DIVISION 8

DOORS AND WINDOWS

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PART 1 GENERAL

1.1 SUMMARY

A. Section includes steel doors, panels and frames; non-rated and fire rated, and interior borrowed light frames.

1.2 SUBMITTALS

A. Shop Drawings: Indicate door and frame elevations, internal reinforcement, cut-outs for glazing, louvers, jamb and door selections and finishes.

B. Product Data: Submit door and frame configurations, location of cut-outs for hardware reinforcement.

1.3 QUALITY ASSURANCE

A. Perform Work in accordance with the following:
   1. ANSI 250.8 - Recommended Specifications for Standard Steel Doors and Frames.
   2. DHI - Door Hardware Institute - The Installation of Commercial Steel Doors and Steel Frames, Insulated Steel Doors in Wood Frames and Builder's Hardware.

B. Fire Rated Door and Panel Construction: Conform to NFPA 252.

C. Fire Rated Stair Doors: Rate of rise of 450 degrees F across door thickness.

D. Installed Fire Rated Door and Panel Assembly: Conform to NFPA 80 for fire rated class as indicated on Drawings.

E. Attach label from agency approved by authority having jurisdiction to identify each fire rated door.
   1. Indicate temperature rise rating for stair doors.

F. Surface Burning Characteristics:
   1. Foam Insulation: Maximum 75/450 flame spread/smoke developed index when tested in accordance with ASTM E84 and NFPA 255.

G. Apply label from agency approved by authority having jurisdiction to identify each foam plastic insulation material.

PART 2 PRODUCTS

2.1 STEEL DOORS AND FRAMES

A. Manufacturers:
   1. Amweld Building Products, Inc.

2. Ceco Door Products.
3. Pioneer Industries.
4. Republic Builders Products.
5. Steelcraft.
6. Substitutions: Permitted in accordance with Section 01600.

B. Product Description: Standard shop fabricated steel doors, door panels, and frames; fire rated and non-rated types; flush face or stile and rail design, and door louvers.

2.2 COMPONENTS

A. Exterior Doors (Insulated): SDI 108, 1-3/4 inch thick.
1. Level 3 - Extra heavy Duty, Model 2, seamless design. - galvanized.

B. Interior Doors (Non-Rated): SDI 108, 1-3/4 inch thick.
1. Level 3 - Extra heavy Duty, Model 2, seamless design.

C. Interior Doors (Fire Rated): SDI 108, 1-3/4 inch thick.
1. Level 3 - Extra heavy Duty, Model 2, seamless design.

D. Exterior Frames:
1. Level 3 for Door Models 2 nominal 16 gage/0.053 inch thick material, base metal thickness. - galvanized

E. Interior Frames:
1. Level 3 for Door Models 2, nominal 16 gage/0.053 inch thick material, base metal thickness.

F. Door Core: Polystyrene foam and steel channel grid.

G. End Closure: Channel, 0.04 inch thick, inverted.

H. Thermal Insulated Door: Total insulation R-Value of 4, measured in accordance with ASTM C1363.

I. Sound Rated Door: STC of 32, measured in accordance with ASTM E413.

2.3 ACCESSORIES

A. Door Louvers: Roll formed material; Inverted Y blade, sight proof; prime painted.

B. Silencers: Resilient vinyl fitted into drilled hole.

C. Removable Stops: Rolled steel channel shape.

D. Astragals for Double Doors: Steel, T shaped, specifically for double doors.

E. Bituminous Coating: Fibered asphalt emulsion.

F. Primer: ANSI A250.10 rust inhibitive type.

G. Weatherstripping: Specified in Section 08710.

H. Acrylic Panels: Specified in Section 06650.

2.4 FABRICATION

A. Fabricate doors and frames with hardware reinforcement welded in place. Protect frame hardware preparations with mortar guard boxes.

B. Attach astragal to one leaf of pairs of doors.

C. Fabricate frames as face welded units.

D. Fabricate frames to suit masonry wall coursing with head member as detailed.

E. Reinforce frames wider than 48 inches with roll formed steel channels fitted tightly into frame head, flush with top.

F. Prepare interior frames for silencers and install.

G. Frame Mullions for Double Doors: Removable type, with profile matching jambs.

H. Frame Transom Bars: Fixed type, with profile matching jamb and head.

I. Attach fire rating label to each fire rated door and frame.

2.5 SHOP FINISHING

A. Steel Sheet: Galvanized to ASTM A653/A653M A60.

B. Primer: Baked.

C. Coat inside of frame profile with bituminous coating.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify opening sizes and tolerances are acceptable.

3.2 INSTALLATION

A. Install doors and frames in accordance with ANSI A250.8.

B. Coordinate installation of doors and frames with installation of hardware specified in Section 08710.

C. Coordinate door frames with masonry, gypsum board wall construction for frame anchor placement.

D. Install roll formed steel reinforcement channels between two abutting frames. Anchor to structure and floor.

E. Install door louvers plumb and level.

F. Coordinate installation of glass and glazing specified in Section 08800.

G. Adjust door for smooth and balanced door movement.

H. Tolerances:
   1. Maximum Diagonal Distortion: 1/16 inch measured with straight edge, corner to corner.

END OF SECTION

PART 1 GENERAL

1.1 SUMMARY

A. Section includes wood doors fire rated and non-rated.

1.2 SUBMITTALS

A. Shop Drawings: Indicate door elevations, cutouts for glazing and hardware preparation.

B. Samples: Submit three (3) samples of door veneer, 4 x 4 inch in size illustrating wood grain, veneer pattern, veneer joints, color, and finish.

1.3 QUALITY ASSURANCE

A. Perform work in accordance with NWWDA I.S.1.

B. Fire Rated Door and Panel Construction: Conform to one of the following:
   1. NFPA 252; with neutral pressure level at 40 inches maximum above sill at 5 minutes into test.
   2. UL 10C.
   3. 20-Minute Fire Rated Corridor Doors: Fire tested without hose stream test.

C. Fire Rated Stair Doors: Rate of rise of 450 degrees F across door thickness.

D. Installed Fire Rated Door Assembly: Conform to NFPA 80 for fire rated class as indicated on Drawings.

E. Attach label from agency approved by authority having jurisdiction to identify each fire rated door.

1.4 WARRANTY

A. Furnish lifetime manufacturer warranty to include delamination of veneer, warping beyond specified installation tolerances, defective materials, and telegraphing core construction.

B. Furnish manufacturer’s Life of Installation warranty for interior doors.

PART 2 PRODUCTS

2.1 WOOD DOORS

A. Manufacturers:
   1. Algoma Hardwoods Inc.
   2. Eggers Industries.
   3. Weyerhauser.
   4. Mohawk Doors.

5. Substitutions: Permitted in accordance with Section 01600.

B. Product Description: Solid core wood doors, fire rated, non-rated; flush and design; wood veneer site finished.
   1. Flush Interior Doors: 1-3/4 inches thick; solid core seven ply construction; fire acoustical as indicated on Drawings.

2.2 COMPONENTS

A. Core:
   1. Core (Solid, Non-Rated): NWWDA, Type Structural composite lumber core.

B. Flush Door Facing:
   1. Wood Veneer: NWWDA Grade 1 - Premium; Select White Maple species wood, plain sliced with book match grain, for transparent finish.
      a. Pair match multiple door leaves in single opening.

   2. Adhesive: NWWDA, Type I - waterproof.

2.3 ACCESSORIES

A. Glass Stops: Wood of same species as door facing type conform to UL requirements.

2.4 FABRICATION

A. Fabricate doors in accordance with NWWDA I.S.1 requirements.

B. Astragals for Double Doors: Steel, T shaped, recessed at face edge.

C. Fabricate doors with hardware reinforcement blocking in place.

D. Factory machine doors for finish hardware.

E. Factory fit doors for frame opening dimensions identified on shop drawings.

2.5 FINISH

A. Custom factory finish doors in accordance with approved sample.

B. Seal door top edge with color sealer to match door facing.

PART 3 EXECUTION

3.1 INSTALLATION

A. Install doors in accordance with NWWDA I.S.1 requirements.

B. Coordinate installation of glass and glazing.

C. Install door louvers plumb and level.

D. Coordinate installation of doors with installation of steel frames specified in Section 08110 and hardware specified in Section 08710. Glass specified in Section 08800.

E. Adjust door for smooth and balanced door movement.

F. Tolerances:
   1. Maximum Diagonal Distortion: 1/4 inch measured with straight edge, corner to corner.

3.2 SCHEDULE

A. Refer to Drawings.

END OF SECTION

PART 1 GENERAL

1.1 SUMMARY

A. Section includes fire resistive rated and non-rated access doors and panels with frames.
   1. Provide for access to controls, valves, traps, dampers, cleanouts, and similar items requiring operation behind inaccessible finished surfaces.
   2. Coordinate exact locations with various trades to assure proper placement of access doors and panels.

B. Related Sections:
   1. Section 09900 - Paints and Coatings: Field paint finish.
   2. Section 15800 – Air Distribution Systems.

1.2 REFERENCES

A. ASTM International:
   1. ASTM E119 - Standard Test Methods for Fire Tests of Building Construction and Materials.

B. Intertek Testing Services (Warnock Hersey Listed):
   1. WH - Certification Listings.

C. National Fire Protection Association:
   1. NFPA 80 - Standard for Fire Doors, Fire Windows.

D. Underwriters Laboratories Inc.:
   1. UL - Building Materials Directory.

1.3 SUBMITTALS

A. Section 01330 - Submittal Procedures: Submittal procedures.

B. Shop Drawings: Indicate exact position of access door units.

C. Product Data: Submit literature indicating sizes, types, finishes, hardware, scheduled locations, fire resistance listings, and details of adjoining Work.

D. Samples: Submit two 12 x 12 inch in size illustrating frame configuration and anchors.

E. Manufacturer's Installation Instructions: Submit installation requirements and rough-in dimensions.

1.4 CLOSEOUT SUBMITTALS

A. Section 01700 - Execution Requirements: Closeout procedures.

B. Project Record Documents: Record actual locations of access units.

1.5 QUALITY ASSURANCE

A. Fire Resistance Ratings: Where indicated as fire rated provide assemblies from manufacturers listed in UL Directory or Intertek Testing Services (Warnock Hersey Listed) Directory.

B. Fire Rated Horizontal Access Doors: Rating as indicated on Drawings.
   1. Tested Rating: Determined in accordance with ASTM E119.

C. Attach label from agency approved by authority having jurisdiction to identify each fire rated access door.

1.6 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified with minimum three years documented experience, and with service facilities within 100 miles of Project.

1.7 COORDINATION

A. Section 01300 - Administrative Requirements: Requirements for coordination.

B. Coordinate Work with work requiring controls, valves, traps, dampers, cleanouts, and similar items requiring operation being located behind finished surfaces.

PART 2 PRODUCTS

2.1 ACCESS DOORS AND PANELS

A. Manufacturers:
   1. J. L. Industries.
   2. Karp Associates, Inc.
   3. Nystrom Products Co.
   4. Milcor LTD, Partnership.
   5. Substitutions: Section 01600 - Product Requirements.

B. Flush Framed Access Doors (Type 1): Frames and nominal 1 inch wide exposed flanges of 16 gage steel and door panels of 14 gage steel.

C. Gypsum Board Access Doors (Type 2): Frames and nominal 1 inch wide flanges of 16 gage steel and door panels of 14 gage steel. Design flanges to be concealed by gypsum board joint finishing compound specified in Section 09260.

D. Recessed Wall Access Doors (Type 4): Frames and nominal 1 inch wide flanges of 16 gage steel and door panels of 16 gage steel. Design flanges to be concealed by gypsum board joint finishing compound specified in Section 09260.

E. Fire Rated Access Doors (Type 5): Frames and nominal 1 inch wide exposed flanges of minimum 16 gage steel and door panels of 20 gage steel. Provide self closing and latching doors with keyed lock to match cylinders specified in Section 08710.

F. Gypsum Board Fire Rated Access Doors (Type 6): 16 gage steel frames with minimum 22 gage galvanized steel drywall bead flanges and door panels of 20 gage steel. Design flanges to be concealed by gypsum board joint finishing compound specified in Section 09260. Provide self closing and latching doors with keyed lock to match cylinders specified in Section 08710.

2.2 FABRICATION

A. Fabricate units of continuous welded construction; weld, fill, and grind joints to assure flush and square unit.

B. Wall and Ceiling Access Door and Panel Hardware:
   1. Hinge: Standard continuous or concealed spring pin type, 175 degree steel hinges.
   2. Lock: Self-latching lock. Screw driver slot for quarter turn cam lock.

C. Floor Hatch Hardware:
   1. Hinge: 175 degree steel continuous hinge with removable pin concealed constant force closure spring type.
   2. Lock: Self-latching lock. Screw driver slot for quarter turn cam lock. Cylinder lock with latch, two keys for each unit.

D. Size Variations: Obtain acceptance of manufacturer's standard size units which vary slightly from sizes shown or scheduled.

2.3 SHOP FINISHING

A. Base Metal Protection: Prime coat units with baked on primer.

B. Finish: One coat baked enamel, color as selected.

PART 3 EXECUTION

3.1 EXAMINATION

A. Section 01300 - Administrative Requirements: Coordination and project conditions.

B. Verify rough openings for access doors and panels are correctly sized and located.

3.2 INSTALLATION

A. Secure frames rigidly in place, plumb and level in opening, with plane of door and panel face aligned with adjacent finished surfaces.
   1. Set concealed frame type units flush with adjacent finished surfaces.

B. Position unit to provide convenient access to concealed work requiring access.

C. Install fire rated units in accordance with NFPA 80 and requirements for fire listing.

3.3 SCHEDULES

A. Corridor Ceilings: Gypsum board finish type, 24 x 24 inch size, screwdriver slot lock, primed and one coat baked enamel "White".

B. Washroom Walls Above Urinal Valves: Ceramic tile finish type, 12 x 12 inch size, cylinder lock, primed and two coat baked enamel to match ceramic tile color.

END OF SECTION

PART 1 GENERAL

1.1 SUMMARY

A. Section includes aluminum-framed storefronts including aluminum and glass doors.

B. Related Sections:
1. Section 07900 - Joint Sealers: System perimeter sealant and back-up materials.
2. Section 08710 - Finish Hardware: Mortised hardware reinforcement requirements affecting framing members; hardware items other than specified in this section.
3. Section 08800 - Glazing.
4. Single Source Requirement: All products listed below shall be from same manufacturer:
   a. Section 08440 – Aluminum Curtainwall.

1.2 REFERENCES

A. Aluminum Association:
1. AA ADM 1 - Aluminum Design Manual.

B. American Architectural Manufacturers Association:
1. AAMA 501 - Methods of Test for Exterior Walls.
2. AAMA 502 - Voluntary Specification for Field Testing of Windows and Sliding Glass Doors.
3. AAMA 503 - Voluntary Specification for Field Testing of Metal Storefronts. Curtain Wall and Sloped Glazing Systems.
4. AAMA 611 - Voluntary Specification for Anodized Architectural Aluminum.
5. AAMA 1503 - Voluntary Test Method for Thermal Transmittance and Condensation Resistance of Windows, Doors and Glazed Wall Sections.
6. AAMA 2603 - Voluntary Specification, Performance Requirements and Test Procedures for Pigmented Organic Coatings on Aluminum Extrusions and Panels.
7. AAMA 2604 - Voluntary specification, Performance Requirements and Test Procedures for High Performance Organic Coatings on Aluminum Extrusions and Panels.
8. AAMA 2605 - Voluntary Specification, Performance Requirements and Test Procedures for Superior Performing Organic Coatings on Aluminum Extrusions and Panels.
9. AAMA CW-10 - Care and Handling of Architectural Aluminum from Shop to Site.
10. AAMA MCWM-1 - Metal Curtain Wall Manual.
11. AAMA SFM-1 - Aluminum Store Front and Entrance Manual.

C. American Society of Civil Engineers:
1. ASCE 7 - Minimum Design Loads for Buildings and Other Structures.

D. ASTM International:
1. ASTM A36/A36M - Standard Specification for Carbon Structural Steel.

2. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
3. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
4. ASTM B209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate.
5. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.
6. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.
7. ASTM E283 - Standard Test Method for Determining the Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen.
8. ASTM E330 - Standard Test Method for Structural Performance of Exterior Windows, Curtain Walls, and Doors By Uniform Static Air Pressure Difference.
9. ASTM E331 - Standard Test Method for Water Penetration of Exterior Windows, Curtain Walls, and Doors By Uniform Static Air Pressure Difference.
10. ASTM E547 - Standard Test Method for Water Penetration of Exterior Windows, Curtain Walls, and Doors by Cyclic Static Air Pressure Differential.
11. ASTM E1105 - Standard Test Method for Field Determination of Water Penetration of Installed Exterior Windows, Curtain Walls, and Doors by Uniform or Cyclic Static Air Pressure Difference.

E. National Fenestration Rating Council Incorporated:
1. NFRC 100 - Procedures for Determining Fenestration Product U-Factors.

F. National Fire Protection Association:
1. NFPA 255 - Standard Method of Test of Surface Burning Characteristics of Building Materials.

G. SSPC: The Society for Protective Coatings:
1. SSPC Paint 20 - Zinc-Rich Primers (Type I - Inorganic and Type II - Organic).
2. SSPC Paint 25 - Red Iron Oxide, Zinc Oxide, Raw Linseed Oil, and Alkyd Primer.

H. Underwriters Laboratories Inc.:
1. UL 723 - Tests for Surface Burning Characteristics of Building Materials.

1.3 SYSTEM DESCRIPTION

A. Aluminum-framed storefront system includes tubular aluminum sections with supplementary internal support framing, aluminum and glass entrances, shop fabricated, factory finished, glass and glazing, related flashings, anchorage and attachment devices.

B. System Assembly: Site assembled.

1.4 PERFORMANCE REQUIREMENTS

A. System Design: Design and size components to withstand dead and live loads caused by positive and negative wind pressure acting normal to plane of wall, including building corners.
   1. To design pressure of 25 lb/sq ft, as tested in accordance with ASTM E330.

B. Deflection: Limit mullion deflection to flexure limit of glass of span; with full recovery of glazing materials.

C. System Assembly: Accommodate without damage to components or deterioration of seals, movement within system, movement between system and peripheral construction, dynamic loading and release of loads, deflection of structural support framing.

D. Air Infiltration: Limit air leakage through assembly to 0.06 cfm/min/sq ft of wall area, measured at reference differential pressure across assembly of 1.57 psf as measured in accordance with ASTM E283.

E. Air and Vapor Seal: Maintain continuous air barrier and vapor retarder throughout assembly, primarily in line with inside pane of glass and inner sheet of infill panel and heel bead of glazing compound.

F. Water Leakage: None, when measured in accordance with ASTM E331 with test pressure difference of 20 percent of design pressure, with minimum differential of 2.86 lbf/sq ft and maximum of 12.00 lbf/sq ft.

G. Thermal Transmittance of Assembly (Excluding Entrances): Maximum U Value of 0.45 Btu/sq ft per hour per deg F when measured in accordance with AAMA 1503 and NFRC 100.

H. Expansion/Contraction: Provide for expansion and contraction within system components caused by cycling temperature range of 170 degrees F over 12 hour period without causing detrimental effect to system components and anchorage.

I. System Internal Drainage: Drain water entering joints, condensation occurring in glazing channels, or migrating moisture occurring within system, to exterior by weep drainage network.

1.5 SUBMITTALS

A. Section 01330 - Submittal Procedures: Submittal procedures.

B. Shop Drawings: Indicate system dimensions, framed opening requirements and tolerances, affected related Work and expansion and contraction joint location and details.

C. Product Data: Submit component dimensions, describe components within assembly, anchorage and fasteners, glass and infill, and internal drainage details.

D. Samples: Submit two samples 12 x 12 inches in size illustrating finished aluminum surface, infill panels, glazing materials.

E. Design Data: Indicate framing member structural and physical characteristics, calculations, dimensional limitations.

F. Manufacturer's Certificate: Certify products meet or exceed specified requirements.

1.6 QUALITY ASSURANCE

A. Perform Work in accordance with AAMA SFM-1 and AAMA MCWM-1 - Metal Curtain Wall, Window, Store Front and Entrance - Guide Specifications Manual.

B. Surface Burning Characteristics:
1. Foam Insulation: Maximum 75/450 flame spread/smoke developed index when tested in accordance with ASTM E84.

C. Apply label from agency approved by authority having jurisdiction to identify each foam plastic insulation board.

1.7 QUALIFICATIONS

A. Manufacturer and Installer: Company specializing in manufacturing aluminum glazing systems with minimum ten years documented experience, and with service facilities within 100 miles of Project.

B. Design structural support framing components under direct supervision of Professional Engineer experienced in design of this Work and licensed in State of Maryland.

1.8 PRE-INSTALLATION MEETINGS

A. Section 01300 - Administrative Requirements: Pre-installation meeting.

B. Convene minimum one week prior to commencing work of this section.

1.9 DELIVERY, STORAGE, AND PROTECTION

A. Section 01600 - Product Requirements: Product storage and handling requirements.

B. Handle Products of this section in accordance with AAMA MCWM-1 - Curtain Wall Manual #10.

C. Protect finished aluminum surfaces with wrapping or strippable coating. Do not use adhesive papers or sprayed coatings which bond when exposed to sunlight or weather.

1.10 ENVIRONMENTAL REQUIREMENTS

A. Section 01600 - Product Requirements.

B. Do not install sealants nor glazing materials when ambient temperature is less than 40 degrees F during and 48 hours after installation.

1.11 COORDINATION

A. Section 01300 - Administrative Requirements: Coordination and project conditions.

1.12 WARRANTY

A. Section 01700 - Execution Requirements: Product warranties and product bonds.

B. Furnish five year manufacturer warranty for glazed units.

PART 2 PRODUCTS

2.1 ALUMINUM-FRAMED STOREFRONTS

A. Manufacturers:
   1. YKK AP America Model YES 45 FS - Basis of Design.
   2. EFCO Corp.
   3. Kawneer Co., Inc.
   4. Traco.
   5. Substitutions: Section 01600 - Product Requirements.

B. Product Description:
   1. Aluminum Frame: Thermally broken; applied glazing stops; drainage holes; internal weep drainage system. Frames for interior glazing need not to be thermally broken. Nominal 2”w x 4 ½” d.
   2. Mullions: Profile of extruded aluminum with internal reinforcement of aluminum or shaped steel structural section.
   3. Doors: Aluminum framed thermally broken, insulated (Megatherm 50XT) glass doors; 1-3/4 inches thick, nominal 6 inch wide top rail and vertical stiles, nominal 10 inch wide bottom rail (medium stile) with; square glazing stops.

2.2 COMPONENTS

A. Extruded Aluminum: ASTM B221; 6063 alloy, T5 temper typical, 6061 alloy, T6 temper for extruded structural members.

B. Sheet Aluminum: ASTM B209, 5005 alloy, H15 or H34 temper.

C. Sheet Steel: ASTM A653/A653M; galvanized to minimum G90.

D. Steel Sections: ASTM A36/A36M; shaped to suit mullion sections, galvanized.

E. Glass: Specified in Section 08800.

F. Glazing Materials: As specified in Section 08800.

G. Hardware: Furnish manufacturer’s standard door hardware for types of doors and applications indicated, and as specified below.
   1. Weather Stripping: Polypropylene pile, continuous and replaceable.
   2. Sill Sweep Strips: Resilient seal type, of neoprene compound.
   3. Threshold: Specified in Section 08710.
   4. Hinges: Specified in Section 08710.
   5. Push/Pull: Specified in Section 08710.
   6. Panic Device: Specified in Section 08710.
   7. Closer: Specified in Section 08710.

8. Finish: Exposed hardware to match hardware finishes specified in Section 08710.
9. Lock Cylinders: Specified in Section 08710.

H. Flashings: Minimum 0.032 inch thick aluminum to match mullion sections where exposed.

I. Sealant and Backing Materials:
1. Sealant Used Within System (Not Used for Glazing): Manufacturer's standard materials to achieve weather, moisture, and air infiltration requirements.
2. Perimeter Sealant: Specified in Section 07900.

J. Fasteners: Stainless steel.

2.3 FABRICATION

A. Fabricate components with minimum clearances and shim spacing around perimeter of assembly, yet enabling installation and dynamic movement of perimeter seal.

B. Accurately fit and secure joints and corners. Make joints flush, hairline, and weatherproof.

C. Prepare components to receive anchor devices. Fabricate anchors.

D. Arrange fasteners and attachments to conceal from view.

E. Reinforce interior horizontal head rail to receive drapery track brackets and attachments.

F. Prepare components with internal reinforcement for door hardware.

G. Reinforce framing members for imposed loads.

2.4 SHOP FINISHING

A. Clear Anodized Aluminum Surfaces: AAMA 611, AA-M12C22A41 non-specular as fabricated mechanical finish, medium matte chemical finish, and Architectural Class I 0.7 mils clear anodized coating.

B. Concealed Steel Items: Galvanized to ASTM A123/A123M; minimum 2.0 oz/sq ft coating thickness; galvanize after fabrication. Unfinished.

C. Apply bituminous paint to concealed aluminum and steel surfaces in contact with cementitious or dissimilar metals.

D. Shop and Touch-Up Primer for Steel Components: SSPC Paint 25 red oxide.

E. Touch-Up Primer for Galvanized Steel Surfaces: SSPC Paint 20 zinc rich.

F. Extent of Finish:
1. Apply factory coating to surfaces exposed at completed assemblies.
2. Apply finish to surfaces cut during fabrication so no natural aluminum is visible in completed assemblies, including joint edges.

3. Apply touch-up materials recommended by coating manufacturer for field application to cut ends and minor damage to factory applied finish.

PART 3 EXECUTION

3.1 EXAMINATION

A. Section 01300 - Administrative Requirements: Coordination and project conditions.

B. Verify dimensions, tolerances, and method of attachment with other Work.

C. Verify wall openings and adjoining air and vapor seal materials are ready to receive Work of this Section.

3.2 INSTALLATION

A. Install wall system in accordance with AAMA MCWM-1 - Metal Curtain Wall, Window, Store Front and Entrance - Guide Specifications Manual.

B. Attach to structure to permit sufficient adjustment to accommodate construction tolerances and other irregularities.

C. Provide alignment attachments and shims to permanently fasten system to building structure.

D. Align assembly plumb and level, free of warp or twist. Maintain assembly dimensional tolerances.

E. Provide thermal isolation where components penetrate or disrupt building insulation.

F. Install sill flashings. Turn up ends and edges; seal to adjacent Work to form water tight dam.

G. Coordinate attachment and seal of perimeter air and vapor retarder materials.

H. Pack fibrous insulation in shim spaces at perimeter of assembly to maintain continuity of thermal barrier.

I. Install integral flashings and integral joint sealers.

J. Set thresholds in bed of mastic and secure.

K. Install hardware using templates provided. Refer to Section 08710 for installation requirements.

L. Install infill panels using method required to achieve performance criteria.

M. Coordinate installation of glass with Section 08800; separate glass from metal surfaces.

N. Coordinate installation of perimeter sealants with Section 07900.

3.3 ERECTION TOLERANCES

A. Section 01400 - Quality Requirements: Tolerances.

B. Maximum Variation from Plumb: 0.06 inches every 3 ft non-cumulative or 1/16 inches per 10 ft, whichever is less.

C. Maximum Misalignment of Two Adjoining Members Abutting in Plane: 1/32 inch.

3.4 FIELD QUALITY CONTROL

A. Section 01400 - Quality Requirements: Field inspecting, testing, adjusting, and balancing.

B. Inspection to monitor quality of installation and glazing.

C. Test to ASTM E1105.

3.5 ADJUSTING

A. Section 01700 - Execution Requirements: Testing, adjusting and balancing.

B. Adjust operating hardware for smooth operation.

3.6 CLEANING

A. Section 01700 - Execution Requirements: Final cleaning.

B. Remove protective material from pre-finished aluminum surfaces.

C. Wash down surfaces with solution of mild detergent in warm water, applied with soft, clean wiping cloths. Take care to remove dirt from corners. Wipe surfaces clean.

D. Remove excess sealant by method acceptable to sealant manufacturer.

3.7 PROTECTION OF INSTALLED CONSTRUCTION

A. Section 01700 - Execution Requirements: Protecting installed construction.

B. Protect finished Work from damage.

3.8 SCHEDULES

A. Refer to Drawings.

END OF SECTION

PART 1 GENERAL

1.1 SUMMARY

A. Section includes aluminum-framed curtainwall systems.

B. Related Sections:
1. Section 07900 - Joint Sealers: System perimeter sealant and back-up materials.
2. Section 08410 - Aluminum Framed Storefronts: Aluminum and glass doors.
3. Section 08800 - Glazing.
4. Single Source Requirement: All products listed below shall be from same manufacturer.
a. 08410 - Aluminum Framed Storefronts.

1.2 REFERENCES

A. Aluminum Association:
1. AA ADM 1 - Aluminum Design Manual.

B. American Architectural Manufacturers Association:
1. AAMA 501 - Methods of Test for Exterior Walls.
2. AAMA 502 - Voluntary Specification for Field Testing of Windows and Sliding Glass Doors.
3. AAMA 503 - Voluntary Specification for Field Testing of Metal Storefronts. Curtain Wall and Sloped Glazing Systems.
4. AAMA 611 - Voluntary Specification for Anodized Architectural Aluminum.
5. AAMA 1503 - Voluntary Test Method for Thermal Transmittance and Condensation Resistance of Windows, Doors and Glazed Wall Sections.
6. AAMA 2603 - Voluntary Specification, Performance Requirements and Test Procedures for Pigmented Organic Coatings on Aluminum Extrusions and Panels.
7. AAMA 2604 - Voluntary specification, Performance Requirements and Test Procedures for High Performance Organic Coatings on Aluminum Extrusions and Panels.
8. AAMA 2605 - Voluntary Specification, Performance Requirements and Test Procedures for Superior Performing Organic Coatings on Aluminum Extrusions and Panels.
9. AAMA CW-10 - Care and Handling of Architectural Aluminum from Shop to Site.
10. AAMA MCWM-1 - Metal Curtain Wall Manual.
11. AAMA SFM-1 - Aluminum Store Front and Entrance Manual.

C. American Society of Civil Engineers:
1. ASCE 7 - Minimum Design Loads for Buildings and Other Structures.

D. ASTM International:
1. ASTM A36/A36M - Standard Specification for Carbon Structural Steel.
2. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.

3. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
4. ASTM B209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate.
5. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.
6. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.
7. ASTM E283 - Standard Test Method for Determining the Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen.
8. ASTM E330 - Standard Test Method for Structural Performance of Exterior Windows, Curtain Walls, and Doors By Uniform Static Air Pressure Difference.
9. ASTM E331 - Standard Test Method for Water Penetration of Exterior Windows, Curtain Walls, and Doors By Uniform Static Air Pressure Difference.
10. ASTM E547 - Standard Test Method for Water Penetration of Exterior Windows, Curtain Walls, and Doors by Cyclic Static Air Pressure Differential.
11. ASTM E1105 - Standard Test Method for Field Determination of Water Penetration of Installed Exterior Windows, Curtain Walls, and Doors by Uniform or Cyclic Static Air Pressure Difference.

E. National Fenestration Rating Council Incorporated:
1. NFRC 100 - Procedures for Determining Fenestration Product U-Factors.

F. National Fire Protection Association:
1. NFPA 255 - Standard Method of Test of Surface Burning Characteristics of Building Materials.

G. SSPC: The Society for Protective Coatings:
1. SSPC Paint 20 - Zinc-Rich Primers (Type I - Inorganic and Type II - Organic).
2. SSPC Paint 25 - Red Iron Oxide, Zinc Oxide, Raw Linseed Oil, and Alkyd Primer.

H. Underwriters Laboratories Inc.:
1. UL 723 - Tests for Surface Burning Characteristics of Building Materials.

1.3 SYSTEM DESCRIPTION

A. Aluminum-framed curtainwall system includes tubular aluminum sections with supplementary internal support framing, aluminum and glass entrances, shop fabricated, factory finished, glass and glazing, related flashings, anchorage and attachment devices.

B. System Assembly: Site assembled.

1.4 PERFORMANCE REQUIREMENTS

A. System Design: Design and size components to withstand dead and live loads caused by positive and negative wind pressure acting normal to plane of wall, including building corners.
1. To design pressure of 25 lb/sq ft, as tested in accordance with ASTM E330.

B. Deflection: Limit mullion deflection to flexure limit of glass of span; with full recovery of glazing materials.

C. System Assembly: Accommodate without damage to components or deterioration of seals, movement within system, movement between system and peripheral construction, dynamic loading and release of loads, deflection of structural support framing.

D. Air Infiltration: Limit air leakage through assembly to 0.06 cfm/min/sq ft of wall area, measured at reference differential pressure across assembly of 1.57 psf as measured in accordance with ASTM E283.

E. Air and Vapor Seal: Maintain continuous air barrier and vapor retarder throughout assembly, primarily in line with inside pane of glass and inner sheet of infill panel and heel bead of glazing compound.

F. Water Leakage: None, when measured in accordance with ASTM E331 with test pressure difference of 20 percent of design pressure, with minimum differential of 2.86 lbf/sq ft and maximum of 12.00 lbf/sq ft.

G. Thermal Transmittance of Assembly (Excluding Entrances): Maximum U Value of 0.45 Btu/sq ft per hour per deg F when measured in accordance with AAMA 1503 and NFRC 100.

H. Expansion/Contraction: Provide for expansion and contraction within system components caused by cycling temperature range of 170 degrees F over 12 hour period without causing detrimental effect to system components and anchorage.

I. System Internal Drainage: Drain water entering joints, condensation occurring in glazing channels, or migrating moisture occurring within system, to exterior by weep drainage network.

1.5 SUSTAINABLE DESIGN REQUIREMENTS

A. MRc2: Construction Waste Management

No less than the specified minimum proportion of all construction waste from the project shall be diverted from disposal in a landfill and/or incineration in accordance with the project requirements for Construction Waste Management. See Section 01351 Sustainable Project Requirements.

Contractor shall provide a Construction Waste Management Plan in accordance with the project requirements for Construction Waste Management. Nonhazardous construction and demolition debris shall be recycled and / or salvaged. The approved construction waste management plan shall identify materials to be diverted and those to be sorted on-site. All measurements and calculations shall be by weight. The Construction Waste Management Plan shall be subject to approval by TerraLogos: eco architecture, pc . See Section 01351 Sustainable Project Requirements.

Contractor shall provide LEED credit verification as per Section 01330 Submittal Procedures.

B. MRc4: Recycled Content Material

No less than the specified minimum proportion of the building materials shall contain post-consumer and pre-consumer waste materials in accordance with the project requirements for Recycled Content Materials. All materials counted toward the computation of the proportion of the Recycled Content Materials shall comply with the standard for the minimum percentages of post-consumer waste materials and for the minimum percentage of pre-consumer waste materials. See Section 01351 Sustainable Project Requirements.

Contractor shall provide LEED credit verification as per section 01330 Submittal Procedures.

C. MRc5: Regionally manufactured harvested materials

No less than the specified proportion of the building materials shall be extracted, processed, and manufactured within 500 miles of the project site in accordance with the project requirements for Regionally Manufactured and/or Harvested Materials. See Section 01351 Sustainable Project Requirements.

Contractor shall provide LEED credit verification as per section 01330 Submittal Procedures.

D. IEQc4.1: Low-Emitting Materials – Sealants and Adhesives

All sealants, adhesives, and sealant primers used on the interior of the building shall comply with the project requirements for Low-Emitting Materials – Sealants and Adhesives. See Section 01351 Sustainable Project Requirements.

Contractor shall provide LEED credit verification as per Section 01330 Submittal Procedures.

E. IEQc4.2: Low-Emitting Materials – Paints and Coatings

All paints and coatings used in the building interior comply with the project requirements for Low-Emitting Materials – Paints and Coatings. See Section 01351 Sustainable Project Requirements.

Contractor shall provide LEED credit verification as per section 01330 Submittal Procedures.

1.6 SUBMITTALS

A. Section 01330 - Submittal Procedures: Submittal procedures.

B. Shop Drawings: Indicate system dimensions, framed opening requirements and tolerances, affected related Work and expansion and contraction joint location and details.

C. Product Data: Submit component dimensions, describe components within assembly, anchorage and fasteners, glass and infill, and internal drainage details.

D. Samples: Submit two samples 12 x 12 inches in size illustrating finished aluminum surface, infill panels, glazing materials.

E. Design Data: Indicate framing member structural and physical characteristics, calculations, dimensional limitations.

F. Manufacturer's Certificate: Certify products meet or exceed specified requirements.

1.7 QUALITY ASSURANCE

A. Perform Work in accordance with AAMA SFM-1 and AAMA MCWM-1 - Metal Curtain Wall, Window, Store Front and Entrance - Guide Specifications Manual.

B. Surface Burning Characteristics:
1. Foam Insulation: Maximum 75/450 flame spread/smoke developed index when tested in accordance with ASTM E84.

C. Apply label from agency approved by authority having jurisdiction to identify each foam plastic insulation board.

1.8 QUALIFICATIONS

A. Manufacturer and Installer: Company specializing in manufacturing aluminum glazing systems with minimum ten years documented experience, and with service facilities within 100 miles of Project.

B. Design structural support framing components under direct supervision of Professional Engineer experienced in design of this Work and licensed in State of Maryland.

1.9 PRE-INSTALLATION MEETINGS

A. Section 01300 - Administrative Requirements: Pre-installation meeting.

B. Convene minimum one week prior to commencing work of this section.

1.10 DELIVERY, STORAGE, AND PROTECTION

A. Section 01600 - Product Requirements: Product storage and handling requirements.

B. Handle Products of this section in accordance with AAMA MCWM-1 - Curtain Wall Manual #10.

C. Protect finished aluminum surfaces with wrapping or strippable coating. Do not use adhesive papers or sprayed coatings which bond when exposed to sunlight or weather.

1.11 ENVIRONMENTAL REQUIREMENTS

A. Section 01600 - Product Requirements.

B. Do not install sealants nor glazing materials when ambient temperature is less than 40 degrees F during and 48 hours after installation.

1.12 COORDINATION

A. Section 01300 - Administrative Requirements: Coordination and project conditions.

1.13 WARRANTY

A. Section 01700 - Execution Requirements: Product warranties and product bonds.

B. Furnish five year manufacturer warranty for glazed units.

PART 2 PRODUCTS

2.1 ALUMINUM-FRAMED STOREFRONTS

A. Manufacturers:
   1. YKK AP America Model YCW 750 OG (Basis of Design).
   2. EFCO Corp.
   3. Kawneer Co., Inc.
   4. Traco.
   5. Substitutions: Section 01600 - Product Requirements.

B. Product Description:
   1. Aluminum Frame: Thermally broken; applied glazing stops; drainage holes; internal weep drainage system. Frames for interior glazing need not to be thermally broken. Nominal 2-1/2”w x 7-1/2” d.
   2. Mullions: Profile of extruded aluminum with internal reinforcement of aluminum or shaped steel structural section.

2.2 RECYCLED CONTENT

A. Provide aluminum with minimum recycled content in conformance with LEED Credit MR 4.1 and MR 4.2.

2.3 COMPONENTS

A. Extruded Aluminum: ASTM B221; 6063 alloy, T5 temper typical, 6061 alloy, T6 temper for extruded structural members.

B. Sheet Aluminum: ASTM B209, 5005 alloy, H15 or H34 temper.

C. Sheet Steel: ASTM A653/A653M; galvanized to minimum G90.

D. Steel Sections: ASTM A36/A36M; shaped to suit mullion sections, galvanized.

E. Glass: Specified in Section 08800.

F. Glazing Materials: As specified in Section 08800.

G. Flashings: Minimum 0.032 inch thick aluminum to match mullion sections where exposed.

H. Sealant and Backing Materials:

1. Sealant Used Within System (Not Used for Glazing): Manufacturer's standard materials to achieve weather, moisture, and air infiltration requirements.
2. Perimeter Sealant: Specified in Section 07900.

I. Fasteners: Stainless steel.

2.4 FABRICATION

A. Fabricate components with minimum clearances and shim spacing around perimeter of assembly, yet enabling installation and dynamic movement of perimeter seal.

B. Accurately fit and secure joints and corners. Make joints flush, hairline, and weatherproof.

C. Prepare components to receive anchor devices. Fabricate anchors.

D. Arrange fasteners and attachments to conceal from view.

E. Reinforce interior horizontal head rail to receive drapery track brackets and attachments.

F. Prepare components with internal reinforcement for door hardware.

G. Reinforce framing members for imposed loads.

2.5 SHOP FINISHING

A. Clear Anodized Aluminum Surfaces: AAMA 611, AA-M12C22A41 non-specular as fabricated mechanical finish, medium matte chemical finish, and Architectural Class I 0.7 mils clear anodized coating.

B. Concealed Steel Items: Galvanized to ASTM A123/A123M; minimum 2.0 oz/sq ft coating thickness; galvanize after fabrication. Unfinished.

C. Apply bituminous paint to concealed aluminum and steel surfaces in contact with cementitious or dissimilar metals.

D. Shop and Touch-Up Primer for Steel Components: SSPC Paint 25 red oxide.

E. Touch-Up Primer for Galvanized Steel Surfaces: SSPC Paint 20 zinc rich.

F. Extent of Finish:
1. Apply factory coating to surfaces exposed at completed assemblies.
2. Apply finish to surfaces cut during fabrication so no natural aluminum is visible in completed assemblies, including joint edges.
3. Apply touch-up materials recommended by coating manufacturer for field application to cut ends and minor damage to factory applied finish.

PART 3 EXECUTION

3.1 EXAMINATION

A. Section 01300 - Administrative Requirements: Coordination and project conditions.

B. Verify dimensions, tolerances, and method of attachment with other Work.

C. Verify wall openings and adjoining air and vapor seal materials are ready to receive Work of this Section.

3.2 INSTALLATION

A. Install wall system in accordance with AAMA MCWM-1 - Metal Curtain Wall, Window, Store Front and Entrance - Guide Specifications Manual.

B. Attach to structure to permit sufficient adjustment to accommodate construction tolerances and other irregularities.

C. Provide alignment attachments and shims to permanently fasten system to building structure.

D. Align assembly plumb and level, free of warp or twist. Maintain assembly dimensional tolerances.

E. Provide thermal isolation where components penetrate or disrupt building insulation.

F. Install sill flashings. Turn up ends and edges; seal to adjacent Work to form water tight dam.

G. Coordinate attachment and seal of perimeter air and vapor retarder materials.

H. Pack fibrous insulation in shim spaces at perimeter of assembly to maintain continuity of thermal barrier.

I. Install integral flashings and integral joint sealers.

J. Set thresholds in bed of mastic and secure.

K. Install hardware using templates provided. Refer to Section 08710 for installation requirements.

L. Install infill panels using method required to achieve performance criteria.

M. Coordinate installation of glass with Section 08800; separate glass from metal surfaces.

N. Coordinate installation of perimeter sealants with Section 07900.

3.3 ERECTION TOLERANCES

A. Section 01400 - Quality Requirements: Tolerances.

B. Maximum Variation from Plumb: 0.06 inches every 3 ft non-cumulative or 1/16 inches per 10 ft, whichever is less.

C. Maximum Misalignment of Two Adjoining Members Abutting in Plane: 1/32 inch.

3.4 FIELD QUALITY CONTROL

A. Section 01400 - Quality Requirements: Field inspecting, testing, adjusting, and balancing.

B. Inspection to monitor quality of installation and glazing.

C. Test to ASTM E1105.

3.5 ADJUSTING

A. Section 01700 - Execution Requirements: Testing, adjusting and balancing.

B. Adjust operating hardware for smooth operation.

3.6 CLEANING

A. Section 01700 - Execution Requirements: Final cleaning.

B. Remove protective material from pre-finished aluminum surfaces.

C. Wash down surfaces with solution of mild detergent in warm water, applied with soft, clean wiping cloths. Take care to remove dirt from corners. Wipe surfaces clean.

D. Remove excess sealant by method acceptable to sealant manufacturer.

3.7 PROTECTION OF INSTALLED CONSTRUCTION

A. Section 01700 - Execution Requirements: Protecting installed construction.

B. Protect finished Work from damage.

3.8 SCHEDULES

A. Refer to Drawings.

END OF SECTION

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Work under this section comprises of furnishing and installing commercial door hardware needed for a complete and operational system for following:
      a. Swinging doors
      b. Sliding doors
      c. Folding doors
      d. Other doors indicated in schedules and plans
   2. Cylinders for doors specified in other Sections
   3. Electrified door hardware

B. Products Supplied but not Installed under this Section:
   1. Cylinders for locks on storefront entrance doors
   2. Cylinders for locks on all-glass entrance doors
   3. Cylinders for locks on overhead coiling doors and grilles
   4. Final replacement cores and keys installed by Owner

C. Related Sections:
   1. Section 08110 Steel Doors and Frames
   2. Section 08210 Wood 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 A115W Wood Door Hardware Standards; Hardware Preparation
   3. ANSI A115 Specifications for Steel Door and Frame Preparation for Hardware
   4. ANSI A117.1 Accessible and Usable Buildings and Facilities
   5. ANSI A250.6 Hardware on Steel Doors (Reinforcement - Applications)

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 for Labeled Fire Doors (with supplements)
   4. DHI Publication - Hardware Reinforcements on Steel Doors and Frames
   5. DHI Publication - Installation Guide for Doors and Hardware
   6. DHI Publication - WDHS-1 Template Book Criteria for Wood Doors
   7. DHI Publication - WDHS-3 Recommended Hardware Locations for Wood Flush Doors
   8. DHI Publication - For Processing Hardware Schedules and Templates

E. National Fire Protection Association:
   1. NFPA 70 National Electrical Code
   2. NFPA 80 Standard for Fire Doors and Windows
   3. NFPA 101 Life Safety Code
   4. NFPA 105 Recommended Practice for the Installation of Smoke-Control Door Assemblies
   5. NFPA 252 Standard Methods of Fire Tests of Door Assemblies

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

G. Underwriters Laboratories, Inc.
    1. UL Standard 10C Positive Pressure Fire Tests of Door Assemblies
    2. UL Standard 1784 Air Leakage Tests of Door Assemblies
    3. UL Building Materials Directory

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.

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 Schedule 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

D. Shop Drawings:
    1. Provide a copy with each hardware schedule submitted.
        a. Electrical components shall be listed by opening in hardware submittals.
    2. Submit details of interface between electrified door hardware and following:
        a. Fire alarm system
        b. Access control system

c. Security system
d. Building control system

3. Provide description of each electrified door hardware function, including location, sequence of operation, and interface with other building control systems; include description of component functions that occur in following situations:
   a. Authorized person wants to enter
   b. Authorized person wants to exit
   c. Unauthorized person wants to enter
   d. Unauthorized person wants to exit
4. Provide elevation drawings of electronic hardware and systems identifying locations of system components with respect to their placement in door opening.

   a. Indicate mounting heights and locations of electronic components listed by opening in hardware submittals.
5. Wiring Diagrams:
   a. Submit detail wiring for power, signal, and control systems for each opening that requires electrified hardware, except openings where only magnetic hold-opens are specified. Differentiate between manufacturer-installed and field-installed wiring. Include following:
      (1) System schematic
      (2) Point-to-point wiring diagram
      (3) Riser diagram
      (4) Elevation of each door

E. Samples:
   1. Submit samples of door hardware items if requested by Architect. Accepted samples may be incorporated into Work.

F. Quality Assurance Submittals:
   1. Test Reports:
      a. Provide product test reports based on evaluation of comprehensive tests performed by manufacturer and witnessed by a qualified testing agency, indicating current products comply with requirements.
   2. Certificates:
      a. Submit Product Certificates signed by manufacturers of electrified door hardware certifying that electronic hardware and systems being furnished comply with specified requirements.
      b. Submit a statement from manufacturer certifying that door hardware is approved for use on types and sizes of labeled fire doors and complies with listed fire door assemblies.
   3. 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, wood doors and frames, and other items related to hardware.
      c. Submission for templates and template list shall follow procedures established by DHI publication *For Processing Hardware Schedules and Templates*.
   4. Field Quality Assurance.
      a. To ensure and validate the proper closing, latching, sealing and securing of a door the manufacturer of the gasket shall provide a program of Field Quality Assurance.
      b. The program shall be acceptable to the architect and provide the site superintendent and installers with knowledge as to the industry acceptable standards for tolerances in manufacturing and field installation.
      c. The program shall create an audit trail of documentation for the inspection of pre-machined doors for machining and sizing, including hinge backset and depth of mortise, width and height. An "Installation Checklist" and the "Industry Guidelines" shall also be furnished for verification of acceptability of related door, frame and hardware components prior to installing the gasket. These forms shall be part of the submittal process and shall be acknowledged by the site superior and returned to the manufacturer in a timely manner.
         (1) http://dhsi-seal.com/inspectionforms.cfm

G. 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 point-to-point 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.
        b. Electrified Door Hardware:
            (1) Supplier shall be an experienced door hardware supplier who has completed projects with electrified door hardware similar in material, design, and extent to that indicated for this Project, whose work has resulted in construction with a record of successful in-service performance, and who is acceptable to manufacturer of primary materials.
            (2) Supplier shall prepare data for electrified door hardware, including shop drawings, based on testing and engineering analysis of manufacturer's standard units in assemblies similar to those indicated for this Project.
    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.

4. Single Source Responsibility:
   a. Obtain each type and variety of door hardware from a single manufacturer, unless otherwise indicated.
   b. Provide electrified door hardware from same manufacturer as mechanical door hardware, unless otherwise indicated.
   c. Manufacturers that are listed to perform electrical modifications, by a testing and inspecting agency acceptable to authorities having jurisdiction, shall be acceptable.

B. Regulatory Requirements:
   1. Hardware and installation shall comply with provisions and standards listed in IBC 2003.
   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
      d. NFPA 252 Standard Methods of Fire Tests of Door Assemblies
   4. Underwriters Laboratories Inc.:
      a. UL 10C Positive Pressure Fire Tests of Door Assemblies
      b. UL 1784 Air Leakage Tests of Door Assemblies
   5. ANSI/BHMA Standards
      a. A115-W Series
      b. A115 Series
      c. A156 Series:
   6. Door and Hardware Institute:
      a. Abbreviations and Symbols
      b. Basic Architectural Hardware
      c. Hardware for Labeled Fire Doors (with supplements)
      d. Hardware Reinforcements on Steel Doors and Frames
      e. Installation Guide for Doors and Hardware
      f. WDHS-1 Template Book Criteria for Wood Doors
      g. WDHS-3 Recommended Hardware Locations for Wood Flush Doors

C. Certifications:
   1. Hardware used in labeled fire or smoke rated openings shall be bear identifying label or mark indicating listing by Underwriters Laboratories, Inc., ITS (Warnock Hersey International), or other nationally recognized organizations acceptable to authority having jurisdiction.
   2. Provide door hardware for fire-rated door assemblies complying with NFPA 80 for fire ratings indicated, based on testing in compliance with NFPA 252.
   3. Electrified door hardware shall be listed and labeled as defined in NFPA 70, Article 100.

D. Pre-Installation Meetings:
   1. Conduct conference on-site to comply with requirements in Division 1 for Project Meetings.
   2. Topics to be discussed at meeting shall include:
      a. Review items such as proper installation sequence, adjustments, attachment, and location of door hardware.
      b. Review methods and procedures related to electrified door hardware including but not limited to following:
         (1) Inspect and discuss electrical roughing-in and other preparatory work performed by other trades.
         (2) Review sequence of operation for each type of electrified door hardware.
         (3) Review required testing, inspecting, and certifying procedures.

c. Review and finalize construction schedule and verify availability of materials, installer's personnel, equipment, and facilities needed to make progress and avoid delays.

E. 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

F. 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.

2. Electrical System Roughing-In:
a. Coordinate layout and installation of electrified door hardware with connections to power supplies, fire alarm system and detection devices, access control system, security system, building control system.
b. Refer to work specified in Division 16 applicable to electrified hardware items including, but not limited to conduit, pull boxes, wiring, and final connections.

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: 10 years

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

A. Extra Materials:

1. Furnish 3 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 12 months' 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. Do not use through-bolts for installations where bolt head or nut opposite face is exposed in other work. Use of sex bolts shall not be allowed.
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	US27	A	Aluminum
630	Satin stainless steel	US32D	A	Stainless Steel
652	Satin chromium plated	US26D	E	Steel
689	Aluminum painted	US28	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 or security studs.
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. Acceptable Manufacturers:

	Steel	Stainless Steel
a. Bommer:	BB5000	BB5002
b. Hager:	BB1279	BB1191
c. H. B. Ives:	5BB1	5BB1

8. Acceptable Manufacturers:

	Steel	Stainless Steel
a. Bommer:	BB5004	BB5006
b. Hager:	BB1168	BB1199
c. H. B. Ives:	5BB1HW	5BB1HW

B. Geared Continuous Hinges: ANSI/ BHMA A156.26 Grade 1
   1. Provide full mortise, non-handed, full height hinges with interlocking cover and symmetrically templated hole pattern made from extruded aluminum.

   2. Finish: BHMA #628 (US27)
   3. Acceptable Manufacturers:
      a. Hager: 780-112 HD
      b. Ives: 112HD
      c. Select: SL-12HD

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.

B. 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. Acceptable Manufacturers:
      a. Falcon – MA Series with QG lever design
      b. Best Lock: 40H Series with 14H lever design
      c. Sargent: 8200 Series with LNP lever design

2.4 EXIT DEVICES

A. Exit Devices: ANSI/ BHMA A156.3, Grade 1
   1. Exit devices shall be listed by UL for accident and hazard. Devices shall conform to applicable requirements of NFPA 80 and NFPA 101.
   2. Shape of lever shall be easy to grasp with one hand and not require tight grasping, tight pinching, or twisting of wrist.
   3. Exit devices shall not require more than 15 lbf to release latch. Locks shall not require use of a key, tool, or special knowledge for operation.
   4. Exit devices mounted on labeled wood doors shall be through-bolt mounted in compliance with door manufacturer's requirements. Do not through-bolt if there has been special blocking specified in wood door specification; refer to Section 08210.
   5. Furnish filler plates and shim kits as needed for flush mounting of devices on doors.
   6. Provide stainless steel touch pads. Plastic touch pads shall not be acceptable.
   7. Surface strike shall be roller type and device shall have dead latching feature to prevent latchbolt tampering.
   8. Lever trim shall be heavy-duty type fastened by means of concealed welded lugs and through-bolts from inside.
   9. Lever trim shall be designed with a breakaway feature to allow trim to freely rotate while remaining securely locked, preventing damage to internal lock components from vandalism by excessive force.
   10. End caps shall be provide horizontal adjustment to provide flush alignment with device cover plate. When device end capo is installed, no raised edges will protrude.
   11. Acceptable Manufacturers:
      a. Falcon: 25 Series
      b. Precision: 2100 Series
      c. Sargent: 8800 Series

2.5 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. Finish: BHMA #689
   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. Closers shall be non-sized, field adjustable from size 1 to 6.
   6. Furnish non-sized closers with 1 1/2" diameter piston.
   7. Do not through-bolt if there has been special blocking specified in wood door specification; refer to Section 08210.
   8. Locate closers on interior side of exterior doors and on non-public side of interior doors, unless otherwise specified.
   9. Provide manufacturers heaviest duty arm available at doors scheduled with parallel arm applications.

10. Provide plates, brackets and special templates when needed for interface with particular header door and wall conditions and adjacent hardware.
11. Closers shall be tested to 100 hours of salt spray test in compliance with ASTM B117; furnish data on request.
12. Acceptable Manufacturers:
    a. Dor-O-Matic: SC71 Series
    b. Sargent: 350 Series
    c. Precision: D-4550

2.6 FLUSHBOLTS

A. Flushbolts: ANSI/ BHMA A156.16
   1. Provide minimum 1/2" diameter rods of brass or stainless steel, with minimum 12" long rods for doors up to 7'-0" in height. Provide longer rods as needed for doors exceeding 7'-0" in height.
   2. Provide dustproof strikes for bottom flushbolt applications, except where special threshold construction provides non-recessed strike for bolt.
   3. Finish: BHMA #630 (US32D)
   4. Acceptable Manufacturers:
      a. Ives: FB458
      b. Rockwood: 555
      c. Trimco: 3917

B. Combination Flushbolts: ANSI/ BHMA A156.16
   1. Provide combination flushbolts using two automatic flushbolts for top and bottom of the door. When active leaf is opened flushbolts are opened. Automatic flushbolts engages each time inactive leaf is closed.
   2. Provide dust-proof strikes for bottom flushbolt applications.
   3. Finish: BHMA #630 (US32D)
   4. Acceptable Manufacturers: (wood doors)
      a. Ives: FB41P
      b. Rockwood: 1945
      c. Trimco: 3815
   5. Acceptable Manufacturers: (hollow metal doors)
      a. Ives: FB31P
      b. Rockwood: 1845
      c. Trimco: 3810

2.7 PUSH PLATES, PULL BARS, AND GRIPS

A. 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 on four edges.
   3. Where applicable plates shall be prepared to receive cylinder locks or thumb turns as scheduled.
   4. Finish: BHMA #630 (US32D)

B. Push Plates:
   1. Size: 4" x 16"
   2. Thickness (US GA): 18 gauge; .050"
   3. Acceptable Manufacturers:
      a. Hager: 30S
      b. Ives: 8200
      c. Rockwood: 70C

C. Pull Plates:
   1. Size: 4" x 16"
   2. Thickness (US GA): 18 gauge; .050"

3. Pull Size: 1” diameter; 10” center-to-center
4. Acceptable Manufacturers:
    a. Hager: 34G
    b. Ives: 8302-0
    c. Rockwood: 110 x 70C

D. Pull Bars: Offset “D” pull
1. Size: 1” diameter
2. Projection: 2 1/2”
3. Mounting: 10” center-to-center
4. Acceptable Manufacturers:
    a. Hager: 11J
    b. Rockwood: 151
    c. Ives – 8190-0

2.8 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: Stainless steel
    a. Thickness (US GA): 18 gauge; .050”
5. Finish: BHMA #630 (US32D)

B. Kick Plates:
1. Size: 8”
2. Acceptable Manufacturers:
    a. Hager: 193S
    b. Ives: 8400
    c. Rockwood: kick plate

C. Armor Plates:
1. Size: 36”
2. Acceptable Manufacturers:
    a. Hager: 193S
    b. Ives: 8400
    c. Rockwood: armor plate

2.9 OVERHEAD STOPS AND HOLDERS

A. Surface Mounted Overhead Holders/Stops: ANSI/ BHMA A156.8
1. Description: Heavy-duty extruded brass, bronze or stainless steel stop/holders with shock absorber and no plastic parts
2. Finish: BHMA #630 (US32D)
3. Acceptable Manufacturers:
    a. GJ: 90 and 450 Series
    b. Rixon: Heavy Duty 9 and 33 Series
    c. ABH Mfg.: 9000 and 3300 Series

2.10 SEALS AND GASKETS

A. General Requirements: ANSI/ BHMA A156.22
1. Except as otherwise indicated, provide continuous weatherstripping at each edge of every exterior door leaf. Provide type, sizes and profiles shown or scheduled. Provide non-corrosive fasteners as recommended by manufacturer for application indicated.

2. Seals and gaskets shall be continuous and without unnecessary interruptions at door corners and hardware. Provide components which shall not become ineffective as seals due to misalignment at corners, minor out-of-adjustment of doors and frames, temperature variations, and normal wear and aging.
    a. Openings allowing light to pass frame perimeter (exclusive of door bottom) shall be rejected.
    b. Seals that bind door, requiring more than 15 lbs. to release latch, shall be unacceptable.
    c. Filing of strike plates shall be unacceptable.

B. Replaceable Seal Strips:
    1. Provide only those units where resilient or flexible seal strip is easily replaceable and readily available from stocks maintained by manufacturer.
    2. Acceptable Manufacturers:
        a. NGP
        b. Pemko
        c. Reese

C. Smoke Seals:
    1. Provide at doors where called for in hardware sets.
    2. To avoid self-adhesive failure, due to stretching during installation, self adhesive frame seals shall be inelastic and shall not be subject to stretching.
    3. Acceptable Manufacturers:
        a. Door Hardware Systems, Inc. 105 Cush N Seal
        b. Pemko Mfg Co. S733

2.11 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 #628 (US27)
    3. Provide thresholds that are 1” wider than depth of frame.
    4. Acceptable Manufacturers:
        a. NGP
        b. Pemko
        c. Reese

2.12 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. Hager: 307D
        b. Ives: SR64
        c. Rockwood: 608

B. Wall Bumpers: 2 1/2” diameter; 1” nominal projection
    1. Finish: BHMA #626 (US26D)
    2. Acceptable Manufacturers:
        a. Hager: 235W
        b. Ives: WS402CCV
        c. Rockwood: 403

C. Interior Floor-Mounted Stops: Dome stops with risers; 1” height
    1. Finish: BHMA #626 (US26D)
    2. Acceptable Manufacturers:

a. Hager: 241F
b. Ives: FS13
c. Rockwood: 441

2.13 ACCESSORY HARDWARE

A. Key Cabinet:
1. Type: Two tag system with triple cross reference.
2. Capacity: 150% greater than number of door keys needed
3. Provide a key cabinet complete with accessories set up with keys and hooks tagged, keys installed, and index cards completed. Install key cabinet in location as indicated on Drawings or as directed by Owner.
4. Acceptable Manufacturers:
   a. Bommer: BKC Series
   b. Lund: Lund Key Box
   c. Salsbury: Model 1010

2.14 ELECTRICALLY OPERATED HARDWARE

A. General Requirements:
1. Electrically operated locking devices shall be connected to building fire and smoke/heat alarm systems. Activation of alarm system shall disengage electric locking mechanism allowing free, unrestricted egress through opening.
2. Coordinate installation of electrically operated hardware to insure proper size wire is used to power load(s).
   a. Voltage drop shall not exceed 5% of load's stated voltage.
   b. Voltage drop shall be calculated by first determining resistance of load (R=E/I voltage divided by AMP draw). Next, determine resistance of wire (per below chart). Divide this number by resistance of load. If result exceeds 5%, wire thickness shall be increased.
   c. Wire length shall equal distance to load and back to supply (Lock 50 ft. from power supply; wire length = 100 ft.). Two loads powered by one pair of wires draw double current and have half (50%) of resistance.

Wire Size	Resistance Per 1,000 Feet
12 Gauge	1.6 OHM
14 Gauge	2.5 OHM
16 Gauge	4.1 OHM
18 Gauge	6.4 OHM
20 Gauge	10.1 OHM
22 Gauge	16.0 OHM

3. Furnish electrically operated hardware with power supply units, junction boxes, and other accessories needed for a complete, efficient installation.
4. Power Supply Units:
   a. Power supply units shall be designed for electromagnetic locks, electric locking or monitoring exit devices, and/or electric strikes as needed.
   b. Output power shall be field selectable for either 24 volts DC at 1 ampere or 12 volts DC at 2 amperes. Input power shall be 120 volts AC at 0.6 ampere, unless otherwise indicated.
   c. Units shall have a terminal block that shall accept 14 gauge stranded wire.
   d. Enclosure shall have not less than six, 1/2" knock-out holes for conduit connection.

B. Power Transfer Devices:
1. Provide a means to transfer power from frame to door stile. Devices shall be reversible and allow a full 180° door swing with 4 1/2" x 4 1/2" butt hinges or 3/4" offset pivots. When door is in closed position, transfer unit shall be concealed.
2. Transfer units shall contain ten 24 awg UL approved conductors.
3. Rating: 10 Amps at 24 vdc (Class 1 low voltage)

4. Acceptable Manufacturers:
   a. Von Duprin: EPT10

C. Electric Strikes: ANSI/ BHMA A156.5, Grade 1
   1. Electric strikes shall be listed by UL for fire door accessory and burglary resistance.
   2. Strikes shall be for use with mortise locks without deadbolt or cylindrical locks on single door; hollow metal or aluminum frame application.
   3. Operation shall be fail-safe or fail-secure as listed.
   4. Power Requirements: 24 VDC
   5. Finish: BHMA #630 (US32D)
   6. Acceptable Manufacturers:
      a. Folger Adam: 310 Series
      b. Von Duprin: 6200 Series

2.15 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. Cylinders shall be from same manufacturer as locks
   3. Provide temporary construction keying system during construction period. Permanent keys shall be furnished to Owner's Representative prior to occupancy. Owner or Owner's Security Agent will void operation of construction keys.

B. Cylinders:
   1. Permanent cylinders shall be keyed by manufacturer 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: 6 per cylinder
      d. Temporary Construction Master Keys: 12 total
   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.

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. Examine roughing-in for electrical power systems to verify actual locations of wiring connections before electrified door hardware installation.
3. Proceed with installation only after unsatisfactory conditions have been corrected.
4. Commencement of installation constitutes acceptance of conditions and responsibility for satisfactory performance.

3.2 PREPARATION

A. Surface Preparation:
   1. Steel Doors and Frames: Comply with DHI A115 Series
      a. Surface-Applied Door Hardware: Drill and tap doors and frames in compliance with SDI 109
   2. Wood Doors: Comply with DHI A115-W Series.

3.3 INSTALLATION

A. General Requirements:
   1. Install each door hardware item to comply with manufacturers' written instructions using manufacturers 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
         (2) DHI Publication *Recommended Locations for Builders' Hardware for Custom Steel Doors and Frames*
      b. Wood Doors: DHI Publication WDHS-3

C. Electrically Operated Hardware:
   1. Comply with manufacturer's instructions for wiring, grounding, and shielding.
   2. Locate boxed power supplies as indicated or if not indicated, verify location with Architect.
   3. Provide one power supply for each door opening.
   4. Provide least number of power supplies needed to adequately serve doors with electrified door hardware.

D. 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.

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

F. Key Control System:
    1. Place keys on markers and hooks in key control system cabinet, as determined by final keying schedule.

3.4 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.

3.5 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.

3.6 DEMONSTRATION

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

3.7 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.

3.8 HARDWARE SETS:

HW SET: 01

3	EA	HINGE	5BB1 4.5 X 4.5	652	IVE
1	EA	ENTRY/OFFICE LOCK	M521H QG	626	FAL
1	EA	IC CORE ONLY, KEYED	C607	626	FAL
1	EA	WALL STOP	WS406CCV	630	IVE
3	EA	SILENCER	SR64	GRY	IVE

HW SET: 02

3	EA	HINGE	5BB1 4.5 X 4.5	652	IVE
1	EA	CLASSROOM LOCK	M561H QG	626	FAL
1	EA	IC CORE ONLY, KEYED	C607	626	FAL
1	EA	WALL STOP	WS406CCV	630	IVE
3	EA	SILENCER	SR64	GRY	IVE

HW SET: 03

3	EA	HINGE	5BB1 4.5 X 4.5	652	IVE
1	EA	PUSH PLATE	8200 4" X 16"	630	IVE
1	EA	PULL PLATE	8303-8 4" X 16"	630	IVE
1	EA	SURFACE CLOSER	SC71	689	FAL
1	EA	KICK PLATE	8400 8" X 2" LDW	630	IVE
1	EA	WALL STOP	WS406CCV	630	IVE
3	EA	SILENCER	SR64	GRY	IVE

HW SET: 04

3	EA	HINGE	5BB1 4.5 X 4.5	652	IVE
1	EA	PRIVACY SET	M311 QG	626	FAL
1	EA	SURFACE CLOSER	SC71	689	FAL
1	EA	OVERHEAD STOP	450S	630	GLY
1	EA	KICK PLATE	8400 8" X 2" LDW	630	IVE
3	EA	SILENCER	SR64	GRY	IVE

HW SET: 05

6	EA	HINGE	5BB1 4.5 X 4.5 NRP	630	IVE
2	EA	POWER TRANSFER	EPT10	689	FAL
1	EA	MULLION	KR4023	600	FAL
1	EA	PANIC DEVICE	HWEA-25-R-EO	32D	FAL
1	EA	PANIC DEVICE	HWEA-25-R-L-NL	32D	FAL
4	EA	MORTISE CYLINDER	C987 A12667-003-00	626	FAL
4	EA	IC CORE ONLY, KEYED	C607	626	FAL
2	EA	SURFACE CLOSER	SC71 DS	689	FAL
2	EA	KICK PLATE	8400 8" X 1" LDW	630	IVE
2	EA	JAMB SEALS	160S	AL	NGP
1	EA	HEAD SEAL	700SA	AL	NGP
2	EA	DOOR SWEEP	C627A	AL	NGP
1	EA	THRESHOLD	8425	AL	NGP

HW SET: 06

3	EA	HINGE	5BB1 4.5 X 4.5 NRP	630	IVE
1	EA	STOREROOM LOCK	M581H QG	626	FAL
1	EA	ELECTRIC STRIKE	6211 FSE 24VDC	630	VON
1	EA	IC CORE ONLY, KEYED	C607	626	FAL
1	EA	SURFACE CLOSER	SC71 DS	689	FAL

1	EA	KICK PLATE	8400 8" X 2" LDW	630	IVE
2	EA	JAMB SEALS	160S	AL	NGP
1	EA	HEAD SEAL	700SA	AL	NGP
1	EA	DOOR SWEEP	C627A	AL	NGP
1	EA	THRESHOLD	8425	AL	NGP
			CARD READER BY OTHERS		

HW SET: 07

2	EA	CONTINUOUS HINGE	112HD	628	IVE
2	EA	PANIC DEVICE	25-C-EO	26D	FAL
2	EA	PULL/PUSHBAR	9190-0	630	IVE
2	EA	SURFACE CLOSER	SC71 SS	689	FAL
2	EA	DOOR SWEEP	C627A	AL	NGP
1	EA	THRESHOLD	8425	AL	NGP
			WEATHERSTRIP BY FRAME MFG		
1	EA	ELECTRIC STRIKE	6211 FSE 24VDC	630	VON

HW SET: 08

3	EA	HINGE	5BB1HW 5 X 4.5	652	IVE
1	EA	STOREROOM LOCK	M581H QG	626	FAL
1	EA	ELECTRIC STRIKE	6211 FSE 24VDC	630	VON
1	EA	IC CORE ONLY, KEYED	C607	626	FAL
1	EA	SURFACE CLOSER	SC71	689	FAL
1	EA	KICK PLATE	8400 8" X 2" LDW	630	IVE
1	EA	WALL STOP	WS406CCV	630	IVE
3	EA	SILENCER	SR64	GRY	IVE
			CARD READER BY OTHERS		

HW SET: 09

3	EA	HINGE	5BB1HW 5 X 4.5	652	IVE
1	EA	ENTRY/ OFFICE LOCK	M521H QG	626	FAL
1	EA	ELECTRIC STRIKE	6211 FSE 24VDC	630	VON
1	EA	IC CORE ONLY, KEYED	C607	626	FAL
1	EA	SURFACE CLOSER	SC71	689	FAL
1	EA	KICK PLATE	8400 8" X 2" LDW	630	IVE
1	EA	WALL STOP	WS406CCV	630	IVE
3	EA	SILENCER	SR64	GRY	IVE
			CARD READER BY OTHERS		

HW SET: 10

2	EA	CONTINUOUS HINGE	112HD	628	IVE
2	EA	POWER TRANSFER	EPT-10	689	VON
1	EA	PANIC DEVICE	EL-25-C-EO	26D	FAL
1	EA	PANIC DEVICE	EL-25-C-NL-OP	26D	FAL
1	EA	RIM CYLINDER	C953	626	FAL
1	EA	IC CORE ONLY, KEYED	C607	626	FAL
2	EA	OFFSET DOOR PULL	8190-0	630	IVE
1	EA	AUTO. OPERATOR	9553 RF REG2	628	LCN
2	EA	DOOR SWEEP	C627A	AL	NGP
1	EA	THRESHOLD	8425	AL	NGP
1	EA	POWER SUPPLY	PS873-2 X AO	GRY	VON
2	EA	ACTUATOR, WALL MOUNT	8310-856T		LCN
1	EA	ELECTRIC STRIKE	6211 FSE 24VDC (Door 101A)	630	VON

ALL HARDWARE BY DOOR MFG
CARD READER BY OTHERS
WEATHERSTRIP BY FRAME MFG

HW SET: 10A

1	EA	CONTINUOUS HINGE	112HD	628	IVE
1	EA	POWER TRANSFER	EPT-10	689	VON
1	EA	PANIC DEVICE	EL-25-C-EO	26D	FAL
1	EA	RIM CYLINDER	C953	626	FAL
1	EA	IC CORE ONLY, KEYED	C607	626	FAL
1	EA	OFFSET DOOR PULL	8190-0	630	IVE
1	EA	AUTO. OPERATOR	9553 RF REG2	628	LCN
1	EA	DOOR SWEEP	C627A	AL	NGP
1	EA	THRESHOLD	8425	AL	NGP
1	EA	POWER SUPPLY	PS873-2 X AO	GRY	VON
2	EA	ACTUATOR,WALL MOUNT	8310-856T		LCN
1	EA	ELECTRIC STRIKE	6211 FSE 24VDC (Door 101A)	630	VON

ALL HARDWARE BY DOOR MFG
CARD READER BY OTHERS
WEATHERSTRIP BY FRAME MFG

HW SET: 11

6	EA	HINGE	5BB1 4.5 X 4.5	652	IVE
2	EA	MANUAL FLUSH BOLT	FB458	626	IVE
1	EA	DUST PROOF STRIKE	DP2	626	IVE
1	EA	CLASSROOM LOCK	M561H QG	626	FAL
1	EA	ASTRAGAL	139A	600	NGP
1	EA	SURFACE CLOSER	SC71 HD/PA	689	FAL
2	EA	KICK PLATE	8400 8" X 1" LDW	630	IVE
2	EA	WALL STOP & HOLDER	WS40	626	IVE
2	EA	SILENCER	SR64	GRY	IVE

END OF SECTION

PART 1 GENERAL

1.1 SUMMARY

A. Section includes glazing products, including those specified in other Sections where glazing requirements are specified by reference to this Section as required by Contract Documents.

1.2 DEFINITIONS

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

B. Glass Thicknesses: Indicated by thickness designations in millimeters according to ASTM C 1036.

C. Interspace: Space between lites of an insulating-glass unit that contains dehydrated air or a specified gas.

D. Deterioration of Insulating Glass: Failure of hermetic seal under normal use that is attributed to the manufacturing process and not to causes other than glass breakage and practices for maintaining and cleaning insulating glass contrary to manufacturer's written instructions. Evidence of failure is the obstruction of vision by dust, moisture, or film on interior surfaces of glass.

1.3 PERFORMANCE REQUIREMENTS

A. General: Provide glazing systems capable of withstanding normal thermal movement and wind and impact loads (where applicable) 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. Design Wind Loads: Determine design wind loads applicable to project from basic wind speed indicated in miles per hour at 33 feet above grade, according to ASCE 7, "Minimum Design Loads for Buildings and Other Structures": Section 6.5, "Method 2-Analytical Procedure," based on mean roof heights above grade indicated on Contract 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 monolithic-glass lites heat treated to resist wind loads.
        2) For insulating glass.

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.

D. Thermal and Optical Performance Properties: Provide glass with performance properties specified based on manufacturer's published test data, as determined according to procedures indicated below:
   1. For monolithic-glass lites, properties are based on units with lites 1/4 inch thick.
   2. Center-of-Glass Values: Based on using LBL-44789 WINDOW 5.0 computer program for the following methodologies:
      a. U-Factors: NFRC 100 expressed as Btu/ sq. ft. x h x deg F.
      b. Solar Heat Gain Coefficient: NFRC 200.
      c. Solar Optical Properties: NFRC 300.

1.4 SUBMITTALS

A. Product Data: For each glass product and glazing material indicated including performance data for glass.

B. Samples: For the following products, in the form of 12-inch- square Samples for glass.
   1. Each color of float glass.
   2. Wired glass.
   3. Insulating glass for each designation indicated.

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

D. Generally retain paragraph and subparagraph below unless types of glass selected do not require labeling by authorities having jurisdiction or if certification is required as well as labels. See Evaluations.

E. Product Certificates: Signed by manufacturers of glass and glazing products certifying that products furnished comply with requirements.
   1. For solar-control low-e-coated glass, provide documentation demonstrating that manufacturer of coated glass is certified by coating manufacturer.

F. 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.

B. Source Limitations for Glass: Obtain the following through one source from a single manufacturer for each glass type: clear float and insulating glass.

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

D. Glazing for Fire-Rated Door Assemblies: Glazing for assemblies that comply with NFPA 80 and that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire-protection ratings indicated, based on testing according to NFPA 252.

E. Safety Glazing Products: Comply with testing requirements in 16 CFR 1201 and, for wired glass, ANSI Z97.1.
   1. Subject to compliance with requirements, obtain safety glazing products permanently marked with certification label of the Safety Glazing Certification Council or another certification agency acceptable to authorities having jurisdiction.

2. Where glazing units, including Kind FT glass and laminated glass, are specified in Part 2 articles for glazing lites more than 9 sq. ft. in exposed surface area of one side, provide glazing products that comply with Category II materials, for lites 9 sq. ft. or less in exposed surface area of one side, provide glazing products that comply with Category I or II materials, except for hazardous locations where Category II materials are required by 16 CFR 1201 and regulations of authorities having jurisdiction.

F. 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."

G. Insulating-Glass Certification Program: Permanently marked either on spacers or on at least one component lite of units with appropriate certification label of the following testing and inspecting agency:
1. Insulating Glass Certification Council.

H. Conform to applicable requirements of Section 01351, Sustainable Project Requirements.

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.

1.8 WARRANTY

A. Manufacturer's Special Warranty for Coated-Glass Products: Manufacturer's standard form, made out to the 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: 5 years from date of Substantial Completion.

B. Manufacturer's Special Warranty on Insulating Glass: Manufacturer's standard form, made out to the 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 MANUFACTURERS

A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:

1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the work include, but are not limited to, manufacturers specified.

2.2 GLASS PRODUCTS

A. Float Glass (Type G-1): ASTM C1036, Type 1 transparent flat, Class 1 clear, Quality q3 glazing select; 1/4 inch thick minimum.

B. Laminated Safety Glass (Type G-2): Two lites of clear annealed glass, 1/8 inch thick with clear Saflex interlayer by Solutia. Laminate shall comply with CPSC 16 CFR 1201 Category I and Safety Glazing Test Standard and ANSI A-97.1-1984. Minimum standards specified in ASTM C1036-85 or C1048-85.

C. Wire Glass (Type G-3): Clear, polished both sides, square mesh of woven stainless steel wire of 2 inch grid size; 1/4 inch thick. Conform to ANSI Z97.1.

D. Safety Glass (Type G-4): Clear; fully tempered; conforming to ANSI A97.1 and CPSC 96 CFR (1201); 1/4 inch thick minimum.

E. Tinted Glass (Type G-5): Float type, tempered, light reducing tinted color; light transmittance of 70 percent, 3/8 inch thick minimum. Color as selected by Owner/Architect.

F. Insulating-Glass Units, General (Type G-6 and G-7): Factory-assembled units consisting of sealed lites of glass separated by a dehydrated interspace, and complying with ASTM E 774 for Class CBA units and with requirements specified in this Article and in Part 2 "Insulating-Glass Units" Article.
1. Provide Kind HS (heat-strengthened) float glass in place of annealed glass where needed to resist thermal stresses induced by differential shading of individual glass lites and to comply with glass design requirements specified in Part 1 "Performance Requirements" Article.
2. Provide Kind FT (fully tempered) glass lites where safety glass is indicated.
3. Overall Unit Thickness and Thickness of Each Lite: Dimensions indicated for insulating-glass units are nominal and the overall thicknesses of units are measured perpendicularly from outer surfaces of glass lites at unit's edge.
4. Sealing System: Dual seal, with primary and secondary sealants as follows:
   a. Manufacturer's standard sealants.
5. Spacer Specifications: Manufacturer's standard spacer material and construction.

G. Spandrel Coated Glass (Type G-8): ASTM C 1048, Kind FT fully tempered, condition C, coat back (Number 2) surface. Glass shall match adjacent non-spandrel glazing.

2.3 GLAZING GASKETS

A. Dense Compression Gaskets: Molded or extruded gaskets of material indicated below, complying with standards referenced with name of elastomer indicated below, and of profile and hardness required to maintain watertight seal:
1. Neoprene, ASTM C 864.
2. EPDM, ASTM C 864.
3. Silicone, ASTM C 1115.
4. Thermoplastic polyolefin rubber, ASTM C 1115.
5. Any material indicated above.

B. Soft Compression Gaskets: Extruded or molded, closed-cell, integral-skinned gaskets of material indicated below; complying with ASTM C 509, Type II, black; and of profile and hardness required to maintain watertight seal:
1. Neoprene.
2. EPDM.
3. Silicone.

4. Thermoplastic polyolefin rubber.
5. Any material indicated above.

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

2.4 GLAZING TAPES

A. Back-Bedding Mastic Glazing Tapes: Preformed, butyl-based elastomeric tape with a solids content of 100 percent; nonstaining and nonmigrating in contact with nonporous surfaces; with or without spacer rod as recommended in writing by tape and glass manufacturers for application indicated; packaged on rolls with a release paper backing; and complying with ASTM C 1281 and AAMA 800 for products indicated below:
1. AAMA 807.3 tape, for glazing applications in which tape is not subject to continuous pressure.

2.5 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).

2.6 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.

B. Clean-cut or flat-grind vertical edges of butt-glazed monolithic lites in a manner that produces square edges with slight kerfs at junctions with outdoor and indoor faces.

C. Grind smooth and polish exposed glass edges and corners.

2.7 MONOLITHIC FLOAT-GLASS UNITS

A. Uncoated Clear Float-Glass Units: Class 1 (clear) annealed or Kind HS (heat-strengthened) float glass where heat strengthening is required to resist thermal stresses induced by differential shading of individual glass lites and to comply with system performance requirements.
1. Thickness: 1/4 inck thick minimum.

2.8 MONOLITHIC WIRED-GLASS UNITS

A. Polished Wired-Glass Units: Form 1 (wired glass, polished both sides), Quality-Q6, Mesh 1 (Diamond), 1/4 inch thick.
   1. Available Manufacturers:
      a. Asahi/AMA Glass Corp.; affiliated with AFG Industries, Inc.
      b. Central Glass Co., Ltd.; distributed by Northwestern Industries Inc.
      c. Pilkington Sales (North America) Ltd.
      d. Substitutions: Or approved equal.

2.9 INSULATING-GLASS UNITS

A. Tinted Insulating-Glass Units (G-6 & G-7):
   1. Acceptable Manufactures:
      a. PPG – Solarban 70XL – Atlantica (Basis of Design).
      b. Oldcastle.
      c. Guardian.
      d. Pilkington.
      e. Substitutions: Or approved equal.
   2. Overall Unit Thickness and Thickness of Each Lite: 1/4 inch minimum individual glass lite thickness with an overall unit thickness of 1 inch.
   3. Interspace Content: Air or Argon.
   4. Outdoor Lite: Class 1 float glass.
   5. Indoor Lite: Class 1 (clear) float glass.
      a. Kind HS (heat strengthened).
   6. Low-E Coating: Pyrolytic or sputtered on second or third surface.
   7. Visible Light Transmittance: 510 percent minimum.
   8. Summer Daytime U-Factor: 0.24 maximum.
   9. Solar Heat Gain Coefficient: 0.28 maximum.
   10. Shading Coefficient: 0.27 minimum.
   11. Ultra Violet: 2 percent.

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.

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

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

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

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

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

G. Provide spacers for glass lites where length plus width is larger than 50 inches as follows:
   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.

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

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

J. 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.

K. 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 just 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. Fabricate compression gaskets in 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. 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. Install gaskets so they protrude past face of glazing stops.

3.6 LOCK-STRIP GASKET GLAZING

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

3.7 CLEANING AND PROTECTION

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

B. Protect glass from contact with contaminating substances resulting from construction operations, 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.

END OF SECTION