-7D15D PATD CORMAX PATENTED KEYING	626	BE
1	Closer	HD8016 SDS	689	BE
1	Kick Plate	K0050 10" X 2" LDW B4E-HEAVY-KP CSK	630	TR
1	Weatherstrip	700 S HEAD & JAMBS		NA
1	Door Sweep	200 SA X LAR		NA
1	Threshold	896 S X LAR 1/4-20 SSMS/EA	AL	NA

Set #002A - HMD EXTERIOR

Doors: 114

3	Hinges	FBB199 4.5" x 4.5" NRP	32D	ST
1	Exit Device	2103 X 4903A	630	PR
1	Rim Cylinder	12E-72 PATD CORMAX PATENTED KEYING	626	BE
1	Closer	HD8016 SDS	689	BE
1	Kick Plate	K0050 10" X 2" LDW B4E-HEAVY-KP CSK	630	TR

1	Weatherstrip	700 S HEAD & JAMBS		NA
1	Door Sweep	200 SA X LAR		NA
1	Threshold	896 S X LAR 1/4-20 SSMS/EA	AL	NA

Set #003 - WD PAIR EXIT DEVICE

Doors: 114a

6	Butt Hinge	FBB168 4.5" x 4.5" NRP	26D	ST
1	Exit Device	2202 X 4902A LBR	630	PR
1	Exit Device	2208 X 4908A LBR	630	PR
1	Rim Cylinder	12E-72 PATD CORMAX PATENTED KEYING	626	BE
2	Closer	HD8016 AF80P	689	BE
2	Kick Plate	K0050 10" X 1" LDW B4E-HEAVY-KP CSK	630	TR
2	Mop Plate	KM050 4" X 1" LDW B4E-HEAVY-KP CSK	630	TR
2	Wall Bumper	1270 CV/CX	626	TR
2	Silencer	1229A	GREY	TR

Set #004 - HMD PAIR CLASSROOM LOCKSET/FLUSH BOLTS

Doors: 201

6	Butt Hinge	FBB168 4.5" x 4.5" NRP	26D	ST
2	Manual Flushbolt	3917-12	626	TR
1	Classroom Lockset	9K3-7R15D PATD CORMAX PATENTED KEYING	626	BE
2	Closer	HD8016 AF80P	689	BE
2	Kick Plate	K0050 10" X 1" LDW B4E-HEAVY-KP CSK	630	TR
2	Mop Plate	KM050 4" X 1" LDW B4E-HEAVY-KP CSK	630	TR
2	Wall Bumper	1270 CV/CX	626	TR
1	Dust Proof Strike	3910	626	TR
2	Silencer	1229A	GREY	TR

Set #005 - WD PAIR CLASSROOM LOCKSET/FLUSH BOLTS

Doors: 122a

6	Butt Hinge	FBB168 4.5" x 4.5" NRP	26D	ST
2	Manual Flushbolt	3913	626	TR
1	Classroom Lockset	9K3-7R15D PATD CORMAX PATENTED KEYING	626	BE
2	Closer	HD8016 AF80P	689	BE
2	Kick Plate	K0050 10" X 1" LDW B4E-HEAVY-KP CSK	630	TR
2	Mop Plate	KM050 4" X 1" LDW B4E-HEAVY-KP CSK	630	TR
2	Wall Bumper	1270 CV/CX	626	TR
1	Dust Proof Strike	3910	626	TR
2	Silencer	1229A	GREY	TR

Set #006 - WD PUSH/PULL DEADBOLT PAIR

Doors: 122

6	Butt Hinge	FBB168 4.5" x 4.5" (NRP AS REQ'D)	26D	ST
2	Push Plate	1001-3	630	TR
2	Classroom Deadbolt	8T3-7S PATD CORMAX PATENED KEYING	626	BE
2	Closer	HD8016 SDS/IS	689	BE
4	Kick Plate	K0050 10" X 1" LDW B4E-HEAVY-KP CSK	630	TR
6	Silencer	1229A	GREY	TR

Set #007 - HMD EXIT DEVICE

Doors: 108a

3	Butt Hinge	FBB168 4.5" x 4.5" NRP	26D	ST
1	Exit Device	2108 X 4908A	630	PR
1	Rim Cylinder	12E-72 PATD CORMAX PATENTED KEYING	626	BE
1	Closer	HD8016 AF80P	689	BE
1	Kick Plate	K0050 10" X 2" LDW B4E-HEAVY-KP CSK	630	TR

1	Mop Plate	KM050 4" X 1" LDW B4E-HEAVY-KP CSK	630	TR
1	Wall Bumper	1270 CV/CX	626	TR
3	Silencer	1229A	GREY	TR

Set #008 - HMD UL EXIT DEVICE

Doors: S1c

3	Butt Hinge	FBB168 4.5" x 4.5"	26D	ST
1	Exit Device	FL 2114 X 4914A	630	PR
1	Closer	HD8016 AF80P	689	BE
1	Kick Plate	K0050 10" X 2" LDW B4E-HEAVY-KP CSK	630	TR
1	Mop Plate	KM050 4" X 1" LDW B4E-HEAVY-KP CSK	630	TR
1	Wall Bumper	1270 CV/CX	626	TR
1	Gasketing	5050 B Head & Jambs		NA

Set #009 - HMD UL EXIT DEVICE

Doors: S1b

3	Butt Hinge	FBB168 4.5" x 4.5"	26D	ST
1	Exit Device	FL 2114 X 4914A	630	PR
1	Closer	HD8016 SDS	689	BE
1	Kick Plate	K0050 10" X 2" LDW B4E-HEAVY-KP CSK	630	TR
1	Mop Plate	KM050 4" X 1" LDW B4E-HEAVY-KP CSK	630	TR
1	Gasketing	5050 B Head & Jambs		NA

Set #010 - HMD UL CLASSROOM LOCKSET

Doors: 102, S2a

3	Butt Hinge	FBB168 4.5" x 4.5"	26D	ST
1	Classroom Lockset	9K3-7R15D PATD CORMAX PATENTED KEYING	626	BE
1	Closer	HD8016 AF80P	689	BE
1	Kick Plate	K0050 10" X 2" LDW B4E-HEAVY-KP CSK	630	TR
1	Mop Plate	KM050 4" X 1" LDW B4E-HEAVY-KP CSK	630	TR
1	Wall Bumper	1270 CV/CX	626	TR
1	Gasketing	5050 B Head & Jambs		NA

Set #010A - HMD UL PASSAGE SET

Doors: S2c

3	Butt Hinge	FBB168 4.5" x 4.5"	26D	ST
1	Passage Set	9K3-0N15D	626	BE
1	Closer	HD8016 AF80P	689	BE
1	Kick Plate	K0050 10" X 2" LDW B4E-HEAVY-KP CSK	630	TR
1	Mop Plate	KM050 4" X 1" LDW B4E-HEAVY-KP CSK	630	TR
1	Wall Bumper	1270 CV/CX	626	TR
1	Gasketing	5050 B Head & Jambs		NA

Set #011 - HMD CLASSROOM LOCKSET

Doors: 105, 106, 121

3	Butt Hinge	FBB168 4.5" x 4.5"	26D	ST
1	Classroom Lockset	9K3-7R15D PATD CORMAX PATENTED KEYING	626	BE
1	Wall Bumper	1270 CV/CX	626	TR
3	Silencer	1229A	GREY	TR

Set #011A - HMD PASSAGE SET

Doors: 103, 118

3	Butt Hinge	FBB168 4.5" x 4.5"	26D	ST
1	Passage Set	9K3-0N15D	626	BE
1	Wall Bumper	1270 CV/CX	626	TR
3	Silencer	1229A	GREY	TR

Set #012 - HMD CLASSROOM LOCKSET

Doors: 104

3	Butt Hinge	FBB168 4.5" x 4.5"	26D	ST
1	Classroom Lockset	9K3-7R15D PATD CORMAX PATENTED KEYING	626	BE
1	Closer	HD8016 AF80P	689	BE
1	Kick Plate	K0050 10" X 1" LDW B4E-HEAVY-KP CSK	630	TR
1	Mop Plate	KM050 4" X 1" LDW B4E-HEAVY-KP CSK	630	TR
1	Wall Bumper	1270 CV/CX	626	TR
3	Silencer	1229A	GREY	TR

Set #013 - HMD CLASSROOM LOCKSET

Doors: 100h

3	Butt Hinge	FBB168 4.5" x 4.5" NRP	26D	ST
1	Classroom Lockset	9K3-7R15D PATD CORMAX PATENTED KEYING	626	BE
1	Closer	HD8016 IS	689	BE
1	Mop Plate	KM050 4" X 1" LDW B4E-HEAVY-KP CSK	630	TR
1	Weatherstrip	700 S HEAD & JAMBS		NA
1	Door Sweep	200 SA X LAR		NA
1	Threshold	896 S X LAR 1/4-20 SSMS/EA	AL	NA

Set #014 - HMD STOREROOM LOCKSET

Doors: 110

3	Butt Hinge	FBB168 4.5" x 4.5" NRP	26D	ST
1	Storeroom Lockset	9K3-7D15D PATD CORMAX PATENTED KEYING	626	BE
1	Closer	HD8016 SDS	689	BE
1	Kick Plate	K0050 10" X 2" LDW B4E-HEAVY-KP CSK	630	TR
1	Mop Plate	KM050 4" X 1" LDW B4E-HEAVY-KP CSK	630	TR
3	Silencer	1229A	GREY	TR

Set #015 - HMD STOREROOM LOCKSET

Doors: 107

3	Butt Hinge	FBB168 4.5" x 4.5"	26D	ST
1	Storeroom Lockset	9K3-7D15D PATD CORMAX PATENTED KEYING	626	BE
1	Closer	HD8016 IS	689	BE
1	Kick Plate	K0050 10" X 2" LDW B4E-HEAVY-KP CSK	630	TR
1	Mop Plate	KM050 4" X 1" LDW B4E-HEAVY-KP CSK	630	TR
3	Silencer	1229A	GREY	TR

Set #016 - HMD ENTRANCE LOCKSET

Doors: 120

3	Butt Hinge	FBB168 4.5" x 4.5"	26D	ST
1	Entrance Lockset	9K3-7AB15D PATD CORMAX PATENTED KEYING	626	BE
1	Wall Bumper	1270 CV/CX	626	TR
3	Silencer	1229A	GREY	TR

Set #017 - WD UL CLASSROOM LOCKSET

Doors: 109a

3	Butt Hinge	FBB168 4.5" x 4.5" NRP	26D	ST

1	Classroom Lockset	9K3-7R15D PATD CORMAX PATENTED KEYING	626	BE
1	Closer	HD8016 AF80P	689	BE
1	Kick Plate	K0050 10" X 2" LDW B4E-HEAVY-KP CSK	630	TR
1	Mop Plate	KM050 4" X 1" LDW B4E-HEAVY-KP CSK	630	TR
1	Wall Bumper	1270 CV/CX	626	TR
1	Gasketing	5050 B Head & Jambs		NA

Set #018 - WD CLASSROOM LOCKSET

Doors: 123, 204, 215, 218

3	Butt Hinge	FBB168 4.5" x 4.5"	26D	ST
1	Classroom Lockset	9K3-7R15D PATD CORMAX PATENTED KEYING	626	BE
1	Wall Bumper	1270 CV/CX	626	TR
3	Silencer	1229A	GREY	TR

Set #019 - WD CLASSROOM LOCKSET

Doors: 125, 126, 206, 208

3	Butt Hinge	FBB168 4.5" x 4.5" NRP	26D	ST
1	Classroom Lockset	9K3-7R15D PATD CORMAX PATENTED KEYING	626	BE
1	Wall Bumper	1270 CV/CX	626	TR
3	Silencer	1229A	GREY	TR

Set #020 - WD CLASSROOM LOCKSET

Doors: 223, 223a

3	Butt Hinge	FBB168 4.5" x 4.5"	26D	ST
1	Classroom Lockset	9K3-7R15D PATD CORMAX PATENTED KEYING	626	BE
1	Closer	HD8016 AF80P	689	BE
1	Kick Plate	K0050 10" X 2" LDW B4E-HEAVY-KP CSK	630	TR
1	Mop Plate	KM050 4" X 1" LDW B4E-HEAVY-KP CSK	630	TR
1	Wall Bumper	1270 CV/CX	626	TR
3	Silencer	1229A	GREY	TR

Set #021 - WD STOREROOM LOCKSET

Doors: 217

3	Butt Hinge	FBB168 4.5" x 4.5"	26D	ST
1	Storeroom Lockset	9K3-7D15D PATD CORMAX PATENTED KEYING	626	BE
1	Closer	HD8016 AF80P	689	BE
1	Kick Plate	K0050 10" X 2" LDW B4E-HEAVY-KP CSK	630	TR
1	Mop Plate	KM050 4" X 1" LDW B4E-HEAVY-KP CSK	630	TR
1	Wall Bumper	1270 CV/CX	626	TR
3	Silencer	1229A	GREY	TR

Set #022 - WD STOREROOM LOCKSET

Doors: 211

3	Butt Hinge	FBB168 4.5" x 4.5" NRP	26D	ST
1	Storeroom Lockset	9K3-7D15D PATD CORMAX PATENTED KEYING	626	BE
1	Closer	HD8016 AF80P	689	BE
1	Kick Plate	K0050 10" X 2" LDW B4E-HEAVY-KP CSK	630	TR
1	Mop Plate	KM050 4" X 1" LDW B4E-HEAVY-KP CSK	630	TR
1	Wall Bumper	1270 CV/CX	626	TR

3	Silencer	1229A	GREY	TR

Set #023 - WD STOREROOM LOCKSET

Doors: 124

3	Butt Hinge	FBB168 4.5" x 4.5" NRP	26D	ST
1	Storeroom Lockset	9K3-7D15D PATD CORMAX PATENTED KEYING	626	BE
1	Closer	HD8016 SDS	689	BE
1	Kick Plate	K0050 10" X 2" LDW B4E-HEAVY-KP CSK	630	TR
1	Mop Plate	KM050 4" X 1" LDW B4E-HEAVY-KP CSK	630	TR
3	Silencer	1229A	GREY	TR

Set #024 - WD ENTRANCE LOCKSET

Doors: 200, 219, 220, 221, 222

3	Butt Hinge	FBB168 4.5" x 4.5"	26D	ST
1	Entrance Lockset	9K3-7AB15D PATD CORMAX PATENTED KEYING	626	BE
1	Wall Bumper	1270 CV/CX	626	TR
3	Silencer	1229A	GREY	TR

Set #025 - WD ENTRY LOCKSET

Doors: 223b

3	Butt Hinge	FBB168 4.5" x 4.5"	26D	ST
1	Entrance Lockset	9K3-7AB15D PATD CORMAX PATENTED KEYING	626	BE
1	Overhead Stop	910 S	626	DM
3	Silencer	1229A	GREY	TR

Set #026 - WD PASSAGE SET

Doors: 109, 216

3	Butt Hinge	FBB168 4.5" x 4.5"	26D	ST

1	Passage Set	9K3-0N15D	626	BE
1	Wall Bumper	1270 CV/CX	626	TR
3	Silencer	1229A	GREY	TR

Set #027 - WD INDICTOR PRIVACY SET

Doors: 110, 111, 112, 113, 116, 117, 119

3	Butt Hinge	FBB168 4.5" x 4.5"	26D	ST
1	Indicator Privacy Set	45H-0L15H VIB	626	BE
1	Closer	HD8016 AF80P	689	BE
1	Kick Plate	K0050 10" X 2" LDW B4E-HEAVY-KP CSK	630	TR
1	Mop Plate	KM050 4" X 1" LDW B4E-HEAVY-KP CSK	630	TR
1	Wall Bumper	1270 CV/CX	626	TR
3	Silencer	1229A	GREY	TR

Set #028 - WD INDICATOR PRIVACY SET

Doors: 213, 214

3	Butt Hinge	FBB168 4.5" x 4.5"	26D	ST
1	Indicator Privacy Set	45H-0L15H VIB	626	BE
1	Overhead Stop	900 S	626	DM
3	Silencer	1229A	GREY	TR

Set #029 - WD PUSH/PULL

Doors: 205, 207

3	Butt Hinge	FBB168 4.5" x 4.5"	26D	ST
1	Push Plate	1001-3	630	TR
1	Pull Plate	1013-3B	630	TR
1	Closer	HD8016 AF80P	689	BE
1	Kick Plate	K0050 10" X 2" LDW B4E-HEAVY-KP CSK	630	TR

1	Mop Plate	KM050 4" X 1" LDW B4E-HEAVY-KP CSK	630	TR
1	Wall Bumper	1270 CV/CX	626	TR
3	Silencer	1229A	GREY	TR

Opening List

Opening	Hdwr Set	Opening Label	Door Type	Frame Type
100g	002		HM	HM
100h	013		HM	HM
100i	002		HM	HM
101b	002		HM	HM
102	010	60	HM	HM
103	011		HM	HM
104	012		HM	HM
105	011		HM	HM
106	011		HM	HM
107	015		HM	HM
108	002		HM	HM
108a	007		HM	HM
109	026		WD	HM
109a	017	45	WD	HM
110	027		WD	HM
111	027		WD	HM
112	027		WD	HM
113	027		WD	HM
114	002		HM	HM
114a	003		WD	HM
115	027		WD	HM
116	027		WD	HM
117	011		HM	HM
118	014		HM	HM

Opening	Hdwr Set	Opening Label	Door Type	Frame Type
119	016		HM	HM
120	011		HM	HM
121	006		WD	HM
121a	005		WD	HM
122	018		WD	HM
123	023		WD	HM
124	019		WD	HM
125	019		WD	HM
126	001		AL	AL
200	024		WD	HM
201	004		HM	HM
204	018		WD	HM
205	029		WD	HM
206	018		WD	HM
207	029		WD	HM
208	018		WD	HM
211	022		WD	HM
213	028		WD	HM
214	028		WD	HM
215	018		WD	HM
216	026		WD	HM
217	021		WD	HM
218	018		WD	HM
219	024		WD	HM
220	024		WD	HM
221	024		WD	HM

Opening	Hdwr Set	Opening Label	Door Type	Frame Type
222	024		WD	HM
223	020		WD	HM
223a	020		WD	HM
223b	025		WD	HM
S1a	002		HM	HM
S1b	008	60	HM	HM
S1c	008	60	HM	HM
S2a	008	60	HM	HM
S2b	002		FRP	AL
S2c	008	60	HM	HM

END OF SECTION 087100

SECTION 088000

GLAZING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Glass products.
2. Laminated glass.
3. Insulating glass.
4. Glazing sealants.
5. Glazing tapes.
6. Miscellaneous glazing materials.

1.3 DEFINITIONS

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

B. Glass Thicknesses: Indicated by thickness designations in millimeters in accordance with ASTM C1036.

C. Interspace: Space between lites of an insulating-glass unit.

1.4 COORDINATION

A. Coordinate glazing channel dimensions to provide necessary bite on glass, minimum edge and face clearances, and adequate sealant thicknesses, with reasonable tolerances to achieve proper safety margins for glazing retention under each design load case, load case combination, and service condition.

1.5 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Glass Samples: For each type of glass product other than clear monolithic vision glass; 12 inches square.

C. Glazing Schedule: List glass types and thicknesses for each size opening and location. Use same designations indicated on Drawings.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Protect glazing materials in accordance with manufacturer's written instructions. Prevent damage to glass and glazing materials from condensation, temperature changes, direct exposure to sun, or other causes.

1.7 FIELD CONDITIONS

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

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

1.8 WARRANTY

A. Manufacturer's Special Warranty for Coated-Glass Products: Manufacturer agrees to replace coated-glass units that deteriorate within specified warranty period. Deterioration of coated glass is defined as defects developed from normal use that are not attributed to glass breakage or to maintaining and cleaning coated glass contrary to manufacturer's written instructions. Defects include peeling, cracking, and other indications of deterioration in coating.

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

B. Manufacturer's Special Warranty for Laminated Glass: Manufacturer agrees to replace laminated-glass units that deteriorate within specified warranty period. Deterioration of laminated glass is defined as defects developed from normal use that are not attributed to glass breakage or to maintaining and cleaning laminated glass contrary to manufacturer's written instructions. Defects include edge separation, delamination materially obstructing vision through glass, and blemishes exceeding those allowed by referenced laminated-glass standard.

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

C. Manufacturer's Special Warranty for Insulating Glass: Manufacturer agrees to replace insulating-glass units that deteriorate within specified warranty period. Deterioration of insulating glass is defined as failure of hermetic seal under normal use that is not attributed to glass breakage or to maintaining and cleaning insulating glass contrary to manufacturer's written instructions. Evidence of failure is obstruction of vision by dust, moisture, or film on interior surfaces of glass.

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

D. Manufacturer's Special Warranty for Heat-Soaked Tempered Glass: Manufacturer agrees to replace heat-soaked tempered glass units that spontaneously break due to nickel sulfide (NiS) inclusions at a rate exceeding 0.3 percent (3/1000) within specified warranty period. Coverage for any other cause is excluded.

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

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Source Limitations for Glazing Accessories: For each product and installation method, obtain from single source from single manufacturer.

2.2 PERFORMANCE REQUIREMENTS

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

B. Structural Performance: Glazing shall withstand the following design loads within limits and under conditions indicated determined in accordance with the IBC and ASTM E1300:

1. Design Wind Pressures: Determine design wind pressures applicable to Project in accordance with ASCE/SEI 7, based on heights above grade indicated on Drawings.

a. Wind Design Data: As indicated on Drawings.

2. Design Snow Loads: As indicated on Drawings.

3. Maximum Lateral Deflection: For glass supported on all four edges, limit center-of-glass deflection at design wind pressure to not more than 1/50 times the short-side length or 1 inch, whichever is less.

4. Thermal Loads: Design glazing to resist thermal stress breakage induced by differential temperature conditions and limited air circulation within individual glass lites and insulated glazing units.

C. Safety Glazing: Where safety glazing is indicated, provide glazing that complies with 16 CFR 1201, Category II.

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

1. For monolithic-glass lites, properties are based on units with lites 6 mm thick.
2. For laminated-glass lites, properties are based on products of construction indicated.
3. For insulating-glass units, properties are based on units of thickness indicated for overall unit and for each lite.
4. U-Factors: Center-of-glazing values, in accordance with NFRC 100 and based on most current non-beta version of LBL's WINDOW computer program, expressed as Btu/sq. ft. x h x deg F.
5. SHGC and Visible Transmittance: Center-of-glazing values, in accordance with NFRC 200 and based on most current non-beta version of LBL's WINDOW computer program.
6. Visible Reflectance: Center-of-glazing values, in accordance with NFRC 300.

2.3 GLASS PRODUCTS, GENERAL

A. Glazing Publications: Comply with published recommendations of glass product manufacturers and organizations below unless more stringent requirements are indicated. See these publications for glazing terms not otherwise defined in this Section or in referenced standards.

1. NGA Publications: "Laminated Glazing Reference Manual" and "Glazing Manual."
2. FGIA Publication for Insulating Glass: IGMA TM-3000, "North American Glazing Guidelines for Sealed Insulating Glass Units for Commercial and Residential Use."

B. Safety Glazing Labeling: Where safety glazing is indicated, permanently mark glazing with certification label of the SGCC. Label shall indicate manufacturer's name, type of glass, thickness, and safety glazing standard with which glass complies.

C. Insulating-Glass Certification Program: Permanently marked either on spacers or on at least one component lite of units with appropriate certification label of the IGCC.

D. Thickness: Where glass thickness is indicated, it is a minimum. Provide glass that complies with performance requirements and is not less than thickness indicated.

E. Strength: Where annealed float glass is indicated, provide annealed float glass, heat-strengthened float glass, or fully tempered float glass. Where heat-strengthened float glass is indicated, provide heat-strengthened float glass or fully tempered float glass. Where fully tempered float glass is indicated, provide fully tempered float glass.

2.4 GLASS PRODUCTS

A. Clear Float Glass: ASTM C1036, Type I, Class 1 (clear), Quality-Q3.

B. Fully Tempered Float Glass: ASTM C1048, Kind FT (fully tempered), Condition A (uncoated) unless otherwise indicated, Type I, Class 1 (clear) or Class 2 (tinted) as indicated, Quality-Q3.

1. Fabrication Process: By horizontal (roller-hearth) process with roll-wave distortion horizontally oriented upon completion of installation.

C. Low-E-Coated Vision Glass: ASTM C1376. Coated by vacuum deposition (sputter-coating) process.

2.5 LAMINATED GLASS

A. Laminated Glass: ASTM C1172. Use materials that have a proven record of no tendency to bubble, discolor, or lose physical and mechanical properties after fabrication and installation.

1. Construction: Laminate glass with polyvinyl butyral interlayer to comply with interlayer manufacturer's written instructions.

2. Interlayer Thickness: Provide thickness not less than that indicated as needed to comply with requirements.

3. Interlayer Color: Clear.

2.6 FIRE-PROTECTION-RATED GLAZING

A. General: Listed and labeled by a testing agency acceptable to authorities having jurisdiction, for fire-protection ratings indicated, based on positive-pressure testing in accordance with NFPA 257 or UL 9, including hose-stream test, and shall comply with NFPA 80.

B. Fire-Protection-Rated Glazing Labeling: Permanently mark fire-protection-rated glazing with certification label of a testing agency acceptable to authorities having jurisdiction. Label shall indicate manufacturer's name; test standard; whether glazing is permitted to be used in doors

or openings; if permitted in openings, whether glazing has passed hose-stream test; and fire-resistance rating in minutes.

C. Fire-Protection-Rated Monolithic Glass for Doors Only: 19-mm thickness; clear, fire-protection glass; complying with 16 CFR 1201, Category II. UL listed and tested in accordance with NFPA 252 for fire-rated doors with hose-stream testing.

2.7 INSULATING GLASS

A. Insulating-Glass Units: Factory-assembled units consisting of sealed lites of glass separated by a dehydrated interspace, qualified in accordance with ASTM E2190.

1. Sealing System: Dual seal, with manufacturer's standard primary and secondary sealants.
2. Perimeter Spacer: Silicone with integral desiccant and vapor barrier.
3. Desiccant: Molecular sieve or silica gel, or a blend of both.

2.8 GLAZING SEALANTS

A. General:

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

B. Elastomeric Glazing Sealants: Materials compatible with adjacent materials including glass, insulating glass seals, and glazing channels.

1. Silicone Glazing Sealant: ASTM C920, Type S, Grade NS, Class and Use suitable for glazing application indicated; single component; chemical curing; capable of water immersion

without loss of properties; non-bleeding, non-staining, cured Shore A hardness of 15 to 25.

2. Polysulfide Glazing Sealant: ASTM C920, Type M, Grade NS, Class and Use suitable for glazing application indicated; two component; chemical curing, non-sagging type; cured Shore A hardness of 15 to 25.

3. Polyurethane Glazing Sealant: ASTM C920, Type S, Grade NS, Class and Use suitable for glazing application indicated; single component, chemical curing, non-staining, non-bleeding, Shore A Hardness Range 20 to 35.

2.9 GLAZING TAPES

A. Back-Bedding Mastic Glazing Tapes: Preformed, butyl-based, 100 percent solids elastomeric tape; nonstaining and nonmigrating in contact with nonporous surfaces; with or without spacer rod as recommended in writing by tape and glass manufacturers for application indicated; and complying with ASTM C1281 and AAMA 800.

B. Expanded Cellular Glazing Tapes: Closed-cell, PVC foam tapes; factory coated with adhesive on both surfaces; and complying with AAMA 800 for the following types:

1. AAMA 810.1, Type 1, for glazing applications in which tape acts as primary sealant.

2. AAMA 810.1, Type 2, for glazing applications in which tape is used in combination with a full bead of liquid sealant.

2.10 MISCELLANEOUS GLAZING MATERIALS

A. General: Provide products of material, size, and shape complying with referenced glazing standard, recommended in writing by manufacturers of glass and other glazing materials for application indicated, and with a proven record of compatibility with surfaces contacted in installation.

B. Cleaners, Primers, and Sealers: Types recommended by sealant or gasket manufacturer.

C. Setting Blocks:

1. Neoprene with Shore A durometer hardness of 85, plus or minus 5.
2. Type recommended in writing by sealant or glass manufacturer.

D. Spacers:

1. Neoprene blocks or continuous extrusions of hardness required by glass manufacturer to maintain glass lites in place for installation indicated.
2. Type recommended in writing by sealant or glass manufacturer.

E. Edge Blocks:

1. Silicone with Shore A durometer hardness per manufacturer's written instructions.
2. Type recommended in writing by sealant or glass manufacturer.

2.11 FABRICATION OF GLAZING UNITS

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

1. Allow for thermal movements from ambient and surface temperature changes acting on glass framing members and glazing components.

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

PART 3 - EXECUTION

3.1 EXAMINATION

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

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

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

3.2 PREPARATION

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

B. Examine glazing units to locate exterior and interior surfaces. Label or mark units as needed so that exterior and interior surfaces are readily identifiable. Do not use materials that leave visible marks in the completed Work.

3.3 GLAZING, GENERAL

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

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

C. Apply primers to joint surfaces where required for adhesion of sealants.

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

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

F. Provide spacers for glass lites where length plus width is larger than 50 inches.

1. Locate spacers directly opposite each other on both inside and outside faces of glass. Install correct size and spacing to preserve required face clearances, unless gaskets and glazing tapes are used that have demonstrated ability to maintain required face clearances and to comply with system performance requirements.

2. Provide 1/8-inch-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.

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

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

I. Set glass lites with proper orientation so that coatings face exterior or interior as specified.

3.4 TAPE GLAZING

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, then to jambs. Cover horizontal framing joints by applying tapes to jambs, 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 right before each glazing unit is installed.

F. Apply heel bead of elastomeric sealant.

G. 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.

H. Apply cap bead of elastomeric sealant over exposed edge of tape.

3.5 GASKET GLAZING (DRY)

A. Cut compression gaskets to lengths recommended by gasket manufacturer to fit openings exactly, with allowance for stretch during installation.

B. Insert soft compression gasket between glass and frame or fixed stop so it is securely in place with joints miter cut and bonded together at corners.

C. Installation with Drive-in Wedge Gaskets: Center glass lites in openings on setting blocks, and press firmly against soft compression gasket 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. Compress gaskets to produce a weathertight seal without developing bending stresses in glass. Seal gasket joints with sealant recommended in writing by gasket manufacturer.

D. Installation with Pressure-Glazing Stops: Center glass lites in openings on setting blocks, and press firmly against soft compression gasket. Install dense compression gaskets and pressure-glazing stops, applying pressure uniformly to compression gaskets. Compress gaskets to produce a weathertight seal without developing bending stresses in glass. Seal gasket joints with sealant recommended in writing by gasket manufacturer.

E. Install gaskets so they protrude past face of glazing stops.

3.6 SEALANT GLAZING (WET)

A. Install continuous spacers, or spacers combined with cylindrical sealant backing, between glass lites and glazing stops to maintain glass face clearances and to prevent sealant from extruding into glass channel and blocking weep systems until sealants cure. Secure spacers or spacers and backings in place and in position to control depth of installed sealant relative to edge clearance for optimum sealant performance.

B. Force sealants into glazing channels to eliminate voids and to ensure complete wetting or bond of sealant to glass and channel surfaces.

C. Tool exposed surfaces of sealants to provide a substantial wash away from glass.

3.7 CLEANING AND PROTECTION

A. Immediately after installation, remove nonpermanent labels and clean surfaces.

B. Protect glass from contact with contaminating substances resulting from construction operations. 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 buildup of dirt, scum, alkaline deposits, or stains.

1. If, despite such protection, contaminating substances do contact with glass, remove substances immediately as recommended in writing by glass manufacturer. Remove and replace glass that cannot be cleaned without damage to coatings.

C. Remove and replace glass that is damaged during construction period.

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

3.8 SCHEDULE

A. Interior Non-Fire-Rated Doors, Windows and Sidelights **(SG)**: Clear Monolithic Laminated Safety Glass, interior wet method with paintable acrylic glazing sealant.

1. Overall Thickness: 9/16 inch laminated glass.
2. Minimum Thickness of Each Glass Ply: 6 mm.
3. Interlayer: Clear PVB, 0.060 inch thick.

B. Interior Fire-Rated Doors, Windows, and Sidelights **(FRG)**: Clear Laminated Fire-Protection-Rated Glass, with fire-rated glazing system.

1. TGP, FireLite Plus (Basis of Design).

C. Exterior Entrances, Doors, Sidelights, and Windows **(IG)**: Low-E-Coated Clear Tempered Insulating Glass, exterior wet/dry method with silicone glazing sealant exterior.

1. Overall Unit Thickness: 1 inch.
2. Minimum Thickness of Each Glass Lite: 6mm.
3. Exterior Lite: Sputter-coated Clear Float Glass.
    a. Guardian SunGuard, SN 68 (Basis of design) on Surface Number 2.
4. Interspace: 1/2 inch Argon, hermetically sealed.
5. Interior Lite: Clear Float Glass.
6. Performance Characteristics:
    a. Visible Light Transmittance: Minimum 68 percent.
    b. SHGC: Maximum 0.38.
    c. U-Factor: Maximum 0.36.

D. Exterior Storefront Windows at Vintage Vehicle Bay (See Alternate #1) **(ILG)**: Low-E-Coated Clear Tempered Insulating Laminated Glass, exterior wet/dry method with silicone glazing sealant exterior.

1. Overall Unit Thickness: 1-1/8 inch.
2. Minimum Thickness of Each Glass Lite: 6mm.
3. Exterior Lite: Sputter-coated Clear Float Glass.
    a. Guardian SunGuard, SN 68 (Basis of design) on Surface Number 2.
4. Interspace: 1/2 inch Argon, hermetically sealed.
5. Interior Lite: Clear Laminated Float Glass.
    a. 2-ply.

b. Interlayer: UV PVB, 0.060 inch.

6. Performance Characteristics:

a. Visible Light Transmittance: Minimum 66 percent.

b. SHGC: Maximum 0.37.

c. U-Factor: Maximum 0.36.

END OF SECTION 088000