SECTION 081113 - HOLLOW METAL FRAMES

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. Standard hollow metal frames for doors not listed with FRP frames.

2. Standard hollow metal frames for windows.

B. Related Sections:

1. Division 04 Section "Unit Masonry" for embedding anchors for hollow metal work into masonry construction.
2. Division 08 Section "Door Hardware" for door hardware for hollow metal doors.
3. Division 09 Sections "Exterior Painting" and "Interior Painting" for field painting hollow metal doors and frames.

1.3 DEFINITIONS

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

B. Standard Hollow Metal Work: Hollow metal work fabricated according to ANSI/SDI A250.8.

1.4 SUBMITTALS

A. Product Data: For each type of product indicated. Include construction details, material descriptions, core descriptions, fire-resistance rating, temperature-rise ratings, and finishes.

B. Shop Drawings: Include the following:

1. Elevations of each door design.
2. Details of doors, including vertical and horizontal edge details and metal thicknesses.
3. Frame details for each frame type, including dimensioned profiles and metal thicknesses.
4. Locations of reinforcement and preparations for hardware.
5. Details of each different wall opening condition.
6. Details of anchorages, joints, field splices, and connections.
7. Details of accessories.
8. Details of moldings, removable stops, and glazing.
9. Details of conduit and preparations for power, signal, and control systems.

C. Other Action Submittals:

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1. Schedule: Provide a schedule of hollow metal work prepared by or under the supervision of supplier, using same reference numbers for details and openings as those on Drawings. Coordinate with door hardware schedule.

D. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for each type of hollow metal door and frame assembly.

1.5 QUALITY ASSURANCE

A. Source Limitations: Obtain hollow metal work from single source from single manufacturer.

1.6 DELIVERY, STORAGE, AND HANDLING

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

1. Provide additional protection to prevent damage to finish of factory-finished units.

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

C. Store hollow metal work under cover at Project site. Place in stacks of five units maximum in a vertical position with heads up, spaced by blocking, on minimum 102-mm- (4-inch-) high wood blocking. Do not store in a manner that traps excess humidity.

1. Provide minimum 6-mm (1/4-inch) space between each stacked door to permit air circulation.

1.7 PROJECT CONDITIONS

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

1.8 COORDINATION

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

PART 2 - PRODUCTS

2.1 MANUFACTURERS

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

1. Amweld Building Products, LLC.
2. Ceco Door Products; an Assa Abloy Group company.
3. Curries Company; an Assa Abloy Group company.
4. Firedoor Corporation.
5. Habersham Metal Products Company.
6. Mesker Door Inc.

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7. Pioneer Industries, Inc.
8. Security Metal Products Corp.
9. Steelcraft; an Ingersoll-Rand company.
10. Windsor Republic Doors.

2.2 MATERIALS

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

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

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

D. Frame Anchors: ASTM A 591/A 591M, Commercial Steel (CS), 12G (40Z) coating designation; mill phosphatized.

1. For anchors built into exterior walls, steel sheet complying with ASTM A 1008/A 1008M or ASTM A 1011/A 1011M, hot-dip galvanized according to ASTM A 153/A 153M, Class B.

E. Inserts, Bolts, and Fasteners: Hot-dip galvanized according to ASTM A 153/A 153M.

F. Powder-Actuated Fasteners in Concrete: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with clips or other accessory devices for attaching hollow metal frames of type indicated.

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

2.3 STANDARD HOLLOW METAL FRAMES

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

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

1. Fabricate frames with mitered or coped corners.
2. Fabricate frames as face welded unless otherwise indicated.
3. Frames for Level 3 Steel Doors: 1.3-mm- (0.053-inch-) thick steel sheet.

C. Interior Frames: Fabricated from cold-rolled steel sheet unless metallic-coated sheet is indicated.

1. Fabricate frames with mitered or coped corners.
2. Fabricate frames as face welded unless otherwise indicated.
3. Frames for Level 3 Steel Doors: 1.3-mm- (0.053-inch-) thick steel sheet.
4. Frames for Wood Doors: 1.0-mm- (0.042-inch-) 1.3-mm- (0.053-inch-) thick steel sheet.
5. Frames for Borrowed Lights: 1.7-mm- (0.067-inch-) thick steel sheet.

D. Hardware Reinforcement: Fabricate according to ANSI/SDI A250.6 with reinforcement plates from same material as frames.

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2.4 FRAME ANCHORS

A. Jamb Anchors:

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

2.5 STOPS AND MOLDINGS

A. Fixed Frame Moldings: Formed integral with hollow metal frames, a minimum of 16 mm (5/8 inch) high unless otherwise indicated.

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

C. Terminated Stops: Where indicated on interior door frames, terminate stops 152 mm (6 inches) above finish floor with a 45-degree angle cut, and close open end of stop with steel sheet closure. Cover opening in extension of frame with welded-steel filler plate, with welds ground smooth and flush with frame.

1. Provide terminated stops unless otherwise indicated.

2.6 ACCESSORIES

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

2.7 FABRICATION

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

B. Tolerances: Fabricate hollow metal work to tolerances indicated in SDI 117.

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

1. Welded Frames: Weld flush face joints continuously; grind, fill, dress, and make smooth, flush, and invisible.
2. Provide countersunk, flat- or oval-head exposed screws and bolts for exposed fasteners unless otherwise indicated.
3. Grout Guards: Weld guards to frame at back of hardware mortises in frames to be grouted.
4. Jamb Anchors: Provide number and spacing of anchors as follows:

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

1) Three anchors per jamb up to 1524 mm (60 inches) high.
2) Four anchors per jamb from 1524 to 2286 mm (60 to 90 inches) high.
3) Five anchors per jamb from 2286 to 2438 mm (90 to 96 inches) high.

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4) Five anchors per jamb plus 1 additional anchor per jamb for each 610 mm (24 inches) or fraction thereof above 2438 mm (96 inches) high.
5) Two anchors per head for frames above 1066 mm (42 inches) wide and mounted in metal-stud partitions.

5. Door Silencers: Except on weather-stripped doors, drill stops to receive door silencers as follows. Keep holes clear during construction.

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

D. Fabricate concealed stiffeners, edge channels, and hardware reinforcement from either cold- or hot-rolled steel sheet.

E. Hardware Preparation: Factory prepare hollow metal work to receive templated mortised hardware; include cutouts, reinforcement, mortising, drilling, and tapping according to the Door Hardware Schedule and templates furnished as specified in Division 08 Section "Door Hardware."

1. Locate hardware as indicated, or if not indicated, according to ANSI/SDI A250.8.
2. Reinforce doors and frames to receive nontemplated, mortised and surface-mounted door hardware.
3. Comply with applicable requirements in ANSI/SDI A250.6 and ANSI/DHI A115 Series specifications for preparation of hollow metal work for hardware.
4. Coordinate locations of conduit and wiring boxes for electrical connections with Division 26 Sections.

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

1. Single Glazed Lites: Provide fixed stops and moldings welded on secure side of hollow metal work.
2. Multiple Glazed Lites: Provide fixed and removable stops and moldings so that each glazed lite is capable of being removed independently.
3. Provide fixed frame moldings on outside of exterior and on secure side of interior doors and frames.
4. Provide loose stops and moldings on inside of hollow metal work.
5. Coordinate rabbet width between fixed and removable stops with type of glazing and type of installation indicated.

2.8 STEEL FINISHES

A. Prime Finish: Apply manufacturer's standard primer immediately after cleaning and pretreating.

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

PART 3 - EXECUTION

3.1 EXAMINATION

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

B. Examine roughing-in for embedded and built-in anchors to verify actual locations before frame installation.

C. For the record, prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work.

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

3.2 PREPARATION

A. Remove welded-in shipping spreaders installed at factory. Restore exposed finish by grinding, filling, and dressing, as required to make repaired area smooth, flush, and invisible on exposed faces.

B. Prior to installation, adjust and securely brace welded hollow metal frames for squareness, alignment, twist, and plumbness to the following tolerances:

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

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

3.3 INSTALLATION

A. General: Install hollow metal work plumb, rigid, properly aligned, and securely fastened in place; comply with Drawings and manufacturer's written instructions.

B. Hollow Metal Frames: Install hollow metal frames of size and profile indicated. Comply with ANSI/SDI A250.11.

1. Set frames accurately in position, plumbed, aligned, and braced securely until permanent anchors are set. After wall construction is complete, remove temporary braces, leaving surfaces smooth and undamaged.
   a. Install frames with removable glazing stops located on secure side of opening.
   b. Install door silencers in frames before grouting.
   c. Remove temporary braces necessary for installation only after frames have been properly set and secured.
   d. Check plumbness, squareness, and twist of frames as walls are constructed. Shim as necessary to comply with installation tolerances.
   e. Field apply bituminous coating to backs of frames that are filled with grout containing antifreezing agents.
2. Installation Tolerances: Adjust hollow metal door frames for squareness, alignment, twist, and plumb to the following tolerances:

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

C. Glazing: Comply with installation requirements in Division 08 Section "Glazing" and with hollow metal manufacturer's written instructions.

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

3.4 ADJUSTING AND CLEANING

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

B. Remove grout and other bonding material from hollow metal work immediately after installation.

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

D. Metallic-Coated Surfaces: Clean abraded areas and repair with galvanizing repair paint according to manufacturer's written instructions.

END OF SECTION 081113

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SECTION 081416 - 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 faces.
2. Factory finishing flush wood doors.
3. Factory fitting flush wood doors to frames and factory machining for hardware.

B. Related Sections:

1. Division 08 Section "Glazing" for glass view panels in flush wood doors.

1.3 SUBMITTALS

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

B. LEED Submittals:

1. Product Data for Credit EQ 4.4: For adhesives and composite wood products, documentation indicating that product contains no urea formaldehyde.

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

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

D. Samples for Initial Selection: For factory-finished doors.

E. Warranty: Sample of special warranty.

1.4 QUALITY ASSURANCE

A. Source Limitations: Obtain flush wood doors and wood paneling from single manufacturer.

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B. Quality Standard: In addition to requirements specified, comply with AWI's "Architectural Woodwork Quality Standards Illustrated."

1. Provide AWI Quality Certification Labels or an AWI letter of licensing for Project indicating that doors comply with requirements of grades specified.

C. Fire-Rated Wood Doors: Doors complying with NFPA 80 that are listed and labeled by a qualified testing agency, for fire-protection ratings indicated, based on testing at positive pressure as close to neutral pressure as possible according to NFPA 252 or UL 10B.

1. Temperature-Rise Limit: At vertical exit enclosures and exit passageways, provide doors that have a maximum transmitted temperature end point of not more than 250 deg C (450 deg F) above ambient after 30 minutes of standard fire-test exposure.

1.5 DELIVERY, STORAGE, AND HANDLING

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

B. Package doors individually in cardboard cartons and wrap bundles of doors in plastic sheeting.

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

1.6 PROJECT CONDITIONS

A. Environmental Limitations: Do not deliver or install doors until spaces are enclosed and weather tight, wet work in spaces is complete and dry, and HVAC system is operating and maintaining temperature between 16 and 32 deg C (60 and 90 deg F) and relative humidity between 43 and 70 percent during the remainder of the construction period.

1.7 WARRANTY

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

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

a. Warping (bow, cup, or twist) more than 6.4 mm (1/4 inch) in a 1067-by-2134-mm (42-by-84-inch) section.
b. Telegraphing of core construction in face veneers exceeding 0.25 mm in a 76.2-mm (0.01 inch in a 3-inch) span.

2. Warranty shall also include installation and finishing that may be required due to repair or replacement of defective doors.
3. Warranty Period for Solid-Core Interior Doors: Life of installation.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

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

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1. Algoma Hardwoods, Inc.
2. Buell Door Company Inc.
3. Chappell Door Co.
4. Graham; an Assa Abloy Group company.
5. Marshfield Door Systems, Inc.
6. Mohawk Flush Doors, Inc.; a Masonite company.

2.2 DOOR CONSTRUCTION, GENERAL

A. Low-Emitting Materials: Provide doors made with adhesives and composite wood products that do not contain urea formaldehyde.

B. Particleboard-Core Doors:

1. Particleboard: ANSI A208.1, Grade LD-2 , made with binder containing no urea-formaldehyde resin.

2. Blocking: Provide wood blocking in particleboard-core doors as follows:
   a. All blocking shall be a minimum of 64mm (2.5"). Note this is greater than the AWI standard listed for PC-7 construction. Additionally, provide the following:
      1) 125-mm (5-inch)Top-rail blocking, in doors indicated to have closers, bottom rail where indicated for kick plate, and midrail where indicated for exit device..

C. Fire-Protection-Rated Doors: Provide core specified or mineral core as needed to provide fire-protection rating indicated.

1. Edge Construction: Provide edge construction with intumescent seals concealed by outer stile. Comply with specified requirements for exposed edges.
2. Pairs: Provide fire-retardant stiles that are listed and labeled for applications indicated without formed-steel edges and astragals. Comply with specified requirements for exposed edges.

2.3 VENEERED-FACED DOORS FOR TRANSPARENT FINISH

A. Interior Solid-Core Doors:

1. Grade: Custom (Grade A faces).
2. Species: Birch.
3. Cut: Rotary.
4. Match between Veneer Leaves: Book match.
5. Assembly of Veneer Leaves on Door Faces: Running match.
6. Pair and Set Match: Provide for doors hung in same opening or separated only by mullions.
7. Exposed Vertical and Top Edges: Same species as faces.
8. Core: Particleboard.
9. Construction: Seven plies, bonded construction. (AWI PC-7)

2.4 LOUVERS AND LIGHT FRAMES

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

1. Wood Species: Same species as door faces.

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2. Profile: Flush rectangular beads.

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. Include concealed metal glazing clips where required for opening size and fire-protection rating indicated.

2.5 FABRICATION

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

1. Comply with requirements in NFPA 80 for fire-rated doors. No fire rated door shall be undercut more than 0.75".

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

C. Transom and Side Panels: Fabricate matching panels with same construction, exposed surfaces, and finish as specified for associated doors. Finish bottom edges of transoms and top edges of rabbeted doors same as door stiles.

1. Fabricate door and transom panels with full-width, solid-lumber meeting rails. Provide factory-installed spring bolts for concealed attachment into jambs of metal door frames.

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

1. Light Openings: Trim openings with moldings of material and profile indicated.
2. Glazing: Factory install glazing in doors indicated to be factory finished. Comply with applicable requirements in Division 08 Section "Glazing."

2.6 FACTORY FINISHING

A. General: Comply with referenced quality standard for factory finishing. Complete fabrication, including fitting doors for openings and machining for hardware that is not surface applied, before finishing.

1. Finish faces, all four edges, edges of cutouts, and mortises. Stains and fillers may be omitted on top and bottom edges, edges of cutouts, and mortises.

B. Finish doors at factory.

C. Transparent Finish:

1. Grade: Custom.
2. Finish: AWI catalyzed polyurethane system.
3. Staining: As selected by Architect from manufacturer's full range.
4. Effect: Semifilled finish, produced by applying an additional finish coat to partially fill the wood pores.
5. Sheen: Satin.

PART 3 - EXECUTION

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3.1 EXAMINATION

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

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

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

3.2 INSTALLATION

A. Hardware: For installation, see Division 08 Section "Door Hardware."

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

1. Install fire-rated doors in corresponding fire-rated frames according to NFPA 80.

C. Job-Fitted Doors: Align and fit doors in frames with uniform clearances and bevels as indicated below; do not trim stiles and rails in excess of limits set by manufacturer or permitted for fire-rated doors. Machine doors for hardware. Seal edges of doors, edges of cutouts, and mortises after fitting and machining.

1. Clearances: Provide 3.2 mm (1/8 inch) at heads, jambs, and between pairs of doors. Provide 3.2 mm (1/8 inch) from bottom of door to top of decorative floor finish or covering unless otherwise indicated. Where threshold is shown or scheduled, provide 6.4 mm (1/4 inch) from bottom of door to top of threshold unless otherwise indicated.

    a. Comply with NFPA 80 for fire-rated doors.

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

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SECTION 082222 - FRP DOORS AND FRAMES

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Furnish and Install

1. Glass fiber reinforced polyester doors and frames, complete with factory-Installed hardware provided under Section 087000 – DOOR HARDWARE.

B. Retain or delete this article in all Sections of Project Manual.

1.2 RELATED SECTIONS

A. Section 061000 – ROUGH CARPENTRY: Wood blocking, and nailers; installation of hollow metal door frames.

B. Section 079000 – JOINT SEALERS.

C. Section 087100 – DOOR HARDWARE: Furnishing finish hardware, and installation templates for hardware cut-outs and reinforcing.

D. Section 088000 – GLAZING: Furnishing and installing glass located in doors and frames.

E. Section 099100 – PAINTS: Applied Finish Coatings.

1.3 SUBMITTALS

A. Submit the following under provisions of Section 01330 – SUBMITTAL PROCEDURES:

1. Literature: Manufacturer's product data sheets, specifications for doors, frames and shop applied finishes.
2. Certifications: Certificates of conformance to the standards and specifications referenced hereunder.
3. Warranty: Provide sample copies of manufacturers' actual warranties for all materials to be furnished under this Section, clearly defining all terms, conditions, and time periods for the coverage thereof.
4. Shop Drawings: A complete schedule of doors and frames, to be furnished hereunder, coordinated with the door and frame schedule contained in the Contract Drawings. Large scale details of each type door and frame construction, indicating all gages, reinforcing, anchorage, and cut-outs for glazing in doors.
5. Selection Samples: Integrally colored Glass fiber reinforced resin chips of Manufacturer's standard available colors for selection(s) by Architect.

1.4 QUALITY ASSURANCE

A. Fabricator, with a minimum of 3 years documented experience demonstrating previously successful work of the type specified herein, and be capable of submitting a list of recent installations upon request.

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PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Acceptable Manufacturer: Subject to compliance with the requirements specified herein, manufacturers offering products which may be incorporated in the work include the following, or approved equal:
   1. Chem-Pruf Door Co.
   2. Corrim Company, Oshkos WI.
   3. Imco Reinforced Plastics Inc.
   4. Fib-r-Dor, (Division of Advanced Fiberglass Inc) Maumelle, AR.

2.2 GLASS FIBER DOORS

A. General: Refer to the Drawings for design of doors, sizes, glazing cut-outs in doors, integral louvers, and details. All reinforcing resins shall contain a halogenated additive or co-reactant plus Antimony Trioxide to achieve a 25 or less per ASTM E 84 and shall be self-extinguishing per ASTM D 635.

B. Door Description: Full flush commercial type, 1-3/4 inch thick with integral color gel coat:

   1. Stiles and rails: Constructed of pultruded Glass fiber.
   2. Core filter: Continuous sheet urethane, foamed in-place having an STC rating not exceeding 30.
   3. Face sheets: Molded in one continuous piece, starting with a 15-20 mil. gel coat of the specified color, integrally molded with at least two layers of 1.5 ounce per square foot Glass fiber mat and layer of 16 ounce per square yard unidirectional glass roving.
   4. Hardware Reinforcing: Steel plate buried in Glass fiber matrix, factory-installed from templates and information provided by the hardware suppliers responsible for furnishing the specific items to be applied to each door.

2.3 GLASS FIBER DOOR FRAMES

A. Door Frame Description: Stop and Frame shall be single pultruded element from standard Glass fiber-reinforced chemical resistant vinyl ester resin equal to Extren 625.
   1. Reinforcing: Steel plate buried into Glass fiber matrix, factory-installed from templates and information provided by the hardware suppliers responsible for furnishing the specific items to be applied to each door.
   2. Joints shall be mitered and continuously chemically bonded.
   3. Color integral through out frame. Unless otherwise indicated in the Drawings, painting or coating over pultrusions and moldings to achieve color is not acceptable.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install doors and frames accurately to establish lines and levels. Perform the installation work in strict accordance with the approved shop drawings and with actual conditions at the building, level and square, and with all angles and edges parallel to the related lines of the building.

B. Anchorage of Doors and Frames:

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1. Anchorage for frames in concrete: Flat head countersunk expansion bolts, spacers, and expansion sleeves, galvanized steel.
2. Spacing of anchorage:
   a. For frames up to and including 3'-0" in height, provide not less than 2 anchors, clips, or bolts, per jamb, as applicable.
   b. For frames greater than 3'-0" but less than 7'-6" in height, provide not less than 4 anchors, clips, or bolts, per jamb, as applicable.
   c. For frames greater than 7'-6" in height, provide 5 anchors, clips, or bolts, per jamb, as applicable.
   d. For frames requiring only 2 anchorage items per jamb, locate anchors at head and sill of frame. For frames requiring more than 2 anchors per jamb, locate anchors or clips at head, 12 inches below head, and spaced equidistant from that point to floor.

END OF SECTION

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SECTION 083613-SECTIONAL OVERHEAD DOORS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes electrically operated aluminum and glass sectional overhead doors, overhead track design.

B. Related Sections include the following:
   1. Division 5 Section "Metal Fabrications" for miscellaneous steel supports.
   2. Division 8 Section "Door Hardware" for lock cylinders and keying.
   3. Division 16 Sections for electrical service and connections for powered operators and accessories.

1.3 DEFINITIONS

A. Operation Cycle: One cycle of a door is complete when it is moved from the closed position to the fully open position and returned to the closed position.

1.4 PERFORMANCE REQUIREMENTS

A. Structural Performance: Provide sectional overhead doors capable of withstanding the effects of gravity loads and the following loads and stresses without evidencing permanent deformation of door components:
   1. Wind Loads: Determine loads based on the following minimum design wind pressures:
      a. Uniform pressure (velocity pressure) based upon 130 MPH continuous winds and in accordance with the 2009 NCSBC.
   2. Air Infiltration: Maximum rate not more than indicated when tested according to ASTM E 283.
      a. Maximum Rate: 0.08 cfm (0.038 L/s) at 15 mph (24 km/h).
   3. Impact Test for Flying Debris: Comply with ASTM E 1996, tested according to ASTM E 1886.
      a. Level of Protection: Coastal Hurricane.

B. Operation-Cycle Requirements: Provide sectional overhead door components and operators capable of operating for not less than 10,000 cycles.

1.5 SUBMITTALS

A. Product Data: For each type and size of sectional overhead door and accessory. Include the following:

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1. Summary of forces and loads on walls and jambs.
2. Motors: Show nameplate data and ratings, characteristics, and mounting arrangements.

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

C. Samples for Verification: For each type of exposed finish required, prepared on Samples of size indicated below.
1. Frame: 6 inches (150 mm) long.
2. Panel: 6 inches (150 mm) square.

D. Qualification Data: For Installer.

E. Engineer's Calculations: Provide calculations supporting the design of the door and frame system meeting the requirements of this section performed by an engineer registered in the State of North Carolina. Calculations and report must bear the engineer's seal and be signed and dated according to NC law.

1.6 QUALITY ASSURANCE

A. Installer Qualifications: Manufacturer's authorized representative who is trained and approved for both installation and maintenance of units required for this Project.

B. Source Limitations: Obtain sectional overhead doors through one source from a single manufacturer.
1. Obtain operators and controls from sectional overhead door manufacturer.

C. Product Options: Drawings indicate size, profiles, and dimensional requirements of sectional overhead doors and accessories and are based on the specific system indicated. Other manufacturers' systems with equal performance and dimensional characteristics may be considered. Refer to Division 1 Section "Product Requirements."

D. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

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

B. Aluminum Doors with Glazed Panels:
a. Arm-R-Lite.
b. C. H. I. Overhead Doors
c. Haas Door; a Nofziger Company.
d. Martin Door Manufacturing.
e. Overhead Door Corp.
f. Raynor.
g. Wayne-Dalton Corp.
h. Windsor Door; a MAGNATRAX Corporation.

2.2 ALUMINUM DOOR SECTIONS

A. Construct door sections with extruded-aluminum shapes, complying with ASTM B 221 (ASTM B 221M), alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated, with wall thickness not less than 0.050 inch (1.3 mm) for door section 2 inches (50.8 mm) deep. Fabricate sections with stile and rail dimensions and profiles shown. Join stiles and rails by welding or with concealed, 1/4-inch- (6-mm-) minimum diameter, aluminum or nonmagnetic stainless steel through bolts, full height of door section. Form meeting rails to provide a weather tight-seal joint. Provide reinforcement for hardware attachment.

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

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C. 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.

2.3 TRACKS, SUPPORTS, AND ACCESSORIES

A. Tracks: Manufacturer's standard, galvanized steel track system, sized for door size and weight, designed for lift type indicated and clearances shown, and complying with ASTM A 653/A 653M for minimum G60 (Z180) zinc coating. Provide complete track assembly including brackets, bracing, and reinforcement for rigid support of ball-bearing roller guides for required door type and size. Slot vertical sections of track spaced at 2 inches (51 mm) apart for door-drop safety device. Return tracks overhead. Weld or bolt to track supports.
   1. Provide tracks configured for the following lift types:
      a. Overhead return.

B. Track Reinforcement and Supports: Galvanized steel track reinforcement and support members, complying with ASTM A 36/A 36M and ASTM A 123/A 123M. Secure, reinforce, and support tracks as required for door size and weight to provide strength and rigidity without sag, sway, and vibration during opening and closing of doors.
   1. Support and attach tracks to opening jambs with continuous angle welded to tracks and attached to wall.
      a. Repair galvanized coating on tracks according to ASTM A 780.

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

D. Windows: Type and size indicated and in arrangement shown. Set glazing in vinyl, rubber, or neoprene glazing channel for aluminum-framed doors. Provide removable stops of same material as door-section frames.

E. Full-Vision Panels: Manufacturer's standard, tubular, aluminum-framed section fully glazed with nominal 1/2”-thick insulating, clear tempered glazing set in vinyl, rubber, or neoprene glazing channel and with removable extruded-vinyl or aluminum stops.

2.4 HARDWARE

A. General: Provide heavy-duty, corrosion-resistant hardware, with stainless-steel, fasteners, to suit door type.

B. Hinges: Heavy-duty stainless steel hinges of not less than 0.0747-inch- (1.9-mm-) thick, at each end stile and at each intermediate stile, according to manufacturer's written recommendations for door size. Attach hinges to door sections through stiles and rails with bolts and lock nuts or lock washers and nuts. Use rivets or self-tapping fasteners where access to nuts is not possible. Provide double-end hinges where required, for doors exceeding 16 feet (4.87 m) in width, unless otherwise recommended by door manufacturer.

C. Rollers: Heavy-duty rollers with steel ball bearings in case-hardened steel races, mounted with varying projections to suit slope of track. Extend roller shaft through both hinges where double hinges are required. Provide 3-inch- (75-mm-) diameter roller tires for 3-inch- (75-mm-) wide track and 2-inch- (51-mm-) diameter roller tires for 2-inch- (51-mm-) wide track.
   1. Tire Material: Case-hardened steel.

D. Push/Pull Handles: For push-up-operated doors, provide stainless steel lifting handles on each side of door.

E. Slide Bolt: Fabricate with side-locking bolts to engage through slots in tracks for locking by padlock, located on single-jamb side, operable from inside only.

F. Fabricate locking device assembly with lock, spring-loaded dead bolt, operating handle, cam plate, and adjustable locking bar to engage through slots in tracks.
   1. Locking Bars: Full-disc cremone type, both jamb sides operable from inside only.
   2. Lock cylinder is specified in Division 8 Section "Door Hardware."

G. Provide safety interlock switch to disengage power supply when door is locked.

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2.5 COUNTERBALANCE MECHANISM

A. Torsion Spring: Counterbalance mechanism consisting of adjustable-tension torsion springs fabricated from oil-tempered-steel wire complying with ASTM A 229/A 229M, Class II, mounted on a cross-header tube or steel shaft. Connect to door with galvanized aircraft-type lift cables with cable safety factor of at least 5 to 1. Provide springs calibrated for a minimum of 10,000 cycles.

B. Cable Drums: Cast-aluminum or gray-iron casting cable drums grooved to receive cable. Mount counterbalance mechanism with manufacturer's standard ball-bearing brackets at each end of shaft. Provide one additional midpoint bracket for shafts up to 16 feet (4.87 m) long and two additional brackets at one-third points to support shafts more than 16 feet (4.87 m) long unless closer spacing is recommended by door manufacturer.

C. Cable Safety Device: Include a spring-loaded, steel or bronze cam mounted to bottom door roller assembly on each side and designed to automatically stop door if either cable breaks.

D. Bracket: Provide anchor support bracket as required to connect stationary end of spring to the wall and to level shaft and prevent sag.

E. Provide a spring bumper at each horizontal track to cushion door at end of opening operation.

2.6 ELECTRIC DOOR OPERATORS

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

B. Basis of design is a ½ HP motor at 120v. The 120v service is a requirement of the project. If a different HP motor is required for proper function the door, the Contractor shall cover the difference in cost in his bid.

C. Comply with NFPA 70.

D. Disconnect Device: Hand-operated disconnect device or mechanism for automatically engaging chain-and-sprocket operator and releasing brake for emergency manual operation while disconnecting motor without affecting timing of limit switch. Mount disconnect device and operator so they are accessible from floor level. Include interlock device to automatically prevent motor from operating when emergency operator is engaged.

E. Design operator so motor may be removed without disturbing limit-switch adjustment and without affecting emergency auxiliary operator.

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

G. Door-Operator Type: Unit consisting of electric motor and the following:
   1. Jackshaft gear-head hoist type, with enclosed worm-gear, running-in-oil, primary drive; chain-and-sprocket secondary drive; auxiliary chain hoist; and floor-level quick release for manual operation.

H. Electric Motors: High-starting torque, reversible, continuous-duty, Class A insulated, electric motors complying with NEMA MG 1, with overload protection, sized to start, accelerate, and operate door in either direction from any position, at not less than 2/3 fps (0.2 m/s) and not more than 1 fps (0.3 m/s), without exceeding nameplate ratings or service factor.
   1. Type: Polyphase, medium-induction type.
   2. Service Factor: Comply with NEMA MG 1, unless otherwise indicated.
   3. Coordinate wiring requirements and electrical characteristics of motors with building electrical system.
   4. Provide open dripproof-type motor, and controller with NEMA ICS 6, Type 1 enclosure.

I. Remote-Control Station: Momentary-contact, three-button control station with push-button controls labeled "Open," "Close," and "Stop."
   1. Provide full-guarded, surface-mounted, heavy-duty-type interior unit with general-purpose, NEMA ICS 6, Type 1 enclosure.

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J. Obstruction Detection Device: Provide each motorized door with indicated external automatic safety sensor capable of protecting full width of door opening. Activation of sensor immediately stops and reverses downward door travel.
   1. Photoelectric Sensor: Manufacturer's standard system designed to detect an obstruction in door opening without contact between door and obstruction.
   2. Pressure-Sensor Edge: Provide each motorized door with an automatic safety sensor edge, located within astragal or weather stripping mounted to bottom bar. Contact with sensor immediately stops and reverses downward door travel. Connect to control circuit using manufacturer's standard take-up reel or self-coiling cable.
      a. Provide electrically actuated automatic bottom bar.

K. Limit Switches: Adjustable switches interlocked with motor controls and set to automatically stop door at fully opened and fully closed positions.

PART 3 - EXECUTION

3.1 INSTALLATION

A. General: Install door, track, and operating equipment complete with necessary hardware, jamb and head molding strips, anchors, inserts, hangers, and equipment supports according to Shop Drawings, manufacturer's written instructions, and as specified.

B. Fasten vertical track assembly to CMU, spaced not less than 24 inches (600 mm) apart. Hang horizontal track from structural overhead framing with angle or channel hangers fastened 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.

3.2 STARTUP SERVICES

A. Engage a factory-authorized service representative to perform startup services.
   1. Complete installation and startup checks according to manufacturer's written instructions.
   2. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

3.3 ADJUSTING

A. Lubricate bearings and sliding parts; adjust doors to operate easily, free from warp, twist, or distortion and with weather-tight fit around entire perimeter.

B. Touch-up Painting: Immediately after welding galvanized track to track supports, clean field welds and abraded galvanized surfaces and repair galvanizing to comply with ASTM A 780.

3.4 DEMONSTRATION

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

END OF SECTION 083613

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SECTION 084113 - ALUMINUM ENTRANCES, STOREFRONTS AND WINDOWS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.

1.2 SUMMARY

A. This section includes:
   1. Aluminum entrances and storefronts as indicated on drawings and schedules. Which include:
      a. Storefront type framing system as windows.
      b. Aluminum doors and entrance.

B. Related work specified elsewhere includes but is not limited to:
   1. Division 08 Section “Glass and Glazing” for glazing requirements for aluminum entrances and storefronts.
   2. Division 8 Section Finish Hardware for cores and exit devices.

1.3 SYSTEM DESCRIPTION

A. Performance Requirements: Provide aluminum entrance and storefront assemblies that comply with specified performance characteristics.

B. Thermal Movement: Provide systems capable of withstanding thermal movements resulting from an ambient temperature range of 120 deg. F (67 deg.C), that could cause a metal surface temperature range of 180 deg.F (100 deg.C) within the framing system.

C. Wind Loading: Provide assemblies capable of withstanding a uniform test pressure induced by 130 MPH continuous wind according to ASTM E 330.

D. Fixed Framing Transmission Characteristics: Provide aluminum entrance and storefront framing system that complies with requirements indicated for transmission characteristics.
   1. Air Infiltration: Provide framing system with an air infiltration rate of not more than 0.06 CFM per sq. ft. of fixed area (excluding operable door edges) when tested in accordance with ASTM E 283 at an inward test pressure differential of 6.24 psf.
   2. Water Penetration: Provide framing systems with no water penetration (excluding operable door edges) as defined in the test method when tested in accordance with ASTM E 331 at an inward test pressure differential of 6.24 lbf. per sq. ft.
   3. Condensation Resistance: Where framing systems are "thermal- break" construction, provide units tested for thermal performance in accordance with AAMA 1502 showing condensation resistance factor (CFR) of not less than 45.
   4. Thermal Transmittance: Provide framing systems that have an overall U-value of not more than 0.65 BTU/(hr. x sq. ft. x deg.F) at 15 mph exterior wind velocity when tested in accordance with AAMA 1503.

1.4 SUBMITTALS

A. Product Data: Submit manufacturer's product specifications, technical product data, standard details, and installation recommendations for each type of entrance and storefront product required.

B. Shop Drawings: Submit shop drawings for fabrication and installation of entrances, storefronts and windows including the following:
   1. Elevations.
   2. Detail sections of typical composite members.
   3. Anchorages and reinforcements.
   4. Glazing details.

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1.5 QUALITY ASSURANCE

A. Manufacturer's Qualifications: Provide entrances and storefront produced by a single manufacturer with not less than 5 years successful experience in the fabrication of assemblies of the type and quality required.

B. Installer's Qualifications: Entrances and storefront shall be installed by a firm that has not less than 5-years successful experience in the installation of systems similar to those required.

C. Design Criteria: Drawings are based on one manufacturer's entrance and storefront system. Another manufacturer's system of a similar and equivalent nature will be acceptable when, in the Architect's sole judgment, differences do not materially detract from the design concept or intended performance.

1. Side hinged or pivoted swinging doors shall be tested in accordance with NFPA 252 or UL 10C per 2009 North Carolina Building code 715.4.1.

1.6 PROJECT CONDITIONS

A. Field Measurements: Check openings by field measurement before fabrication to ensure proper fitting of work; show measurements on final shop drawings. Coordinate fabrication schedule with construction progress to avoid delay in the work. Where necessary, proceed with fabrication without field measurements, and coordinate fabrication tolerances to ensure proper fit.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

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

1. Kawneer
2. EFCO Corp.
3. YKK

2.2 MATERIALS

A. Frame for Entrance and Glazed Panel:

1. Aluminum Members: Provide alloy and temper recommended by the manufacturer for strength, corrosion resistance, and application of required finish; comply with ASTM B 221 for extrusions and ASTM B 209 for sheet or plate.

B. Fasteners: Provide fasteners of aluminum, nonmagnetic stainless steel, or other materials warranted by the manufacturer to be noncorrosive and compatible with aluminum components, hardware, anchors and other components.

1. Reinforcement: Where fasteners screw-anchor into aluminum less than 0.125" thick, reinforce the interior with aluminum or nonmagnetic stainless steel to receive screw threads, or provide standard noncorrosive pressed-in splined grommet nuts.
2. Exposed Fasteners: Except where unavoidable for application of hardware, do not use exposed fasteners. For the application of hardware, use fasteners that match the finish of member or hardware being fastened.
   a. Provide Phillips flat-head machine screws for exposed fasteners.

C. Concealed Flashing: Provide 26 gage minimum dead-soft stainless steel, or 0.026" minimum extruded aluminum of alloy and type selected by manufacturer for compatibility with other components.

D. Brackets and Reinforcements: For all hardware installation fastening, provide high- strength aluminum brackets and reinforcements; otherwise provide nonmagnetic stainless steel or hot-dip galvanized steel complying with ASTM A 386.

E. Concrete/Masonry Inserts: Provide concrete and masonry inserts fabricated from cast-iron, malleable iron, or hot-dip galvanized steel complying with ASTM A 386.

F. Compression Weather-stripping: Provide the manufacturer's standard replaceable compressible weather-stripping gaskets of molded neoprene complying with ASTM D 2000 or molded PVC complying with ASTM D 2287.

G. Sliding Weather-stripping: Provide the manufacturer's standard replaceable weather-stripping of wool, polypropylene, or nylon woven pile, with nylon fabric or aluminum strip backing, complying with AAMA 701.2.

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H. Glass and Glazing Materials: Glass and glazing materials shall comply with requirements of "Glass and Glazing" section of these specifications.

I. Hardware: All door hardware to be furnished by hardware supplier, except as otherwise specified in this section for storefront entrances. Installation by General Contractor. Coordinate with door manufacturer.

2.3 COMPONENTS

A. Storefront Framing and/or Window Framing System: Provide inside-outside matched resilient flush-glazed framing system with provisions for glass replacement. Shop-fabricate and preassemble frame components where possible. Provide framing components with profiles noted on drawings.

1. Thermal-Break Construction: Fabricate framing system with integrally concealed, low conductance thermal barrier, located between exterior materials and exposed interior members to eliminate direct metal-to-metal contact. Provide internal weep drainage system. Include sill-flashing member for all locations. Use manufacturer's standard construction that has been in use for similar projects for period of not less than 3 years.

B. Entrance Doors:

1. Doors: Manufacturer's standard glazed doors for manual or automatic swing operation.
   a. Door Construction: 1-3/4-inch (44.5-mm) overall thickness, with minimum 0.125-inch-(3.2-mm-) thick, extruded-aluminum tubular rail and stile members. Mechanically fasten corners with reinforcing brackets that are deep penetration and fillet welded or that incorporate concealed tie rods.
   b. Door Design: Wide stile; 5-1/2-inch nominal width.
      1) Accessible Doors: Smooth surfaced for width of door in area within 10 inches (255 mm) above floor or ground plane.
   c. Glazing Stops and Gaskets: Beveled, snap-on, extruded-aluminum stops and preformed gaskets.
      1) Provide nonremovable glazing stops on outside of door.

2.4 HARDWARE

A. General: Refer to hardware section in Division-8 for requirements for hardware items other than those indicated to be provided by the aluminum entrance manufacturer.

B. Provide manufacturer's heavy-duty hardware units as indicated, scheduled, or required for operation of each door, including the following items of sizes, number, and type recommended by manufacturer for service required; finish matching door.

1. Pivots: Top mid-stile and bottom offset.
2. Door Stop: Provide floor door stop with integral rubber bumper; comply with ANSI A156.16, Grade 1.
3. Pulls: Provide standard aluminum pulls of style CO9.
4. Thresholds: Provide extruded aluminum threshold of size and design indicated in mill finish, complete with anchors and clips, coordinated with pivots and floor-concealed closers.
5. Exit Device: Provide as scheduled and described under specification section for Finish Hardware.

2.5 FABRICATION

A. General: Sizes of frame units, and profile requirements, are indicated on drawings. Variable dimensions are indicated, with maximum and minimum dimensions required to achieve design requirements and coordination with other work.

B. Prefabrication: Before shipment to the project site, complete fabrication, assembly, finishing, and other work to the greatest extent possible. Disassemble components only as necessary for shipment and installation.

1. Perform fabrication operations, including cutting, fitting, forming, drilling and grinding of metal work to prevent damage to exposed finish surfaces.

C. Welding: Comply with AWS recommendations; grind exposed welds smooth and restore mechanical finish.

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D. Reinforcing: Install reinforcing as required for performance requirements, sag resistance and rigidity and for all hardware attachment points. No hardware shall be installed directly to threaded holes in the aluminum member.

E. Dissimilar Metals: Separate dissimilar metals with zinc chromate primer, bituminous paint, or other separator that will prevent corrosion.

F. Continuity: Maintain accurate relation of planes and angles, with hairline fit of containing members.

1. Uniformity of Finish: Abutting extruded aluminum members shall not have an integral color or texture variation greater than half the range indicated in the sample pair submittal.

G. Fasteners: Conceal fasteners wherever possible.

2.6 FINISHES

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

1. Clear Anodic Finish: AAMA 611, Class I, 0.018 mm or thicker.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Contractor shall close up all exterior openings with plywood after demolition work is performed. Create both a weather-tight and secure perimeter against entry or vandalism. Maintain barriers until new complete system is put into place. Do not leave window or door openings overnight.

B. Comply with manufacturer's instructions and recommendations for installation.

C. Set units plumb, level, and true to line, without warp or rack of framing members, or panels. Provide proper support and anchor securely in place.

1. Separate aluminum and other corrodible metal surfaces from sources of corrosion of electrolytic action at points of contact with other materials. Comply with requirements specified under paragraph "Dissimilar Materials" in the Appendix to AAMA 101-85.

D. Drill and tap frames and reinforcing plates and apply surface-mounted hardware. Comply with hardware manufacturer's instructions and template requirements. Use concealed fasteners wherever possible.

E. Set sill members and other members in three lines of sealant, or with joint fillers or gaskets to provide weathertight construction. Comply with requirements of Division 7 for sealants, fillers, and gaskets.

F. Refer to "Glass and Glazing" section of Division 8 for installation of glass and other panels indicated to be glazed into doors and framing, and not preglazed by manufacturer.

3.2 ADJUSTING

A. Adjust operating hardware to function properly, for smooth operation without binding, and for weathertight closure.

3.3 CLEANING

A. Clean the completed system, inside and out, promptly after installation, exercising care to avoid damage to coatings.

B. Clean glass surfaces after installation, complying with requirements contained in the "Glass and Glazing" section for cleaning and maintenance. Remove excess glazing and sealant compounds, dirt and other substances from aluminum surfaces.

3.4 PROTECTION

A. Institute protective measures required throughout the remainder of the construction period to ensure that aluminum entrances and storefronts will be without damage or deterioration, other than normal weathering, at time of acceptance.

END OF SECTION

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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 for the following:

a. Swinging doors.

2. Cylinders for door hardware specified in other Sections.

B. Related Sections:
1. Division 08 Section "Overhead Sectional Doors" for door hardware provided as part of overhead door assemblies.
2. Division 08 Section "Aluminum-Framed Entrances and Storefronts" for installation of entrance door hardware, except cylinders and exit devices.

1.3 SUBMITTALS

A. Product Data: For each type of product indicated. Include construction and installation details, material descriptions, dimensions of individual components and profiles, and finishes.

B. Shop drawings and submittal data:

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

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

1) Identification number, location, hand, fire rating, size, and material of each door and frame.
2) Locations of each door hardware set, cross-referenced to Drawings on floor plans and to door and frame schedule.

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3) Complete designations, including name and manufacturer, type, style, function, size, quantity, function, and finish of each door hardware product.
4) Description of electrified door hardware sequences of operation and interfaces with other building control systems.
5) Fastenings and other pertinent information.
6) Explanation of abbreviations, symbols, and codes contained in schedule.
7) Mounting locations for door hardware.
8) List of related door devices specified in other Sections for each door and frame.

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

C. Qualification Data: For Installer and Architectural Hardware Consultant.

D. Product Certificates: For electrified door hardware, from the manufacturer.

1. Certify that door hardware approved for use on types and sizes of labeled fire-rated doors complies with listed fire-rated door assemblies.

E. Product Test Reports: For compliance with accessibility requirements, based on evaluation of comprehensive tests performed by manufacturer and witnessed by a qualified testing agency, for door hardware on doors located in accessible routes.

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

G. Warranty: Special warranty specified in this Section.

1.4 QUALITY ASSURANCE

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

1. Scheduling Responsibility: Preparation of door hardware and keying schedules.
2. Engineering Responsibility: Preparation of data for electrified door hardware, including Shop Drawings, based on testing and engineering analysis of manufacturer's standard units in assemblies similar to those indicated for this Project.

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 follows:

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

1. Provide electrified door hardware from same manufacturer as mechanical door hardware, unless otherwise indicated. Manufacturers that perform electrical modifications and that are listed by a testing and inspecting agency acceptable to authorities having jurisdiction are acceptable.

D. Means of Egress Doors: Latches do not require more than 15 lbf (67 N) to release the latch. Locks do not require use of a key, tool, or special knowledge for operation.

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E. Accessibility Requirements: For door hardware on doors in an accessible route, comply with the U.S. Architectural & Transportation Barriers Compliance Board's ADA-ABA Accessibility Guidelines ICC/ANSI 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 (22.2 N).
2. Comply with the following maximum opening-force requirements:

    a. Interior, Non-Fire-Rated Hinged Doors: 5 lbf (22.2 N) applied perpendicular to door.
    b. Sliding or Folding Doors: 5 lbf (22.2 N) applied parallel to door at latch.

3. Bevel raised thresholds with a slope of not more than 1:2. Provide thresholds not more than 1/2 inch (13 mm) high and.
4. Adjust door closer sweep periods so that, from an open position of 70 degrees, the door will take at least 3 seconds to move to a point 3 inches (75 mm) from the latch, measured to the leading edge of the door.

F. Keying Conference: Conduct conference at Project site to comply with requirements in Division 01 Section "Project Management and Coordination." In addition to Owner, Construction Manager, Contractor, and Architect, conference participants shall also include Installer's Architectural Hardware Consultant and Owner's security consultant. Incorporate keying conference decisions into final keying schedule after reviewing door hardware keying system including, but not limited to, the following:

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

1.5 DELIVERY, STORAGE, AND HANDLING

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

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

C. Deliver keys and permanent cores to Owner by registered mail or overnight package service.

1.6 COORDINATION

A. Coordinate layout and installation of floor-recessed door hardware with floor construction. Cast anchoring inserts into concrete. Concrete, reinforcement, and formwork requirements are specified in Division 03.

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.

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D. Electrical System Roughing-In: Coordinate layout and installation of electrified door hardware with connections to power supplies and building safety and security systems.

1.7 WARRANTY

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

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

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

2. Warranty Period: Three years from date of Final Completion, unless otherwise indicated.

PART 2 - PRODUCTS

2.1 SCHEDULED DOOR HARDWARE

A. Provide door hardware for each door as scheduled in Part 3 "Door Hardware Schedule" Article to comply with requirements in this Section.

1. Door Hardware Sets: Provide quantity, item, size, finish or color indicated, and named manufacturers' products products equivalent in function and comparable in quality to named products products complying with BHMA designations referenced.
2. Sequence of Operation: Provide electrified door hardware function, sequence of operation, and interface with other building control systems indicated.

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

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

2.2 HINGES

A. Hinges: BHMA A156.1. Provide template-produced hinges for hinges installed on hollow-metal doors and hollow-metal frames. Provide 4 ½" x 4 ½" ball bearing hinge. Exterior shall have non-removable pins. Finish shall be US32D.

1. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on schedule or comparable product by one of the following:

a. Baldwin Hardware Corporation.
b. Bommer Industries, Inc.

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c. Cal-Royal Products, Inc.
d. Hager Companies.
e. IVES Hardware; an Ingersoll-Rand company.
f. Lawrence Hardware Inc.
g. McKinney Products Company; an ASSA ABLOY Group company.
h. PBB, Inc.
i. Stanley Commercial Hardware; Div. of The Stanley Works.

2.3 MECHANICAL LOCKS AND LATCHES

A. Lock Functions: As indicated in door hardware schedule.

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

1. Mortise Locks: Minimum 3/4-inch (19-mm) latchbolt throw.

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

1. Levers: Cast.

a. Equal to Best Access Systems style 16. Provide tactile warning surfaces on ozone room door.

2. Escutcheons (Roses): Wrought.
3. Operating Device: Lever with escutcheons (roses).

D. Strikes: Provide manufacturer's standard strike for each lock bolt or latchbolt complying with requirements indicated for applicable lock or latch and with strike box and curved lip extended to protect frame; finished to match lock or latch.

1. Flat-Lip Strikes: For locks with three-piece antifriction latchbolts, as recommended by manufacturer. Meet ANSI Standards. Provide 4 7/8" x 1 1/4" x 1 1/8" lip to center.

E. Mortise Locks: BHMA A156.13; Security Grade 1; stamped steel case with steel or brass parts; Series 45H by Best Access Systems. Provide 7 pin housing.

1. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on schedule or comparable product by one of the following:

a. Best Access Systems; Div. of Stanley Security Solutions, Inc.
b. Corbin Russwin Architectural Hardware; an ASSA ABLOY Group company.
c. SARGENT Manufacturing Company; an ASSA ABLOY Group company.
d. Schlage Commercial Lock Division; an Ingersoll-Rand company.
e. Yale Security Inc.; an ASSA ABLOY Group company.

2.4 MANUAL FLUSH BOLTS

A. Manual Flush Bolts: BHMA A156.16; minimum 3/4-inch (19-mm) throw; designed for mortising into door edge. Finish shall be US32D.

1. Basis-of-Design Product: Subject to compliance with requirements, provide Ives FB258N or comparable product by one of the following:

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a. Adams Rite Manufacturing Co.; an ASSA ABLOY Group company.
b. Burns Manufacturing Incorporated.
c. Don-Jo Mfg., Inc.
d. Door Controls International, Inc.
e. Hiawatha, Inc.
f. IVES Hardware; an Ingersoll-Rand company.
g. Trimco.

2.5 EXIT DEVICES AND AUXILIARY ITEMS

A. Exit Devices and Auxiliary Items: BHMA A156.3.

1. Basis-of-Design Product: Subject to compliance with requirements, provide Von Duprin 99 Series or comparable product by one of the following:

a. Adams Rite Manufacturing Co.; an ASSA ABLOY Group company.
b. Corbin Russwin Architectural Hardware; an ASSA ABLOY Group company.
c. Precision Hardware, Inc.; Division of Stanley Security Solutions, Inc.
d. SARGENT Manufacturing Company; an ASSA ABLOY Group company.
e. Von Duprin; an Ingersoll-Rand company.
f. Yale Security Inc.; an ASSA ABLOY Group company.

2.6 LOCK CYLINDERS

A. Lock Cylinders: Tumbler type, six pin, constructed from stainless steel.

1. Manufacturer: Same manufacturer as for locking devices.

B. Construction Cores: Provide construction cores that are replaceable by permanent cores.

2.7 KEYING

A. Keying System: Factory registered, complying with guidelines in BHMA A156.28, Appendix A. Incorporate decisions made in keying conference.

1. Existing System:

a. Master key or grand master key locks to Owner's existing system and keyway.

B. Keys: Nickle Silver.

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

a. Notation: "DO NOT DUPLICATE." Information to be furnished by Owner.

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

a. Five for each lockset.

2.8 ACCESSORIES FOR PAIRS OF DOORS

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A. 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.

B. Astragals: BHMA A156.22.

2.9 SURFACE CLOSERS

A. Surface Closers: BHMA A156.4; rack-and-pinion hydraulic type with adjustable sweep and latch speeds controlled by key-operated valves and forged-steel main arm. Comply with manufacturer's written recommendations for size of door closers depending on size of door, exposure to weather, and anticipated frequency of use. Provide factory-sized closers, adjustable to meet field conditions and requirements for opening force.

1. Basis-of-Design Product: Subject to compliance with requirements, provide LCN Series 4000 surface mounted closers or comparable product by one of the following:

    a. Corbin Russwin Architectural Hardware; an ASSA ABLOY Group company.
    b. LCN Closers; an Ingersoll-Rand company.
    c. Norton Door Controls; an ASSA ABLOY Group company.
    d. Rixson Specialty Door Controls; an ASSA ABLOY Group company.
    e. SARGENT Manufacturing Company; an ASSA ABLOY Group company.
    f. Yale Security Inc.; an ASSA ABLOY Group company.

2.10 MECHANICAL STOPS AND HOLDERS

2.11 OVERHEAD STOPS AND HOLDERS

A. Overhead Stops and Holders: BHMA A156.8.

1. Basis-of-Design Product: Subject to compliance with requirements, provide Ives Series 90 surface overhead holders/stops or comparable product by one of the following:

    a. Architectural Builders Hardware Mfg., Inc.
    b. Glynn-Johnson; an Ingersoll-Rand company.
    c. Rockwood Manufacturing Company.
    d. SARGENT Manufacturing Company; an ASSA ABLOY Group company.

2.12 DOOR GASKETING

A. Door Gasketing: BHMA A156.22; air leakage not to exceed 0.50 cfm per foot (0.000774 cu. m/s per m) of crack length for gasketing other than for smoke control, as tested according to ASTM E 283; with resilient or flexible seal strips that are easily replaceable and readily available from stocks maintained by manufacturer.

1. Basis-of-Design Product: Subject to compliance with requirements, provide products by one of the following:

    a. Hager Companies.
    b. M-D Building Products, Inc.
    c. National Guard Products.

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d. Pemko Manufacturing Co.; an ASSA ABLOY Group company.
e. Reese Enterprises, Inc.
f. Sealeze; a unit of Jason Incorporated.
g. Zero International.

2.13 THRESHOLDS

A. Thresholds: BHMA A156.21; fabricated to full width of opening indicated.

1. Basis-of-Design Product: Subject to compliance with requirements, provide products by one of the following:

a. Hager Companies.
b. M-D Building Products, Inc.
c. National Guard Products.
d. Pemko Manufacturing Co.; an ASSA ABLOY Group company.
e. Reese Enterprises, Inc.
f. Rixson Specialty Door Controls; an ASSA ABLOY Group company.
g. Sealeze; a unit of Jason Incorporated.
h. Zero International.

2.14 FABRICATION

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

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

B. Base Metals: Produce door hardware units of base metal 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.

C. 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.

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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. Fasteners for Wood Doors: Comply with requirements in DHI WDHS.2, "Recommended Fasteners for Wood Doors."
5. Gasketing Fasteners: Provide noncorrosive fasteners for exterior applications and elsewhere as indicated.

2.15 FINISHES

A. Provide finishes complying with BHMA A156.18 as indicated. If not indicated, provide US32D.

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.

B. Examine roughing-in for electrical power systems to verify actual locations of wiring connections before electrified door hardware installation.

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

3.2 PREPARATION

A. Steel Doors and Frames: For surface applied door hardware, drill and tap doors and frames according to ANSI/SDI A250.6.

B. Wood Doors: Comply with DHI WDHS.5 "Recommended Hardware Reinforcement Locations for Mineral Core Wood Flush Doors."

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.

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1. Standard Steel Doors and Frames: ANSI/SDI A250.8.
2. Custom Steel Doors and Frames: HMMA 831.
3. Wood Doors: DHI WDHS.3, "Recommended Locations for Architectural Hardware for Wood Flush Doors."

B. Install each door hardware item to comply with manufacturer's written instructions. Where cutting and fitting are required to install door hardware onto or into surfaces that are later to be painted or finished in another way, coordinate removal, storage, and reinstallation of surface protective trim units with finishing work specified in Division 09 Sections. Do not install surface-mounted items until finishes have been completed on substrates involved.

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

C. Hinges: Install types and in quantities indicated in door hardware schedule but not fewer than the number recommended by manufacturer for application indicated or one hinge for every 30 inches (750 mm) of door height, whichever is more stringent, unless other equivalent means of support for door, such as spring hinges or pivots, are provided.

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

F. Boxed Power Supplies: Locate power supplies as indicated or, if not indicated, above accessible ceilings. Verify location with Architect.

1. Configuration: Provide least number of power supplies required to adequately serve doors with electrified door hardware.

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

H. Stops: Provide floor stops for doors unless wall or other type stops are indicated in door hardware schedule. Do not mount floor stops where they will impede traffic.

I. Perimeter Gasketing: Apply to head and jamb, forming seal between door and frame.

J. Meeting Stile Gasketing: Fasten to meeting stiles, forming seal when doors are closed.

K. Door Bottoms: Apply to bottom of door, forming seal with threshold when door is closed.

3.4 ADJUSTING

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

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1. Spring Hinges: Adjust to achieve positive latching when door is allowed to close freely from an open position of 30 degrees.
2. Electric Strikes: Adjust horizontal and vertical alignment of keeper to properly engage lock bolt.
3. Door Closers: Adjust sweep period to comply with accessibility requirements and requirements of authorities having jurisdiction.

B. Occupancy Adjustment: Approximately three months after date of Final 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.

3.5 CLEANING AND PROTECTION

A. Clean adjacent surfaces soiled by door hardware installation.

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

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

3.6 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain door hardware and door hardware finishes. Refer to Division 01 Section "Demonstration and Training."

3.7 DOOR HARDWARE SCHEDULE

Set Number 1
1 Cylinder Lock
1 Exit Device
1 Threshold
Other hardware included with storefront package

Set Number 2
1 Cylinder lock each sectional door
Other hardware included with door package

Set Number 3
1 Cylinder lock
1 Threshold
Other hardware included with storefront package

Set Number 4
3 Hinges

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1 Storeroom Lockset
1 Overhead Stop
3 Silencers

Set Number 5
6 Hinges – 180 Degree Opening
1 Storeroom Lockset Active Leaf
1 Manual Flush bolt for Inactive Leaf
2 Wall Stops
2 Silencers

Set Number 6
3 Hinges
1 Office Locksets
1 Wall Stop
3 Silencers

END OF SECTION 087100

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

1. Glass for storefront framing.
2. Glazed entrances.
3. Interior borrowed lites.

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 according to ASTM C 1036.

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

1.4 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 the following: 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. Delegated Design: Design glass, including comprehensive engineering analysis according to ASTM E 1300 ICC's 2003 International Building Code by a qualified professional engineer, using the following design criteria:

1. Design Wind Pressures: As indicated on Drawings.
2. Design Wind Pressures: Determine design wind pressures applicable to Project according to ASCE/SEI 7, based on heights above grade indicated on Drawings.
    a. Basic Wind Speed: 130 mph
    b. Exposure Category: C.
3. Vertical Glazing: For glass surfaces sloped 15 degrees or less from vertical, design glass to resist design wind pressure based on glass type factors for short-duration load.

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a. Long-Duration Glass Type Factor for Patterned Glass: 0.6.

4. 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 (25 mm), whichever is less.
5. Differential Shading: Design glass to resist thermal stresses induced by differential shading within individual glass lites.

C. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes acting on glass framing members and glazing components.

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

1.5 PRECONSTRUCTION TESTING

A. Preconstruction Adhesion and Compatibility Testing: Test each glazing material type, tape sealant, gasket, glazing accessory, and glass-framing member for adhesion to and compatibility with elastomeric glazing sealants.

1. Testing will not be required if data are submitted based on previous testing of current sealant products and glazing materials matching those submitted.
2. Use ASTM C 1087 to determine whether priming and other specific joint-preparation techniques are required to obtain rapid, optimum adhesion of glazing sealants to glass, tape sealants, gaskets, and glazing channel substrates.
3. Test no fewer than eight Samples of each type of material, including joint substrates, shims, sealant backings, secondary seals, and miscellaneous materials.
4. Schedule sufficient time for testing and analyzing results to prevent delaying the Work.
5. For materials failing tests, submit sealant manufacturer's written instructions for corrective measures including the use of specially formulated primers.

1.6 SUBMITTALS

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

B. Glass Samples: For each type of glass product other than clear monolithic vision glass; 12 inches (300 mm) square.

1. Tinted glass.
2. Insulating glass.

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

D. Product Certificates: For glass and glazing products, from manufacturer.

E. Preconstruction adhesion and compatibility test report.

F. Warranties: Sample of special warranties.

1.7 QUALITY ASSURANCE

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A. Installer Qualifications: A qualified installer who employs glass installers for this Project who are certified under the National Glass Association's Certified Glass Installer Program.

B. Glass Testing Agency Qualifications: A qualified independent testing agency accredited according to the NFRC CAP 1 Certification Agency Program.

C. Source Limitations for Glazing Accessories: Obtain from single source from single manufacturer for each product and installation method.

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

1. GANA Publications: GANA's "Laminated Glazing Reference Manual" and GANA's "Glazing Manual."
2. AAMA Publications: AAMA GDSG-1, "Glass Design for Sloped Glazing," and AAMA TIR-A7, "Sloped Glazing Guidelines."
3. IGMA Publication for Sloped Glazing: IGMA TB-3001, "Guidelines for Sloped Glazing."
4. IGMA Publication for Insulating Glass: SIGMA TM-3000, "North American Glazing Guidelines for Sealed Insulating Glass Units for Commercial and Residential Use."

E. Safety Glazing Labeling: Where safety glazing labeling is indicated, permanently mark glazing with certification label of the SGCC or another certification agency acceptable to authorities having jurisdiction. Label shall indicate manufacturer's name, type of glass, thickness, and safety glazing standard with which glass complies.

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

1.8 DELIVERY, STORAGE, AND HANDLING

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

B. Comply with insulating-glass manufacturer's written recommendations for venting and sealing units to avoid hermetic seal ruptures due to altitude change.

1.9 PROJECT CONDITIONS

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

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

1.10 WARRANTY

A. Manufacturer's Special Warranty for Coated-Glass Products: Manufacturer's standard form in which coated-glass 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

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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 on Insulating Glass: Manufacturer's standard form in which 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 the obstruction of vision by dust, moisture, or film on interior surfaces of glass.

1. Warranty Period: 10 years from date of Final Acceptance.

PART 2 - PRODUCTS

2.1 GLASS PRODUCTS, GENERAL

A. Thickness: Where glass thickness is indicated, it is a minimum. Provide glass lites in thicknesses as needed to comply with requirements indicated.

1. Minimum Glass Thickness for Exterior Lites: Not less than 6.0 mm.
2. Thickness of Tinted Glass: Provide same thickness for each tint color indicated throughout Project.

B. Strength: Where float glass is indicated, provide annealed float glass, Kind HS heat-treated float glass, or Kind FT heat-treated float glass as needed to comply with "Performance Requirements" Article. Where heat-strengthened glass is indicated, provide Kind HS heat-treated float glass or Kind FT heat-treated float glass as needed to comply with "Performance Requirements" Article. Where fully tempered glass is indicated, provide Kind FT heat-treated float glass.

C. Windborne-Debris-Impact Resistance: Provide exterior glazing that passes basic-protection testing requirements in ASTM E 1996 for Wind Zone 3 when tested according to ASTM E 1886. Test specimens shall be no smaller in width and length than glazing indicated for use on the Project and shall be installed in same manner as glazing indicated for use on the Project.

1. Large-Missile Test: For glazing located within 30 feet (9.1 m) of grade.
2. Small-Missile Test: For glazing located more than 30 feet (9.1 m) above grade.
3. Large-Missile Test: For all glazing, regardless of height above grade.

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 6.0 mm thick.
2. For insulating-glass units, properties are based on units of thickness indicated for overall unit and for each lite.
3. U-Factors: Center-of-glazing values, according to NFRC 100 and based on LBL's WINDOW 5.2 computer program, expressed as Btu/sq. ft. x h x deg F (W/sq. m x K).
4. Solar Heat-Gain Coefficient and Visible Transmittance: Center-of-glazing values, according to NFRC 200 and based on LBL's WINDOW 5.2 computer program.
5. Visible Reflectance: Center-of-glazing values, according to NFRC 300.

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2.2 GLASS PRODUCTS

A. Heat-Treated Float Glass: ASTM C 1048; Type I; Quality-Q3; Class I (clear) unless otherwise indicated; of kind and condition indicated.

1. Fabrication Process: By horizontal (roller-hearth) process with roll-wave distortion parallel to bottom edge of glass as installed unless otherwise indicated.
2. For uncoated glass, comply with requirements for Condition A.
3. For coated vision glass, comply with requirements for Condition C (other coated glass).
4. Products: Subject to compliance with requirements, provide one of the following:

    a. AFG Industries, Inc.
    b. Cardinal Glass Industries
    c. Pilkington North America
    d. PPG Industries, Inc.

2.3 INSULATING GLASS

A. Insulating-Glass Units: Factory-assembled units consisting of sealed lites of glass separated by a dehydrated interspace, qualified according to ASTM E 2190, and complying with other requirements specified.

1. Sealing System: Dual seal, with polyisobutylene and silicone primary and secondary.
2. Spacer: Thermally broken aluminum.
3. Desiccant: Molecular sieve or silica gel, or blend of both.
4. Products Provide the following or equivalent products by any of the listed manufacturers above:

    a. Basis of Design: Provide Pilkington Energy Advantage Low-E Insulating Glass, Optifloat Grey Tint.

2.4 GLAZING GASKETS

A. Lock-Strip Gaskets: Neoprene extrusions in size and shape indicated, fabricated into frames with molded corner units and zipper lock-strips, complying with ASTM C 542, black.

2.5 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 C 1281 and AAMA 800 for products indicated below:

1. AAMA 806.3 tape, for glazing applications in which tape is subject to continuous pressure.
2. AAMA 807.3 tape, for glazing applications in which tape is not subject to continuous pressure.

2.6 MISCELLANEOUS GLAZING MATERIALS

A. General: Provide products of material, size, and shape complying with referenced glazing standard, requirements of manufacturers of glass and other glazing materials for application indicated, and with a proven record of compatibility with surfaces contacted in installation.

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B. Cleaners, Primers, and Sealers: Types recommended by sealant or gasket manufacturer.

C. Setting Blocks: Elastomeric material with a Shore, Type A durometer hardness of 85, plus or minus 5.

D. Spacers: Elastomeric blocks or continuous extrusions of hardness required by glass manufacturer to maintain glass lites in place for installation indicated.

E. Edge Blocks: Elastomeric material of hardness needed to limit glass lateral movement (side walking).

2.7 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.

2.8 MONOLITHIC-GLASS TYPES

A. Clear fully tempered float glass.

1. Thickness: 6.0 mm.
2. Provide safety glazing labeling for tempered units.

2.9 INSULATING-GLASS TYPES

A. Clear insulating fully tempered float glass:

1. Overall Unit Thickness: 5/8 inch.
2. Thickness of Each Glass Lite: 6.0 mm.
3. Outdoor Lite: Fully tempered float glass.
4. Interspace Content: Air.
5. Indoor Lite: Fully tempered float glass.
6. Provide safety glazing labeling for fully tempered units.

B. Tinted insulating float and fully tempered glass.

1. Overall Unit Thickness: 1 inch (25 mm).
2. Thickness of Each Glass Lite: 6.0 mm.
3. Outdoor Lite: Tinted float or fully tempered glass.
4. Tint shall be gray.
5. Interspace Content: Air.
6. Indoor Lite: Clear float or fully tempered glass with Low-E coating.
7. Winter Nighttime U-Factor: 0.33.
8. Summer Daytime U-Factor: 0.33
9. Solar Heat Gain Coefficient: 0.39
10. Transmittance: 35%

PART 3 - EXECUTION

3.1 EXAMINATION

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

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

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

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

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

G. Provide spacers for glass lites where length plus width is larger than 50 inches (1270 mm).

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 (3-mm) minimum bite of spacers on glass and use thickness equal to sealant width. With glazing tape, use thickness slightly less than final compressed thickness of tape.

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

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

J. 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 and then to jambs. Cover horizontal framing joints by applying tapes to jambs and then to heads and sills.

D. Place joints in tapes at corners of opening with adjoining lengths butted together, not lapped. Seal joints in tapes with compatible sealant approved by tape manufacturer.

E. Do not remove release paper from tape until 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.

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. 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 by gasket manufacturer.

C. 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 by gasket manufacturer.

D. Install gaskets so they protrude past face of glazing stops.

3.6 LOCK-STRIP GASKET GLAZING

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A. Comply with ASTM C 716 and gasket manufacturer's written instructions. Provide supplementary wet seal and weep system unless otherwise indicated.

3.7 CLEANING AND PROTECTION

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

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

C. Examine glass surfaces adjacent to or below exterior concrete and other masonry surfaces at frequent intervals during construction, but not less than once a month, for buildup of dirt, scum, alkaline deposits, or stains; remove as recommended in writing by glass manufacturer.

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

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

END OF SECTION 088000

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