

## SECTION 081113 - METAL DOORS AND FRAMES

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Section includes Standard hollow metal doors and frames.

#### 1.2 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: Include elevations, door edge details, frame profiles, metal thicknesses, preparations for hardware, and other details.
- C. Samples for Initial Selection: For units with factory-applied color finishes.
- D. Samples for Verification: For each type of exposed finish required.
- E. Schedule: Prepared by or under the supervision of supplier, using same reference numbers for details and openings as those on Drawings.

#### 1.3 QUALITY ASSURANCE

- A. Fire-Rated Door Assemblies: Assemblies complying with NFPA 80 that are listed and labeled by a qualified testing agency, for fire-protection ratings indicated, based on testing at positive pressure according to NFPA 252.
  - 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 450 deg F above ambient after 30 minutes of standard fire-test exposure.

### PART 2 - PRODUCTS

#### 2.1 MANUFACTURERS

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

#### 2.2 MATERIALS

- A. Cold-Rolled Steel Sheet: ASTM A 1008/A 1008M, CS, Type B; suitable for exposed applications.
- B. Hot-Rolled Steel Sheet: ASTM A 1011/A 1011M, CS, Type B.
- C. Metallic-Coated Steel Sheet: ASTM A 653/A 653M, Commercial Steel (CS), Type B; with minimum A40 metallic coating.

- D. Frame Anchors: ASTM A 591/A 591M, Commercial Steel (CS), 40Z coating designation; mill phosphatized.
  - 1. For anchors built into exterior walls, steel sheet complying with ASTM A 1008/A 1008M or ASTM A 1011/A 1011M, hot-dip galvanized according to ASTM A 153/A 153M, Class B.
- E. Inserts, Bolts, and Fasteners: Hot-dip galvanized according to ASTM A 153/A 153M.
- F. Grout: ASTM C 476, except with a maximum slump of 4 inches, as measured according to ASTM C 143/C 143M.
- G. Mineral-Fiber Insulation: ASTM C 665, Type I.
- H. Glazing: Division 08 Section "Glazing."
- I. Bituminous Coating: Cold-applied asphalt mastic, SSPC-Paint 12, compounded for 15-mil dry film thickness per coat.

### 2.3 HOLLOW METAL DOORS

- A. General: Comply with ANSI/SDI A250.8.
  - 1. Design: Flush panel.
  - 2. Core Construction: Manufacturer's standard kraft-paper honeycomb, polystyrene, polyurethane, polyisocyanurate, mineral-board, or vertical steel-stiffener core.
    - a. Fire Door Core: As required to provide fire-protection and temperature-rise ratings indicated.
    - b. Thermal-Rated (Insulated) Doors: R-value of not less than 6.0 deg F x h x sq. ft./Btu when tested according to ASTM C 1363.
  - 3. Vertical Edges for Single-Acting Doors: Square edge.
  - 4. Top and Bottom Edges: Closed with flush or inverted 0.042-inch- thick, end closures or channels of same material as face sheets.
  - 5. Tolerances: SDI 117, "Manufacturing Tolerances for Standard Steel Doors and Frames."
  - 6. Thermal Transmittance: Provide whole-window, U-factor maximum indicated at 15-mph exterior wind velocity and winter condition temperatures when tested according to AAMA 1503.
    - a. U-Factor: 0.21 Btu/sq. ft. x h x deg F or less.
- B. Exterior Doors: Face sheets fabricated from metallic-coated steel sheet. Provide doors complying with requirements indicated below by referencing ANSI/SDI A250.8 for level and model and ANSI/SDI A250.4 for physical performance level:
  - 1. Level 3 and Physical Performance Level A (Extra Heavy Duty), Model 1 (Full Flush).
- C. Interior Doors: Face sheets fabricated from cold-rolled steel sheet. Provide doors complying with requirements indicated below by referencing ANSI/SDI A250.8 for level and model and ANSI/SDI A250.4 for physical performance level:
  - 1. Level 3 and Physical Performance Level A (Extra Heavy Duty), Model 1 (Full Flush).
- D. Hardware Reinforcement: ANSI/SDI A250.6.
- E. Fabricate concealed stiffeners and hardware reinforcement from either cold- or hot-rolled steel sheet.

### 2.4 HOLLOW METAL FRAMES

- A. General: Comply with ANSI/SDI A250.8.
- B. Exterior Frames: Fabricated from metallic-coated steel sheet.
  - 1. Fabricate frames with mitered or coped corners.
  - 2. Fabricate frames as fully welded unless otherwise indicated.
  - 3. Frames for Level 3 Steel Doors: 0.060-inch- thick steel sheet (16 gage)

- 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 knocked down (KD):
    - a. Location: Unit entry from corridor, storage/service rooms on corridor, others as indicated on Drawings.
  - 3. Frames for Level 3 Steel Doors: 0.048-inch- thick steel sheet (18 gage)
  - 4. Fabricate frames as fully welded (HM):
    - a. Location: Elevator lobby, others as indicated on Drawings
  - 5. Frames for Wood Doors:
    - a. Unit Entry Doors: 0.048-inch- thick steel sheet (18 gage)
  - 6. Fire Rating: 25, 40 and 60 minutes refer to Drawings for locations.
  - 7. Finish: Shop primed and painted.

- D. Hardware Reinforcement: ANSI/SDI A250.6.

## 2.5 FRAME ANCHORS

- A. Jamb Anchors:
  - 1. Masonry Type: Adjustable strap-and-stirrup or T-shaped anchors to suit frame size, not less than 0.042 inch thick, with corrugated or perforated straps not less than 2 inches wide by 10 inches long; or wire anchors not less than 0.177 inch thick.
  - 2. Stud-Wall Type: Designed to engage stud, welded to back of frames; not less than 0.042 inch thick.
  - 3. Compression Type for Drywall Slip-on Frames: Adjustable compression anchors.
- B. Floor Anchors: Formed from same material as frames, not less than 0.042 inch thick, and as follows:
  - 1. Monolithic Concrete Slabs: Clip-type anchors, with two holes to receive fasteners.
  - 2. Separate Topping Concrete Slabs: Adjustable-type anchors with extension clips, allowing not less than 2-inch height adjustment. Terminate bottom of frames at finish floor surface.

## 2.6 HOLLOW METAL PANELS

- A. Provide hollow metal panels of same materials, construction, and finish as specified for adjoining hollow metal work.

## 2.7 STOPS AND MOLDINGS

- A. Moldings for Glazed Lites in Doors: Minimum 0.032 inch thick, same material as door face sheet.
- B. Fixed Frame Moldings: Formed integral with hollow metal frames, a minimum of 5/8 inch high unless otherwise indicated.
- C. Loose Stops for Glazed Lites in Frames: Minimum 0.032 inch thick, same material as frames.
- D. Terminated Stops: Where indicated, terminate stops 6 inches above finish floor with a 90-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.

## 2.8 ACCESSORIES

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

## 2.9 FABRICATION

- A. Tolerances: Fabricate hollow metal work to tolerances indicated in SDI 117.
- B. Hollow Metal Doors:
1. Exterior Doors: Provide weep-hole openings in bottom of exterior doors. Seal joints in top edges of doors against water penetration.
  2. Astragals: Provide overlapping astragal on one leaf of pairs of doors where required by NFPA 80 for fire-performance rating or where indicated.
- C. Hollow Metal Frames: Where frames are fabricated in sections, provide alignment plates or angles at each joint, fabricated of same thickness metal as frames.
1. Welded Frames: Weld flush face joints continuously; grind, fill, dress, and make smooth, flush, and invisible.
  2. Provide countersunk, flat- or oval-head exposed screws and bolts for exposed fasteners unless otherwise indicated.
  3. Grout Guards: Weld guards to frame at back of hardware mortises in frames to be grouted.
  4. Floor Anchors: Weld anchors to bottom of jambs and mullions with at least four spot welds per anchor.
  5. Jamb Anchors: Provide number and spacing of anchors as follows:
    - a. Masonry Type: Locate anchors not more than 18 inches from top and bottom of frame. Space anchors not more than 32 inches o.c. and as follows:
      - 1) Two anchors per jamb up to 60 inches high.
      - 2) Three anchors per jamb from 60 to 90 inches high.
      - 3) Four anchors per jamb from 90 to 120 inches high.
      - 4) Four anchors per jamb plus 1 additional anchor per jamb for each 24 inches or fraction thereof above 120 inches high.
    - b. Stud-Wall Type: Locate anchors not more than 18 inches from top and bottom of frame. Space anchors not more than 32 inches o.c. and as follows:
      - 1) Three anchors per jamb up to 60 inches high.
      - 2) Four anchors per jamb from 60 to 90 inches high.
      - 3) Five anchors per jamb from 90 to 96 inches high.
      - 4) Five anchors per jamb plus 1 additional anchor per jamb for each 24 inches or fraction thereof above 96 inches high.
      - 5) Two anchors per head for frames more than 42 inches wide and mounted in metal-stud partitions.
    - c. Compression Type: Not less than two anchors in each jamb.
    - d. Postinstalled Expansion Type: Locate anchors not more than 6 inches from top and bottom of frame. Space anchors not more than 26 inches o.c.
  6. Door Silencers: Except on weather-stripped doors, drill stops to receive door silencers.
    - a. Single-Door Frames: Three door silencers.
    - b. Double-Door Frames: Two door silencers.
- D. Hardware Preparation: Factory prepare hollow metal work to receive templated mortised hardware 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 electrical Sections.
- E. Stops and Moldings: Provide stops and moldings around glazed lites where indicated. Form corners of stops and moldings with butted or mitered hairline joints.
1. Single Glazed Lites: Provide fixed stops and moldings welded on secure side of 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.

## 2.10 STEEL FINISHES

- A. Factory-Applied Paint Finish: ANSI/SDI A250.3.
  1. Color and Gloss: As selected by Architect from manufacturer's full range.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. Hollow Metal Frames: Comply with ANSI/SDI A250.11.
  1. Set frames accurately in position, plumbed, aligned, and braced securely until permanent anchors are set. After wall construction is complete, remove temporary braces, leaving surfaces smooth and undamaged.
    - a. At fire-protection-rated openings, install frames according to NFPA 80.
    - b. Where frames are fabricated in sections because of shipping or handling limitations, field splice at approved locations by welding face joint continuously; grind, fill, dress, and make splice smooth, flush, and invisible on exposed faces.
    - c. Install frames with removable glazing stops located on secure side of opening.
    - d. Install door silencers in frames before grouting.
    - e. Remove temporary braces necessary for installation only after frames have been properly set and secured.
    - f. Check plumbness, squareness, and twist of frames as walls are constructed. Shim as necessary to comply with installation tolerances.
    - g. Field apply bituminous coating to backs of frames that are filled with grout containing antifreezing agents.
  2. Floor Anchors: Provide floor anchors for each jamb and mullion that extends to floor, and secure with postinstalled expansion anchors.
    - a. Floor anchors may be set with powder-actuated fasteners instead of postinstalled expansion anchors if so indicated and approved on Shop Drawings.
  3. Masonry Walls: Coordinate installation of frames to allow for solidly filling space between frames and masonry with grout.
  4. Concrete Walls: Solidly fill space between frames and concrete with grout. Take precautions, including bracing frames, to ensure that frames are not deformed or damaged by grout forces.
  5. In-Place Concrete or Masonry Construction: Secure frames in place with postinstalled expansion anchors. Countersink anchors, and fill and make smooth, flush, and invisible on exposed faces.
  6. In-Place Gypsum Board Partitions: Secure frames in place with postinstalled expansion anchors through floor anchors at each jamb. Countersink anchors, and fill and make smooth, flush, and invisible on exposed faces.
  7. Ceiling Struts: Extend struts vertically from top of frame at each jamb to overhead structural supports or substrates above frame unless frame is anchored to masonry or to other structural support at each jamb. Bend top of struts to provide flush contact for securing to supporting construction. Provide adjustable wedged or bolted anchorage to frame jamb members.
  8. Installation Tolerances: Adjust hollow metal door frames for squareness, alignment, twist, and plumb to the following tolerances:
    - a. Squareness: Plus or minus 1/16 inch, measured at door rabbet on a line 90 degrees from jamb perpendicular to frame head.
    - b. Alignment: Plus or minus 1/16 inch, measured at jambs on a horizontal line parallel to plane of wall.
    - c. Twist: Plus or minus 1/16 inch, measured at opposite face corners of jambs on parallel lines, and perpendicular to plane of wall.
    - d. Plumbness: Plus or minus 1/16 inch, measured at jambs at floor.

- B. Hollow Metal Doors: Fit hollow metal doors accurately in frames, within clearances specified below. Shim as necessary.
  - 1. Non-Fire-Rated Standard Steel Doors:
    - a. Jamb and Head: 1/8 inch plus or minus 1/16 inch.
    - b. Between Edges of Pairs of Doors: 1/8 inch plus or minus 1/16 inch.
    - c. Between Bottom of Door and Top of Threshold: Maximum 3/8 inch.
    - d. Between Bottom of Door and Top of Finish Floor (No Threshold): Maximum 3/4 inch.
  - 2. Fire-Rated Doors: Install doors with clearances according to NFPA 80.
  - 3. Smoke-Control Doors: Install doors according to NFPA 105.
  
- 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 9 inches o.c. and not more than 2 inches o.c. from each corner.

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

END OF SECTION 081113

## SECTION 081416 - FLUSH DOORS

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Section Includes:
1. Solid-core doors with wood-veneer faces.
  2. Solid core doors with painted faces.
  3. Factory finishing flush wood doors.
  4. Factory fitting flush wood doors to frames and factory machining for hardware.

#### 1.2 SUBMITTALS

- A. Product Data: For each type of door indicated. Include factory-finishing specifications.
- B. Shop Drawings: Indicate location, size, and hand of each door; elevation of each kind of door; construction details not covered in Product Data; location and extent of hardware blocking; and other pertinent data.
1. Indicate dimensions and locations of mortises and holes for hardware.
  2. Indicate dimensions and locations of cutouts.
  3. Indicate requirements for veneer matching.
  4. Indicate doors to be factory finished and finish requirements.
  5. Indicate fire-protection ratings for fire-rated doors.
- C. Samples: Represent typical range of color and grain for each species of veneer and solid lumber required.
- D. Finish Sample with same materials proposed for factory-finished doors.

#### 1.3 QUALITY ASSURANCE

- A. Manufacturer Qualifications: A qualified manufacturer that is certified for chain of custody by an FSC-accredited certification body.
- B. Quality Standard: In addition to requirements specified, comply with WDMA I.S.1-A, "Architectural Wood Flush Doors."
- C. Fire-Rated 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 as close to neutral pressure as possible according to NFPA 252.

### PART 2 - PRODUCTS

#### 2.1 DOOR CONSTRUCTION, GENERAL

- A. Quality Standard: In addition to requirements specified, comply with WDMA I.S.1-A-11, "Architectural Wood Flush Doors."
1. Heavy Duty unless otherwise indicated.
  2. Extra Heavy Duty: Janitor's closets.
- B. Fire-Rated 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 according to NFPA 252 or UL 10C.

- C. Acoustic Rated Doors:
    - 1. Provide core indicated or special construction core as required to meet STC rating indicated on door schedule. All STC ratings must be tested as operable.
    - 2. Provide gasketing and mortise door bottom as required to meet manufacturers tested acoustic rating.
    - 3. Hollow metal frames shall be fully grouted or packed with mineral wool where acoustic rated wood doors are installed.
    - 4. The Sound Transmission Class (STC) specified shall be certified by the manufacturer to be based on tests conducted at an independent testing agency in accordance with ASTM E90-90 and E413-87.
  
  - D. Mineral-Core Doors:
    - 1. Core: Noncombustible mineral product complying with requirements of referenced quality standard and testing and inspecting agency for fire-protection rating indicated.
    - 2. Blocking: Provide composite blocking with improved screw-holding capability approved for use in doors of fire-protection ratings indicated as needed to eliminate through-bolting hardware.
    - 3. Edge Construction: At hinge stiles, provide laminated-edge construction with improved screw-holding capability and split resistance. Comply with specified requirements for exposed edges.
  
  - E. 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 needed to eliminate through-bolting hardware.
  
  - F. Hollow-Core Doors:
    - 1. Construction: Standard hollow core.
  
  - G. Door Types: Refer to Drawings.
- 2.2 DOORS FOR OPAQUE FINISH
- A. General:
    - 1. Grade: Premium.
    - 2. Faces: Any closed-grain hardwood of mill option
    - 3. Finish: Shop primed, field finish.
  
  - B. Interior Hollow-Core Doors:
    - 1. Thickness: 1 3/8 inches.
  
  - C. Interior Solid-Core Doors:
    - 1. Thickness: 1 3/8 inches.
    - 2. Core: Wood-based Particleboard
    - 3. Construction: Five plies. Stiles and rails are bonded to core, then entire unit abrasive planed before veneering.
    - 4. Fire Rated: 20 minute.
    - 5. Core: Particleboard.
    - 6. Adhesives: Type I per WDMA T.M.-6.
  
  - D. Entry Solid-Core Doors:
    - 1. Thickness: 1 3/4 inches.
    - 2. Core: Wood-based Particleboard or Mineral fiber
    - 3. Construction: Five plies
    - 4. Fire Rated: 20 minute.
    - 5. Adhesives: Type I per WDMA T.M.-6.

6. Provide acoustic sweep.
  - a. Adjustable Mortise Door Bottom #AMDB-3-3 as manufactured by Door and Hardware Systems Inc.

### 2.3 FABRICATION

- A. Factory fit doors to suit frame-opening sizes indicated. Comply with clearance requirements of referenced quality standard for fitting unless otherwise indicated.
  1. Comply with requirements in NFPA 80 for fire-rated doors.
- B. Factory machine doors for hardware that is not surface applied.
- C. Prehung Doors: Provide doors complete with frames, and hardware.
- D. Bifold, Bypass, Barn and Pocket Doors
  1. Bifold Doors shall match panel, sticking, profile and design of doors indicated.
  2. All doors shall have hardwood wedge in the top rail of all door panels for improved screw holding and hardware attachment.
  3. Bifold Hardware: Manufacturer and Type: L.E. Johnson Products, Inc. Series 111FD folding door hardware set including track, hangers, hinges, pivots, knobs, brackets, screws and all other accessory items.
  4. Barn Doors: : BDS Barn Door System as manufactured The Sliding Door Company

### 2.4 SHOP PRIMING

- A. Doors for Opaque Finish: Shop prime faces, all four edges, edges of cutouts, and mortises with one coat of wood primer specified in Division 09 Section "Interior Painting."

### 2.5 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. Factory finish doors that are indicated to receive transparent finish.

## PART 3 - EXECUTION

### 3.1 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.
  2. Coordinate undercutting of doors with Interior finishes.
- 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. Machine doors for hardware. Seal edges of doors, edges of cutouts, and mortises after fitting and machining.
  1. Clearances: Provide 1/8 inch at heads, jambs, and between pairs of doors. Provide 1/4 inch from bottom of door to top of decorative floor finish or covering unless otherwise indicated. Where

- threshold is shown or scheduled, provide 3/8 inch from bottom of door to top of threshold unless otherwise indicated.
2. Bevel non-fire-rated doors 1/8 inch in 2 inches at lock and hinge edges.
- D. Factory-Fitted Doors: Align in frames for uniform clearance at each edge.
- E. Factory-Finished Doors: Restore finish before installation if fitting or machining is required at Project site.

END OF SECTION 081416

## SECTION 081613 - FIBERGLASS DOORS

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. This Section includes framed fiberglass entry doors and patio

#### 1.2 PERFORMANCE REQUIREMENTS

- A. General: Provide fiberglass doors capable of complying with performance requirements indicated, based on testing manufacturer's windows that are representative of those specified, and that are of test size required by AAMA/WDMA 101/I.S.2/NAFS.
  - 1. Compliance with EPA/DOE ENERGY STAR product labeling program.
- B. Door Unit Air Leakage, NFRC 400, 1.57 psf (25 mph): 0.50 cfm per square foot of frame or less.
- C. Door Unit Water Penetration: No water penetration through door unit when tested in accordance with ASTM E 331 or ASTM E 547 with water applied at rate of 5 gallons per hour per square foot at 0 psf.
- D. 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.
- E. Forced Entry Resistance: Comply with ASTM F 842.
- F. Certifications for insulated glass doors:
  - 1. Overall Standards: Comply with ANSI/AAMA/NWDA 101/I.S.2, except as otherwise noted herein.
  - 2. AAMA: Doors shall be Gold Label certified with label attached to frame per AAMA requirements.
  - 3. NFRC: Doors shall be NFRC certified with temporary U-factor label applied to glass and an NFRC tab added to permanent AAMA frame label.
- G. Sound Transmission Characteristics: Provide window assemblies tested for STC and IIC ratings per ASTM E 90 and ASTM E 492 by a qualified testing agency.
- H. Doors shall qualify for Energy Star Rating.

#### 1.3 SUBMITTALS

- A. Product Data: For each type of vinyl window indicated.
- B. Shop Drawings: Include plans, elevations, sections, details, hardware, attachments to other work, operational clearances, and installation details.
- C. Samples: For each exposed finish.
- D. Product Schedule: Use same designations indicated on Drawings.

- E. Product test reports.
- F. Maintenance data.

#### 1.4 QUALITY ASSURANCE

- A. Installer: A qualified installer, approved by manufacturer to install manufacturer's products.
- B. Glazing Publications: Comply with published recommendations of glass manufacturers and with GANA's "Glazing Manual" unless more stringent requirements are indicated.
- C. Preinstallation Conference: Conduct conference at Project site.
- D. Fenestration installation shall comply with AAMA (American Architectural Manufacturers Associations) and be supervised and inspected by an individual certified as an installation Master by Architectural Testing, Inc,

#### 1.5 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace fiberglass doors that fail in materials or workmanship within specified warranty period.
  - 1. Failures include, but are not limited to, the following:
    - a. Failure to meet performance requirements.
    - b. Structural failures including excessive deflection, water leakage, air infiltration, or condensation.
    - c. Faulty operation of movable sash and hardware.
    - d. Deterioration of fiberglass, other materials, and finishes beyond normal weathering.
    - e. Failure of insulating glass.
  - 2. Warranty Period:
    - a. Glazing: 10 years from date of Substantial Completion.

### PART 2 - PRODUCTS

#### 2.1 MANUFACTURER

- A. Basis-of-Design Product: The design doors systems is based on Full Lite Traditions as manufactured by Therma-Tru Corporation Subject to compliance with requirements, provide the named product or a comparable product, or approved equal.
  - 1. Finish: As selected from manufacturers full range.

#### 2.2 SWINGING DOOR

- A. Thermal Performance: Comply with NFRC 100.
- B. Core: Polystyrene, manufacturers standard
- C. Door:
  - 1. 3/32 minimum thickness proprietary fiberglass reinforced thermoset composite, "AccuGrain" textured to duplicate hand-crafted hardwood master or smooth surface.
  - 2. Door edges are machinable kiln-dried hardwood, flush and square with door faces, lock edge reinforced with full-length integrated 3-1/2-inch wide engineered lumber core.
  - 3. Door bottom edge is moisture- and decay-resistant composite.

4. Core is foamed-in-place polyurethane, with a minimum density of 1.9 pcf.

D. Provide sill brick molding where required

## 2.3 PERFORMANCE REQUIREMENTS

A. Fire-Rated Assemblies: Complying with NFPA 80 and listed and labeled by a qualified testing agency acceptable to authorities having jurisdiction for fire-protection ratings indicated, based on testing at positive pressure according to NFPA 252 or UL 10C.

B. Thermally Rated Door Assemblies: Provide door assemblies with U-factor of not more than 0.40 deg Btu/F x h x sq. ft. when tested according to ASTM C 518.

## 2.4 FRAMES

A. Non Rated Frames: Provided and assembled by third party fabricators to exacting specifications from manufacturer to help maximize system performance.

1. Milled from 5/4 kiln-dried material with profiled ½ inches stop and 6 degree sill gain prep.
2. Jamb Width Standard 4 9/16 inches
3. Rot Resistant – frames, mullions, and brickmould sourced through door manufacturer.

## 2.5 GLAZING

A. Glass: Clear, insulating-glass units, air filled, with low-E coating pyrolytic on second surface or sputtered on second or third surface.

1. No grills
2. U Value: 0.83 Maximum for assembly
3. SHGC: 0.25 Maximum

B. Glazing System: Manufacturer's standard factory-glazing system that produces weathertight seal.

## 2.6 OPERABLE HARDWARE

A. ADA Accessible Hardware: Locate on windows indicated on the Drawing.

1. Product: ADA Operator Handle and door sills.

B. Finish: As selected by Architect from manufacturers full range.

C. Sills: Outswing door, public access.

D. Locking Hardware:

1. Multi-point lock system includes stainless steel face plate.

## 2.7 FABRICATION

A. Fabricate doors that are reglazable without dismantling sash or ventilator framing.

B. Weather Stripping: Provide full-perimeter weather stripping for each operable sash and ventilator.

C. Subframes: Provide subframes with anchors for window units as shown, of profile and dimensions indicated but not less than 0.062-inch- thick extruded aluminum. Miter or cope corners, and weld and

dress smooth with concealed mechanical joint fasteners. Provide manufacturer's standard finish to match window units. Provide subframes capable of withstanding design loads of window units.

- D. Glazing Stops: Provide nailed or snap-on glazing stops coordinated with Division 08 Section "Glazing" and glazing system indicated. Provide glazing stops to match sash and ventilator frames.
- E. Provide doors in configuration indicated. Provide window frames, fixed and operating sash, operating hardware, and other trim and components necessary for a complete, secure, and weathertight installation, including the following:
  - 1. Angled interior and exterior extension and trim.
  - 2. Support brackets.

### PART 3 - EXECUTION

#### 3.1 INSTALLATION

- A. Comply with Drawings, Shop Drawings, and manufacturer's written instructions for installing windows, hardware, accessories, and other components.
- B. Install level, plumb, square, true to line, without distortion or impeding thermal movement, anchored securely in place to structural support, and in proper relation to wall flashing and other adjacent construction.
- C. Set sill members in bed of sealant or with gaskets, as indicated, for weathertight construction.
- D. Separate corrodible surfaces from sources of corrosion or electrolytic action at points of contact with other materials.
- E. Adjust operating sashes and ventilators, screens, hardware, and accessories for a tight fit at contact points and weather stripping for smooth operation and weathertight closure. Lubricate hardware and moving parts.
- F. Clean exposed surfaces immediately after installing windows. Avoid damaging protective coatings and finishes. Remove excess sealants, glazing materials, dirt, and other substances.
- G. Clean factory-glazed glass immediately after installing windows and doors. Comply with manufacturer's written recommendations for final cleaning and maintenance. Remove nonpermanent labels, and clean surfaces.
- H. Remove and replace glass that has been broken, chipped, cracked, abraded, or damaged during construction period.

END OF SECTION 081613

## SECTION 083113 - ACCESS DOORS AND FRAMES

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Section includes access doors and frames for walls and ceilings.

#### 1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.
- C. Samples: For each door face material.
- D. Schedule: Types, locations, sizes, latching or locking provisions, and other data pertinent to installation.

### PART 2 - PRODUCTS

#### 2.1 PERFORMANCE REQUIREMENTS

- A. Fire-Rated Access Doors and Frames: Units complying with NFPA 80 tested according to the following test method:
  - 1. NFPA 252 or UL 10B for fire-rated access door assemblies installed vertically.
  - 2. NFPA 288 for fire-rated access door assemblies installed horizontally.

#### 2.2 ACCESS DOORS AND FRAMES FOR WALLS AND CEILINGS

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
  - 1. Alfab, Inc.
  - 2. Babcock-Davis.
  - 3. Jensen Industries; Div. of Broan-Nutone, LLC.
  - 4. J. L. Industries, Inc.; Div. of Activar Construction Products Group.
  - 5. Larsen's Manufacturing Company.
  - 6. Nystrom, Inc.
- B. Source Limitations: Obtain each type of access door and frame from single source from single manufacturer.
- C. Flush Access Doors with Concealed Flanges:
  - 1. Assembly Description: Fabricate door to fit flush to frame. Provide frame with gypsum board beads for concealed flange installation.
  - 2. Locations: Wall.
  - 3. Door Size: As indicated.
  - 4. Metallic-Coated Steel Sheet for Door: Nominal 0.064 inch, 16 gage.
    - a. Finish: Factory finish.
  - 5. Frame Material: Same material and thickness as door.
  - 6. Hinges: Manufacturer's standard.
  - 7. Hardware: Lock.
  - 8. Attic access doors shall be insulated.
- D. Fire-Rated, Flush Access Doors with Concealed Flanges:

1. Assembly Description: Fabricate door to fit flush to frame, with a core of mineral-fiber insulation enclosed in sheet metal. Provide self-latching door with automatic closer and interior latch release. Provide frame with gypsum board beads for concealed flange installation.
2. Locations: Wall and ceiling.
3. Fire-Resistance Rating: Not less than that of adjacent construction.
4. Temperature-Rise Rating: 250 deg F at the end of 30 minutes.
5. Metallic-Coated Steel Sheet for Door: Nominal 0.040 inch, 20 gage.
  - a. Finish: Factory finish.
6. Frame Material: Same material, thickness, and finish as door.
7. Hinges: Manufacturer's standard.
8. Hardware: Lock.

E. Concealed Access Doors: (at Amenity spaces, Alternate)

1. Basis of Design: Concealed Drop In Access Door as manufactured by Bobcockdavis
2. Size: As indicated

F. Flush Concealed Hinge Doors (at Amenity Spaces)

1. Basis of Design: Baucoplus-II Series as manufactured by Bauco Access Panel Solutions Inc
2. Size: As indicated
3. Finish: Board inlay, as selected.
4. Non rated.

G. Hardware:

1. Lock: Mortise cylinder.
  - a. Lock Preparation: Prepare door panel to accept cylinder specified in Division 08 Section "Door Hardware".

## 2.3 MATERIALS

- A. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.
- B. Rolled-Steel Floor Plate: ASTM A 786/A 786M, rolled from plate complying with ASTM A 36/A 36M or ASTM A 283/A 283M, Grade C or D.
- C. Steel Sheet: Uncoated or electrolytic zinc coated, ASTM A 879/A 879M, with cold-rolled steel sheet substrate complying with ASTM A 1008/A 1008M, Commercial Steel (CS), exposed.
- D. Metallic-Coated Steel Sheet: ASTM A 653/A 653M, Commercial Steel (CS), Type B; with minimum G60 or A60 metallic coating.
- E. Frame Anchors: Same type as door face.
- F. Inserts, Bolts, and Anchor Fasteners: Hot-dip galvanized steel according to ASTM A 153/A 153M or ASTM F 2329.

## 2.4 FABRICATION

- A. General: Provide access door and frame assemblies manufactured as integral units ready for installation.
- B. Metal Surfaces: For metal surfaces exposed to view in the completed Work, provide materials with smooth, flat surfaces without blemishes. Do not use materials with exposed pitting, seam marks, roller marks, rolled trade names, or roughness.
- C. Doors and Frames: Grind exposed welds smooth and flush with adjacent surfaces. Furnish attachment devices and fasteners of type required to secure access doors to types of supports indicated.

- D. Recessed Access Doors: Form face of panel to provide recess for application of applied finish. Reinforce panel as required to prevent buckling.
- E. Latching Mechanisms: Furnish number required to hold doors in flush, smooth plane when closed.
  - 1. For cylinder locks, furnish two keys per lock and key all locks alike.
  - 2. For recessed panel doors, provide access sleeves for each locking device. Furnish plastic grommets and install in holes cut through finish.

## 2.5 FINISHES

- A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
- B. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- C. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.
- D. Steel and Metallic-Coated-Steel Finishes:
  - 1. Factory Finish: Immediately after cleaning and pretreating, apply manufacturer's standard two-coat, baked-on finish consisting of prime coat and thermosetting topcoat, with a minimum dry-film thickness of 1 mil for topcoat.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. Comply with manufacturer's written instructions for installing access doors and frames.
- B. Install doors flush with adjacent finish surfaces or recessed to receive finish material.

### 3.2 ADJUSTING

- A. Adjust doors and hardware, after installation, for proper operation.
- B. Remove and replace doors and frames that are warped, bowed, or otherwise damaged.

END OF SECTION 083113



## SECTION 083613 - SECTIONAL DOORS

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Section Includes the following:
  - 1. Full glazed manual operated sectional doors.
  - 2. Steel sectional door
- B. Related Section:
  - 1. Division 05 Section "Metal Fabrications" for miscellaneous steel supports.
  - 2. Division 08 Section "Door Hardware" for special automatic openers.

#### 1.2 PERFORMANCE REQUIREMENTS

- A. General Performance: Sectional doors shall meet performance requirements specified without failure due to defective manufacture, fabrication, installation, or other defects in construction and without requiring temporary installation of reinforcing components.
- B. Exterior Doors:
  - 1. Structural Performance: Exterior sectional doors shall withstand the effects of gravity loads, and the following loads and stresses within limits and under conditions indicated according to ASCE/SEI 7
    - a. Wind Loads: Uniform pressure (velocity pressure) of 20 lbf/sq. ft., acting inward and outward
  - 2. Air Infiltration: Maximum rate not more than indicated when tested according to ASTM E 283 or DASMA 105.
    - a. Air Infiltration: Maximum rate of 0.08 cfm/sq. ft. at 15 and 25 mph.
- C. Delegated Design: Design sectional doors, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.

#### 1.3 SUBMITTALS

- A. Product Data: For each type and size of sectional door and accessory.
- B. Shop Drawings: For each installation and for special components not dimensioned or detailed in manufacturer's product data. Include plans, elevations, sections, details, and attachments to other work.
- C. Samples: For each exposed product and for each color and texture specified.
- D. Delegated-Design Submittal: For sectional doors indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
- E. Seismic Qualification Certificates: For sectional doors, accessories, and components, from manufacturer.
- F. Maintenance data.
- G. Warranties: Sample of special warranties.

#### 1.4 QUALITY ASSURANCE

- A. Installer Qualifications: Manufacturer's authorized representative who is trained and approved for both installation and maintenance of units required for this Project.
- B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- C. Standard for Sectional Doors: Fabricate sectional doors to comply with DASMA 102 unless otherwise indicated.
- D. Single Source: Provide door, tracks, motors and accessories from one manufacturer for each type of door. Provide secondary components from source acceptable to manufacturer of primary components.

#### 1.5 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of sectional doors that fail in materials or workmanship within specified warranty period.
  - 1. Warranty Period: Five years from date of Substantial Completion.
- B. Special Finish Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components that show evidence of deterioration of factory-applied finishes within specified warranty period.
  - 1. Warranty Period: 10 years from date of Substantial Completion.

### PART 2 - PRODUCTS

#### 2.1 ALUMINUM DOOR ASSEMBLY

- A. Basis-of-Design Product: Subject to compliance with requirements, provide Overhead Doors 521 Series or comparable product by Windsor Door.
  - 1. Size: As indicated on Drawings.
  - 2. Operation Cycles: Not less than 20,000
  - 3. Aluminum Sections: Full vision, thermally improved.
  - 4. Track Configuration: Low-headroom track.
  - 5. Locking Devices: Equip door with manufacturer's standard locking device assembly.
    - a. Locking Device Assembly: Slide bolt locking bars, operable from inside.
  - 6. Door Operator: Manual and electrical operation.
  - 7. Door Finish: As selected from manufacturers full range.
  - 8. Weather Stripping/Stripping:
    - a. Jamb
    - b. Head
    - c. Door bottom seal.
- B. Sections: Construct door sections with stiles and rails formed from extruded-aluminum shapes. Fabricate sections with stile and rail dimensions and profiles shown on Drawings. Join stiles and rails by welding or with concealed aluminum or nonmagnetic stainless-steel through bolts, full height of door section. Form meeting rails to provide a weathertight-seal joint.
  - 1. Reinforce sections with continuous horizontal and diagonal reinforcement, as required to stiffen door and for wind loading. Ensure that reinforcement does not obstruct vision lites.
  - 2. Provide reinforcement for hardware attachment.
- C. Full-Vision Sections: Manufacturer's standard, tubular, aluminum-framed section fully glazed with 6-mm-thick, glazing set in vinyl, rubber, or neoprene glazing channel and with removable extruded-vinyl or aluminum stops.

1. Thickness: ½ inches
2. Type: Tempered glass
3. Finish: Decorative stained glazing as selected from manufacturers full range
4. Thermally improved.
  - a. U-Value=0.35 maximum.
  - b. SHCF=0.40 maximum

## 2.2 STEEL DOOR ASSEMBLY (Trash Room)

- A. Basis-of-Design Product: Subject to compliance with requirements, provide 416 Series as manufactured by Overhead Door Corporation or comparable product.
- B. Size: As indicated on Drawings.
- C. Operation Cycles: Not less than 20,000
- D. Construction:
  1. Panel Thickness: 2 inches.
  2. Exterior Surface: Flush.
  3. Section Material: 16 gauge, galvanized steel.
  4. Center and End Stiles: 16 gauge steel.
  5. Windload Design: Provide to meet the Design/Performance requirements specified.
  6. Hardware: Galvanized steel hinges and fixtures. Ball bearing rollers with hardened steel races.
- E. Track: Provide track as recommended by manufacturer to suit loading required and clearances available.
- F. Locking Devices: Equip door with manufacturer's standard locking device assembly.
  1. Locking Device Assembly: Slide bolt locking bars, operable from inside.
- G. Weatherseal, manufacturers standard.
- H. Door Operator: Manual operation.
- I. Door Finish:
  1. Aluminum Finish: As selected by architect from manufacturers full range.
- J. Special Operations: Card reader, door timer, commercial light package and others as selected by Architect.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. Install sectional doors and operating equipment complete with necessary hardware, anchors, inserts, hangers, and equipment supports; according to manufacturer's written instructions and as specified.
- B. Tracks: Provide sway bracing, diagonal bracing, and reinforcement as required for rigid installation of track and door-operating equipment. Repair galvanized coating on tracks according to ASTM A 780.
- C. Adjust hardware and moving parts to function smoothly so that doors operate easily, free of warp, twist, or distortion. Adjust doors and seals to provide weathertight fit around entire perimeter.

3.2 DEMONSTRATION

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

END OF SECTION 083613

## SECTION 084113 - ALUMINUM-FRAMED ENTRANCES AND STOREFRONTS

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. This Section includes the following:
  - 1. Exterior and interior aluminum-framed storefronts.
    - a. Glazing is retained mechanically with gaskets on four sides.
  - 2. Exterior aluminum doors.
  - 3. Door operators and activation and safety devices
  - 4. Exterior insulated balcony doors
- B. Related Requirements:
  - 1. Division 08 Section "Glazing" for glazing associated with this Section.

#### 1.2 PERFORMANCE REQUIREMENTS

- A. General: Provide aluminum-framed systems, including anchorage, capable of withstanding, without failure, the effects of the following:
  - 1. Structural loads.
  - 2. Thermal movements.
  - 3. Movements of supporting structure indicated on Drawings including, but not limited to, story drift and deflection from uniformly distributed and concentrated live loads.
  - 4. Dimensional tolerances of building frame and other adjacent construction.
  - 5. Structural-sealant-glazed storefront shall withstand movements of supporting structure indicated on Drawings including, but not limited to, story drift, twist, column shortening, long-term creep, and deflection from uniformly distributed and concentrated live loads.
  - 6. Failure includes the following:
    - a. Deflection exceeding specified limits.
    - b. Thermal stresses transferred to building structure.
    - c. Framing members transferring stresses, including those caused by thermal and structural movements, to glazing.
    - d. Noise or vibration created by wind and thermal and structural movements.
    - e. Loosening or weakening of fasteners, attachments, and other components.
    - f. Sealant failure.
    - g. Failure of operating units to function properly.
- B. Wind Loads: Refer to Drawings for additional information;
  - 1. Zone 4, Wall, Typical; -23.2 / 23.2 psf
  - 2. Zone 5, Wall, Corners; -42.7 / 23.2 psf
- C. Deflection of Framing Members Normal to Wall Plane: Limited to 1/175 of clear span for spans up to 13 feet 6 inches and to 1/240 of clear span plus 1/4 inch for spans greater than 13 feet 6 inches or an amount that restricts edge deflection of individual glazing lites to 3/4 inch, whichever is less.
- D. Structural-Test Performance: Systems tested according to ASTM E 330 as follows:
  - 1. When tested at positive and negative wind-load design pressures, systems do not evidence deflection exceeding specified limits.
  - 2. When tested at 150 percent of positive and negative wind-load design pressures, systems, including anchorage, do not evidence material failures, structural distress, and permanent deformation of main framing members exceeding 0.2 percent of span.

3. Test Durations: As required by design wind velocity but not less than 10 seconds.

- E. Temperature Change (Range): Systems accommodate 120 deg F, ambient; 180 deg F, material surfaces.
- F. Air Infiltration: Maximum air leakage through fixed glazing and framing areas of systems of 0.06 cfm/sq. ft. of fixed wall area when tested according to ASTM E 283 at a minimum static-air-pressure difference of 6.24 psf (299 Pa).
- G. Water Penetration Under Static Pressure: Systems do not evidence water penetration through fixed glazing and framing areas when tested according to ASTM E 331 at a minimum static-air-pressure difference of 20 percent of positive wind-load design pressure, but not less than 10 psf (478 Pa)
- H. Condensation Resistance: Fixed glazing and framing areas of systems have condensation-resistance factor (CRF) of not less than 68 when tested according to AAMA 1503.
- I. Average Thermal Conductance: Fixed glazing and framing areas of systems have average U-factor of not more than 0.41 Btu/sq. ft. x h x deg F when tested according to AAMA 1503.
- J. Sound Transmission Class (STC) and Outdoor-Indoor Transmission Class (OITC): When tested to AAMA Specification 1801 and in accordance with ASTM E1425 and ASTM E90, the STC and OITC Rating shall not be less than:
  - 1. Glass to Center – 37 (STC) and 30 (OITC).

### 1.3 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Product Certifications for compliance with SHGC and U-Value (in lieu of labeling each glass pane)
- C. Shop Drawings: Include plans, elevations, sections, details, internal seals/weeping mechanisms and attachments to other work.
  - 1. Include structural analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
  - 2. For entrances, include hardware schedule and indicate operating hardware types, functions, quantities, and locations.
- D. Samples: For each exposed finish.
- E. Preconstruction Sealant Test Reports: For structural-sealant-glazed systems.
- F. Product test reports.
- G. Field quality-control test and inspection reports.

### 1.4 QUALITY ASSURANCE

- A. Installer Qualifications: Acceptable to manufacturer and capable of preparation of data for aluminum-framed systems including Shop Drawings based on testing and engineering analysis of manufacturer's standard units in assemblies similar to those indicated for this Project.
- B. Testing Agency Qualifications: Qualified according to ASTM E 699 for testing indicated.

- C. Engineering Responsibility: Prepare data for aluminum-framed systems, including Shop Drawings, based on testing and engineering analysis of manufacturer's standard units in systems similar to those indicated for this Project.
- D. Product Options: Information on Drawings and in Specifications establishes requirements for systems' aesthetic effects and performance characteristics. Aesthetic effects are indicated by dimensions, arrangements, alignment, and profiles of components and assemblies as they relate to sightlines, to one another, and to adjoining construction. Performance characteristics are indicated by criteria subject to verification by one or more methods including preconstruction testing, field testing, and in-service performance.
- E. Accessible Entrances: Comply with applicable provisions in the U.S. Architectural & Transportation Barriers Compliance Board's ADA-ABA Accessibility Guidelines and ICC/ANSI A117.1.
- F. Source Limitations for Aluminum-Framed Systems: Obtain from single source from single manufacturer.
- G. Preinstallation Conference: Conduct conference at Project Site.

## 1.5 WARRANTY

- A. Special Assembly Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of aluminum-framed systems that do not comply with requirements or that deteriorate as defined in this Section within specified warranty period.
  - 1. Warranty Period: 18 months from date of Substantial Completion.
- B. Special Finish Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components on which finishes fail within specified warranty period. Warranty does not include normal weathering.
  - 1. Warranty Period: 20 years from date of Substantial Completion.

## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

- A. Basis-of-Design Products: The design for aluminum-framed systems is based on products manufactured by EFCO.
- B. Exterior Storefront System: EFCO System 945 Thermal Quick Set Screw Spline Storefront/Ribbon.
  - 1. Frame
    - a. 4 ½-inch minimum depth
    - b. 2 ¼-inch minimum face dimension
    - c. Screw spline construction
  - 2. Thermal Break
    - a. All exterior aluminum shall be separated from interior aluminum by a rigid, structural thermal barrier. For purposes of this specification, a structural thermal barrier is defined as a system that shall transfer shear during bending and, therefore, promote composite action between the exterior and interior extrusions.
    - b. Barrier material shall be poured-in-place, two-part polyurethane. A nonstructural thermal barrier is unacceptable.
- C. Interior Storefront System: EFCO System 401 Flush-Glazed Storefront.
  - 1. Frame
    - a. 4 ½-inch minimum depth
    - b. 1 ¾-inch minimum face dimension

c. Screw spline construction

2.2 MATERIALS

- A. Aluminum Extrusions: Alloy and temper recommended by aluminum storefront manufacturer for strength, corrosion resistance, and application of required finish and not less than 0.080 inches wall thickness at any location for the main frame and complying with ASTM B 221: 6063-T6 alloy and temper.
- B. Fasteners: Aluminum, nonmagnetic stainless steel or other materials to be non-corrosive and compatible with aluminum framing members, trim hardware, anchors, and other components.
- C. Anchors, Clips, and Accessories: Aluminum, nonmagnetic stainless steel, or zinc-coated steel or iron complying with ASTM B 633 for SC 3 severe service conditions or other suitable zinc coating; provide sufficient strength to withstand design pressure indicated.
- D. Reinforcing Members: Aluminum, nonmagnetic stainless steel, or nickel/chrome-plated steel complying with ASTM B 456 for Type SC 3 severe service conditions, or zinc-coated steel or iron complying with ASTM B 633 for SC 3 severe service conditions or other suitable zinc coating; provide sufficient strength to withstand design pressure indicated.
- E. Tolerances: Reference to tolerances for wall thickness and other cross-sectional dimensions of storefront members are nominal and in compliance with AA Aluminum Standards and Data.

2.3 FRAMING SYSTEMS

- A. Framing Members: Manufacturer's standard extruded-aluminum framing members of thickness required and reinforced as required to support imposed loads.
  - 1. Thermal Barrier: Thermal break with ¼ inches separation consisting of a two part chemically curing, high density polyurethane which is mechanically and adhesively attached to the storefront sections, designed in accordance with AAMA TIR-A8 and tested according to AAMA 505.
- B. Brackets and Reinforcements: Manufacturer's standard high-strength aluminum with nonstaining, nonferrous shims for aligning system components.
- C. Fasteners and Accessories: Manufacturer's standard corrosion-resistant, nonstaining, nonbleeding fasteners and accessories compatible with adjacent materials.
  - 1. Where fasteners are subject to loosening or turning out from thermal and structural movements, wind loads, or vibration, use self-locking devices.
  - 2. Reinforce members as required to receive fastener threads.
- D. Concrete and Masonry Inserts: Hot-dip galvanized cast-iron, malleable-iron, or steel inserts complying with ASTM A 123/A 123M or ASTM A 153/A 153M requirements.
- E. Flashing: Manufacturer's standard corrosion-resistant, nonstaining, nonbleeding flashing compatible with adjacent materials. Form exposed flashing from sheet aluminum finished to match framing and of sufficient thickness to maintain a flat appearance without visible deflection.
- F. Framing System Gaskets and Sealants: Manufacturer's standard recommended by manufacturer for joint type.
- G. Manufacturers standard subsill with end dams.
- H. Mullion Fillers, provide manufacturers continuous fillers as required for project conditions and design.

## 2.4 GLAZING SYSTEMS

- A. Glazing: As specified in Division 8 Section "Glazing."
- B. Glazing Gaskets: Manufacturer's standard compression types, replaceable, molded or extruded, that maintain uniform pressure and watertight seal.
- C. Spacers and Setting Blocks: Manufacturer's standard elastomeric types.
- D. Bond-Breaker Tape: Manufacturer's standard TFE-fluorocarbon or polyethylene material to which sealants will not develop adhesion.
- E. Glazing Sealants: For structural-sealant-glazed storefront, as recommended by manufacturer for joint type, and as follows:
  - 1. Structural Sealant: ASTM C 1184, single-component neutral-curing silicone formulation that is compatible with system components with which it comes in contact, specifically formulated and tested for use as structural sealant and approved by a structural-sealant manufacturer for use in aluminum-framed systems indicated.
    - a. Color: Black
  - 2. Weatherseal Sealant: ASTM C 920 for Type S; Grade NS; Class 25; Uses NT, G, A, and O; chemically curing silicone formulation that is compatible with structural sealant and other system components with which it comes in contact; recommended by structural-sealant, weatherseal-sealant, and structural-sealant-glazed curtain-wall manufacturers for this use.

## 2.5 DOOR OPERATORS AND ACTIVATION AND SAFETY DEVICES

- A. Door Operators: Provide door operators of size recommended by manufacturer for door size, weight, and movement; for condition of exposure; and for long-term, maintenance-free operation under normal traffic load for type of occupancy indicated.
  - 1. Door Operator Performance: Provide door operators that will open and close doors and maintain them in fully closed position when subjected to Project's design wind loads.
  - 2. Electromechanical Operators: Concealed, self-contained, overhead unit powered by fractional-horsepower, permanent-magnet dc motor; with closing speed controlled mechanically by gear train and dynamically by braking action of electric motor; with solid-state microprocessor controller; UL 325; and with manual operation with power off.
- B. Push-Plate Switch: Momentary-contact door control switch with flat push-plate actuator with contrasting-colored, engraved message.
  - 1. Configuration: Square push plate with 4-by-4-inch junction box.
    - a. Mounting: Surface mounted on wall.
  - 2. Push-Plate Material: Stainless steel as selected by Architect from manufacturer's full range.
  - 3. Message: International symbol of accessibility.
- C. Electrical Interlocks: Unless units are equipped with self-protecting devices or circuits, provide electrical interlocks to prevent activation of operator when door is locked, latched, or bolted.

## 2.6 DOOR HARDWARE

- A. General: Provide heavy-duty units in sizes and types recommended by entrance system and hardware manufacturers for entrances and uses indicated.
  - 1. Opening-Force Requirements:
    - a. Egress Doors: Not more than 30 lbf required to set door in motion and not more than 15 lbf required to open door to minimum required width.

- B. Pivot Hinges:
  - 1. Heavy Duty Offset-Pivot Hinges: Provide top, bottom, and intermediate offset pivots at each door leaf.
- C. Continuous-Gear Hinges: Manufacturer's standard with stainless-steel bearings between knuckles; fabricated to full height of door and frame.
- D. Panic Exit Devices: Listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for panic protection, based on testing according to UL 305.
  - 1. Manufacturers standard mid-panel panic hardware concealed in the crossrail. Maximum projection in neutral position 1-3/32 inches.
- E. Cylinders:
  - 1. Furnished by Division 08 Section "Hardware"
- F. Operating Trim:
  - 1. Manufacturers standard offset pull, minimum 12 inches CTC.
- G. Closers: With accessories required for a complete installation, sized as required by door size, exposure to weather, and anticipated frequency of use, and adjustable to meet field conditions and requirements for opening force.
  - 1. Manufacturer's standard concealed closers.
- H. High performance sills.
- I. Surface-Mounted Holders:
  - 1. Glynn Johnson 100H series.
- J. Weather Stripping: Manufacturer's standard replaceable components.
  - 1. Compression Type: Made of ASTM D 2000, molded neoprene, or ASTM D 2287, molded PVC.
  - 2. Sliding Type: AAMA 701, made of wool, polypropylene, or nylon woven pile with nylon-fabric or aluminum-strip backing.
- K. Weather Sweeps: Manufacturer's standard exterior-door bottom sweep with concealed fasteners on mounting strip.
- L. Thresholds: Raised thresholds beveled with a slope of not more than 1:2, with maximum height of 1/2 inch.

## 2.7 FABRICATION

- A. Form aluminum shapes before finishing.
- B. Framing Members, General: Fabricate components that, when assembled, have the following characteristics:
  - 1. Profiles that are sharp, straight, and free of defects or deformations.
  - 2. Accurately fitted joints with ends coped or mitered.
  - 3. Means to drain water passing joints, condensation occurring within framing members, and moisture migrating within the system to exterior.
  - 4. Physical and thermal isolation of glazing from framing members.
  - 5. Accommodations for thermal and mechanical movements of glazing and framing to maintain required glazing edge clearances.
  - 6. Provisions for field replacement of glazing from interior.
  - 7. Fasteners, anchors, and connection devices that are concealed from view to greatest extent possible.
- C. Structural-Sealant-Glazed Framing Members: Include accommodations for using temporary support device to retain glazing in place while structural sealant cures.

- D. Mechanically Glazed Framing Members: Fabricate for flush glazing (without projecting stops).
- E. Doors:
  - 1. Door Frames: Reinforce as required to support loads imposed by door operation and for installing hardware.
    - a. At exterior doors, provide compression weather stripping at fixed stops.
    - b. At interior doors, provide silencers at stops to prevent metal-to-metal contact. Install three silencers on strike jamb of single-door frames and two silencers on head of frames for pairs of doors.
  - 2. Doors: Reinforce doors as required for installing hardware.
    - a. At pairs of exterior doors, provide sliding weather stripping retained in adjustable strip mortised into door edge.
    - b. At exterior doors, provide weather sweeps applied to door bottoms.
- F. Windows:
  - 1. Window Frame Joinery: Mitered and Mechanically clipped and/or staked. Factory sealed frame and corner joints.
  - 2. Fabricate aluminum windows in sizes indicated. Include a complete system for assembling components and anchoring windows.
  - 3. Fabricate aluminum windows that are re-glazable without dismantling sash or framing.
  - 4. Mullions: Provide mullions and cover plates as shown, matching window units, complete with anchors for support to structure and installation of window units. Allow for erection tolerances and provide for movement of window units due to thermal expansion and building deflections, as indicated. Provide mullions and cover plates capable of withstanding design loads of window units.
  - 5. Sub frames: Provide sub frames with anchors for window units as shown, of profile and dimensions indicated but not less than 0.070 inches thick extruded aluminum. Miter or cope corners, and join with concealed mechanical joint fasteners. Finish to match window units. Provide sub frames capable of withstanding design loads of window units.
- G. Glazing Stops: Provide snap-on glazing stops coordinated with Division 08 Section "Glazing" and glazing system indicated. Provide glazing stops to match frame.
- H. Hardware Installation: Factory install hardware to the greatest extent possible. Cut, drill, and tap for factory-installed hardware before applying finishes.
- I. After fabrication, clearly mark components to identify their locations in Project according to Shop Drawings.

## 2.8 ALUMINUM FINISHES

- A. Color Anodic Finish: AAMA 611, AA-M12C22A42/A44, Class I, 0.018 mm or thicker.
  - 1. Color: As selected by Architect.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. General:
  - 1. Fit joints to produce hairline joints free of burrs and distortion.
  - 2. Rigidly secure nonmovement joints.
  - 3. Install anchors with separators and isolators to prevent metal corrosion and electrolytic deterioration.
  - 4. Seal joints watertight, unless otherwise indicated.
- B. Metal Protection:

1. Where aluminum will contact dissimilar metals, protect against galvanic action by painting contact surfaces with primer or by applying sealant or tape or installing nonconductive spacers as recommended by manufacturer for this purpose.
  2. Where aluminum will contact concrete or masonry, protect against corrosion by painting contact surfaces with bituminous paint.
- C. Install components to drain water passing joints, condensation occurring within framing members, and moisture migrating within the system to exterior.
- D. Set continuous sill members, subsill including end dams and flashing in full sealant bed as specified in Division 7 Section "Joint Sealants" and to produce weathertight installation, comply with manufacturers installation instructions.
- E. Install components plumb and true in alignment with established lines and grades, without warp or rack.
- F. Install glazing as specified in Division 8 Section "Glazing."
- G. Entrances: Install to produce smooth operation and tight fit at contact points.
1. Exterior Entrances: Install to produce tight fit at weather stripping and weathertight closure.
  2. Field-Installed Hardware: Install surface-mounted hardware according to hardware manufacturers' written instructions using concealed fasteners to greatest extent possible.
- H. Install perimeter joint sealants as specified in Division 7 Section "Joint Sealants" and to produce weathertight installation.
- I. Erection Tolerances: Install aluminum-framed systems to comply with the following maximum tolerances:
1. Location and Plane: Limit variation from true location and plane to 1/8 inch in 12 feet 1/4 inch over total length.
  2. Alignment:
    - a. Where surfaces abut in line, limit offset from true alignment to 1/16 inch.
    - b. Where surfaces meet at corners, limit offset from true alignment to 1/32 inch
  3. Diagonal Measurements: Limit difference between diagonal measurement to 1/8 inch

### 3.2 FIELD QUALITY CONTROL

- A. Representative testing shall be completed in location and quantity as directed by Owner.
1. Provide two onsite water and air infiltration tests to be completed by independent testing agency.
- B. Should test failures occur Owner to determine follow up procedure.
- C. Testing to be completed to same testing standards as completed in laboratory or as agreed upon by Owner and Architect.
- D. Testing Services: Testing and inspecting of representative areas to determine compliance of installed systems with specified requirements shall take place as follows and in successive phases as indicated on Drawings. Do not proceed with installation of the next area until test results for previously completed areas show compliance with requirements.
- E. Repair or remove work if test results and inspections indicate that it does not comply with specified requirements.
- F. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

- G. Aluminum-framed assemblies will be considered defective if they do not pass tests and inspections.
- H. Prepare test and inspection reports.

### 3.3 ADJUSTING

- A. Entrances: Adjust operating hardware for smooth operation according to hardware manufacturers' written instructions.
  - 1. For doors accessible to people with disabilities, adjust closers to provide a 3-second closer sweep period for doors to move from a 70-degree open position to 3 inches from the latch measured to the leading door edge.

END OF SECTION 084113



## SECTION 085113 - ALUMINUM WINDOWS

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Section includes aluminum windows.

#### 1.2 DEFINITIONS

- A. Performance class designations according to AAMA/WDMA 101/I.S.2/NAFS:
- B. Performance grade number according to AAMA/WDMA 101/I.S.2/NAFS:
  - 1. Design pressure number in pounds force per square foot used to determine the structural test pressure and water test pressure.
- C. Structural Test Pressure: For uniform load structural test, is equivalent to 150 percent of the design pressure.
- D. Minimum Test Size: Smallest size permitted for performance class (gateway test size). Products must be tested at minimum test size or at a size larger than minimum test size to comply with requirements for performance class.

#### 1.3 SYSTEM REQUIREMENTS

- A. Design and Performance Requirements
  - 1. Applications of windows include:
    - a. Residential: C40 rating (design test pressure of 60 psf required). b. Light Commercial: C40 rating (design test pressure of 60 psf required).
    - b. Air, water, structural, and forced entry resistance shall be at levels which meet the specified design pressure as per ANSI/AAMA/NWDA 101/I.S.2-97, 101/I.S.2/NAFS-02, or AAMA/WDMA/CSA 101/I.S.2/A440-05.
  - 2. Air Infiltration:
    - a. Complete testing in accordance with ASTM E 283, at a static air pressure of 1.57 psf with resultant air infiltration not to exceed 0.30 cfm/ft.
    - 3. Water Resistance:
      - b. Complete testing in accordance with ASTM E 331 and ASTM E 547, at a static pressure difference of 6.00 psf with no resulting uncontrolled water leakage.
  - 3. Uniform Structural Load:
    - a. Complete testing in accordance with ASTM E 330-02, at a static pressure of 60 psf positive load and 60 psf negative load with no resulting glass breakage, permanent damage to fasteners, hardware parts, frame or other components.
    - b. The entire window system shall not deflect more than 0.411 inches at a design pressure (DP) of 40 psf.
  - 4. Forced Entry Resistance:
    - a. Complete testing in accordance with ASTM F 588-07 Grade 10 with no entry.
  - 5. Unique, non-listed unit's performance, when not tested, may be addressed by a manufacturer's Statement of Qualification.
  - 6. Mullion design can be adequate for specified design pressure.
- B. Energy Ratings

1. All units tested are identified with RAM ID No. as listed on the NFRC label adhered to each unit. Values are certified per NFRC and units are labeled per state requirements. 2. U-Factor:
  - a. Values to range between 0.45 and 0.61 per NFRC 100-2004 depending on specified design.
  - b. SHGC:
    - 1) North and East: 0.39
    - 2) South and West: 0.27
  - c. Values to range between 0.19 and 0.56 per NFRC 200-2004 depending on specified design.
2. Unique, non-listed units may have U-Factor & SHGC determined by NFRC procedures and listed on a manufacturer's Statement of Qualification.

C. Emergency Escape and Rescue

1. Larger widths/heights with standard hardware will comply with emergency escape and rescue requirements of Building Codes (greater or equal to 5.7 Sqft. of clear opening).

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings:

1. Submit complete catalog data on all materials as described in Part Two below for windows including all test data for proposed units. Include proposed method of isolating aluminum from dissimilar metals. Catalog data shall be clearly marked to denote the items that are being submitted.
2. Submit installers certification, signed by an officer of the company, certifying that the installer has a minimum of five years experience installing commercial windows. The installer shall submit the names and points of contact for at least three successfully completed school projects.
3. Submit complete shop drawings including:
  - a. Frame sections including head, jamb and sill details that show the building structure and where in the opening the window is located. Show all attachment detail. Show limits device details and mounting details.
  - b. Window dimensions: window unit sizes and required rough opening dimensions.
  - c. Operating hardware information.
  - d. Name of the balance manufacturer and catalog numbers of each type of balance used.

C. Samples: For each exposed product and for each color specified, 12 inches.

D. Test Reports: In addition to providing proof of AAMA rating, provide AAMA 910-10 Life Cycle Test results from an independent laboratory. Submit results of life cycle tests for actual live load testing. Test reports shall be no older than four years old from the date of the award of the Contract. Sample warranties.

E. Product Certification: To prove energy compliance, window manufacturer shall submit certification that their proposed window system meets the AW criteria and AAMA certification. Submit a NFRC Bid Report at time of bid. Submit a NFRC Label Certificates as a submittal item.

F. Operation and Maintenance data

1.5 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

## 1.6 QUALITY ASSURANCE

- A. **Installer Qualifications:** An installer acceptable to aluminum window manufacturer for installation of units required for this Project.
  - 1. Installer's responsibilities include providing professional engineering services needed to assume engineering responsibility.
  - 2. **Engineering Responsibility:** Preparation of data for aluminum windows, including Shop Drawings, based on testing and engineering analysis of manufacturer's standard units in assemblies similar to those indicated for this Project.
- B. **Manufacturer Qualifications:** A manufacturer capable of fabricating aluminum windows that meet or exceed performance requirements indicated and of documenting this performance by inclusion in lists and by labels, test reports, and calculations.
- C. **Source Limitations:** Obtain aluminum windows through one source from a single manufacturer.
- D. **Product Options:** Information on Drawings and in Specifications establishes requirements for aluminum windows' aesthetic effects and performance characteristics. Aesthetic effects are indicated by dimensions, arrangements, alignment, and profiles of components and assemblies as they relate to sightlines, to one another, and to adjoining construction. Performance characteristics are indicated by criteria subject to verification by one or more methods including preconstruction testing, field testing, and in-service performance.
- E. **Product Options:** Drawings indicate size, profiles, and dimensional requirements of aluminum windows and are based on the specific system indicated. Refer to Division 01 Section "Product Requirements." Do not modify size and dimensional requirements.
  - 1. Do not modify intended aesthetic effects, as judged solely by Architect, except with Architect's approval. If modifications are proposed, submit comprehensive explanatory data to Architect for review.
- F. **Fenestration Standard:** Comply with AAMA/WDMA 101/I.S.2/NAFS, "North American Fenestration Standard Voluntary Performance Specification for Windows, Skylights and Glass Doors," for definitions and minimum standards of performance, materials, components, accessories, and fabrication. Comply with more stringent requirements if indicated.
  - 1. Provide AAMA certified aluminum windows with an attached label.
- G. **Glazing Publications:** Comply with published recommendations of glass manufacturers and with GANA's "Glazing Manual" unless more stringent requirements are indicated.
- H. **Preinstallation Conference:** Conduct conference at Project site to comply with requirements in Division 01 Section "Project Management and Coordination." Review methods and procedures related to aluminum windows including, but not limited to, the following:
  - 1. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
  - 2. Review and discuss the finishing of aluminum windows that is required to be coordinated with the finishing of other aluminum work for color and finish matching.
  - 3. Review, discuss, and coordinate the interrelationship of aluminum windows with other exterior wall components. Include provisions for structural anchorage, glazing, flashing, weeping, sealants, and protection of finishes.
  - 4. Review and discuss the sequence of work required to construct a watertight and weathertight exterior building envelope.
  - 5. Inspect and discuss the condition of substrate and other preparatory work performed by other trades.

## 1.7 PROJECT CONDITIONS

- A. Field Measurements: Verify aluminum window openings by field measurements before fabrication and indicate measurements on Shop Drawings.
  - 1. Established Dimensions: Where field measurements cannot be made without delaying the Work, establish opening dimensions and proceed with fabricating aluminum windows without field measurements. Coordinate wall construction to ensure that actual opening dimensions correspond to established dimensions.

## 1.8 WARRANTY

- A. Warranty: The window manufacturer shall provide a warranty statement.
  - 1. Warranty shall be for five years past final acceptance of the project on materials, including all hardware, and ten years on insulated glass units, when insulated glass units are provided.
  - 2. The finish warranty is to be for ten years from the date of final acceptance.
  - 3. This warranty shall include all labor and materials.
  - 4. Acts of vandalism are not covered by this warranty after final acceptance of the project.
  - 5. The installation warranty will be for two years from the date of final acceptance with warranty walk-throughs every six months during the installation warranty period.

## PART 2 - PRODUCTS

### 2.1 ALUMINUM WINDOWS

- A. Basis of Design Manufacturers: Subject to compliance with requirements, provide 4250 Series as manufactured by Cascade windows.
- B. Configurations: As indicated on Drawings.

### 2.2 GLAZING

- A. Factory Glazing: Dual-pane, EC + Low-E glass with warm edge spacer.

### 2.3 ALUMINUM FINISHES

- A. Color Anodic Finish: AAMA 611, AA-M12C22A32/A34, Class II, 0.010 mm or thicker.
  - 1. Color: As selected by Architect from manufacturer's standards.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Verify that window openings are dimensionally correct and within allowable manufacturer's installation tolerances. Openings shall be plumb, level, and clean. A solid anchoring system shall be provided in accordance with approved shop drawings.

- B. Windows shall be installed with protection against air-infiltration around frames or between mulled units. Fill frames with insulation, backer rod and caulk all perimeters (inside and outside). As an alternative, expandable foam type insulation shall be used. Specify type and minimum – maximum expansion.
- C. Examine openings, substrates, structural support, anchorage, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of work. Verify rough opening dimensions, levelness of sill plate and operational clearances. Examine wall flashings, vapor retarders, water and weather barriers, and other built-in components to ensure a coordinated, weather tight window installation.
  - 1. Masonry Surfaces: Visibly dry and free of excess mortar, sand, and other construction debris.
  - 2. Wood Frame Walls: Dry, clean, sound, well nailed, free of voids, and without offsets at joints. Ensure that nail heads are driven flush with surfaces in opening and within 3 inches (76.2 mm) of opening.
  - 3. Metal Surfaces: Dry; clean; free of grease, oil, dirt, rust, corrosion, and welding slag; without sharp edges or offsets at joints.
  - 4. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 INSTALLATION

- A. Comply with Drawings, Shop Drawings, and manufacturer's written instructions for installing windows, hardware, accessories, and other components.
  - 1. For installation procedures and requirements not addressed in manufacturer's written instructions, comply with installation requirements in ASTM E 2112.
- B. Install aluminum framed window system level, plumb, square, true to line, without distortion or impeding thermal movement, anchored securely in place to structural support, and in proper relation to wall flashing and other adjacent construction.
- A. Separate aluminum and other corrodible surfaces from sources of corrosion or electrolytic action at points of contact with other materials Set sill members in bed of sealant or with gaskets, as indicated, for weather tight construction.
- B. Install aluminum framed window system and components to drain condensation, water penetrating joints, and moisture migrating within system to the exterior.
- C. Separate aluminum from dissimilar materials to prevent corrosion or electrolytic action at points of contact.

### 3.3 FIELD QUALITY CONTROL

- A. Testing Agency: Engage a qualified testing agency to perform tests and inspections and prepare test reports.
  - 1. Testing and inspecting agency will interpret tests and state in each report whether tested work complies with or deviates from requirements.
- B. Testing Services: Testing and inspecting of installed windows shall take place as follows:
  - 1. Testing Methodology: Testing Standard shall be per AAMA 502, Method A including reference to ASTM E 783 for Air Infiltration Test and ASTM E 1105 for Water Penetration Test.
  - 2. Testing Extent: Architect shall select 10 percent of installed window units to be tested as soon as a representative portion of the project has been installed, glazed, perimeter caulked and cured. Conduct tests for air infiltration and water penetration with manufacturer's representative present.
  - 3. Test Reports: Shall be prepared according to AAMA 502.

3.4 ADJUSTING, CLEANING, AND PROTECTION

- A. Adjust operating sashes, screens, hardware, and accessories for a tight fit at contact points and weather stripping for smooth operation and weather tight closure. Lubricate hardware and moving parts.
- B. Clean aluminum surfaces immediately after installing windows. Avoid damaging protective coatings and finishes. Remove excess sealants, glazing materials, dirt, and other substances.
- C. Clean glass immediately after installing windows. Comply with manufacturer's written recommendations for final cleaning and maintenance. Remove nonpermanent labels, and clean surfaces.
- D. Remove and replace glass that has been broken, chipped, cracked, abraded, or damaged during construction period.
- E. Protect window surfaces from contact with contaminating substances resulting from construction operations. In addition, monitor window surfaces adjacent to and below exterior concrete and masonry surfaces during construction for presence of dirt, scum, alkaline deposits, stains, or other contaminants. If contaminating substances do contact window surfaces, remove contaminants immediately according to manufacturer's written recommendations.

END OF SECTION 085113

## SECTION 088000 - GLAZING

### PART 1 - GENERAL

#### 1.1 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. Windows.
  - 2. Doors.
- B. Related Sections:
  - 1. Refer to Division 08 Section "Composite Windows" for glazing in windows.

#### 1.2 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Design glass, including comprehensive engineering analysis according to ICC's 2003 International Building Code by a qualified professional engineer, using the following design criteria:
  - 1. Design Wind Pressures and Grade Performance: As indicated on Drawings.
  - 2. 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.
  - 3. Differential Shading: Design glass to resist thermal stresses induced by differential shading within individual glass lites.

#### 1.3 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.

#### 1.4 SUBMITTALS

- A. Product Data: For each glass product and glazing material indicated.
  - 1. For glazing sealants used inside of the weatherproofing system, including printed statement of VOC content.
- B. Glass Samples: For each type of glass product other than clear monolithic vision glass; 12 inches square.
- C. Glazing Schedule: List glass types and thicknesses for each size opening and location. Use same designations indicated on Drawings.
- D. Delegated-Design Submittal: For glass indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
- E. Preconstruction adhesion and compatibility test report.

#### 1.5 QUALITY ASSURANCE

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

1. IGMA Publication for Insulating Glass: SIGMA TM-3000, "North American Glazing Guidelines for Sealed Insulating Glass Units for Commercial and Residential Use."
  - B. 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.
  - C. Insulating-Glass Certification Program: Permanently marked either on spacers or on at least one component lite of units with appropriate certification label of IGCC.
- 1.6 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 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 Substantial Completion.

## 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.
- 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. 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. 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.
  2. 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.
  3. Visible Reflectance: Center-of-glazing values, according to NFRC 300.

### 2.2 GLASS PRODUCTS

- A. Float Glass: ASTM C 1036, Type I, Quality-Q3, Class I (clear) unless otherwise indicated.
- B. Float Glass: ASTM C 1036, Type I, Quality-Q3, Class I, complying with other requirements specified and with visible light transmission not less than 91 percent.

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

### 2.3 INSULATING GLASS

- A. Basis-of-Design Product: The design for insulated glass systems is based on Solarban 70XL by PPG Industries Inc for the South and West Facades and Solarban 60 by PPG Industries Inc for the North and East Facades. Subject to compliance with requirements, provide the named product or a comparable product by one of the following:
  - 1. Cardinal Glass Industries
  - 2. Guardian Industries Corp.
  - 3. Viracon Inc
- B. 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.
  - 2. Spacer: Thermally broken aluminum.

### 2.4 DECORATIVE FILM

- A. Decorative Self Adhered, decorative film overlay: Use translucent, dimensionally stable, cast PVC film, 2-mil- (0.05-mm-) minimum thickness, with pressure-sensitive, clear adhesive back for adhering to glass and releasable protective backing.
  - 1. Fasara 3M - Fine Crystal Decorative / Privacy Glazing Film:
    - a. Ultraviolet Rejected (ASTM E 903): Not less than 99 percent.
    - b. Visible Light Transmission (ASTM E 903, ASTM E308): Not more than 83 percent.
    - c. Visible Light Rejected (ASTM E 903): Not less than 8 percent.
    - d. Solar Heat Reduction: Not less than 7 percent.
    - e. Shading Coefficient at 90 Degrees (Normal Incidence) (ASTM E 903): Not less than 0.93.

### 2.5 GLAZING GASKETS

- A. Dense Compression Gaskets: Molded or extruded gaskets of profile and hardness required to maintain watertight seal, made from the following:
  - 1. Silicone complying with ASTM C 1115.
- B. Soft Compression Gaskets: Extruded or molded, closed-cell, integral-skinned silicone] gaskets complying with ASTM C 509, Type II, black; of profile and hardness required to maintain watertight seal.
  - 1. Application: Use where soft compression gaskets will be compressed by inserting dense compression gaskets on opposite side of glazing or pressure applied by means of pressure-glazing stops on opposite side of glazing.

### 2.6 GLAZING SEALANTS

- A. General:
  - 1. Compatibility: Provide glazing sealants that are compatible with one another and with other materials they will contact, including glass products, seals of insulating-glass units, and glazing channel substrates, under conditions of service and application, as demonstrated by sealant manufacturer based on testing and field experience.
  - 2. Suitability: Comply with sealant and glass manufacturers' written instructions for selecting glazing sealants suitable for applications indicated and for conditions existing at time of installation.
  - 3. VOC Content: Refer to Division 01 Section "Sustainable Design Requirements".
  - 4. Colors of Exposed Glazing Sealants: As selected by Architect from manufacturer's full range.
- B. Glazing Sealant: Neutral-curing silicone glazing sealant complying with ASTM C 920, Type S, Grade NS, Class 100/50, Use NT.

## 2.7 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 804.3 tape, where indicated.
  2. AAMA 806.3 tape, for glazing applications in which tape is subject to continuous pressure.
  3. AAMA 807.3 tape, for glazing applications in which tape is not subject to continuous pressure.

## 2.8 MISCELLANEOUS GLAZING MATERIALS

- A. Cleaners, Primers, and Sealers: Types recommended by sealant or gasket manufacturer.
- B. Setting Blocks: Elastomeric material with a Shore, Type A durometer hardness of 85, plus or minus 5.
- C. Spacers: Elastomeric blocks or continuous extrusions of hardness required by glass manufacturer to maintain glass lites in place for installation indicated.
- D. Edge Blocks: Elastomeric material of hardness needed to limit glass lateral movement (side walking).
- E. Cylindrical Glazing Sealant Backing: ASTM C 1330, Type O (open-cell material), of size and density to control glazing sealant depth and otherwise produce optimum glazing sealant performance.

## 2.9 MONOLITHIC-GLASS TYPES

- A. Glass Type A: Clear float glass or heat-strengthened float glass or fully tempered float glass.
1. Thickness: 6.0 mm.
- B. Glazing Type B – Decorative with film, uncoated Clear Float Glass; Where glass as designated below is indicated, provide Type I (transparent glass, flat), Class 1 (clear) glass lites complying with the following:
1. Kind FT (heat strengthened) or tempered where required), Condition A (uncoated surfaces).
  2. Uncoated Clear Annealed Float Glass: Annealed or Kind HS (heat strengthened), Condition A (uncoated surfaces) where heat strengthening is required to resist thermal stresses induced by differential shading of individual glass lites and to comply with performance requirements.

## 2.10 INSULATING-GLASS TYPES

- A. Glass Type C: Low-e-coated, clear insulating glass.
1. Overall Unit Thickness: 1 inch
  2. Thickness of Each Glass Lite: 6.0 mm.
  3. Outdoor Lite: Clear heat-strengthened float glass.
  4. Interspace Content: Air
  5. Indoor Lite: Clear heat-strengthened float glass or clear fully tempered float glass.
  6. Low-E Coating: Pyrolytic or sputtered on second or third surface.
  7. Provide safety glazing labeling.
  8. North and East Walls: PPG Solarban 60
    - a. Winter Nighttime U-Factor: 0.29 maximum.
    - b. Solar Heat Gain Coefficient: 0.39.
  9. South and West Walls: PPG Solarban 70XL
    - a. Winter Nighttime U-Factor: 0.28 maximum.
    - b. Solar Heat Gain Coefficient: 0.27.

## PART 3 - EXECUTION

### 3.1 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.
- 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.

### 3.2 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. Apply heel bead of elastomeric sealant.
- F. Center glass lites in openings on setting blocks and press firmly against tape by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centers of openings.
- G. Apply cap bead of elastomeric sealant over exposed edge of tape.

### 3.3 GASKET GLAZING (DRY)

- A. Cut compression gaskets to lengths recommended by gasket manufacturer to fit openings exactly, with allowance for stretch during installation.

- B. Insert soft compression gasket between glass and frame or fixed stop so it is securely in place with joints miter cut and bonded together at corners.
- C. Installation with Drive-in Wedge Gaskets: Center glass lites in openings on setting blocks and press firmly against soft compression gasket by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centers of openings. Compress gaskets to produce a weathertight seal without developing bending stresses in glass. Seal gasket joints with sealant recommended by gasket manufacturer.
- D. Installation with Pressure-Glazing Stops: Center glass lites in openings on setting blocks and press firmly against soft compression gasket. Install dense compression gaskets and pressure-glazing stops, applying pressure uniformly to compression gaskets. Compress gaskets to produce a weathertight seal without developing bending stresses in glass. Seal gasket joints with sealant recommended by gasket manufacturer.
- E. Install gaskets so they protrude past face of glazing stops.

#### 3.4 SEALANT GLAZING (WET)

- A. Install continuous spacers, or spacers combined with cylindrical sealant backing, between glass lites and glazing stops to maintain glass face clearances and to prevent sealant from extruding into glass channel and blocking weep systems until sealants cure. Secure spacers or spacers and backings in place and in position to control depth of installed sealant relative to edge clearance for optimum sealant performance.
- B. Force sealants into glazing channels to eliminate voids and to ensure complete wetting or bond of sealant to glass and channel surfaces.
- C. Tool exposed surfaces of sealants to provide a substantial wash away from glass.

#### 3.5 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.

END OF SECTION 088000

## SECTION 089119 - FIXED LOUVERS

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Section includes fixed, extruded-aluminum louvers.
- B. Related Requirements: Refer to Mechanical Drawings for percentage of opening required

#### 1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product.
  - 1. For louvers specified to bear AMCA seal, include printed catalog pages showing specified models with appropriate AMCA Certified Ratings Seals.
- B. Shop Drawings: For louvers and accessories. Include plans, elevations, sections, details, and attachments to other work. Show frame profiles and blade profiles, angles, and spacing.
- C. Samples: For each type of metal finish required.
- D. Delegated-Design Submittal: For louvers indicated to comply with structural performance requirements, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

#### 1.3 INFORMATIONAL SUBMITTALS

- A. Product Test Reports: Based on tests performed according to AMCA 500-L.

### PART 2 - PRODUCTS

#### 2.1 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Design louvers, including comprehensive engineering analysis by a qualified professional engineer, using structural performance requirements and design criteria indicated.
- B. Louver Performance Ratings: Provide louvers complying with requirements specified, as demonstrated by testing manufacturer's stock units identical to those provided, except for length and width according to AMCA 500-L.

#### 2.2 FIXED, EXTRUDED-ALUMINUM LOUVERS

- A. Horizontal, Wind-Driven-Rain-Resistant Louver:
  - 1. Louver Depth: inches
  - 2. Frame and Blade Nominal Thickness: Not less than 0.080 inch
  - 3. Louver Performance Ratings:

- a. Free Area: As indicated.
  - b. Air Performance: As indicated.
  - c. Wind-Driven Rain Performance: Not less than 95 percent effectiveness when subjected to a rainfall rate of 3 inches per hour and a wind speed of 29 mph at a core-area intake velocity of 300 fpm
4. AMCA Seal: Mark units with AMCA Certified Ratings Seal.

## 2.3 MATERIALS

- A. Aluminum Extrusions: ASTM B 221, Alloy 6063-T5, T-52, or T6.
- B. Aluminum Sheet: ASTM B 209, Alloy 3003 or 5005 with temper as required for forming, or as otherwise recommended by metal producer for required finish.
- C. Fasteners: Use types and sizes to suit unit installation conditions.
  1. Use Phillips flat-head screws for exposed fasteners unless otherwise indicated.
  2. For fastening aluminum, use aluminum or 300 series stainless-steel fasteners.
  3. For fastening galvanized steel, use hot-dip-galvanized steel or 300 series stainless-steel fasteners.
  4. For fastening stainless steel, use 300 series stainless-steel fasteners.
  5. For color-finished louvers, use fasteners with heads that match color of louvers.
- D. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D 1187.

## 2.4 FABRICATION

- A. Fabricate frames, including integral sills, to fit in openings of sizes indicated, with allowances made for fabrication and installation tolerances, adjoining material tolerances, and perimeter sealant joints.
- B. Join frame members to each other and to fixed louver blades with fillet welds concealed from view, threaded fasteners, or both, as standard with louver manufacturer unless otherwise indicated or size of louver assembly makes bolted connections between frame members necessary.

## 2.5 ALUMINUM FINISHES

- A. High-Performance Organic Finish: Three coat fluoropolymer finish complying with AAMA 2605 and containing not less than 50 percent PVDF resin by weight in both color coat and clear topcoat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
  1. Color and Gloss: As selected by Architect from manufacturer's full range

## PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. Locate and place louvers level, plumb, and at indicated alignment with adjacent work.
- B. Use concealed anchorages where possible. Provide brass or lead washers fitted to screws where required to protect metal surfaces and to make a weathertight connection.
- C. Provide perimeter reveals and openings of uniform width for sealants and joint fillers, as indicated.

- D. Protect unpainted galvanized and nonferrous-metal surfaces that are in contact with concrete, masonry, or dissimilar metals from corrosion and galvanic action by applying a heavy coating of bituminous paint or by separating surfaces with waterproof gaskets or nonmetallic flashing.

3.2 ADJUSTING

- A. Restore louvers damaged during installation and construction so no evidence remains of corrective work. If results of restoration are unsuccessful, as determined by Architect, remove damaged units and replace with new units.

END OF SECTION 089119

