SECTION 081113 - HOLLOW METAL DOORS AND FRAMES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes hollow-metal work.

B. Related Requirements:

1. Section 087100 "Door Hardware" for door hardware for hollow-metal doors.

1.3 DEFINITIONS

A. Minimum Thickness: Minimum thickness of base metal without coatings according to NAAMM-HMMA 803 or SDI A250.8.

1.4 PERFORMANCE REQUIREMENTS

A. Windborne-Debris-Impact-Resistance Performance: Provide aluminum-framed systems that pass missile-impact and cyclic-pressure tests when tested according to ASTM E 1886 and testing information in ASTM E 1996.

1. Large-Missile Impact: For aluminum-framed systems located within 30 feet of grade.

B. Uniform Wind Load Capacity: Design, size and install components to withstand positive and negative wind loading pressures in accordance with International Building Code, as determined by Structural Engineer.

1.5 COORDINATION

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

1.6 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.7 ACTION SUBMITTALS

A. Product Data: For each type of product.

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

B. Shop Drawings: Include the following:

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

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

1.8 INFORMATIONAL SUBMITTALS

A. Product Test Reports: For each type of hollow-metal door and frame assembly, for tests performed by a qualified testing agency.

B. Certification of Thermal Performance: For exterior, thermal rated assemblies, provide certification that thermal performance complies with Section 5 of ASHRAE/IESNA Standard 90.1.

1.9 DELIVERY, STORAGE, AND HANDLING

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

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

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

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

PART 2 - PRODUCTS

2.1 REGULATORY 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 and temperature-rise limits indicated, based on testing at positive pressure according to NFPA 252 or UL 10C.

B. Fire-Rated, Borrowed-Lite Assemblies: Complying with NFPA 80 and listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction for fire-protection ratings indicated, based on testing according to NFPA 257 or UL 9.

2.2 INTERIOR DOORS AND FRAMES

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

B. Extra-Heavy-Duty Doors and Frames: SDI A250.8, Level 3.

1. Physical Performance: Level A according to SDI A250.4.
2. Doors:

    a. Type: As indicated in the Door and Frame Schedule.
    b. Thickness: 1-3/4 inches.
    c. Face: Uncoated, cold-rolled steel sheet, minimum thickness of 0.053 inch (16 gauge).
    d. Edge Construction: Model 2, Seamless.
    e. Core: Manufacturer's standard kraft-paper honeycomb, polystyrene, polyurethane, polyisocyanurate, or mineral-board core at manufacturer's discretion.

3. Frames:

    a. Materials: Uncoated, steel sheet, minimum thickness of 0.053 inch.
    b. Sidelite and Transom Frames: Fabricated from same thickness material as adjacent door frame.
    c. Construction: Full profile welded.

4. Exposed Finish: Prime.

2.3 EXTERIOR HOLLOW-METAL DOORS AND FRAMES

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

B. Extra-Heavy-Duty Doors and Frames: SDI A250.8, Level 3. At exterior locations, unless otherwise indicated.

1. Physical Performance: Level A according to SDI A250.4.
2. Doors:

    a. Type: As indicated in the Door and Frame Schedule.
    b. Thickness: 1-3/4 inches

c. Face: Metallic-coated steel sheet, minimum thickness of 0.053 inch (16 gauge), with minimum A40 coating.
d. Edge Construction: Model 2, Seamless.
e. Core: Polyisocyanurate.

1) Thermal-Rated Doors: Provide doors fabricated with thermal-resistance value (R-value) complying with Section 5 of ASHRAE/IESNA Standard 90.1.

3. Frames:

a. Materials: Metallic-coated steel sheet, minimum thickness of 0.053 inch, with minimum A40 coating.
b. Construction: Full profile welded.

4. Exposed Finish: Prime.

2.4 BORROWED LITES

A. Hollow-metal frames of uncoated or metallic-coated steel sheet as appropriate for application, minimum thickness of 0.053 inch.

B. Construction: Full profile welded.

2.5 FRAME ANCHORS

A. Jamb Anchors:

1. Masonry Type: Adjustable strap-and-stirrup or T-shaped anchors to suit frame size, not less than 0.042 inch thick, with corrugated or perforated straps not less than 2 inches wide by 10 inches long; or wire anchors not less than 0.177 inch thick.
2. Stud-Wall Type: Designed to engage stud, welded to back of frames; not less than 0.042 inch thick.
3. Compression Type for Drywall Slip-on Frames: Adjustable compression anchors.
4. Postinstalled Expansion Type for In-Place Concrete or Masonry: Minimum 3/8-inch-diameter bolts with expansion shields or inserts. Provide pipe spacer from frame to wall, with throat reinforcement plate, welded to frame at each anchor location.

B. Floor Anchors: Formed from same material as frames, minimum thickness of 0.042 inch, and as follows:

1. Monolithic Concrete Slabs: Clip-type anchors, with two holes to receive fasteners.

2.6 MATERIALS

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

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

C. Metallic-Coated Steel Sheet: ASTM A 653/A 653M, Commercial Steel (CS), Type B.

D. Frame Anchors: ASTM A 879/A 879M, Commercial Steel (CS), 04Z 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. Power-Actuated Fasteners in Concrete: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with clips or other accessory devices for attaching hollow-metal frames of type indicated.

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

2.7 FABRICATION

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

B. Hollow-Metal Doors:

1. Steel-Stiffened Door Cores: Provide minimum thickness 0.026 inch, steel vertical stiffeners of same material as face sheets extending full-door height, with vertical webs spaced not more than 6 inches apart. Spot weld to face sheets no more than 5 inches o.c. Fill spaces between stiffeners with glass- or mineral-fiber insulation.
2. Fire Door Cores: As required to provide fire-protection and temperature-rise ratings indicated.
3. Vertical Edges for Single-Acting Doors: Provide beveled or square edges at manufacturer's discretion.
4. Top Edge Closures: Close top edges of doors with inverted closures, except provide flush closures at exterior doors of same material as face sheets.
5. Bottom Edge Closures: Close bottom edges of doors with end closures or channels of same material as face sheets.
6. Exterior Doors: Provide weep-hole openings in bottoms of exterior doors to permit moisture to escape. Seal joints in top edges of doors against water penetration.
7. Astragals: Provide overlapping astragal on one leaf of pairs of doors where required by NFPA 80 for fire-performance rating or where indicated. Extend minimum 3/4 inch beyond edge of door on which astragal is mounted or as required to comply with published listing of qualified testing agency.

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

1. Sidelite and Transom Bar Frames: Provide closed tubular members with no visible face seams or joints, fabricated from same material as door frame. Fasten members at crossings and to jambs by butt welding.
2. Provide countersunk, flat- or oval-head exposed screws and bolts for exposed fasteners unless otherwise indicated.
3. Floor Anchors: Weld anchors to bottoms of jambs with at least four spot welds per anchor; however, for slip-on drywall frames, provide anchor clips or countersunk holes at bottoms of jambs.
4. Jamb Anchors: Provide number and spacing of anchors as follows:

a. Masonry Type: Locate anchors not more than 16 inches from top and bottom of frame. Space anchors not more than 32 inches o.c., to match coursing, 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 one 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 one additional anchor per jamb for each 24 inches or fraction thereof above 96 inches high.

c. Compression Type: Not less than two anchors in each frame.
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.

5. Head Anchors: Two anchors per head for frames more than 42 inches wide and mounted in metal-stud partitions.
6. Door Silencers: Except on weather-stripped frames, drill stops to receive door silencers as follows. Keep holes clear during construction.

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

7. Terminated Stops: Terminate stops 6 inches above finish floor with a 45-degree angle cut, and close open end of stop with steel sheet closure. Cover opening in extension of frame with welded-steel filler plate, with welds ground smooth and flush with frame.

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

E. Hardware Preparation: Factory prepare hollow-metal work to receive templated mortised hardware; include cutouts, reinforcement, mortising, drilling, and tapping according to SDI A250.6, the Door Hardware Schedule, and templates.

1. Reinforce doors and frames to receive nontemplated, mortised, and surface-mounted door hardware.
2. Comply with applicable requirements in SDI A250.6 and BHMA A156.115 for preparation of hollow-metal work for hardware.

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

1. Single Glazed Lites: Provide fixed stops and moldings welded on secure side of hollow-metal work.
2. Multiple Glazed Lites: Provide fixed and removable stops and moldings so that each glazed lite is capable of being removed independently.
3. Provide fixed frame moldings on outside of exterior and on secure side of interior doors and frames.

4. Provide loose stops and moldings on inside of hollow-metal work.
5. Coordinate rabbet width between fixed and removable stops with glazing and installation types indicated.

2.8 STEEL FINISHES

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

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

2.9 ACCESSORIES

A. Mullions and Transom Bars: Join to adjacent members by welding or rigid mechanical anchors.

PART 3 - EXECUTION

3.1 EXAMINATION

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

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

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

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

3.2 PREPARATION

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

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

3.3 INSTALLATION

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

B. Hollow-Metal Frames: Install hollow-metal frames for doors, transoms, sidelites, borrowed lites, and other openings, of size and profile indicated. Comply with SDI A250.11 or NAAMM-HMMA 840 as required by standards specified.

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-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 stops located on secure side of opening.
    d. Remove temporary braces necessary for installation only after frames have been properly set and secured.
    e. Check plumb, square, and twist of frames as walls are constructed. Shim as necessary to comply with installation tolerances.

2. Metal-Stud Partitions: Solidly pack mineral-fiber insulation inside frames.
3. Installation Tolerances: Adjust hollow-metal door frames for squareness, alignment, twist, and plumb to the following tolerances:

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

C. Hollow-Metal Doors: Fit hollow-metal doors accurately in frames, within clearances specified below. Shim as necessary.

1. Non-Fire-Rated Steel Doors:

    a. Between Door and Frame Jambs and Head: 1/8 inch plus or minus 1/32 inch.
    b. Between Edges of Pairs of Doors: 1/8 inch to 1/4 inch plus or minus 1/32 inch.
    c. At Bottom of Door: 5/8 inch plus or minus 1/32 inch.
    d. Between Door Face and Stop: 1/16 inch to 1/8 inch plus or minus 1/32 inch.

2. Fire-Rated Doors: Install doors with clearances according to NFPA 80.

D. Glazing: Comply with installation requirements in Section 088000 "Glazing" and with hollow-metal manufacturer's written instructions.

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

3.4 ADJUSTING AND CLEANING

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

B. 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.

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

END OF SECTION 081113

SECTION 081416 - FLUSH WOOD DOORS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes the following:

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

1.3 SUBMITTALS

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

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

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

C. Samples for Verification:

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

1.4 QUALITY ASSURANCE

A. Quality Standard: In addition to requirements specified, comply with WDMA I.S.1-A, "Architectural Wood Flush Doors."

1.5 DELIVERY, STORAGE, AND HANDLING

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

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

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

1.6 PROJECT CONDITIONS

A. Environmental Limitations: Do not deliver or install doors until building is enclosed, wet work is complete, and HVAC system is operating and will maintain temperature and relative humidity at occupancy levels during the remainder of the construction period.

1. Protect door faces from exposure to light until installation.

1.7 WARRANTY

A. Special Warranty: Manufacturer's standard form, signed by manufacturer, Installer, and Contractor, in which manufacturer agrees to repair or replace doors that are defective in materials or workmanship, have warped (bow, cup, or twist) more than 1/4 inch in a 42-by-84-inch section, or show telegraphing of core construction in face veneers exceeding 0.01 inch in a 3-inch span.

1. Warranty shall also include installation and finishing that may be required due to repair or replacement of defective doors.
2. Warranty shall be in effect during the following period of time from date of Substantial Completion:
    a. Solid-Core Interior Doors: Life of installation.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

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

1. Flush Wood Doors:
    a. Algoma Hardwoods Inc.
    b. Buell Door Company.
    c. Eggers Industries; Architectural Door Division.
    d. Marshfield Door Systems, Inc.
    e. Oshkosh Architectural Door Co.

2.2 DOOR CONSTRUCTION, GENERAL

A. WDMA I.S.1-A Performance Grade: Extra Heavy Duty.

B. Structural-Composite-Lumber-Core Doors:

1. Structural Composite Lumber: WDMA I.S.10.
    a. Screw Withdrawal, Face: 700 lbf.
    b. Screw Withdrawal, Edge: 400 lbf.

2.3 VENEERED-FACED DOORS FOR TRANSPARENT FINISH

A. Doors for Transparent Finish:

1. Grade: Custom (Grade A faces).
2. Species and Cut: Plain sliced Walnut, unless otherwise indicated.
3. Match between Veneer Leaves: Book match.
4. Assembly of Veneer Leaves on Door Faces: Balance match.
5. Exposed Vertical and Top Edges: Same species as faces or a compatible species.
6. Core: Structural composite lumber.
7. Construction: Five plies. Stiles and rails are bonded to core, then entire unit abrasive planed before veneering.

2.4 LIGHT FRAMES

A. Wood Beads for Light Openings in Wood Doors:

1. Wood Species: Same species as door faces.
2. Profile: Flush rectangular beads

2.5 FABRICATION

A. Factory fit doors to suit frame-opening sizes indicated, with the following uniform clearances and bevels, unless otherwise indicated:

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

1. Coordinate measurements of hardware mortises in metal frames to verify dimensions and alignment before factory machining.

C. Openings: Cut and trim openings through doors to comply with applicable requirements of referenced standards for kind(s) of door(s) required.

1. Light Openings: Trim openings with moldings of material and profile indicated.

2.6 FACTORY FINISHING

A. General: Comply with AWI's "Architectural Woodwork Quality Standards Illustrated" for factory finishing.

B. Finish doors at factory that are indicated to receive transparent finish.

C. Transparent Finish:

1. Grade: Premium
2. Finish: System - 5, conversion varnish.
3. Stain: As selected by Architect.
4. Sheen: Satin.

PART 3 - EXECUTION

3.1 EXAMINATION

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

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

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

3.2 INSTALLATION

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

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

C. Factory-Fitted Doors: Align in frames for uniform clearance at each edge.

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

3.3 ADJUSTING

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

B. Finished Doors: Replace doors that are damaged or do not comply with requirements. Doors may be repaired or refinished if work complies with requirements and shows no evidence of repair or refinishing.

END OF SECTION 081416

SECTION 083313 - COILING COUNTER DOORS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Counter doors.
2. Fire-rated counter doors.

B. Related Requirements:

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

1.3 ACTION SUBMITTALS

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

1. Include construction details, material descriptions, dimensions of individual components, profiles for slats, and finishes.
2. Include rated capacities, operating characteristics, and furnished accessories.
3. Include description of automatic closing device and testing and resetting instructions.

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

1. Include plans, elevations, sections, and mounting details.
2. Include details of equipment assemblies, and indicate dimensions, required clearances, method of field assembly, components, and location and size of each field connection.
3. Include points of attachment and their corresponding static and dynamic loads imposed on structure.
4. Show locations of controls, locking devices, detectors or replaceable fusible links, and other accessories.

C. Samples for Verification: For each type of exposed finish on the following components, in manufacturer's standard sizes:

1. Curtain slats.
2. Bottom bar.
3. Locking device(s).
4. Include similar Samples of accessories involving color selection.

1.4 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer.

B. Oversize Construction Certification: For door assemblies required to be fire-rated and that exceed size limitations of labeled assemblies.

1.5 CLOSEOUT SUBMITTALS

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

1.6 QUALITY ASSURANCE

A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer for both installation and maintenance of units required for this Project.

1. Maintenance Proximity: Not more than two hours' normal travel time from Installer's place of business to Project site.

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

PART 2 - PRODUCTS

2.1 COUNTER DOOR ASSEMBLY

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

a. Cornell Iron Works, Inc.
b. McKeon Rolling Steel Door Company, Inc.
c. Overhead Door Corporation - Series 651 (Basis of Design).

B. Operation Cycles: Door components and operators capable of operating for not less than 20,000. One operation cycle is complete when a door is opened from the closed position to the fully open position and returned to the closed position.

C. Door Curtain Material: Stainless steel.

D. Door Curtain Slats: Flat profile.

E. Bottom Bar: Manufacturer's standard continuous channel or tubular shape, fabricated of material to match curtain and finished to match door.

F. Curtain Jamb Guides: Stainless steel with exposed finish matching curtain slats. Provide continuous integral wear strips to prevent metal-to-metal contact and to minimize operational noise.

G. Hood: Match curtain material and finish.

1. Shape: As shown on Drawings.
2. Mounting: As shown on Drawings.

H. Locking Devices: Equip door with locking device assembly.

1. Locking Device Assembly: Cremone type, both jamb sides locking bars, operable from inside and outside with cylinders.

I. Manual Door Operator: Crank operatpr.

J. Door Finish:

1. Stainless-Steel Finish: No. 4 (polished directional satin).

2.2 FIRE-RATED COUNTER DOOR ASSEMBLY

A. Fire-Rated Counter Door: Overhead fire-rated coiling door formed with curtain of interlocking metal slats.

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

a. Cornell Iron Works, Inc.
b. McKeon Rolling Steel Door Company, Inc.
c. Overhead Door Corporation - Series 641 (Basis of Design).

B. Operation Cycles: Door components and operators capable of operating for not less than 20,000. One operation cycle is complete when a door is opened from the closed position to the fully open position and returned to the closed position.

C. Fire Rating: 1 hour.

D. Door Curtain Material: Stainless steel.

E. Door Curtain Slats: Flat profile.

F. Curtain Jamb Guides: Stainless steel with exposed finish matching curtain slats.

G. Hood: Match curtain material and finish.

1. Shape: As shown on Drawings.
2. Mounting: As shown on Drawings.

H. Locking Devices: Equip door with locking device assembly.

1. Locking Device Assembly: Cremone type, both jamb sides locking bars, operable from inside and outside with cylinders.

I. Manual Door Operator: Crank operator.

J. Door Finish:

1. Stainless-Steel Finish: No. 4 (polished directional satin).
2. Interior Curtain-Slat Facing: Match finish of exterior curtain-slat face.

2.3 DOOR CURTAIN MATERIALS AND CONSTRUCTION

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

1. Stainless-Steel Door Curtain Slats: ASTM A 666, Type 304; sheet thickness of 0.025 inch; and as required.

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

2.4 HOODS

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

1. Stainless Steel: 0.025-inch- thick stainless-steel sheet, Type 304, complying with ASTM A 666.
2. Include automatic drop baffle on fire-rated doors to guard against passage of smoke or flame.

2.5 LOCKING DEVICES

A. Locking Device Assembly: Fabricate with cylinder lock, spring-loaded dead bolt, operating handle, cam plate, and adjustable locking bars to engage through slots in tracks.

1. Lock Cylinders: Cylinders standard with manufacturer and keyed to building keying system.
2. Keys: Three for each cylinder.

2.6 CURTAIN ACCESSORIES

A. Smoke Seals: Equip each fire-rated door with replaceable smoke-seal perimeter gaskets or brushes for smoke and draft control as required for door listing and labeling by a qualified testing agency.

B. Weatherseals: Equip door with weather-stripping gaskets fitted to entire perimeter of door for air-resistant installation unless otherwise indicated.

1. At door head, use 1/8-inch- thick, replaceable, continuous-sheet baffle secured to inside of hood or field- installed on the header.
2. At door jambs, use replaceable, adjustable, continuous, flexible, 1/8-inch- thick seals of flexible vinyl, rubber, or neoprene.

C. Astragal: Equip each door bottom bar with a replaceable, adjustable, continuous, compressible gasket of flexible vinyl, rubber, or neoprene as a cushion bumper.

D. Automatic-Closing Device: Equip each fire-rated door with an automatic-closing device or holder-release mechanism and governor unit complying with NFPA 80 and an easily tested and reset release mechanism. Testing for manually operated doors shall allow resetting by opening the door without

retensioning the counterbalancing mechanism. Automatic-closing device shall be designed for activation by the following:

1. Replaceable fusible links with temperature rise and melting point of 165 deg F interconnected and mounted on both sides of door opening.

2.7 COUNTERBALANCING MECHANISM

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

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

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

1. Fire-Rated Doors: Equip with auxiliary counterbalance spring and prevent tension release from main counterbalance spring when automatic closing device operates.

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

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

2.8 MANUAL DOOR OPERATORS

A. General: Equip door with manual door operator by door manufacturer.

B. Crank Operator: Consisting of crank and crank gearbox, steel crank drive shaft, and gear-reduction unit, of type indicated. Size gears to require not more than 25-lbf force to turn crank. Fabricate gearbox to be oiltight and to completely enclose operating mechanism. Provide manufacturer's standard crank-locking device.

2.9 GENERAL FINISH REQUIREMENTS

A. Comply with NAAMM/NOMMA's "Metal Finishes Manual for Architectural and Metal Products (AMP 500-06)" for recommendations for applying and designating finishes.

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

2.10 STAINLESS-STEEL FINISHES

A. Surface Preparation: Remove tool and die marks and stretch lines, or blend into finish.

B. Polished Finishes: Grind and polish surfaces to produce uniform finish, free of cross scratches.

1. Run grain of directional finishes with long dimension of each piece.
2. When polishing is completed, passivate and rinse surfaces. Remove embedded foreign matter and leave surfaces chemically clean.
3. Directional Satin Finish: No. 4.

PART 3 - EXECUTION

3.1 EXAMINATION

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

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

3.2 INSTALLATION

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

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

C. Fire-Rated Doors: Install according to NFPA 80.

3.3 STARTUP SERVICE

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

1. Perform installation and startup checks according to manufacturer's written instructions.
2. Test and adjust controls and safety devices. Replace damaged and malfunctioning controls and equipment.
3. Test door closing when activated by detector or alarm-connected fire-release system. Reset door-closing mechanism after successful test.

3.4 ADJUSTING

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

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

C. Adjust seals to provide tight fit around entire perimeter.

END OF SECTION 083313

SECTION 083800 - TRAFFIC DOORS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SECTION REQUIREMENTS

A. Section Includes: Food service traffic doors.

1. Food service traffic doors.
2. Hollow metal frames for traffic doors.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include construction details, material descriptions, core descriptions, and finishes.

B. Shop Drawings: Include the following:

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

1.4 DELIVERY, STORAGE, AND HANDLING

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

1.5 PROJECT CONDITIONS

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

PART 2 - PRODUCTS

2.1 TRAFFIC DOORS

A. Traffic Doors for Catering Kitchen (FS1): 3/4 inch exterior grade solid wood core; 1 inch total thickness; medium duty.

1. Facing: Reinforcing metal plates.
2. Full Length Panels: 18 gauge stainless steel both sides; stainless steel top hinge covers.
3. Window Size: 9 inches by 14 inches.
4. Glazing: Clear acrylic.
5. Window Molding: Black rubber.
6. Double Action Easy Swing proprietary hinges.
7. Basis-of-Design Product: Subject to compliance with requirements, provide **Model SCP-3 Stainless Steel Traffic Door by Eliason Corporation** or Architect approved comparable product by Chase Doors or Rubbair Door.

B. Traffic Doors for Concessions (FS2): 3/4 inch exterior grade solid wood core; 1 inch total thickness; medium duty.

1. Facing: Reinforced metal plates.

a. Full Height Panels: 0.032 inch tempered aluminum alloy, satin anodized finish, both sides and edges.
b. Base Plates: 12 inches high, 18 gauge stainless steel, both sides.

2. Window: Clear acrylic glazing in black ABS window frame.
3. Window Size: 9 inches by 14 inches.
4. Hinges: Easy Swing proprietary hinges, zinc coated.
5. Basis-of-Design Product: Subject to compliance with requirements, provide **Model SCP-4 Aluminum Traffic Door by Eliason Corporation** or Architect approved comparable product by Chase Doors or Rubbair Door.

2.2 FRAMES FOR TRAFFIC DOORS

A. Comply with the standards indicated for materials, fabrication, hardware locations, hardware reinforcement, tolerances, and clearances, and as specified. Provide frames with pre-drilled holes for top hardware, for fastening frame to the door and for bottom hardware, and with reinforcing plates at all hardware locations.

B. Extra-Heavy-Duty Frames: SDI A250.8, Level 3.

1. Physical Performance: Level A according to SDI A250.4.
2. Frame Material: Uncoated, steel sheet, minimum thickness of 0.053 inch.
3. Exposed Finish: Prime.

C. Basis-of-Design Products: Subject to compliance with requirements, provide the following products by **Eliason Corporation** or comparable Architect approved products by Chase Doors or Rubbair Door.

1. Metal Frame for Masonry: Flush Hollow Metal Frames (Masonry Openings).
2. Metal Frame for Metal Stud Walls: Flush Hollow Metal Frames (Drywall Openings).

PART 3 - EXECUTION

3.1 EXAMINATION

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

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

3.2 PREPARATION

A. Clean surfaces thoroughly prior to installation.

B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

3.3 INSTALLATION

A. Install doors to comply with manufacturer's written instructions.

B. Frames: Install hollow-metal frames for traffic doors, of size and profile indicated. Comply with SDI A250.11 or NAAMM-HMMA 840 as required by standards specified.

C. Fit and align door assembly including hardware.

3.4 PROTECTION

A. Protect installed products until completion of project.

B. Touch-up, repair or replace damaged products before Substantial Completion.

END OF SECTION 083800

SECTION 084113 - ALUMINUM-FRAMED ENTRANCES AND STOREFRONTS

PART 1 - PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes the following:

1. Exterior aluminum-framed storefronts.
2. Exterior manual swing aluminum doors.
3. Exterior aluminum door frames.
4. Horizontal sliding windows.

B. Related Requirements:

1. Section 087100 "Door Hardware" for coordination of door hardware for aluminum entrance doors. Access control connection is supplied under work of Section 087100.
2. Section 107116 "Storm Protection Systems" for storm shutters for horizontal sliding windows.

1.3 STOREFRONT 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. 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. Structural Loads: As indicated on Drawings.

C. Deflection of Framing Members: 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: Provide aluminum-framed 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. Thermal Movements: Allow for thermal movements resulting from ambient and surface temperature changes.

1. Temperature Change: 120 deg F, ambient; 180 deg F, material surfaces.
2. Thermal Cycling: No buckling; stress on glass; sealant failure; excess stress on framing, anchors, and fasteners; or reduction of performance when tested according to AAMA 501.5.

F. Air Infiltration: Test according to ASTM E 283 for infiltration as follows:

1. Fixed Framing and Glass Area: Maximum air leakage of 0.06 cfm/sq. ft. at a static-air-pressure differential of 6.24 lbf/sq. ft.
2. Entrance Doors (Pair): Maximum air leakage of .50 cfm/sq. ft. at a static-air-pressure differential of 1.57 lbf/sq. ft.

G. Water Penetration Under Static Pressure: Provide aluminum-framed systems that 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 10.5 lbf/sq. ft.

H. Energy Performance: Certify and label energy performance according to NFRC as follows:

1. Thermal Transmittance (U-factor): Fixed glazing and framing areas shall have U-factor of not more than 0.45 Btu/sq. ft. x h x deg F as determined according to NFRC 100. Entrance doors shall have U-factor of not more than 0.77 Btu/sq. ft. x h x deg F as determined according to NFRC 100
2. Condensation Resistance: Fixed glazing and framing areas shall have an NFRC-certified condensation resistance rating of no less than 59 as determined according to NFRC 500. Entrance doors shall have an NFRC-certified condensation resistance rating of no less than 28 as determined according to NFRC 500.

I. Windborne-Debris-Impact-Resistance Performance: Provide aluminum-framed systems that pass missile-impact and cyclic-pressure tests when tested according to ASTM E 1886 and testing information in ASTM E 1996.

1. Large-Missile Impact: For aluminum-framed systems located within 30 feet of grade.
2. Small-Missile Test: For glazed openings located more than 30 feet above grade.

J. Uniform Wind Load Capacity: Design, size and install components to withstand positive and negative wind loading pressures in accordance with International Building Code, as determined by Structural Engineer.

1.4 WINDOW PERFORMANCE REQUIREMENTS

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

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

B. Performance Class and Grade: AAMA/WDMA/CSA 101/I.S.2/A440 as follows:

1. Minimum Performance Class: AW.
2. Minimum Performance Grade: 40.

C. Thermal Transmittance: NFRC 100 maximum whole-window U-factor of 0.50 Btu/sq. ft. x h x deg F.

D. Condensation-Resistance Factor (CRF): Provide aluminum windows tested for thermal performance according to AAMA 1503, showing a CRF of 55.

E. Thermal Movements: Provide aluminum windows, including anchorage, that allow for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures by preventing buckling, opening of joints, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.

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

1.5 SUBMITTALS

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

B. Shop Drawings: For aluminum-framed systems, indicating actual project conditions. Include plans, elevations, sections, details, hardware and attachments to other work.

1. Include details of provisions for assembly expansion and contraction and for draining moisture occurring within the assembly to the exterior.
2. Include full-size isometric details of each vertical-to-horizontal intersection of aluminum-framed entrances and storefronts, showing the following:

a. Joinery, including concealed welds.
b. Anchorage, including specific information on size and spacing of fasteners at each frame elevation.
c. Expansion provisions.
d. Glazing, including identification of dry and wet seals, as applicable for project conditions.
e. Flashing and drainage.

3. Show connection to and continuity with adjacent thermal, weather, air, and vapor barriers.
4. For entrances, include hardware schedule and indicate operating hardware types, functions, quantities, and locations.

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

D. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for aluminum-framed systems.

E. Certification of Thermal Performance: For exterior assemblies, provide certification that thermal performance complies with Section 5 of ASHRAE/IESNA Standard 90.1 and that site installation complies with NFRC requirements.

F. Maintenance Data: For aluminum-framed systems to include in maintenance manuals.

G. Warranties: Special warranties specified in this Section.

1.6 QUALITY ASSURANCE

A. Installer Qualifications: Capable of assuming engineering responsibility and performing work of this Section and who is acceptable to manufacturer.

1. Engineering Responsibility: 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 and submission of reports of tests performed on manufacturer's standard assemblies.

B. Accessible Entrances: Comply with the U.S. Architectural & Transportation Barriers Compliance Board's "Americans with Disabilities Act (ADA), Accessibility Guidelines for Buildings and Facilities (ADAAG)."

1.7 PROJECT CONDITIONS

A. Field Measurements: Verify actual locations of structural supports for aluminum-framed systems by field measurements before fabrication and indicate measurements on Shop Drawings.

1.8 WARRANTY

A. Special Warranty: Manufacturer and Installer agree to repair or replace components of aluminum-framed entrances and storefronts that do not comply with requirements or that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:
   a. Structural failures including, but not limited to, excessive deflection.
   b. Noise or vibration created by wind and thermal and structural movements.
   c. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
   d. Water penetration through fixed glazing and framing areas.
   e. Failure of operating components.

2. Warranty Period: One year from date of Substantial Completion.

B. Special Finish Warranty: Standard form in which manufacturer agrees to repair finishes or replace aluminum that shows evidence of deterioration of factory-applied finishes within specified warranty period.

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

   a. Color fading more than 5 Hunter units when tested according to ASTM D 2244.
   b. Chalking in excess of a No. 8 rating when tested according to ASTM D 4214.
   c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.

2. Warranty Period: 20 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

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

1. EFCO Corporation.
2. Kawneer.
3. Oldcastle Building Envelope.
4. YKK AP America Inc. (Basis of Design)

a. Storefront: YHS 50 TU Exterior Storefront.
b. Entrance Doors: 50H Impact Resistant Entrances.
c. Sliding Windows: YSW 400 T Horizontal Sliding Windows.

2.2 MATERIALS

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

1. Sheet and Plate: ASTM B 209.
2. Extruded Bars, Rods, Profiles, and Tubes: ASTM B 221.
3. Extruded Structural Pipe and Tubes: ASTM B 429.
4. Structural Profiles: ASTM B 308/B 308M.

B. Steel Reinforcement: With manufacturer's standard corrosion-resistant primer complying with SSPC-PS Guide No. 12.00 applied immediately after surface preparation and pretreatment. Select surface preparation methods according to recommendations in SSPC-SP COM and prepare surfaces according to applicable SSPC standard.

1. Structural Shapes, Plates, and Bars: ASTM A 36/A 36M.
2. Cold-Rolled Sheet and Strip: ASTM A 1008/A 1008M.
3. Hot-Rolled Sheet and Strip: ASTM A 1011/A 1011M.

2.3 FRAMING SYSTEMS

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

1. Construction: Framing members are composite assemblies of two separate extruded-aluminum components permanently bonded by an elastomeric material of low thermal conductance.

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 aluminum sheet finished to match adjacent framing and of sufficient thickness to maintain a flat appearance without visible deflection.

F. Sill Pan: Manufacturer's standard continuous, wept sill pan profile, certified for framing system.

G. Framing System Gaskets and Sealants: Manufacturer's standard recommended by manufacturer for joint type.

2.4 GLAZING SYSTEMS

A. Glazing: As specified in Division 08 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.

2.5 DOORS

A. Doors: Manufacturer's standard glazed doors, for manual swing operation.

1. Exterior Door Construction: 2-3/8-inch overall thickness, with minimum 0.125-inch-thick, extruded-aluminum tubular rail and stile members. Mechanically fasten corners with reinforcing brackets that are deep penetration and fillet welded or that incorporate concealed tie rods.

    a. Thermal Construction: High-performance plastic connectors separate aluminum members exposed to the exterior from members exposed to the interior.

2. Door Design: Wide stile; 5-inch nominal width; 10-inch bottom rail.
3. Glazing Stops and Gaskets: Square, snap-on, extruded-aluminum stops and preformed gaskets. Provide nonremovable glazing stops on outside of door.

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. Accessible Interior Doors: Not more than 5 lbf.

B. Provide entry door operating hardware as specified in Section 087100 “Door Hardware”, to comply with impact resistance rating. Latching and hanging hardware for entry doors shall be provided under work of this Section.

2.7 SLIDING WINDOWS

A. Aluminum Windows: AAMA/WDMA/CSA 101/I.S.2/A440, manufacturer's standard, with self-flashing mounting fins, and as follows:

1. Window Type: Horizontal sliding.
2. Aluminum Extrusions: ASTM B 221, alloy and temper recommended by manufacturer for strength, corrosion resistance, and application of required finish, but not less than 0.064-inch thickness at any location for main frame and sash members.

a. Thermally Improved Construction: Fabricate window units with an integral, concealed, low-conductance thermal barrier; located between exterior materials and window members exposed on interior side; in a manner that eliminates direct metal-to-metal contact.

3. Mullions: Between adjacent windows, fabricated of extruded aluminum matching finish of window units.
4. Fasteners, Anchors, and Clips: Nonmagnetic stainless steel, aluminum, or other noncorrosive material, compatible with aluminum window members, trim, hardware, anchors, and other components of window units. Fasteners shall not be exposed, except for attaching hardware.

   a. Reinforcement: Where fasteners screw-anchor into aluminum less than 0.128 inch thick, reinforce interior with aluminum or nonmagnetic stainless steel to receive screw threads, or provide standard, noncorrosive, pressed-in, spline grommet nuts.

5. Hardware: Manufacturer's standard; of aluminum, stainless steel, die-cast steel, malleable iron, or bronze; including the following:

   a. Rollers: Standard adjustable acetal roller in stainless steel housing, cast aluminum cam-type sweep lock, and stainless steel keeper.

6. Sliding-Type Weather Stripping: Woven-pile weather stripping of wool, polypropylene, or nylon pilas se and resin-impregnated backing fabric; complying with AAMA 701/702.

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

C. Finish: Match adjacent storefront finish.

2.8 ACCESSORY MATERIALS

A. Joint Sealants: For installation at perimeter of aluminum-framed systems, as specified in Division 07 Section "Joint Sealants."

B. Bituminous Paint: Cold-applied asphalt-mastic paint complying with SSPC-Paint 12 requirements except containing no asbestos, formulated for 30-mil thickness per coat.

2.9 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 exterior.
7. Fasteners, anchors, and connection devices that are concealed from view to greatest extent possible.

C. Mechanically Glazed Framing Members: Fabricate for flush glazing (without projecting stops).

D. Storefront Framing: Fabricate components for assembly using shear-block system or screw-spline system.

E. Door Frames: Reinforce as required to support loads imposed by door operation and for installing hardware. At exterior doors, provide compression weather stripping at fixed stops.

F. Doors: Reinforce doors as required for installing hardware.

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

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

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

2.10 ALUMINUM FINISHES

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

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

C. Clear Anodic Finish: AAMA 611, AA-M12C22A41, Class I, 0.018 mm or thicker.

PART 3 - EXECUTION

3.1 EXAMINATION

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

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

3.2 INSTALLATION

A. General:

1. Comply with manufacturer's written instructions.
2. Do not install damaged components.
3. Fit joints to produce hairline joints free of burrs and distortion.
4. Rigidly secure nonmovement joints.
5. Install anchors with separators and isolators to prevent metal corrosion and electrolytic deterioration.
6. Seal joints watertight, unless otherwise indicated.

B. Metal Protection:

1. Where aluminum will contact dissimilar metals, protect against galvanic action by painting contact surfaces with primer 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. Utilize manufacturer's best recommended practices for provision of weeping water to the exterior. Provide performance sealant joint on back face of storefront framing such that any water penetrating beyond the exterior frame face cannot migrate into the conditioned space. Contractor shall submit window details and specifically note any variation from Architect's details. Any architectural metal at window sills is not intended to replace function of manufacturer's sill pan assembly, which shall be the primary means by which water is weeped to the exterior.

E. Install components plumb and true in alignment with established lines and grades, without warp or rack.

F. Install glazing as specified in Division 08 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 under hurricane conditions.
2. Field-Installed Hardware: Install surface-mounted hardware according to hardware manufacturers' written instructions using concealed fasteners to greatest extent possible.

H. Install operable units level and plumb, securely anchored, and without distortion. Adjust weather-stripping contact and hardware movement to produce proper operation.

I. Install perimeter joint sealants as specified in Division 07 Section "Joint Sealants" and to produce weathertight installation.

J. 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 measurements to 1/8 inch.

3.3 FIELD QUALITY CONTROL

A. Testing Agency: Engage a qualified independent testing and inspecting agency to perform field tests and inspections and prepare test reports.

B. 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 stages as indicated on Drawings. Do not proceed with installation of the next area until test results for previously completed areas show compliance with requirements.

1. Water Spray Test: Before installation of interior finishes has begun, area as designated by Architect shall be tested according to AAMA 501.2 and shall not evidence water penetration.
2. Perform one water spray test at 3 locations as directed by Architect.

C. Testing of Access Control System: The complete access control system at each door shall be tested and documented after installation of door and frame but prior to being tied in to entire building access system.

D. Repair or remove work where test results and inspections indicate that it does not comply with specified requirements.

3.4 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 085619 - SERVICE WINDOWS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes sliding service windows at Concessions.

1.3 SUBMITTALS

A. Product Data: Include construction details, material descriptions, fabrication methods, dimensions of individual components and profiles, hardware, finishes, and operating instructions for each type of aluminum window indicated.

B. Shop Drawings: Include plans, elevations, sections, details, hardware, attachments to other work, operational clearances, and installation details.

1.4 QUALITY ASSURANCE

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

B. 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.

C. Glazing Publications: Comply with published recommendations of glass manufacturers and with GANA's "Glazing Manual" unless more stringent requirements are indicated.

1.5 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.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Aluminum Extrusions: Alloy and temper recommended by aluminum window manufacturer for strength, corrosion resistance, and application of required finish, but not less than 22,000-psi ultimate tensile strength, not less than 16,000-psi minimum yield strength, and not less than 0.062-inch thickness at any location for the main frame and sash members.

B. Fasteners: Aluminum, nonmagnetic stainless steel, epoxy adhesive, or other materials warranted by manufacturer to be noncorrosive and compatible with aluminum window members, trim, hardware, anchors, and other components.

C. Anchors, Clips, and Accessories: Aluminum, nonmagnetic stainless steel, or zinc-coated steel or iron complying with ASTM B 633 for SC 3 severe service conditions; provide sufficient strength to withstand design pressure indicated.

2.2 TRANSACTION WINDOW AT CONCESSIONS

A. Basis-of-Design Product: Subject to compliance with requirements, provide **Self Closing Deluxe Self-Closing Sliding Service Window #SCDW1801A by C.R. Laurence Co., Inc.** or Architect approved comparable product by one of the following:

1. Creative Industries, Inc.
2. Nissen & Co., Inc.
3. Ready Access.

B. Window Type: Horizontal sliding, self-closing.

C. Glass and Glazing Materials: ¼” tempered glass. Refer to Division 08 Section "Glazing" for glass units and glazing requirements applicable to glazed aluminum window units.

D. Sill Cap/Track: Extruded-aluminum track with natural anodized finish, of thickness, dimensions, and profile indicated.

E. Locks and Latches: Self-latching handle and keyed lock; operated from the inside only.

F. Roller Assemblies: Heavy duty ball-bearing design.

G. Hardware: Provide the following operating hardware:

1. Sash Rollers: Nylon or steel, lubricated ball-bearing rollers with nylon tires.
2. Sash Lock: Self-closing mechanism and self-latching handle.

2.3 FABRICATION

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

B. Glass: Glaze aluminum windows in the factory where practical and possible for applications indicated. Comply with requirements in Division 08 Section "Glazing" and with AAMA/WDMA 101/I.S.2/NAFS.

2.4 ALUMINUM FINISHES

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

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

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine openings, substrates, structural support, anchorage, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of work. Verify rough opening dimensions, levelness of sill plate, and operational clearances.

3.2 INSTALLATION

A. Comply with Drawings, Shop Drawings, and manufacturer's written instructions for installing windows, hardware, accessories, and other components.

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

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

3.3 ADJUSTING, CLEANING, AND PROTECTION

A. Adjust operating sashes and ventilators, hardware, and accessories for a tight fit at contact points and smooth operation. 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.

END OF SECTION 085619

SECTION 085653 - SECURITY WINDOWS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes the following:

1. Fixed, transaction security windows at Ticket Booth.

1.3 SUBMITTALS

A. Product Data: For each type of product.

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

B. Shop Drawings: For security windows.

1. Include plans, elevations, sections, and attachments to other work.
2. Full-size section details of framing members, including internal armoring, reinforcement, and stiffeners.
3. Glazing details.
4. Details of transaction counter and speaking aparatus.

C. Cutaway Sample: Corner of security window, made from 12-inch lengths of full-size components, and showing details of the following:

1. Joinery.
2. Anchorage.
3. Glazing.

1.4 QUALITY ASSURANCE

A. Source Limitations: Obtain service windows through one source from a single manufacturer.

B. Installer Qualifications: An authorized representative who is trained and approved by manufacturer for installation of units required for this Project.

C. Welding Qualifications: Qualify procedures and personnel according to the following:

1. AWS D1.2/D1.2M, "Structural Welding Code - Aluminum."

D. Glazing Publications: Comply with published recommendations of glass manufacturers and with GANA's "Glazing Manual" unless more stringent requirements are indicated.

1.5 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.6 COORDINATION

A. Coordinate installation of anchorages for security windows. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in adjacent construction. Deliver such items to Project site in time for installation.

1.7 FIELD CONDITIONS

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

1.8 DELIVERY, STORAGE, AND HANDLING

A. Pack security windows in wood crates for shipment. Crate glazing separate from frames unless factory glazed.

B. Label security window packaging with drawing designation.

C. Store crated security windows on raised blocks to prevent moisture damage.

1.9 WARRANTY

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

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

a. Structural failures including deflections exceeding 1/4 inch.
b. Failure of welds.
c. Deterioration of metals, metal finishes, and other materials beyond normal weathering and use.
d. Deterioration of bullet resistant glass.

2. Warranty Period: One year from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 FIXED, TRANSACTION SECURITY WINDOWS

A. Provide fixed, framed transaction windows with ventilator capable of allowing transfer of currency and documents.

1. Basis-of-Design Product: Subject to compliance with requirements, provide **CRL Aluminum Narrow Inset Frame Multi-Lite Special Window by C.R. Laurence Co., Inc. (800) 421-6144,** or Architect approved comparable product by Quickserv Corp. or Interbank Equipment.

B. Configuration: Multiple fixed-glazed panel, with deal tray.

C. Framing: Fabricate perimeter framing, mullions, and glazing stops from aluminum as follows:

1. Profile: Manufacturer's standard, with minimum face dimension of 1-1/2 inches.
2. Depth: 4 inches.
3. Glass Orientation: Vertical.
4. Sill: One piece extrusion with no integral weep system at the sill.
5. Jambs: Two piece extrusion with removable faces to allow for reglazing.
6. Mullions: Three piece extrusion with removable faces to allow for glazing and individual lite replacement.

D. Accessories:

1. Extension Kit: As required to accommodate glass thickness.
2. Rechargeable Battery Pack: Item 9RBAT by C.R. Laurence Co., Inc.
3. Boom Microphone: Item 9MIC by C.R. Laurence Co., Inc.

E. Materials:

1. Aluminum Extrusions: ASTM B 221. Provide alloy and temper recommended by manufacturer for strength, corrosion resistance, and application of required finish, but not less than 38,000-psi ultimate tensile strength.
2. Aluminum Sheet and Plate: ASTM B 209.

F. Voice-Communication: Barrier intercom system.

1. Outside Face Plate: Solid aluminum, tamper resistant.
2. Control Housing: Machined aluminum, tamper resistant.
3. Communication Devices: Boom microphone and headset jack that permits telephone style headset or wireless microphone.
4. Basis-of-Design Product: **12V DC Thru-Glass Two-Way Digital Electronic Communicator by C.R. Laurence Co., Inc**.

G. Assistive Listening Device:

1. Device kit includes a pre-formed loop for counter type installations.
2. Two (2) independent inputs featuring one (1) microphone input and one (1) switchable microphone/line input.
3. Metal loss compensation.
4. 5-year warranty.
5. Basis-of-Design Product: **CLD1-CX Compact Loop Driver by Listen Technologies** or Architect approved comparable product by Williams Sound or Telex Communications.

2.2 GLAZING

A. Glazing: As specified in Division 08 Section "Glazing."

2.3 ACCESSORIES

A. Concealed Bolts: ASTM A 307, Grade A unless otherwise indicated.

B. Embedded Plate Anchors: Fabricated from mild steel shapes and plates, minimum 3/16 inch thick; with minimum 1/2-inch- diameter, headed studs welded to back of plate.

C. Welding Rods and Bare Electrodes: Select according to AWS specifications for metal alloy welded.

D. Miscellaneous Glazing Materials: Provide material, size, and shape complying with requirements of glass manufacturers and with a proven record of compatibility with surfaces contacted in installation.

1. Cleaners, Primers, and Sealers: Type recommended by sealant or gasket manufacturer.
2. Setting Blocks: Elastomeric material with a Type A Shore durometer hardness of 85, plus or minus 5.
3. Spacers: Elastomeric blocks or continuous extrusions with a Type A Shore durometer hardness required by glass manufacturer to maintain glass lites in place for installation indicated.
4. Edge Blocks: Elastomeric material of hardness needed to limit glass lateral movement (side walking).

E. Anchors, Clips, and Window Accessories: Stainless steel; hot-dip, zinc-coated steel or iron, complying with ASTM B 633; provide sufficient strength to withstand design pressures indicated.

F. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D 1187.

G. Sealants: For sealants required within fabricated security windows, provide type recommended by manufacturer for joint size and movement. Sealant shall remain permanently elastic, nonshrinking, and nonmigrating.

2.4 FABRICATION

A. General: Fabricate security windows to provide a complete system for assembly of components and anchorage of window units.

1. Provide units that are reglazable from the secure side without dismantling the nonsecure side of framing.

B. Framing: Miter or cope corners the full depth of framing; weld and dress smooth.

1. Fabricate framing with manufacturer's standard, internal opaque armoring in thicknesses required for security windows to comply with ballistics-resistance performance indicated.

C. Glazing Stops: Finish glazing stops to match security window framing.

1. Secure-Side (Exterior) Glazing Stops: Welded or integral to framing.
2. Nonsecure-Side (Interior) Glazing Stops: Removable, coordinated with glazing indicated.

D. Welding: Weld components to comply with referenced AWS standard. To greatest extent possible, weld before finishing and in concealed locations to minimize distortion or discoloration of finish. Remove weld spatter and welding oxides from exposed surfaces by descaling or grinding.

E. Metal Protection: Separate dissimilar metals to protect against galvanic action by painting contact surfaces with primer or by applying sealant or tape recommended by manufacturer for this purpose.

F. Preglazed Fabrication: Preglaze window units at factory.

2.5 ALUMINUM FINISHES

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

B. Class I, Clear Anodic Finish: AA-M12C22A41 (Mechanical Finish: nonspecular as fabricated; Chemical Finish: etched, medium matte; Anodic Coating: Architectural Class I, clear coating 0.018 mm or thicker) complying with AAMA 611.

PART 3 - EXECUTION

3.1 EXAMINATION

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

B. Examine roughing-in for embedded and built-in anchors to verify actual locations of security window connections before security window installation.

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

D. Inspect built-in and cast-in anchor installations, before installing security windows, to verify that anchor installations comply with requirements. Prepare inspection reports.

1. Remove and replace anchors where inspections indicate that they do not comply with specified requirements. Reinspect after repairs or replacements are made.
2. Perform additional inspections to determine compliance of replaced or additional work. Prepare anchor inspection reports.

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

3.2 PREPARATION

A. Coordination: Furnish layouts for cast-in-place anchors, clips, and other security window anchors whose installation is specified in other Sections.

1. Furnish cast-in-place anchors and similar devices to other trades for installation well in advance of time needed for coordinating other work.

3.3 INSTALLATION

A. Fastening to In-Place Construction: Provide anchorage devices and fasteners where necessary for securing security windows to in-place construction. Include threaded fasteners for inserts, security fasteners, and other connectors.

1. Install an attached or integral flange to secure side of security windows extending over rough-in opening gap so that gap has same ballistics-resistance performance as security window.

B. Glazed Framing: Provide gasket-glazed framing.

C. Removable Glazing Stops and Trim: Fasten components with security fasteners.

D. Fasteners: Install security windows using fasteners recommended by manufacturer with head style appropriate for installation requirements, strength, and finish of adjacent materials. Provide stainless-steel fasteners in stainless-steel materials.

E. Metal Protection: Where dissimilar metals will contact each other, protect against galvanic action by painting contact surfaces with primer or by applying sealant or tape recommended in writing by manufacturer for this purpose. Where aluminum will contact concrete or masonry, protect against corrosion by painting contact surfaces with bituminous paint.

3.4 FIELD QUALITY CONTROL

A. Inspect installed products to verify compliance with requirements. Prepare inspection reports and indicate compliance with and deviations from the Contract Documents.

B. Perform additional inspections to determine compliance of replaced or additional work. Prepare inspection reports.

C. Prepare field quality-control certification that states installed products and their installation comply with requirements in the Contract Documents.

3.5 CLEANING AND PROTECTION

A. Clean surfaces promptly after installation of security windows. Take care to avoid damaging the finish. Remove excess glazing and sealant compounds, dirt, and other substances.

B. Clean glass of preglazed security windows promptly after installation.

C. Provide temporary protection to ensure that security windows are without damage at time of Substantial Completion.

END OF SECTION 085653

SECTION 087100 - DOOR HARDWARE

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Work under this section comprises of furnishing and installing commercial door hardware specified herein and noted on drawings as needed for a complete and functioning door operation, including ADA operators, for following:
      a. Swinging doors
   2. Electrified door hardware: installed as specified for connections to be provided by Division 26/28.
   3. Provide items, articles, materials, operations and methods listed, as specified herein or on drawings in quantities as required to complete the door operation as required.

B. Products Supplied but not Installed under this Section:
   1. Final replacement cores and keys installed by Owner.

C. Related Sections:
   1. Section 081113 Hollow Metal Frames & Doors

1.2 REFERENCES

A. Publications listed herein are part of this specification to extent referenced.

B. American National Standards Institute:
   1. ANSI A156 Series
   2. ANSI A115 Specifications for Steel Door and Frame Preparation for Hardware
   3. ANSI A117.1 Accessible and Usable Buildings and Facilities

C. Americans with Disabilities Act Accessibility Guidelines (ADAAG)

D. Door and Hardware Institute:
   1. DHI Publication - Abbreviations and Symbols
   2. DHI Publication - Basic Architectural Hardware
   3. DHI Publication - Hardware Reinforcements on Steel Doors and Frames
   4. DHI Publication - Installation Guide for Doors and Hardware
   5. DHI Publication - For Processing Hardware Schedules and Templates

E. National Fire Protection Association:
   1. NFPA 101 Life Safety Code, as adopted.

F. Steel Door Institute:
   1. SDI-109 Hardware for Standard Steel Doors and Frames

G. Building Code:
   1. IBC as currently adopted by the state of South Carolina.
   2. Local Authority Having Jurisdiction.

1.3 SUBMITTALS

A. Submittal Sequence:

1. Submit final Door Hardware Schedule at earliest possible date, particularly where approval of Door Hardware Schedule must precede fabrication of other work that is critical in Project construction schedule.
2. Include Product Data, Samples, Shop Drawings of other work affected by door hardware, and other information essential to coordinated review of Door Hardware Schedule. **The GC shall coordinate the review of these items with the Owner**.
3. Provide copy of the approved Hardware Schedule to the CCU Facility and Maintenance Department for review.

B. Product Data:
1. Submit manufacturer's technical product fact sheets describing each item of hardware to be provided including material descriptions, dimensions of individual components and profiles, and finishes.

C. Door Hardware Schedule:
1. Submit door hardware schedule prepared by or under supervision of a DHI certified Architectural Hardware Consultant (AHC) or Certified Door Consultant (CDC) detailing fabrication and assembly of door hardware, as well as procedures and diagrams.
2. Coordinate Door Hardware Schedule with doors, frames, and related work to ensure proper size, thickness, hand, function, and finish of door hardware.
3. Format:
   a. Comply with scheduling sequence and vertical form as described in DHI's *Sequence and Format for the Hardware Schedule*.
   b. Horizontal hardware schedules are not acceptable.
   c. Submit 6 copies of hardware schedule.
4. Organization:
   a. Organize door hardware schedule into hardware sets indicating complete designations of every item needed for each door or opening.
   b. Organize door hardware sets in same order as in Door Hardware Groups contained in Part 3 of this specification.
   c. For doors of different sizes or where hinges, locks, or closers are different, a separate heading shall be used. No labeled openings shall be combined with non-labeled openings.
5. Content:
   a. Type, style, function, size, label, hand, and finish for each door hardware item
   b. Name and manufacturer of each item
   c. Fastenings and other pertinent information
   d. Location of each door hardware set, cross-referenced to Drawings, both on floor plans and in door and frame schedule
   e. Explanation of abbreviations, symbols, and codes contained in schedule
   f. Mounting locations for door hardware
   g. Door and frame sizes and materials
   h. **Provide only one heading/set/group per page of the Finish Hardware Schedule**.

D. Shop Drawings:
1. Provide a copy with each hardware schedule submitted.

E. Quality Assurance Submittals:
1. Manufacturer's Instructions:
   a. Submit instructions for installation and maintenance of operating parts and finish.
   b. Furnish templates and schedules needed for fabrication of hollow metal doors and frames.
   c. Submission for templates and template list shall follow procedures established by DHI publication *For Processing Hardware Schedules and Templates*.

F. Closeout Submittals:
1. Operation and Maintenance:

a. Provide operation and maintenance data for electrically operated and non-electrical hardware consisting of technical information as follows:
(1) Maintenance instructions for each item of hardware
(2) Catalog pages for each product
(3) Parts list for each product
(4) Copy of final hardware schedule
(5) Copy of final keying schedule
b. Provide complete operational descriptions of electronic components listed by opening in hardware submittals.
(1) Operational descriptions shall detail how each electronic component functions within opening incorporating conditions of ingress and egress.
(2) Provide complete elevation and riser wiring diagrams for electronic components listed by opening in hardware submittals.
c. Include a copy of operational and maintenance descriptions in Operation and Maintenance Data Manual.

2. Warranties:
a. Submit Special warranties specified in this Section.

3. Keying Schedule:
a. Prepare and submit a keying schedule using keyset symbols referenced in DHI manual *Keying Systems and Nomenclature*. Include schematic keying diagram and index each key set to unique door designations.
(1) Index keying schedule by door number, keyset, hardware heading number, cross keying instructions, and special key stamping instructions.
b. Provide one complete bitting list of key cuts.
c. Keying schedule shall be prepared by or under supervision of supplier, detailing Owner's final keying instructions for locks.
d. Submit 4 copies of keying schedule.

4. Deliver keys and bitting list to the Owner by registered mail or overnight package service.

1.4 QUALITY ASSURANCE

A. Qualifications:
1. Door Hardware Supplier:
a. Door hardware supplier shall have warehousing facilities in Project's vicinity and shall employ a qualified Certified Architectural Hardware Consultant (AHC) available during course of Work to consult with Contractor, Architect, and Owner about door hardware and keying.

2. Architectural Hardware Consultant:
a. Architectural Hardware Consultant shall be a person who is currently certified by Door and Hardware Institute as an Architectural Hardware Consultant (AHC) and who is experienced in providing consulting services for door hardware installations that are comparable in material, design, and extent to that indicated for this Project.
b. Architectural Hardware Consultant shall be experienced in providing consulting services for electrified door hardware installations.

3. Installer:
a. Door hardware shall be installed by an experienced installer who has completed door hardware similar in material, design, and extent to that indicated for this Project and whose work has resulted in construction with a record of successful in-service performance.

B. Regulatory Requirements:
1. Hardware and installation shall comply with provisions and standards listed in IBC 2015.
2. Federal Accessibility Regulations:
a. Americans with Disabilities Act - ADA
b. Uniform Federal Accessibility Standards - UFAS
c. ANSI A117.1 Standard for Accessible and Usable Building s and Facilities

d. Accessibility Guidelines for Buildings and Facilities (ADAAG)

3. National Fire Protection Association:
   a. NFPA 80 Standard for Fire Doors and Windows
   b. NFPA 101 Life Safety Code
   c. NFPA 105 Recommended Practice for the Installation of Smoke-Control Door Assemblies
4. ANSI/BHMA Standards
   a. A115-W Series
   b. A115 Series
   c. A156 Series:
5. Door and Hardware Institute:
   a. Abbreviations and Symbols
   b. Basic Architectural Hardware
   c. Hardware Reinforcements on Steel Doors and Frames
   d. Installation Guide for Doors and Hardware

C. Pre-Installation Meetings:
   1. Conduct conference on-site to comply with requirements in Division 1 for Project Meetings. The Pre-install meeting for mechanical hardware products shall be held no later than one month prior to the commencement of the hardware installation. The Owner's Representative, the GC, the Hardware Supplier, and the manufacturer's representative of the closers, locksets, and exit devices, shall be in attendance.
   2. Topics to be discussed at meeting shall include:
      a. Review items such as proper installation sequence, adjustments, attachment, and location of door hardware. Installer shall be present, in addition to product representative, providing instruction on installation of the following products: Locks, Exit Devices, and Closers.
      b. Review and finalize construction schedule and verify availability of materials, installer's personnel, equipment, and facilities needed to make progress and avoid delays.

D. Keying Conference:
   1. Conduct conference on-site to comply with requirements in Division 1 for Project Meetings. Participants shall be Owner's representative, Contractor, hardware supplier, and lock manufacturer's representative.
   2. Incorporate keying conference decisions into final keying schedule after reviewing door hardware keying system including but not limited to following:
      a. Function of building, flow of traffic, purpose of each area, degree of security needed, and plans for future expansion
      b. Preliminary key system schematic diagram
      c. Requirements for key control system
      d. Address for delivery of keys

E. Coordination:
   1. Templates:
      a. Obtain and distribute templates for doors, frames, and other work specified to be factory prepared for installing door hardware to parties involved.
      b. Check shop drawings of other work to confirm that adequate provisions are made for locating and installing door hardware to comply with specified requirements.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Packing, Shipping, Handling, and Unloading:
   1. Inventory door hardware on receipt and provide secure lock-up for door hardware delivered to Site.
   2. Tag each item or package separately with identification related to final Door Hardware Schedule, and include basic installation instructions with each item or package.

1.6 SPECIAL WARRANTY

A. Provide written warranty, executed by manufacturer agreeing to repair or replace components of door hardware that fail in materials or workmanship within specified warranty period. Failures include but are not limited to following:
   1. Structural failures including excessive deflection, cracking, or breakage
   2. Faulty operation of operators and door hardware
   3. Deterioration of metals, metal finishes, and other materials beyond normal weathering

B. Warranty period shall be for not less than 3 years from Date of Substantial Completion unless otherwise indicated.
   1. Manual Closers: 30 years.
   2. Butt & Continuous Geared Hinges: Life of the Door Opening (original installation).

C. Special warranties specified in this Article shall not deprive Owner of other rights Owner may have under other provisions of Contract Documents and shall be in addition to, and run concurrent with, other warranties made by Contractor under requirements of Contract Documents.

1.7 MAINTENANCE

1. Furnish 1 dozen extra screws and other fasteners if each size, type and finish used with the hardware items provided.
2. Extra materials shall be stored on-site as directed by Owner.

B. Maintenance Service:
   1. Beginning at Substantial Completion, provide 6months' full maintenance by skilled employees of door hardware installer.
      a. Include quarterly preventive maintenance, repair or replacement of worn or defective components, lubrication, cleaning, and adjusting as needed for proper door hardware operation.
      b. Provide parts and supplies as used in manufacture and installation of original products.
   2. Furnish a complete set of specialized tools and maintenance instructions as needed for Owner's continued adjustment, maintenance, and removal and replacement of door hardware.

PART 2 PRODUCTS

2.1 MATERIALS

A. General Requirements:
   1. Hardware shall be of best grade, entirely free of imperfections in manufacture and finish, and shall satisfactorily perform various functions needed.
   2. Furnish necessary screws, bolts or others fastenings of suitable size and type to anchor hardware in position and match hardware as to material and finish. Provide Phillips flat-head screws except as otherwise indicated.
   3. Verify use of through-bolts for closer/exit device installations where bolt head or nut opposite face is exposed in other work. Use of sex bolts shall be allowed, as required by the door manufacturer for compliance with fire door certification.
   4. Drawings show direction of slide, swing or hand of each door leaf. Furnish each item of hardware for proper installation and operation of door movement as indicated. Items of hardware not definitely specified, but needed for satisfactory installation of hardware shall be provided. Such items shall be of type and quality suitable for service needed and comparable to adjacent hardware.
   5. Finishes shall comply with ANSI A156.18/ BHMA 1301. Finish designations cross references shall be as follows:

BHMA Code	Description	Nearest US Equiv.	BHMA Category	Basis Metal
626	Satin chromium plated	US26D	A	Brass; Bronze
628	Satin aluminum, clear anodized	US28	A	Aluminum
630	Satin stainless steel	US32D	A	Stainless Steel
689	Aluminum Powder coat	SP28	E	Any

B. Substitutions:
1. Manufacturers and model numbers listed are to establish a standard of quality and design. The architect must approve all product substitutions. Any request for substitutions must be submitted 10 days before the bid date, to allow sufficient time for an addendum to be added to the bid document. In accordance with Section 016000, required data and physical samples must be provided to the architect for review.

2.2 HINGES

A. Butt Hinges: ANSI/ BHMA A156.1
1. Provide full mortise, template, 5-knuckle, button tip hinges with non-rising loose pins and ball type bearings.
2. Out-swinging exterior doors shall be furnished with stainless steel, hinges with non-removable pins.
3. Interior doors with locksets shall be furnished with non-removable pins hinges.
4. Hinges shall be furnished in following quantities:
   a. Doors up to 90” in height: 3 hinges
   b. Doors over 90” in height: Add 1 hinge for every additional 30”
5. Furnish hinge sizes not less than as follows:
   a. For 1 3/4” Thick Doors: Standard weight
      (1) Doors up to 3’-0” wide: 4 1/2 x 4 1/2 x 0.134 gauge
      (2) Doors 3’-0” to 4’-0” wide: 5 x 4 1/2 x 0.146 gauge
   b. For 1 3/4” Thick Doors: Heavy weight
      (1) Doors up to 3’-0” wide: 4 1/2 x 4 1/2 x 0.180 gauge
      (2) Doors 3’-0” to 4’-0” wide: 5 x 4 1/2 x 0.190 gauge
6. Furnish hinges of sufficient throw where needed to clear trim or permit doors to swing 180 degrees.
7. Finishes:
   a. Exterior Doors: BHMA #630 (US32D)
   b. Interior Doors: BHMA #652 (US26D)
8. Acceptable Manufacturers:

	Steel	Stainless Steel
a. Bommer:	BB5000	BB5002
b. Hager:	BB1279	BB1191
c. Ives:	5BB1	5BB1
d. Stanley	FBB179	FBB191

9. Acceptable Manufacturers:

	Steel	Stainless Steel
a. Bommer:	BB5004	BB5006
b. Hager:	BB1168	BB1199
c. Ives:	5BB1HW	5BB1HW
d. Stanley:	FBB168	FBB199

2.3 LOCKSETS AND LATCHSETS

A. General Requirements:

1. Shape of lever shall be easy to grasp with one hand and not require tight grasping, tight pinching, or twisting of wrist.
2. Locksets and latchsets shall not require more than 15 lbf to release latch. Locks shall not require use of a key, tool, or special knowledge for operation.
3. Provide manufacturer's standard wrought box strike for each latchset and lockset with curved lip extended to protect frame without catching clothing. Finish shall match hardware set.
4. Provide all locks and cylinders with keyed construction core. Key system shall be 7-pin to match the Owner's existing Best key system.

B. Cylindrical Locksets and Latchsets: Heavy duty
1. Provide cylindrical locksets and latchsets that comply to ANSI A156.2, Series 4000, Grade 1; tested to exceed 3,000,000 cycles. Functions as listed in Hardware Sets.
2. Locks shall meet ANSI A117.1, Accessibility Code.
3. Locks shall meet UL A label; to have a minimum listing for single doors 4' x 8'.
4. Levers shall be independent and bi-directional.
5. Levers shall be solid. Manufacturers utilizing lever fillers are not acceptable.
6. Locks shall have field reversible handing.
7. Latchbolt to be steel with minimum ½" throw deadlatch on keyed functions; ¾" anti-friction deadlatch on pairs of doors.
8. Strikes shall have curved lip of sufficient length to clear trim and protect clothing.
10. Acceptable Manufacturers:
    a. Best Lock: 93K Series with 14D lever design.

C. Mortise Locksets and Latchsets:
1. Provide heavy duty mortise locksets and latchsets that comply to ANSI A156.13, Series 1000, Grade 1 Operational. Functions as listed in Hardware Sets.
2. Locksets shall be manufactured from heavy gauge steel, 1/8" minimum lock case thickness, containing components of steel with a Zinc dichromate plating for corrosion resistance.
3. Locksets are to have a standard 2 3/4" backset with a full 3/4" throw. Deadbolt shall be a full 1" throw, constructed of stainless steel.
4. Lock shall be easily handed without opening the lock case.
5. Lock trim shall be through-bolted to door to assure correct alignment a proper operation.
6. Finish: BHMA #626 (US26D).
7. Acceptable Manufacturers:
    a. Best Lock: 40H Series with 14D lever design

2.4 DOOR CLOSERS

A. General Requirements:
1. Closers shall be sealed and filled with all-weather fluid. Provide stable hydraulic fluid to withstand a temperature range of 120 degrees F to minus 30 degrees F.
2. Size closers in compliance with requirements for accessibility for handicapped and recommendations of manufacturer. Provide barrier free and delayed action features as needed. Comply with following maximum opening-force requirements:
    a. Interior Hinged Doors: 5.0 lbs.
    b. Exterior Hinged Doors: 8.5 lbs.
    c. Fire Doors: Minimum opening force allowable by authorities having jurisdiction

B. Surface Closers: ANSI/ BHMA A156.4, Grade 1
1. Surface mounted closers shall be full rack-and-pinion type closer with full complement bearings, single piece forged piston, chrome silicon steel spring, non-critical screw valves; back check, sweep and latch.
2. Furnish closers complete with rectangular, non-ferrous covers, necessary brackets and fasteners for top of door surface mounted units.
    a. 689(Alum) Powder Coat

3. Closer products with any type of pressure relief valve system shall not be acceptable.
4. Closers shall be ISO 9000 certified. Units shall be stamped with date of manufacturer code.
5. Non-sized closer to be independent lab tested for 10,000,000 cycles.
6. Closers shall be non-sized, field adjustable from size 1 to 6. Closers shall handing specific.
7. Furnish closers with 1 1/2" diameter piston.
8. **Verify: Through-bolt all closers, unless otherwise directed by the architect**.
9. Locate closers on interior side of exterior doors and on non-public side of interior doors, unless otherwise specified.
10. Provide manufacturers heaviest duty arm available at doors scheduled with parallel arm applications.
11. Provide plates, brackets and special templates when needed for interface with particular header door and wall conditions and adjacent hardware.
12. Closers shall be tested to 100 hours of salt spray test in compliance with ASTM B117; furnish data on request.
13. Closer arms shall be heavy duty forged. Provide extra-duty arms (EDA) at doors scheduled with parallel arm applications.
14. Acceptable Manufacturers:

LCN	
4011	4011 DEL
4111EDA	4111 DEL EDA
4111-CUSH	
4111-SCUSH	
4111 HSCUSH	

C. Push Plates, Pull Bars, and Grips

C. General Requirements: ANSI/ BHMA A156.6
1. Provide concealed mounting where possible. Where exposed fasteners are used, they shall be countersunk.
2. Push plates shall be beveled.
3. Where applicable plates shall be prepared to receive cylinder locks or thumb turns as scheduled.
4. Finish: BHMA #630 (US32D)

D. Push Plates:
1. Size: 4" x 16"
2. Thickness (US GA): 18 gauge; .050"
3. Acceptable Manufacturers:
   a. Trimco: 1001
   b. Ives: 8200
   c. Rockwood: 70

E. Pull Plates
1. Size: 1" diameter
2. Mounting: 8" center-to-center
3. Finish: BHMA #630 (US32D)
4. Acceptable manufacturers:
   a. Ives 8305
   b. Trimco
   c. Rockwood

2.5 DOOR PROTECTION DEVICES

A. General Requirements: ANSI/ BHMA A156.6
1. Fabricate protection plates (armor, kick, or mop) not more than 2" less than door width on stop side and not more than 2" less than door width on pull side, x height indicated.

2. Protection plates shall be beveled on three edges.
3. Furnish protection plates for concealed mounting where possible. Where exposed fasteners are used, they shall be countersunk.
4. Metal Plates: Bronze or Plastic as specified.
   a. Thickness : .050" Brass or 1/8" inch polyethelyne
5. Finish: BHMA #630 Stainless Steel

B. Kick Plates / Armor Plates:
1. Height Size: 8" or 16" as kickplate. 30" as Armor plate.
2. Acceptable Manufacturers:
   a. Trimco
   b. Ives: 8400
   c. Rockwood

2.6 OVERHEAD STOPS AND HOLDERS

A. Surface Mounted Overhead Holders/Stops: ANSI/ BHMA A156.8
1. Description: Surface, Heavy-duty and Standard-duty extruded brass, bronze or stainless steel stop/holders with shock absorber, as specified. No plastic parts.
2. Finish: BHMA #630 (US32D)
3. Acceptable Manufacturers:
   a. GJ: 90/450 Series / 410 Series
   b. ABH: 9000/ 3300 / 3000

2.7 SEALS AND GASKETS

A. General Requirements: ANSI/ BHMA A156.22
1. Except as otherwise indicated, provide weatherstripping at each edge of every exterior door leaf.
2. Where positive pressure labeling is required surface applied intumescent, on either the door or frame is unacceptable.
3. Screw-on type weatherstrip on frames is unacceptable.
4. Acceptable Manufacturers:
   a. NGP
   b. Reese
   c. Zero

2.8 THRESHOLDS

A. General Requirements: ANSI/ BHMA A156.21
1. Except as otherwise indicated provide standard threshold units of type, size and profile as shown or scheduled.
2. Metal: Extruded aluminum; 6063-T5 alloy
   a. Finish: Clear anodized; BHMA Aluminum finish
3. Provide thresholds that are 1" wider than depth of frame.
4. Acceptable Manufacturers:
   a. NGP
   b. Reese
   c. Zero

2.9 AUXILIARY HARDWARE

A. Silencers: ANSI/ BHMA A156.16
1. Furnish tamper proof resilient cushions designed to absorb shock and noise at openings without gaskets.

2. Provide 3 silencers per single door, and 2 for pairs of doors.
3. Acceptable Manufacturers:
   a. Trimco
   b. Ives: SR64
   c. Rockwood: 608

B. Wall Bumpers: 2 1/2" diameter; 1" nominal projection
1. Finish: BHMA #630 (US32D)
2. Acceptable Manufacturers:
   a. Trimco: 1270WXCP
   b. Ives: WS406/407CVX
   c. Door Controls: 3211

C. Interior Floor-Mounted Stops: Dome stops with risers; 1" height
1. Finish: BHMA #630 (US32D)
2. Acceptable Manufacturers:
   a. Trimco
   b. Ives
   c. Door Controls

2.10 CYLINDERS, KEYING SYSTEMS AND KEY CONTROL

A. General Requirements:
1. Meet with Architect and Owner to finalize keying requirements and obtain keying instructions in writing. Keying schedule shall be established in compliance with specific requirements determined in consultation with Owner.
2. Provide keyed construction cores construction period. Construction cores shall not be part of the Owner's existing key system. Permanent keys and cores shall be furnished to Owner's Representative prior to occupancy. Owner or Owner's Security Agent shall install permanent keyed cores.

B. Cores:
1. Permanent keyed cores shall be keyed by Best Access System and configured into sets or subsets, master keyed or great grand master keyed as directed by Owner.
2. Permanent keys and cylinders shall be marked with applicable blind code for identification. These visual key control marks or codes shall not include actual key cuts.
   a. Key and cylinder identification stamping shall be approved by Architect and Owner. Failure to properly comply with these requirements shall be cause for replacement of cylinders and keys involved at no additional cost to Owner.

C. Key Material:
1. Provide manufacturer's standard embossed keys of nickel silver to ensure durability. Key Quantity: Furnish keys in following quantities:
   a. Master Keys: 6 per master group
   b. Change Keys:
      (1) Locks Keyed Alike: 4 per set
      (2) Locks Keyed Different: 3 per lock
   c. Key Blanks: one extra key blank per cylinder.
   d. Temporary Construction Keys: 6 total
   e. Permanently inscribe each key with a visual key control number and include the following notation: "DO NO DUPLICATE".
2. Deliver end user exclusive permanent key blanks and other security keys directly to Owner's representative from manufacturer by secure courier, return receipt requested. Failure to properly comply with these requirements shall be cause for replacement of cylinders and keys involved at no additional cost to Owner.

D. Acceptable Manufacturers:
   1. Cores and Keys: Best Access System, keyed to Owner's existing key system.

PART 3 EXECUTION

3.1 EXAMINATION

A. Site Verification of Conditions:
   1. Examine doors and frames with Installer present for compliance with requirements for installation tolerances, labeled fire door assembly construction, wall and floor construction, and other conditions affecting performance.
   2. Proceed with installation only after unsatisfactory conditions have been corrected.
   3. Commencement of installation constitutes acceptance of conditions and responsibility for satisfactory performance.

3.2 PREPARATION

A. Surface Preparation:
   1. Steel Frames: Comply with DHI A115 Series
   2. HM Doors: Comply with DHI A115 Series.

3.3 INSTALLATION

A. General Requirements:
   1. Install each door hardware item to comply with manufacturers' written instructions using manufacturer's supplied fasteners.
   2. Securely install finish hardware items in compliance with accepted schedule and templates furnished with hardware.
   3. Install mortised items flush with adjacent surfaces.
   4. Install locksets, surface mounted closers, and trim after finishing of doors and frames is complete.
      a. Where cutting and fitting is needed to install door hardware onto or into surfaces that are to be painted or finished in another way later, coordinate removal, storage, and reinstallation of door hardware with finishing work.
   5. Set units level, plumb, and true to line and location. Adjust and reinforce attachment substrates as necessary for proper installation and operation.
   6. Drill and countersink units that are not factory-prepared for anchorage fasteners. Space fasteners and anchors in compliance with industry standards.

B. Mounting Heights:
   1. Mount door hardware units at heights indicated in following applicable publications, unless otherwise specifically indicated or required to comply with governing regulations:
      a. Steel Doors and Frames: ANSI A250.6
         (1) DHI Publication Recommended Locations for Architectural Hardware for Standard Steel Doors and Frames

C. Door Stops:
   1. Door stops shall be furnished for every door leaf. Install floor-mounted or wall-mounted stops, as scheduled. Overhead door holder shall be provided where floor or wall stops cannot be used.
   2. Place door stops in such a position that they permit maximum door swing, but do not present a hazard or obstruction. Furnish floor strikes for floor holders of proper height to engage holders of doors.
   3. Floor stops shall be installed with risers as needed to accommodate finish flooring materials for proper relationship to door.

D. Thresholds:
   1. Set thresholds for exterior and acoustical doors in full bed of sealant in compliance with requirements specified in Division 7.

3.4 FIELD QUALITY CONTROL

A. Inspection Service:
   1. After installation of door hardware is complete, the General Contractor shall hire an independent Architectural Hardware Consultant to inspect door hardware for proper application of finish hardware in compliance finish hardware schedule and keying schedule. In addition check hardware for adjustment and proper operation.
   2. The Inspector shall prepare and submit, to Contractor, Architect, and Owner, a written report of the hardware inspection stating whether installed work complies with or deviates from requirements, including whether door hardware is properly installed and adjusted. Report shall be submitted within 3 days following site visits.

3.5 ADJUSTING

A. Initial Adjustment:
   1. Adjust and check each operating item of door hardware and each door to ensure proper operation or function of every unit. Replace units that cannot be adjusted to operate as intended. Adjust door control devices to compensate for final operation of heating and ventilating equipment and to comply with referenced accessibility requirements.
   2. Adjust electric strikes horizontal and vertical alignment of keeper to properly engage lock bolt.
   3. Adjust door closer sweep period so that from an open position of 70 degrees door will take at least 3 seconds to move to a point 3" from latch measured to leading edge of door.

B. Final Adjustment:
   1. Return to Project during week prior to Substantial Completion and make final check and adjustment of hardware items.
   2. Adjust hardware so doors operate in perfect order. Test and adjust hardware for quiet, smooth operation, free of sticking, binding, or rattling. Adjust closers for proper, smooth operation.
   3. Adjust door control devices to compensate for final operation of heating and ventilating equipment.

C. Six Month Adjustment:
   1. Approximately six months after Date of Substantial Completion, installer shall perform following:
      a. Examine and readjust each item of door hardware as necessary to ensure function of doors, door hardware and electrified door hardware.
      b. Consult with, and instruct, Owner's personnel on recommended maintenance procedures.
      c. Replace door hardware items that have deteriorated or failed due to faulty design, materials, or installation.

3.6 CLEANING

A. Exposed hardware shall be carefully cleaned by methods not injurious to finish, immediately preceding occupancy. Replace defective, damaged, or missing hardware.

B. Clean adjacent surfaces soiled by hardware installation.

C. Clean operating items as needed to restore proper function and finish.

3.7 DEMONSTRATION

A. After installation has been completed, provide services of qualified hardware consultant to check Project to determine proper application of finish hardware according the hardware sets. Check operation and adjustment of hardware items. Instruct Owner's maintenance personnel to adjust, operate, and maintain door hardware and door hardware finishes.

3.8 PROTECTION

A. Provide final protection and maintain conditions that ensure door hardware shall be without damage or deterioration at time of Substantial Completion.

B. Protect door hardware items from abuse, corrosion and other damage until Owner accepts Project as complete.

3.9 DOOR HARDWARE GROUPS

HARDWARE SET NO. 01 - ELEVATOR

FOR USE ON MARK/DOOR #(S):
E101 E102 E103 E203 E301 E302
E303

EACH TO HAVE:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HINGE	5BB1 5 X 4.5 NRP	630	IVE
1	EA	ONE WAY DEADBOLT	48H7L	626	BES
1	EA	PUSH/PULL PLATE	120L CFC	630	HAG
1	EA	WALL STOP/HOLDER	WS45X	626	IVE
1	EA	GASKETING	188S-BK	S-BK	ZER
1	EA	DOOR SWEEP	381A	A	ZER

1. THE HW SUPPLIER SHALL COORDINATE THE UNDERCUT ON THE HM DOOR TO ALLOW THE DOOR SWEEP TO BE EFFECTIVE AGAINST THE SILL.

HARDWARE SET NO. 02

FOR USE ON MARK/DOOR #(S):
E106A E106E E107A E107E W306A W306B
W312A W312B

EACH TO HAVE:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HW HINGE	5BB1HW 5 X 4.5	630	IVE
1	EA	STOREROOM	45H7D 14H	630	BES
1	EA	SURFACE CLOSER	4011 DEL TB	689	LCN
1	EA	KICK PLATE	8400 16" X 2" LDW B-CS	630	IVE
1	EA	WALL STOP	WS406/407CVX	630	IVE
1	EA	GASKETING	488S-BK	S-BK	ZER

HARDWARE SET NO. 03 - ROLLING OVERHEAD COUNTER DOOR

FOR USE ON MARK/DOOR #(S):

E106B	E106C	E106D	E107B	E107C	E107D
W103C	W103D	W103E	W106B	W106C	W306E
W306F	W306G	W306H	W312D	W312E	

EACH TO HAVE:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
1	EA	MORTISE CYLINDER	1E74	626	BES
1			BALANCE OF HARDWARE BY DOOR MANUFACTURER		

1. THE GC & THE HW SUPPLIER SHALL COORDINATE CYLINDER REQUIREMENTS WITH THE DOOR SUPPLIER.

HARDWARE SET NO. 04 - FUTURE ELEVATOR

FOR USE ON MARK/DOOR #(S):
E202

EACH TO HAVE:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HINGE	5BB1 4.5 X 4.5	630	IVE
1	EA	ONE WAY DEADBOLT	48H7L	626	BES
1	EA	GASKETING	488S-BK	S-BK	ZER

HARDWARE SET NO. 05

FOR USE ON MARK/DOOR #(S):
W106F

EACH TO HAVE:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HW HINGE	5BB1HW 5 X 4.5	630	IVE
1	EA	STOREROOM	45H7D 14H	630	BES
1	EA	OH STOP & HOLDER	90H	630	GLY
1	EA	SURFACE CLOSER	4011 TB	689	LCN
1	EA	KICK PLATE	8400 16" X 2" LDW B-CS	630	IVE
3	EA	SILENCER	SR64	GRY	IVE

HARDWARE SET NO. 06

FOR USE ON MARK/DOOR #(S):

W108A	W108B	W301A	W301B	W302A	W302B
W303A	W309	W313A	W313B	W317A	W317B

EACH TO HAVE:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
1	EA	CONT. HINGE	112HD	628	IVE
1	EA	CLASSROOM DEADLOCK	48H7R	626	BES
1	EA	PUSH/PULL PLATE	120L CFC	630	HAG
1	EA	PULL PLATE	8303 8" 4" X 16" CFT	630	IVE
1	EA	SURFACE CLOSER	4011 TB	689	LCN
1	EA	KICK PLATE	8400 8" X 2" LDW B-CS	630	IVE
1	EA	WALL STOP	WS406/407CVX	630	IVE
1	EA	WALL STOP/HOLDER	WS45X	626	IVE
1	EA	GASKETING	488S-BK	S-BK	ZER

HARDWARE SET NO. 07 - TOILET

FOR USE ON MARK/DOOR #(S):
N102

EACH TO HAVE:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HINGE	5BB1 4.5 X 4.5	630	IVE
1	EA	PRIVACY	9K3L 14D	626	BES
1	EA	SURFACE CLOSER	4111 EDA TB	689	LCN
1	EA	KICK PLATE	8400 8" X 2" LDW B-CS	630	IVE
1	EA	COAT AND HAT HOOK	582	626	IVE
3	EA	SILENCER	SR64	GRY	IVE

HARDWARE SET NO. 08 - TOILET

FOR USE ON MARK/DOOR #(S):
N104

EACH TO HAVE:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HINGE	5BB1 4.5 X 4.5	630	IVE
1	EA	PRIVACY	9K3L 14D	626	BES
1	EA	KICK PLATE	8400 8" X 2" LDW B-CS	630	IVE
1	EA	WALL STOP	WS406/407CVX	630	IVE
1	EA	COAT AND HAT HOOK	582	626	IVE
3	EA	SILENCER	SR64	GRY	IVE

HARDWARE SET NO. 09 - STAIR - ELECTRIC REQ'D

FOR USE ON MARK/DOOR #(S):
S102A S102B S103A S103B S104A S104B

EACH TO HAVE:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
1	EA	CONT. HINGE	112HD	628	IVE
1	EA	FIRE EXIT HARDWARE	99-L-F-17 LONG	626	VON
1	EA	RIM CYLINDER	1E72	626	BES
1	EA	FIRE/LIFE CLOSER	4040SE WMS PA X TB	689	LCN
1	EA	KICK PLATE	8400 8" X 2" LDW B-CS	630	IVE
1	EA	GASKETING	488S-BK	S-BK	ZER

1. THE GC & HW SUPPLIER SHALL COORDINATE ELECTRICAL REQUIREMENTS WITH ALL RELATED TRADES.

HARDWARE SET NO. 10 - STAIR - ELECTRIC REQ'D

FOR USE ON MARK/DOOR #(S):
S202A S202B S203A S203B S204A S204B
S302A S302B S303A S303B S304A S304B

EACH TO HAVE:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
1	EA	CONT. HINGE	112HD	628	IVE
1	EA	FIRE EXIT HARDWARE	99-L-BE-F-17 LONG	626	VON
1	EA	SURFACE CLOSER	4111 EDA TB	689	LCN
1	EA	KICK PLATE	8400 8" X 2" LDW B-CS	630	IVE
1	EA	WALL STOP	WS406/407CVX	630	IVE
1	EA	FIRE/LIFE WALL MAG	SEM7850	689	LCN
1	EA	GASKETING	488S-BK	S-BK	ZER

1. THE GC & HW SUPPLIER SHALL COORDINATE ELECTRICAL REQUIREMENTS WITH ALL RELATED TRADES.

HARDWARE SET NO. 11

FOR USE ON MARK/DOOR #(S):
W100

EACH TO HAVE:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HINGE	5BB1 4.5 X 4.5 NRP	630	IVE
1	EA	STOREROOM	45H7D 14H	630	BES
1	EA	SURFACE CLOSER	4111 SCUSH TB	689	LCN
1	EA	GASKETING	188S-BK	S-BK	ZER
1	EA	DOOR SWEEP	39A	A	ZER
1	EA	THRESHOLD	655A-MSLA-10	A	ZER

HARDWARE SET NO. 12 - MAIN ELECTRIC

FOR USE ON MARK/DOOR #(S):
W101A W101B

EACH TO HAVE:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HINGE	5BB1 5 X 4.5 NRP	630	IVE
1	EA	FIRE EXIT HARDWARE	99-L-NL-F-17 LONG	626	VON
1	EA	RIM CYLINDER	1E72	626	BES
1	EA	SURFACE CLOSER	4111 SCUSH TB	689	LCN
1	EA	GASKETING	188S-BK	S-BK	ZER

HARDWARE SET NO. 13

FOR USE ON MARK/DOOR #(S):
W102

EACH TO HAVE:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
6	EA	HINGE	5BB1 4.5 X 4.5 NRP	630	IVE
2	EA	MANUAL FLUSH BOLT	FB458	626	IVE
1	EA	STOREROOM	45H7D 14H	630	BES
1	EA	SURFACE CLOSER	4111 EDA TB	689	LCN
1	EA	GASKETING	488S-BK	S-BK	ZER

1. ASTRAGAL BY DOOR MFGR

HARDWARE SET NO. 14

FOR USE ON MARK/DOOR #(S):
W103A W103B

EACH TO HAVE:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HW HINGE	5BB1HW 5 X 4.5	630	IVE
1	EA	STOREROOM	45H7D 14H	630	BES
1	EA	SURFACE CLOSER	4011 TB	689	LCN
1	EA	ARMOR PLATE	8400 30" X 2" LDW B-CS	630	IVE
1	EA	WALL STOP	WS406/407CVX	630	IVE
1	EA	WALL STOP/HOLDER	WS45X	626	IVE
1	EA	GASKETING	488S-BK	S-BK	ZER
3	EA	SILENCER	SR64	GRY	IVE

HARDWARE SET NO. 15

FOR USE ON MARK/DOOR #(S):
W205A

EACH TO HAVE:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HINGE	5BB1 4.5 X 4.5	630	IVE
1	EA	STOREROOM	9K37D 14D	626	BES
1	EA	WALL STOP	WS406/407CVX	630	IVE
3	EA	SILENCER	SR64	GRY	IVE

HARDWARE SET NO. 16

FOR USE ON MARK/DOOR #(S):
W104 W107 W203 W211 W213 W316

EACH TO HAVE:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HINGE	5BB1 4.5 X 4.5	630	IVE
1	EA	STOREROOM	45H7D 14H	630	BES
1	EA	SURFACE CLOSER	4011 TB	689	LCN
1	EA	KICK PLATE	8400 8" X 2" LDW B-CS	630	IVE
1	EA	WALL STOP	WS406/407CVX	630	IVE
3	EA	SILENCER	SR64	GRY	IVE

HARDWARE SET NO. 17

FOR USE ON MARK/DOOR #(S):
W105

EACH TO HAVE:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
6	EA	HINGE	5BB1 4.5 X 4.5	630	IVE
2	EA	MANUAL FLUSH BOLT	FB458	626	IVE
1	EA	STOREROOM	45H7D 14H	630	BES
2	EA	SILENCER	SR64	GRY	IVE

HARDWARE SET NO. 18

FOR USE ON MARK/DOOR #(S):
W106A

EACH TO HAVE:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HW HINGE	5BB1HW 5 X 4.5	630	IVE
1	EA	STOREROOM	45H7D 14H	630	BES
1	EA	SURFACE CLOSER	4111 SHCUSH TB	689	LCN
1	EA	KICK PLATE	8400 8" X 2" LDW B-CS	630	IVE
1	EA	GASKETING	488S-BK	S-BK	ZER

HARDWARE SET NO. 19

FOR USE ON MARK/DOOR #(S):
W103F W103H W106D W106E W106G W306C
W306D W312C

EACH TO HAVE:

QTY	DESCRIPTION	CATALOG NUMBER	FINISH	MFR
1		BALANCE OF HARDWARE BY DOOR MANUFACTURER ELIASON DOOR		

HARDWARE SET NO. 20

FOR USE ON MARK/DOOR #(S):
W201A W212A

EACH TO HAVE:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
6	EA	HINGE	5BB1 4.5 X 4.5 NRP	630	IVE
2	EA	MANUAL FLUSH BOLT	FB458	626	IVE
1	EA	STOREROOM	45H7D 14H	630	BES
2	EA	SURFACE CLOSER	4111 EDA TB	689	LCN
1	EA	GASKETING	488S-BK	S-BK	ZER

1. ASTRAGAL SHALL BE FURNISHED BY THE DOOR MFGR.

HARDWARE SET NO. 21

FOR USE ON MARK/DOOR #(S):
W202 W207

EACH TO HAVE:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
1	EA	CONT. HINGE	112HD	628	IVE
1	EA	PANIC HARDWARE	CD-99-NL-OP-110MD	626	VON
1	EA	RIM CYLINDER	1E72	626	BES
1	EA	MORTISE CYLINDER	1E74	626	BES
1	EA	DOOR PULL, 1" ROUND	8190EZHD 18" STD	630-316	IVE
1	EA	SURFACE CLOSER	4111 EDA TB	689	LCN
1	EA	WALL STOP	WS406/407CVX	630	IVE
1	EA	THRESHOLD	63A-MSLA-10	A	ZER
1	EA		WEATHERSTRIP BY DOOR/FRAME MANUFACTURER		

HARDWARE SET NO. 22

FOR USE ON MARK/DOOR #(S):
W207A W207B W207C W207D W207E W207F
W209A W209B

EACH TO HAVE:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
1	EA	CONT. HINGE	112HD	628	IVE
1	EA	PANIC HARDWARE	CD-99-NL-OP-110MD	626	VON
1	EA	RIM CYLINDER	1E72	626	BES
1	EA	MORTISE CYLINDER	1E74	626	BES
1	EA	DOOR PULL, 1" ROUND	8190EZHD 18" STD	630-316	IVE
1	EA	SURFACE CLOSER	4111 SCUSH TB	689	LCN
1	EA	MOUNTING PLATE	4110-18	689	LCN
1	EA	CUSH SHOE SUPPORT	4110-30	689	LCN
1	EA	BLADE STOP SPACER	4110-61	689	LCN
1	EA		WEATHERSTRIP BY DOOR/FRAME MANUFACTURER		

HARDWARE SET NO. 23

FOR USE ON MARK/DOOR #(S):
W210A

EACH TO HAVE:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
1	EA	DEADBOLT	83T7K	626	BES
1			BALANCE OF HARDWARE BY DOOR MANUFACTURER ELIASON		

HARDWARE SET NO. 24 - NOT USED

HARDWARE SET NO. 25

FOR USE ON MARK/DOOR #(S):
N106

EACH TO HAVE:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HINGE	5BB1 4.5 X 4.5	630	IVE
1	EA	PASSAGE	9K3N 14D	626	BES
1	EA	KICK PLATE	8400 8" X 2" LDW B-CS	630	IVE
1	EA	WALL STOP	WS406/407CVX	630	IVE
3	EA	SILENCER	SR64	GRY	IVE

HARDWARE SET NO. 26

FOR USE ON MARK/DOOR #(S):
W205

EACH TO HAVE:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HINGE	5BB1 4.5 X 4.5	630	IVE
1	EA	CLASSROOM DEADLOCK	48H7R	626	BES
1	EA	PUSH/PULL PLATE	120L CFC	630	HAG
1	EA	PULL PLATE	8303 8" 4" X 16" CFT	630	IVE
1	EA	SURFACE CLOSER	4111 SCUSH TB	689	LCN
1	EA	CUSH SHOE SUPPORT	4110-30	689	LCN
1	EA	KICK PLATE	8400 8" X 2" LDW B-CS	630	IVE
3	EA	SILENCER	SR64	GRY	IVE

HARDWARE SET NO. 27

FOR USE ON MARK/DOOR #(S):
N101

EACH TO HAVE:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
1	EA	CONT. HINGE	112HD	628	IVE
1	EA	CLASSROOM DEADLOCK	48H7R	626	BES
1	EA	PUSH/PULL PLATE	120L CFC	630	HAG
1	EA	PULL PLATE	8303 8" 4" X 16" CFT	630	IVE
1	EA	SURFACE CLOSER	4011 TB	689	LCN
1	EA	KICK PLATE	8400 8" X 2" LDW B-CS	630	IVE
1	EA	WALL STOP	WS406/407CVX	630	IVE
1	EA	GASKETING	488S-BK	S-BK	ZER
1	EA	DOOR SWEEP	39A	A	ZER
1	EA	THRESHOLD	655A-MSLA-10	A	ZER

HARDWARE SET NO. 28

FOR USE ON MARK/DOOR #(S):
W204

EACH TO HAVE:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HINGE	5BB1 4.5 X 4.5	630	IVE
1	EA	CLASSROOM DEADLOCK	48H7R	626	BES
1	EA	PUSH/PULL PLATE	120L CFC	630	HAG
1	EA	PULL PLATE	8303 8" 4" X 16" CFT	630	IVE
1	EA	SURFACE CLOSER	4111 EDA TB	689	LCN
1	EA	KICK PLATE	8400 8" X 2" LDW B-CS	630	IVE
1	EA	WALL STOP	WS406/407CVX	630	IVE
3	EA	SILENCER	SR64	GRY	IVE

HARDWARE SET NO. 29

FOR USE ON MARK/DOOR #(S):
W303B

EACH TO HAVE:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HINGE	5BB1 4.5 X 4.5	630	IVE
1	EA	CLASSROOM	45H7R 14H	630	BES
1	EA	KICK PLATE	8400 8" X 2" LDW B-CS	630	IVE
1	EA	WALL STOP	WS406/407CVX	630	IVE
1	EA	GASKETING	488S-BK	S-BK	ZER

HARDWARE SET NO. 30

FOR USE ON MARK/DOOR #(S):
W304 W308 W310 W311 W319

EACH TO HAVE:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HW HINGE	5BB1HW 5 X 4.5	630	IVE
1	EA	STOREROOM	45H7D 14H	630	BES
1	EA	SURFACE CLOSER	4011 TB	689	LCN
1	EA	KICK PLATE	8400 8" X 2" LDW B-CS	630	IVE
1	EA	WALL STOP	WS406/407CVX	630	IVE
1	EA	GASKETING	488S-BK	S-BK	ZER

HARDWARE SET NO. 31 - STORAGE

FOR USE ON MARK/DOOR #(S):
W314 W318

EACH TO HAVE:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HINGE	5BB1 4.5 X 4.5 NRP	630	IVE
1	EA	STOREROOM	45H7D 14H	630	BES
1	EA	GASKETING	488S-BK	S-BK	ZER

HARDWARE SET NO. 32 - FAMILY TOILET

FOR USE ON MARK/DOOR #(S):
W315

EACH TO HAVE:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HINGE	5BB1 4.5 X 4.5	630	IVE
1	EA	DORMITORY	45H7T 14H VIN	630	BES
1	EA	SURFACE CLOSER	4011 TB	689	LCN
1	EA	KICK PLATE	8400 8" X 2" LDW B-CS	630	IVE
1	EA	WALL STOP	WS406/407CVX	630	IVE
1	EA	GASKETING	488S-BK	S-BK	ZER

END OF SECTION 087100

SECTION 088000 - GLAZING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This 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. Doors.
2. Glazed storefront and entrances.
3. Horizontal sliding windows.
4. Security window at Ticket Booth.
5. Fire protection rated glazing.

B. Related Sections:

1. Division 08 Section “Aluminum Framed Entrances and Storefronts” for glazed storefronts.

1.3 PERFORMANCE REQUIREMENTS

A. General: Provide glazing systems capable of withstanding normal thermal movement and wind loads without failure, including loss or glass breakage attributable to the following: defective manufacture, fabrication, and installation; failure of sealants or gaskets to remain watertight and airtight; deterioration of glazing materials; or other defects in construction.

B. Glass Design: Glass thickness designations indicated are minimums and are for detailing only. Confirm glass thicknesses by analyzing Project loads and in-service conditions. Provide glass lites in the thickness designations indicated for various size openings, but not less than thicknesses and in strengths (annealed or heat treated) required to meet or exceed the following criteria:

1. Glass Thicknesses: Select minimum glass thicknesses to comply with ASTM E 1300, according to the following requirements:

a. Specified Design Wind Loads: As indicated on Drawings.
b. Maximum Lateral Deflection: For the following types of glass supported on all 4 edges, provide thickness required that limits center deflection at design wind pressure to 1/50 times the short side length or 1 inch, whichever is less.

1) For insulating glass.

c. Minimum Glass Thickness for Exterior Lites: Not less than 6.0 mm.

C. Thermal Movements: Provide glazing that allows for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures acting on glass framing members and glazing components. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.

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

1.4 SUBMITTALS

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

B. Samples: For the following products, in the form of 12-inch- square Samples for glass and of 12-inch-long Samples for sealants. Install sealant Samples between two strips of material representative in color of the adjoining framing system.

1. Insulating glass for each designation indicated.

C. Glazing Schedule: Use same designations indicated on Drawings for glazed openings in preparing a schedule listing glass types and thicknesses for each size opening and location.

D. Product Certificates: Signed by manufacturers of glass and glazing products certifying that products furnished comply with requirements.

E. Warranties: Special warranties specified in this Section.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: An experienced installer who has completed glazing similar in material, design, and extent to that indicated for this Project; whose work has resulted in glass installations with a record of successful in-service performance; and who employs glass installers for this Project who are certified under the National Glass Association Glazier Certification Program as Level 2 (Senior Glaziers) or Level 3 (Master Glaziers).

B. Source Limitations for Glazing Accessories: Obtain glazing accessories through one source from a single manufacturer for each product and installation method indicated.

C. Glass Product Testing: Obtain glass test results for product test reports in "Submittals" Article from a qualified testing agency based on testing glass products.

1. Glass Testing Agency Qualifications: An independent testing agency with the experience and capability to conduct the testing indicated, as documented according to ASTM E 548.

D. 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.

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

1. GANA Publications: GANA's "Glazing Manual."
2. IGMA Publication for Insulating Glass: SIGMA TM-3000, "Glazing Guidelines for Sealed Insulating Glass Units."

1.6 DELIVERY, STORAGE, AND HANDLING

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

B. For insulating-glass units that will be exposed to substantial altitude changes, comply with insulating-glass manufacturer's written recommendations for venting and sealing to avoid hermetic seal ruptures.

1.7 PROJECT CONDITIONS

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

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

1.8 WARRANTY

A. Manufacturer's Special Warranty for Coated-Glass Products: Manufacturer's standard form, made out to Owner and signed by coated-glass manufacturer agreeing to replace coated-glass units that deteriorate as defined in "Definitions" Article, f.o.b. the nearest shipping point to Project site, within specified warranty period indicated below.

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

B. Manufacturer's Special Warranty on Insulating Glass: Manufacturer's standard form, made out to Owner and signed by insulating-glass manufacturer agreeing to replace insulating-glass units that deteriorate as defined in "Definitions" Article, f.o.b. the nearest shipping point to Project site, within specified warranty period indicated below.

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.

1. Minimum Glass Thickness for Exterior Lites: Not less than 6.0 mm.

B. Strength: Where float glass is indicated, provide annealed float glass, Kind HS heat-treated float glass, or Kind FT heat-treated float glass. 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. For monolithic-glass lites, properties are based on units with lites 6.0 mm thick.

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

D. Uniform Wind Load Capacity: Design, size and install components to withstand positive and negative wind loading pressures in accordance with International Building Code, as determined by Structural Engineer.

2.2 MONOLITHIC GLASS PRODUCTS

A. Annealed Float Glass: ASTM C 1036, Type I (transparent flat glass), Quality-Q3; of class indicated.

B. Heat-Treated Float Glass: ASTM C 1048; Type I (transparent flat glass); Quality-Q3; of class, kind, and condition indicated.

1. Fabrication Process: By horizontal (roller-hearth) process with roll-wave distortion parallel to bottom edge of glass as installed, unless otherwise indicated.
2. Provide Kind FT (fully tempered) float glass in place of annealed or Kind HS (heat-strengthened) float glass where safety glass is indicated or required by applicable code.

2.3 LAMINATED GLASS

A. Laminated Glass: ASTM C 1172, and complying with other requirements specified and with the following:

1. Interlayer: Polyvinyl butyral of thickness indicated with a proven record of no tendency to bubble, discolor, or lose physical and mechanical properties after laminating glass lites and installation.
2. Laminating Process: Fabricate laminated glass to produce glass free of foreign substances and air or glass pockets.
3. Interlayer Color: Clear unless otherwise indicated.

B. Windborne-Debris-Impact-Resistant Laminated Glass: ASTM C 1172, and complying with testing requirements in 16 CFR 1201 for Category II materials, with "Windborne-Debris-Impact Resistance" Paragraph in "Glass Products, General" Article, and with other requirements specified. Use materials that have a proven record of no tendency to bubble, discolor, or lose physical and mechanical properties after fabrication and installation.

1. Construction: Laminate glass with one of the following to comply with interlayer manufacturer's written recommendations:

   a. Polyvinyl butyral interlayer.
   b. Polyvinyl butyral interlayers reinforced with polyethylene terephthalate film.
   c. Ionoplast interlayer.
   d. Cast-in-place and cured-transparent-resin interlayer.
   e. Cast-in-place and cured-transparent-resin interlayer reinforced with polyethylene terephthalate film.

2. Interlayer Thickness: Provide thickness not less than that indicated and as needed to comply with requirements.
3. Interlayer Color: Clear unless otherwise indicated.

2.4 INSULATING GLASS

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

1. Sealing System: Dual seal, with manufacturer's standard primary and secondary.
2. Spacer: Manufacturer's standard spacer material and construction.
3. Desiccant: Molecular sieve or silica gel, or blend of both.

B. Glass: Comply with applicable requirements in "Glass Products" Article and in "Laminated Glass" Article as indicated by designations in "Insulating-Glass Types" Article and in "Insulating-Laminated-Glass Types" Article.

2.5 FIRE-PROTECTION-RATED GLAZING

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

B. Film-Faced Ceramic Glazing: Clear, ceramic flat glass; 5-mm thickness; faced on one surface with a clear glazing film; and complying with 16 CFR 1201, Category II.

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

a. AGC Glass Company North America, Inc.
b. SAFTI FIRST Fire Rated Glazing Solutions.
c. Schott North America, Inc.
d. Technical Glass Products.
e. Vetrotech Saint-Gobain.

2.6 GLAZING ACCESSORIES

A. Provide glazing gaskets, glazing sealants, glazing tapes, setting blocks, spacers, edge blocks, and other glazing accessories that are compatible with glazing products and each other and are approved by testing agencies that listed and labeled fire-resistant glazing products with which products are used for applications and fire-protection ratings indicated.

B. Glazing Sealants: Neutral-curing silicone glazing sealant complying with ASTM C 920, Type S, Grade NS, Class 50, Use NT. Comply with sealant and glass manufacturers' written instructions for selecting glazing sealants suitable for applications indicated.

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

a. Dow Corning Corporation.
b. GE Construction Sealants; Momentive Performance Materials Inc.
c. Tremco Incorporated.

2. Colors of Exposed Glazing Sealants: As selected by Architect from manufacturer's full range.

C. 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.

D. Expanded Cellular Glazing Tapes: Closed-cell, PVC foam tapes; factory coated with adhesive on both surfaces; and complying with AAMA 800 for the following types:

1. AAMA 810.1, Type 1, for glazing applications in which tape acts as the primary sealant.
2. AAMA 810.1, Type 2, for glazing applications in which tape is used in combination with a full bead of liquid sealant.

2.7 MISCELLANEOUS GLAZING MATERIALS

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

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

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

D. Spacers: Elastomeric blocks or continuous extrusions with a Shore, Type A durometer hardness required by glass manufacturer to maintain glass lites in place for installation indicated.

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

F. 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.

2.8 FABRICATION OF GLAZING UNITS

A. Fabricate glazing units in sizes required to glaze openings indicated for Project, with edge and face clearances, edge and surface conditions, and bite complying with written instructions of product manufacturer and referenced glazing publications, to comply with system performance requirements.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine framing glazing, with Installer present, for compliance with the following:

1. Manufacturing and installation tolerances, including those for size, squareness, and offsets at corners.
2. Presence and functioning of weep system.
3. Minimum required face or edge clearances.

4. Effective sealing between joints of glass-framing members.

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

3.2 PREPARATION

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

B. Examine glazing units to locate fire side and protected side. Label or mark units as needed so that fire side and protected side are readily identifiable. Do not use materials that leave visible marks in the completed work.

3.3 GLAZING, GENERAL

A. Comply with combined written instructions of manufacturers of glass, sealants, gaskets, and other glazing materials, unless more stringent requirements are indicated, including those in referenced glazing publications.

B. Use methods approved by testing agencies that listed and labeled fire-protection glazing products.

C. 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.

D. 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.

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

F. 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.

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

H. Provide spacers for glass lites where length plus width is larger than 50 inches.

1. Locate spacers directly opposite each other on both inside and outside faces of glass. Install correct size and spacing to preserve required face clearances, unless gaskets and glazing tapes are used that have demonstrated ability to maintain required face clearances and to comply with system performance requirements.
2. Provide 1/8-inch minimum bite of spacers on glass and use thickness equal to sealant width. With glazing tape, use thickness slightly less than final compressed thickness of tape.

I. 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.

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

K. Set glass lites with proper orientation so that coatings face exterior or interior as specified.

L. Set glass lites with proper orientation so that coatings face fire side or protected side as specified.

M. Where wedge-shaped gaskets are driven into one side of channel to pressurize sealant or gasket on opposite side, provide adequate anchorage so gasket cannot walk out when installation is subjected to movement.

N. Square cut wedge-shaped gaskets at corners and install gaskets in a manner recommended by gasket manufacturer to prevent corners from pulling away; seal corner joints and butt joints with sealant recommended by gasket manufacturer.

3.4 TAPE GLAZING

A. Position tapes on fixed stops so that, when compressed by glass, their exposed edges are flush with or protrude slightly above sightline of stops.

B. Install tapes continuously, but not necessarily in one continuous length. Do not stretch tapes to make them fit opening.

C. Cover vertical framing joints by applying tapes to heads and sills first and then to jambs. Cover horizontal framing joints by applying tapes to jambs and then to heads and sills.

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

E. Do not remove release paper from tape until right before each glazing unit is installed.

F. Apply heel bead of elastomeric sealant.

G. Center glass lites in openings on setting blocks and press firmly against tape by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centers of openings.

H. Apply cap bead of elastomeric sealant over exposed edge of tape.

3.5 GASKET GLAZING (DRY)

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

B. Insert soft compression gasket between glass and frame or fixed stop so it is securely in place with joints miter cut and bonded together at corners.

C. Installation with Drive-in Wedge Gaskets: Center glass lites in openings on setting blocks and press firmly against soft compression gasket by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centers of openings. Compress gaskets to produce a weathertight seal without developing bending stresses in glass. Seal gasket joints with sealant recommended 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.

3.6 SEALANT GLAZING (WET)

A. Install continuous spacers, or spacers combined with cylindrical sealant backing, between glass lites and glazing stops to maintain glass face clearances and to prevent sealant from extruding into glass channel and blocking weep systems until sealants cure. Secure spacers or spacers and backings in place and in position to control depth of installed sealant relative to edge clearance for optimum sealant performance.

B. Force sealants into glazing channels to eliminate voids and to ensure complete wetting or bond of sealant to glass and channel surfaces.

C. Tool exposed surfaces of sealants to provide a substantial wash away from glass.

3.7 CLEANING AND PROTECTION

A. 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, including weld splatter. If, despite such protection, contaminating substances do come into contact with glass, remove substances immediately as recommended by glass manufacturer.

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

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

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

3.8 MONOLITHIC GLASS SCHEDULE

A. Clear Glass: Clear fully tempered float glass.

1. Minimum Thickness: 6 mm.
2. Safety glazing required.

3.9 FIRE-PROTECTION-RATED GLAZING SCHEDULE

A. Fire-Protection-Rated Glass Type: Film-faced ceramic glazing; fire rating as indicated.

3.10 INSULATING-GLASS SCHEDULE

A. Glass Type **GL-1**: Low-E, Insulating-Glass Units for East Side of Club (Facing the Field).

1. Description: Guardian SunGuard SN 68 (#2) on 1/4" (6mm) Clear; 1/2" (12mm) Air; 1/4" (6mm) Clear : 0.090" PVB : 1/4" (6mm) Clear.
2. Overall Unit Thickness: 1-11/32 inch.
3. Outdoor Lite: Heat-strengthened (HS) float glass; ASTM C 1036, Type 1, Class 1, Quality q3; tempered where indicated.
    a. Thickness of Glass Lite: 6.0 mm.
    b. Low-E Coating: Vacuum Deposition Sputtered Coating on second surface. ASTM C 1376.
    c. Basis of Design: Guardian SunGuard SuperNeutral 68.
4. Interspace Content: Air, 1/2" (12mm) wide, hermetically sealed, dehydrated space.
5. Indoor Lite: (2) laminated lites of heat-strengthened (HS) float glass, ASTM C 1036, Type 1, Class 1, Quality q3.
6. Thickness of Glass Lites: 6.0 mm each
7. Glass Unit Performance Characteristics:
    a. Visible Light Transmittance (%): 66
    b. Visible Light Reflectance Outdoors (%): 11
    c. Winter Nighttime U-Value: 0.28
    d. Summer Day U-value : 0.27
    e. Solar Heat Gain Coefficient (SHGC): 0.37
    f. Light to Solar Gain (LSG): 1.77
8. Edge Seals: ASTM E 773, with aluminum spacers and silicone sealant for glass-to-spacer seals.
9. Sealant: Approved by glass manufacturer.

B. Glass Type **GL-2**: Low-E, Insulating-Glass Units for West Side of Club at Balcony and Entry Doors.

1. Description: Guardian SunGuard SNX 51/23 (#2) on 1/4" (6mm) Clear; 1/2" (12mm) Air; 1/4" (6mm) Clear : 0.090" PVB : 1/4" (6mm) Clear.
2. Overall Unit Thickness: 1-11/32 inch.
3. Outdoor Lite: heat-strengthened (HS) float glass; ASTM C 1036, Type 1, Class 1, Quality q3.
    a. Thickness of Glass Lite: 6.0 mm.
    b. Low-E Coating: Vacuum Deposition Sputtered Coating on second surface. ASTM C 1376.
    c. Basis of Design: Guardian SunGuard SuperNeutral X 51/23.
4. Interspace Content: Air, 1/2" (12mm) wide, hermetically sealed, dehydrated space.
5. Indoor Lite: (2) laminated lites of heat-strengthened (HS) float glass, ASTM C 1036, Type 1, Class 1, Quality q3.
6. Thickness of Glass Lites: 6.0 mm each
7. Glass Unit Performance Characteristics:
    a. Visible Light Transmittance (%): 49
    b. Visible Light Reflectance Outdoors (%): 14
    c. Winter Nighttime U-Value: 0.28
    d. Summer Day U-value : 0.26
    e. Solar Heat Gain Coefficient (SHGC): 0.23
    f. Light to Solar Gain (LSG): 2.14
8. Edge Seals: ASTM E 773, with aluminum spacers and silicone sealant for glass-to-spacer seals.
9. Sealant: Approved by glass manufacturer.

C. Glass Type **GL-3**: Low-E, Insulating-Glass Units for Horizontal Sliding Windows.

1. Description: Guardian SunGuard SN68 (#2) on 1/4" (6mm) Clear; 1/2" (12mm) Air; 1/4" (6mm) Clear.
2. Overall Unit Thickness: 1 inch.
3. Outdoor Lite: heat-strengthened (HS) float glass; ASTM C 1036, Type 1, Class 1, Quality q3.
    a. Thickness of Glass Lite: 6.0 mm.
    b. Low-E Coating: Vacuum Deposition Sputtered Coating on second surface. ASTM C 1376.
4. Interspace Content: Air, 1/2" (12mm) wide, hermetically sealed, dehydrated space.
5. Indoor Lite: Heat-strengthened (HS) float glass, ASTM C 1036, Type 1, Class 1, Quality q3.
6. Thickness of Glass Lites: 6.0 mm each
7. Glass Unit Performance Characteristics:
    a. Visible Light Transmittance (%): 68
    b. Visible Light Reflectance Outdoors (%): 11
    c. Winter Nighttime U-Value: 0.29
    d. Summer Day U-value : 0.28
    e. Solar Heat Gain Coefficient (SHGC): 0.38
    f. Light to Solar Gain (LSG): 1.80
8. Edge Seals: ASTM E 773, with aluminum spacers and silicone sealant for glass-to-spacer seals.
9. Sealant: Approved by glass manufacturer.

3.11 LAMINATED GLASS SCHEDULE

A. Glass Type **GL-4**: Low-E-coated, laminated vision glass for Entrance Doors and Ticket Window.

1. Description: Guardian SunGuard SN 68 (#2) on 1/4" (6mm) Clear: 0.090" PVB : 1/4" (6mm) Clear.
2. Minimum Thickness of Each Glass Ply: 6 mm.
3. Interlayer Thickness: 0.090 inch.
4. Low-E Coating: Sputtered on second surface.
5. Winter Nighttime U-Factor: 0.94 maximum.
6. Summer Daytime U-Factor: 0.85 maximum.
7. Visible Light Transmittance: 67 percent minimum.
8. Reflectance (Out): 11 percent maximum.
9. Solar Heat Gain Coefficient: 0.40 maximum.
10. Safety glazing required.

END OF SECTION 088000