SECTION 087100 - DOOR HARDWARE

PART 1 - GENERAL

1.1 SUMMARY

A. Intent: The intent of this Section is to provide finish hardware for the proper operation and control of all wood, hollow metal, and aluminum doors in the Project. Prior to bidding, notify the Architect of any doors that do not have hardware meeting this intention.

B. Section Includes: Provide all items of finish hardware required to adequately trim, hang, and operate all doors, as is hereinafter specified and listed in the Hardware Schedule.
   1. The hardware supplier will be responsible to furnish correct hardware on labeled doors to satisfy State and Local Building Codes.
   2. Should items of hardware, not definitely specified, be required for completion of work, furnish such items of type and quality suitable to the services required and comparable to the adjacent hardware.
   3. Provide all necessary standard and special fasteners, screws, bolts, expansion shields or anchors to properly secure hardware to its intended door, frame, or other surface.

C. Related Sections include the following:

1.	Aluminum Doors	Section 08 11 16
2.	FRP/Aluminum Doors/Frames:	Section 08 17 43.

D. This Section includes, but is not necessarily limited to furnishing and installing complete, the following:
   1. Finish hardware for proper operation, function, control and protection of all doors, as required.

1.2 REFERENCES

A. The following reference standards and model code documents shall be used in estimating and detailing door hardware, and shall considered as a standard of quality, function, and performance, as applicable:

1.	I.B.C.	International Building Code (current year adopted)..
2.	NFPA-80	Fire Doors & Windows (current year adopted).
3.	NFPA-101	Life Safety Code (current year adopted).
4.	NFPA-105	Smoke Control Door Assembly. (current year adopted)
5.	ANSI-117.1	2009 Edition Providing Accessibility and Usability for Physically Handicapped People.
6.	A.D.A.A.G	Americans with Disabilities Act Accessibility Guidelines.

1.3 ACTION SUBMITTALS

A. General: Submit the following in accordance with Section 01 33 00.

B. Product Data: Provide a catalog cut sheet, clearly marked and identified, illustrating and describing each product included in the Hardware Schedule.
   1. Include construction and installation details, material descriptions, dimensions of individual components and profiles, and finishes.
   2. Formulate catalog cut sheets into sets and include a set with each copy of the Hardware Schedule submitted.

C. Door Hardware Schedule: Prepared by or under the supervision of Architectural Hardware Consultant, detailing fabrication and assembly of door hardware, as well as procedures and

diagrams. Coordinate the final Door Hardware Schedule with doors, frames, and related work to ensure proper size, thickness, hand, function, and finish of door hardware.

1. Format: Comply with scheduling sequence and vertical format in DHI's "Sequence and Format for the Hardware Schedule."
2. Organization: Organize the Door Hardware Schedule into door hardware sets indicating complete designations of every item required for each door or opening.
3. Content: Include the following information:
    a. Type, style, function, size, label, hand, and finish of each door hardware item.
    b. Complete designations of every item required for each door or opening including name and manufacturer.
    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. Use same scheduling sequence and format and use same door numbers and hardware set numbers as in the Contract Documents.
    e. Explanation of abbreviations, symbols, and codes contained in schedule.
    f. Mounting locations for door hardware.
    g. Door and frame sizes and materials.
    h. Description of each electrified door hardware function, including location, sequence of operation, and interface with other building control systems.
4. Submittal Sequence: Submit the final Door Hardware Schedule at earliest possible date, particularly where approval of the Door Hardware Schedule must precede fabrication of other Work that is critical in the Project construction schedule. Include Product Data, Samples, Shop Drawings of other work affected by door hardware, and other information essential to the coordinated review of the Door Hardware Schedule.

D. Wiring Diagrams: For electrified hardware items specified for this Project, Provide complete wiring diagrams along with riser drawings and elevations, showing locations where such material is to be installed. Wiring Diagrams shall be submitted with Hardware Schedule. Verify and coordinate with the electrical systems installer.
    1. Operation Narrative: Describe the operation of doors controlled by electrified door hardware.

E. Samples for Verification: If so requested by the Owner, provide a sample of any product or item requested, properly marked and tagged, for the opening for which it is intended.

F. Keying: Submit separate detailed schedule indicating keying for all locks. Keying schedule must be approved by the Owner prior to ordering any permanent cylinders.

1.4 INFORMATIONAL SUBMITTALS

A. Operation and Maintenance Data: For each type of door hardware to include in maintenance manuals. Provide latest, revised and updated schedule of finish hardware, complete with catalog cuts and keying schedule. In addition, furnish one (1) copy of maintenance and parts manuals for those items for which they are readily available and normally provided.
    1. Submit in accordance with provisions of Section 01 78 23.

1.5 QUALITY ASSURANCE

A. Substitutions: Request for substitutions for alternative hardware items will not be accepted on this Project unless specifically indicated. If any specified product is listed as a "No Substitution" product, only that specified product shall be provided as indicated.

B. Installer Qualifications: 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.

C. Supplier Qualifications: Door hardware supplier with warehousing facilities in Project's vicinity and who is or employs a qualified Architectural Hardware Consultant, available during the course of the Work to consult with Contractor, Architect, and Owner about door hardware and keying.
   1. The hardware supplier shall be engaged regularly in the furnishing, delivery and servicing of contract builder's hardware and must be experienced and knowledgeable in all phases of estimating, detailing, scheduling, masterkeying, shipping and installation practices.
   2. When electro-mechanical or electronic hardware is supplied, a qualified individual with a minimum five- (5) year’s experience shall be available for assistance.
   3. Hardware provider shall employ installers with not less than 3 years’ experience in installing commercial door hardware. The installers shall also have attended the specified manufacturers training classes instructing them in the proper installation of their products.
   4. Installation of products in this section is to be performed by the door hardware supplier.

D. Architectural Hardware Consultant Qualifications: A person who is currently certified by the Door and Hardware Institute as an Architectural Hardware Consultant 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.

E. Source Limitations: Obtain each type and variety of door hardware from a single manufacturer, unless otherwise indicated.

F. Regulatory Requirements: Comply with provisions of the following:
   1. Provide hardware that complies with Americans with Disabilities Act (ADA), "Accessibility Guidelines for Buildings and Facilities (ADAAG)," and ANSI A117.1.

G. Fire-Rated Door Assemblies: Provide door hardware for assemblies complying with NFPA 80 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire ratings indicated, based on testing according to NFPA 252.

H. Electrified Door Hardware: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

I. Keying Conference: Conduct conference at Project site to comply with requirements in Division 01 Section "Project Management and Coordination." Incorporate keying conference decisions into final keying schedule after reviewing door hardware keying system including, but not limited to, the following:
   1. Function of building, flow of traffic, purpose of each area, degree of security required, and plans for future expansion.
   2. Preliminary key system schematic diagram.
   3. Requirements for key control system.
   4. Address for delivery of keys.
   5. Requirements and/or location of Key Cabinet.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Marking and Packaging: All items of hardware shall be delivered to the site in manufacturer’s original cartons or boxes. Mark each box with hardware heading and door number according to approved hardware schedule.

B. Deliver individually packaged hardware items at the proper times to the proper locations (shop or project site) for installation: Provide a complete packing list showing items, door numbers and hardware headings with each shipment.

C. Store hardware in shipping cartons above ground and under cover to prevent damage. Provide secure lockup for door hardware delivered to the Project, but not yet installed. Control handling and installation of hardware items that are not immediately replaceable -so that completion of the Work will not be delayed by hardware losses both before and after installation

D. Aluminum Door Hardware: Deliver hardware for aluminum doors as directed by the door supplier.

1.7 COORDINATION

A. Templates: Obtain and distribute to the parties involved templates for doors, frames, and other work specified to be factory prepared for installing door hardware. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing door hardware to comply with indicated requirements.

1.8 MAINTENANCE

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

B. Maintenance Service: If there are any products listed hereinafter that normally require a maintenance or service contract, provide the Owner and Architect with details and costs of standard maintenance or service contract.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Designations: Requirements for design, grade, function, finish, size, and other distinctive qualities of each type of door hardware are indicated in Part 3 "Hardware Schedule" Article. Products are identified by using door hardware designations, as follows:
   1. Provide the materials or products indicated by trade names, manufacturer's name, or catalog number.
   2. Provide manufacturer's standard products meeting the design intent of this Specification, free of imperfections affecting appearance or serviceability.
   3. Hand of door: 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 shown.

2.2 SPECIAL REQUIREMENTS

A. Hinges:
   1. Provide non-removable pins for all exterior doors. Use nonrising pins for all other doors.
   2. Provide continuous hinges where specified.
   3. Hinges shall be sized in accordance with the following:
      a. Height: 4-1/2" inches.
      b. Width: Sufficient to clear frame and trim when door swings 180 degrees.
      c. Number of Hinges: Furnish 3 hinges per leaf to 7'-6" in height. Add one hinge for each additional 30 inches of height.

B. Locksets:
   1. All locksets to be grade 1 heavy duty mortise.

C. Electric Lock and Latches
   1. Lock Functions: As indicated in door hardware schedule.
   2. Electronic Mortise/Cylindrical Locks: A156.13/A156.25; Grade 1. UL294 Listed.
   3. Lockset cable of being hard wired or stand-alone powered by readily available off the shelf batteries.
   4. Device shall incorporate a multi-technology reader that reads both 13.56 MHz Smart Cards and 125 kHz Prox cards.
   5. Electronic locks shall include request to exit switch.

D. Exit Devices
1. Exit Devices and Auxiliary Items: BHMA A156.3. Grade 1, and UL listed for Panic Exit and/or Fire Exit Hardware.
2. Exit devices to incorporate a deadlatching feature for security and/or for future addition of alarm kits and/or other electrical requirements.
3. Exit devices are to incorporate a flush and tapered end cap.
4. Exit devices shall incorporate a fluid damper or other device that eliminates noise associated with exit device operation.
5. Device touchbad to extend minimum of one half of door width, but not the full length of exit device rail.
6. Provide electrical options as scheduled.

E. Closers:
1. Comply with manufacturer's recommendations for unit size based on door size, weather exposure and usage.
2. All Closers UL Certified to be in compliance with UBC 7.2 and UL 10C.
3. Closers with Pressure Relief Values will not be acceptable.
4. Closer cylinders, arms, adapter plates, and metal covers shall have a powder coating finish which has been certified to exceed 100 hours salt spray testing as described in ANSI Standard A156.4 and ASTM B117.
5. Supplier to provide any brackets or plates required for proper Installation of door closers.

F. Automatic Operators:
1. Operation: Motor is off when door is in closing mode. Door can be manually operated with power on or off without damage to operator. Provide variable adjustments, including opening and closing speed adjustment.
2. Provide units with manual off/auto/hold-open switch, push and go function to activate power operator, vestibule interface delay, electric lock delay, hold-open delay adjustable from 2 to 30 seconds, and logic terminal to interface with accessories and sensors.
3. Provide drop plates, brackets, or adapters for arms as required to suit details.
4. Provide hard-wired actuator switches for operation as specified.
5. Provide complete assemblies of controls, switches, power supplies, relays, and parts/material recommended and approved by manufacturer of automatic operator for each individual leaf. Actuators control both doors simultaneously at pairs. Locate actuators, key switches, and other controls as directed by Architect.

G. Special Notes
1. All doors to have operable hardware.
2. Provide stop that is required for the application. A wall stop is preferred. If an overhead stop or floor stop is a better application, it is to be provided.
3. Smoke seal and intumescent seal is to be provided as required on fire labeled openings.
4. Coordinate hardware locations with vision light sizes and locations.

2.3 MATERIALS

A. Screws and Fasteners: Provide all screws and fasteners of the proper size and type to properly anchor or attach the item of hardware scheduled. Provide all fasteners with Phillips heads, unless security type screws (spanner-head or torx-head) are hereinafter specified.

2.4 HARDWARE PRODUCTS

ITEM	SPECIFIED		APPROVED EQUAL
Hinges	Ives		Bommer, Hager
Locksets	Schlage	L Series	No Substitution
Exits	Von Duprin	99 Series	No Substitution
Closers	LCN	4040XP Series	No Substitution
Flatgoods	Ives		Burns, Rockwood
Stops	Ives		Burns, Rockwood

Overhead Stops	Glynn Johnson	Rixson
Thresholds	Zero	National Guard, Reese
Weatherstrip	Zero	National Guard, Reese

2.5 FINISHES

A. Provide matching finishes for hardware units at each door to the greatest extent possible, unless otherwise indicated. In general, match items to the finish for the latch, lock or push pull unit for color and texture.

B. Hardware finishes as follows:
1. 626 - Satin Chrome-plated.
2. 630 – Satin Stainless Steel

2.6 CYLINDERS

A. Standard Lock Cylinders: BHMA A156.5; Grade 1; face finished to match lockset.
1. Provide large format removable core cylinders to match Owners existing key system.

B. Construction Cores: Provide construction cores at exterior doors, aluminum doors, and interior card access doors.

2.7 KEYING

A. Keying of locks and cylinders throughout project shall be scheduled through a key meeting with Owner, and hardware supplier. Key schedule shall be prepared and approved by the Owner prior to ordering permanent cylinders. Copies of final key schedule with the bitting instructions shall be submitted as part of the Project Record Documents.

B. All keying shall be accomplished at hardware manufacturer's plant where adequate records are maintained in order to avoid duplication of changes.

C. All doors to be keyed to Owners existing Schlage key system. Exterior keys to be Schlage Primus (Everest ?). Interior keys to be Schlage keyway.

D. Provide keys as follows:
1. Cylinder Change Keys: Three.
2. Master Keys: Five for each master key system.
3. Grand Master Keys: Five.
4. Control Keys: Three.

E. Identification: Stamp all (master-type) keys with the following:
1. Do Not Duplicate.
2. Key change number (all keys).

PART 3 - EXECUTION

3.1 EXAMINATION

A. 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.

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

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

3.2 PREPARATION

A. Steel Doors and Frames: Comply with DHI A115 series.
   1. Surface-Applied Door Hardware: Drill and tap doors and frames according to SDI 107 or ANSI A250.6, whichever is more stringent.

B. Wood Doors: Comply with DHI A115-W series.

3.3 INSTALLATION

A. Installation shall be by a qualified installer with a minimum five (5) years experience in the installation of commercial grade hardware. Manufacturer's instructions shall dictate templating and installation.

B. Mounting Heights: Mount door hardware units at heights indicated in following applicable publications, unless specifically indicated or required to comply with governing regulations:
   1. Standard Steel Doors and Frames: DHI's "Recommended Locations for Architectural Hardware for Standard Steel Doors and Frames."
   2. Wood Doors: DHI WDHS.3, "Recommended Locations for Architectural Hardware for Wood Flush Doors."

C. Prior to hardware installation, the General Contractor shall setup a meeting with the Hardware Supplier and the Hardware installer to ensure the installer has and understands the manufacturers installation requirements for all hardware items

D. Install each door hardware item to comply with manufacturer's written instructions. Where cutting and fitting are required to install door hardware onto or into surfaces that are later to be painted or finished in another way, coordinate removal, storage, and reinstallation of surface protective trim units with finishing work specified in Division 09 Sections. Do not install surface-mounted items until finishes have been completed on substrates involved.
   1. Set units level, plumb, and true to line and location. Adjust and reinforce attachment substrates as necessary for proper installation and operation.
   2. Drill and countersink units that are not factory prepared for anchorage fasteners. Space fasteners and anchors according to industry standards.

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

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

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

3.4 FIELD QUALITY CONTROL

A. Perform final inspection with hardware installer and hardware supplier present to ensure correct installation and operation, and check for any damaged or defective items. Observe and inspect that all hardware has been installed to its correct destination in proper working order.

B. Independent Architectural Hardware Consultant: Owner reserves the right to engage a qualified independent Architectural Hardware Consultant to perform a separate independent inspection and to prepare an inspection report.

3.5 ADJUSTING

A. Initial Adjustment: Adjust and check each operating item of door hardware and each door to ensure proper operation or function of every unit. Replace units that cannot be adjusted to operate as intended.

1. Adjust door control devices to compensate for final operation of heating and ventilating equipment and to comply with referenced accessibility requirements.
2. Door Closers: Adjust door closers immediately upon installation. Adjust in exact conformance with manufacturer's printed instructions. Advance backcheck to eliminate shock at dead stop. Set closer latching speed to assure unassisted positive latching.
   a. Degree of swing of door for self-limiting closers shall be maximum available.
3. Adjust all exit devices immediately upon installation. Adjust in exact conformance with manufacturers' printed instructions.
4. Seal weather protection components attached to the exterior sides of doors and frames, such as drip caps and weather-stripping, in place with clear silicone caulk in such a manner as to ensure a continuously filled seam throughout the joinery.
5. Cut and fit weatherstripping accurately to provide the greatest possible continuity of the contact element. Adjust closer template as required.

B. At completion of the installation and prior to Substantial Completion, make final adjustments to door closures and other items of hardware. Leave all hardware clean and fully operable. Should any item be found to be defective, it shall be repaired or replaced as directed.

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

3.6 CLEANING AND PROTECTION

A. Clean adjacent surfaces soiled by door hardware installation.

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

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

3.7 DEMONSTRATION

A. Instruct Owner's Personnel in proper adjustment and maintenance of hardware and hardware finishes, during the final adjustment of hardware.

B. After hardware is installed and adjusted, the Supplier shall inspect the job with the Owner and the Contractor to determine if the hardware is functioning properly

3.8 HARDWARE SCHEDULE

A. Refer to Part 4 for Door Hardware Schedule.

B. The hardware sets listed below represent the design intent and direction of the Owner and Architect. They are a guideline only and should not be considered a detailed hardware schedule. Discrepancies, conflicting hardware and missing items should be brought to the attention of the architect with corrections made prior to the bidding process.

PART 4 - HARDWARE SCHEDULE

HARDWARE SET: 01 - (TYPICAL CR PAIR, DOCK)

DOORS:

LSHS-A, HGE-A

EACH TO HAVE:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
2	EA	CONT. HINGE	112XY EPT	628	IVE
2	EA	POWER TRANSFER	EPT10	689	VON
1	EA	ELEC PANIC HARDWARE	RX-LC-9949-EO	626	VON
1	EA	ELEC PANIC HARDWARE	RX-LC-QEL-9949-NL-696	626	VON
1	EA	RIM HOUSING	20-079	626	SCH
1	EA	MORTISE CYLINDER	26-091	626	SCH
1	EA	FSIC CONST. CORE	23-030-ICX		SCH
1	EA	PRIMUS CORE	20-740	626	SCH
2	EA	SURFACE CLOSER	4040XP SHCUSH	689	LCN
2	EA	CUSH SHOE SUPPORT	4040-30	689	LCN
2	EA	BLADE STOP SPACER	4040-61	689	LCN
1	EA	MULLION SEAL	8780N	N	ZER
1	EA	THRESHOLD	898A	A	NGP
1	EA	RAIN DRIP	142A	A	ZER
1	EA	MULTITECH READER	BY ACCESS CONTROL PROVIDER	BLK	SCE
2	EA	DOOR CONTACT	679-05HM	BLK	SCE
1	EA	POWER SUPPLY	BY ACCESS CONTROL SUPPLIER	LGR	VON
	EA		WEATHERSTRIP BY DOOR/FRAME MANUFACTURER		

OPERATION: DOOR NORMALLY CLOSED AND LOCKED. PANICS MAY BE DOGGED (MADE PUSH/PULL) VIA HEX KEY. WHEN LOCKED VALID CARD READ WILL UNLOCK DOOR ALLOWING ENTRY. ALWAYS FREE EGRESS.

HARDWARE SET: 02 - (TYPICAL CR W/ CYLINDER SGL)

DOORS:

LSE-A

EACH TO HAVE:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
1	EA	CONT. HINGE	112XY EPT	628	IVE
1	EA	POWER TRANSFER	EPT10	689	VON
1	EA	ELEC PANIC HARDWARE	RX-LC-QEL-99-NL-696	626	VON
1	EA	RIM HOUSING	20-079	626	SCH
1	EA	FSIC CONST. CORE	23-030-ICX		SCH
1	EA	PRIMUS CORE	20-740	626	SCH
1	EA	SURFACE CLOSER	4040XP SCUSH	689	LCN
1	EA	CUSH SHOE SUPPORT	4040-30	689	LCN
1	EA	BLADE STOP SPACER	4040-61	689	LCN
1	EA	THRESHOLD	898A	A	NGP
1	EA	RAIN DRIP	142A	A	ZER
1	EA	MULTITECH READER	BY ACCESS CONTROL PROVIDER	BLK	SCE
1	EA	DOOR CONTACT	679-05HM	BLK	SCE
1	EA	POWER SUPPLY	BY ACCESS CONTROL SUPPLIER		
1	EA		WEATHERSTRIP BY DOOR/FRAME MANUFACTURER		

OPERATION: DOOR NORMALLY CLOSED AND LOCKED. ENTRY VIA VALID CARD READ. PANICS MAY BE DOGGED (MADE PUSH/PULL) ELECTRONICALLY. ALWAYS FREE EGRESS.

HARDWARE SET: 03 - (TYPICAL QEL, DUMMY PULL SGL)

DOORS:

LSE-B, LSN-A, LSN-B, LSN-C, LSN-D

EACH TO HAVE:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
1	EA	CONT. HINGE	112XY EPT	628	IVE
1	EA	POWER TRANSFER	EPT10	689	VON
1	EA	ELEC PANIC HARDWARE	RX-LC-QEL-99-DT-696	626	VON
1	EA	SURFACE CLOSER	4040XP SCUSH	689	LCN
1	EA	CUSH SHOE SUPPORT	4040-30	689	LCN
1	EA	BLADE STOP SPACER	4040-61	689	LCN
1	EA	THRESHOLD	898A	A	NGP
1	EA	RAIN DRIP	142A	A	ZER
1	EA	DOOR CONTACT	679-05HM	BLK	SCE
1	EA	POWER SUPPLY	BY ACCESS CONTROL SUPPLIER	LGR	VON
1	EA		WEATHERSTRIP BY DOOR/FRAME MANUFACTURER		

OPERATION: DOOR NORMALLY CLOSED AND LOCKED. PANICS MAY BE DOGGED (MADE PUSH/PULL) ELECTRONICALLY. ALWAYS FREE EGRESS.

END OF SECTION 087100