MICHIGAN

DEPARTMENT OF TRANSPORTATION

SPECIAL PROVISION

FOR

**DOOR HARDWARE**

BRG:JST 1 of 12 APPR:JAT:DBP:06-10-22

**a. Description.** This work consists of installing door hardware in accordance with the standard specifications, as specified herein, and as shown on the plans. The work includes door handles, hinges, locksets, deadlocks, protection plates, stops, thresholds, latches, cylinders, and weatherstripping.

Coordinate work in this special provision with the work in the following:

● Special Provision for Windows and Doors

● Special Provision for Joint Sealants

● Special Provision for Glass and Glazing

● Special Provision for Bascule Bridge Operator House Rehabilitation

1. Submittals.

A. Product Data. Include installation details, material descriptions, dimensions of individual components and profiles, and finishes.

B. Door Hardware Schedule. Prepared by or under the supervision of supplier, 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 *Door Hardware Industry (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.

(a) Organize door hardware sets in same order as in the door hardware schedule as indicated in the contract.

(3) Content. Include the following information:

(a) Type, style, function, size, label, hand, and finish of each door hardware item.

(b) 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.

(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.

C. Keying Schedule. Prepared by or under the supervision of supplier, detailing the Engineer’s final keying instructions for locks. Include schematic keying diagram and index each key set to unique door designations.

D. Qualification Data. For firms and persons specified in subsection a.2. QA in this special provision.

(1) Include lists of completed projects with project names and addresses of architects and owners, and other information specified.

E. Warranties. Special warranties specified in this section of the special provision.

2. QA.

A. 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.

B. 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 and Engineer about door hardware and keying.

(1) Scheduling Responsibility. Preparation of door hardware and keying schedules.

C. 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.

D. Source Limitation. Obtain each type and variety of door hardware from a single manufacturer, unless otherwise indicated.

E. Regulatory Requirements. Comply with provisions of the following:

(1) Where indicated to comply with accessibility requirements, comply with *ADA, "Accessibility Guidelines for Buildings and Facilities (ADAAG)*," as follows:

(a) Handles, Pulls, Latches, Locks, and other Operating Devices. Shape that is easy to grasp with one hand and does not require tight grasping, tight pinching, or twisting of the wrist.

(b) Door Closers. Comply with the following maximum opening-force requirements indicated:

(i) Interior Hinged Doors. 5 pound-force (lbf) applied perpendicular to door.

(ii) Sliding or Folding Doors. 5 lbf applied parallel to door at latch.

(iii) Fire Doors. Minimum opening force allowable by authorities having jurisdiction.

(c) Thresholds. Not more than 1/2 inch high. Bevel raised thresholds with a slope of not more than 1:2.

(2) *National Fire Protection Association (NFPA) 101.*  Comply with the following for means of egress doors:

(a) Latches, Locks, and Exit Devices. Not more than 15 lbf to release the latch. Locks must not require the use of a key, tool, or special knowledge for operation.

(b) Delayed-Egress Locks. Lock releases within 15 seconds after applying a force not more than 15 lbf for not more than 3 seconds.

(c) Door Closers. Not more than 30 lbf to set door in motion and not more than 15 lbf (67 Newton (N)) to open door to minimum required width.

(d) Thresholds. Not more than 1/2 inch high.

F. Keying Conference. Conduct a keying conference at project site with the Engineer. 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.

G. Preinstallation Conference. Conduct conference at project site to comply with requirements of the specifications and project plans. Review methods and procedures related to door hardware including, but not limited to, the following:

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

(2) Review required testing, inspecting, and certifying procedures.

3. Delivery, Storage, and Handling.

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

B. Tag each item or package separately with identification related to the final door hardware schedule and include basic installation instructions with each item or package.

C. Deliver keys to manufacturer of key control system.

4. Coordination.

A. Coordinate layout and installation of recessed pivots and closers with floor construction. Cast anchoring inserts into concrete.

B. 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 specified requirements.

5. Warranty.

A. General Warranty. Special warranties specified in this document must not deprive the Department of other rights the Department may have under other provisions of the contract and are required to be in addition to, and run concurrent with, other warranties made by Contractor under requirements of the contract.

B. Special Warranty. 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, the 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.

C. Warranty Period. Three years from date of completion, unless otherwise specified.

D. Warranty Period for Manual Closers. Ten years from date of completion.

6. Maintenance Service. Maintenance tools and instructions: Furnish a complete set of specialized tools and maintenance instructions as needed for the Department’s continued adjustment, maintenance, and removal and replacement of door hardware.

**b. Materials.**

1. Door Hardware.

A. Submit any product not listed in Table 1 to the Engineer in order for the product to be considered for approval. The Engineer will notify Contractor, in writing, of decision to accept or reject request.

B. Manufacturers must provide all the functions and features of the item specified, or it will not be approved.

**Table 1: Door Hardware**

|  |  |
| --- | --- |
| (Door Hardware Item) | (Manufacturers) |
| Hinges | Ives (IVE), McKinney, Hager |
| Continuous Hinges | Markar (MAR), Stanley, McKinney |
| Locksets & Deadlocks | Schlage (SCH), Sargent, Best |
| Keypad Locks | Schlage (SCH), Campus Standard, or approved equal |
| Cylinders & Keying | Schlage (SCH), Campus Standard, or approved equal |
| Exit Devices & Mullions | Von Duprin (VON), Precision, Sargent |
| Door Closers & Auto Operators | LCN (LCN), Norton, Sargent |
| Flush Bolts & Coordinators | Ives (IVE), Rockwood, Burns |
| Protection Plates | Ives (IVE), Rockwood, Burns |
| Stops & Holders | Ives (IVE), Rockwood, Burns |
| Overhead Stops | Glynn-Johnson (GLY), Sargent, Rixson |
| Silencers | Ives (IVE), Rockwood, Burns |
| Thresholds & Weatherstrip | National Guard (NGP), Pemko, Reese |

C. 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.

D. Where the hardware specified is not adaptable to the finished shape or size of the members requiring hardware, furnish suitable types having the same operation and quality as the type specified, subject to the Engineer's approval.

2. Hardware and Equipment.

A. Fasteners.

(1) Furnish hardware manufactured to conform to published templates, generally prepared for machine screw installation.

(2) Furnish non-corrosive screws for installation with each hardware item. Finish exposed (exposed under any condition) screws to match hardware finish, or, if exposed in surfaces of other work, to match finish of this other work as closely as possible including "prepared for paint" surfaces to receive painted finish.

(3) Furnish concealed fasteners for hardware units that are exposed when door is closed except to the extent that no standard units of type specified are available with concealed fasteners. Do not use thru-bolts for installation where bolt head or nut on opposite face is exposed in other work unless their use is the only means of reinforcing the work adequately to fasten the hardware securely.

(4) All hardware is required to be installed with the fasteners provided by the hardware manufacturer.

B. Hinges.

(1) The following is a guide for hinge type required for this special provision:

(a) 1¾ inch thick doors up to and including 3 feet - 0 inches wide:

(i) Exterior. Standard weight, ball bearing, bronze/stainless steel, 4½ inches high.

(ii) Interior. Standard weight, ball bearing, steel, 4½ inches high.

(b) 1¾ inch thick doors over 3 feet-0 inches wide:

(i) Exterior. Heavy weight, ball bearing, bronze/stainless steel, 5 inches high.

(ii) Interior. Heavy weight, ball bearing, steel, 5 inches high.

(2) Furnish 3 hinges per door leaf for doors 90 inches or less in height, and one additional hinge for each 30 inches of additional door height.

(3) Hinge Pins. Except as otherwise specified, furnish hinge pins as follows:

(a) Steel Hinges. Steel pins.

(b) Non-Ferrous Hinges. Stainless steel pins.

(c) Out-Swinging Exterior Doors. Non-removable pins.

(d) Interior Doors. Non-rising pins.

(4) The width of hinges must be 4½ inches or as required for clearance.

C. Continuous Hinges.

(1) Furnish continuous hinges fabricated from anodized aluminum or stainless steel as scheduled.

(2) Furnish bearings at each hinge knuckle for quiet, smooth, self-lubricating operation.

(3) Ensure hinges are required to be capable of supporting door weights up to 600 pounds and successfully tested for 1,500,000 cycles.

(4) Install hinges with fasteners supplied by manufacturer. Ensure hole pattern is symmetrical.

D. Flush Bolts. Automatic and manual flush bolts are required to have forged bronze faceplates with extruded brass levers and with wrought brass guides and strikes. Doors up to 7 foot – 6 inches in height must have 12 inch steel or brass rods. Ensure manual flush bolts for doors over 7 foot – 6 inches in height are increased by 6 inches for each additional 6 inches of door height. Furnish dust-proof strikes where scheduled.

E. Coordinators.

(1) Where pairs of doors are equipped with automatic flush bolts, an astragal, or other hardware that requires synchronized closing of the doors, provide a bar-type coordinating device, surface applied to the underside of the stop at the frame head.

(2) Finish of the coordinator to be prime coat to receive the same finish paint as the door frame.

(3) Provide a filler bar of the correct length for the unit to span the entire width of the opening, and appropriate brackets for parallel arm door closers and surface vertical rod exit device strikes. Factory-prep coordinators for vertical rod devices if required.

F. Mortise Locks.

(1) Ensure mortise locks are certified as *ANSI A156.13, Grade 1 Operational, Grade 1 Security*, and manufactured from heavy gauge steel, containing components of steel with a zinc dichromate plating for corrosion resistance. Ensure lock case is multi-function and field reversible for handing without opening the case.

(2) Locks are to have a standard 2¾ inch backset with a full 3/4 inch throw 2-piece stainless steel mechanical anti-friction latchbolt. Deadbolt is required to be a full 1 inch throw, constructed of stainless steel.

(3) Ensure lever trim is solid brass, bronze, or stainless steel, cast or forged in the design specified, with wrought roses and external lever spring cages. Ensure levers are thru-bolted to assure proper alignment and required to have a 2-piece spindle. Lever trim on the secure side of doors serving rooms considered by the Department having jurisdiction to be hazardous must have a tactile warning. Ensure lever design is Schlage 17A or similar.

(4) Locks meeting this special provision: Schlage L9000 series, Sargent 8200 series, Best 35H series.

G. Keypad Locks.

(1) Locksets are required to be mortise type with 3-piece, beveled, stainless steel latchbolts with 3/4 inch throw and equipped with an anti-friction latch.

(2) Chassis must accommodate *ANSI* standard mortise lock prep with a 2¾ inch nominal backset for 1¾ inch doors.

(3) Furnish locksets from the factory with appropriate handing.

(4) Levers are required to operate independently of each other. Lock must use patented clutch mechanism to deter vandalism and maximize durability. Disablement of secured levers must not permit latch bolt retraction from secure side but are required to allow egress. Ensure lever trim on the secure side of doors serving rooms considered by the Department having jurisdiction to be hazardous, or where noted on the door schedule, is knurled to provide a tactile warning. Ensure lever style is Schlage 17.

(5) Furnish key cylinder for emergency key override, with Everest/Primus core.

(6) Ensure electrical operation is battery operated, capable of 80,000 operating cycles using four AA alkaline batteries. Ensure lock is resistant to radio frequency and electrostatic discharge.

(7) Outside escutcheon is required to have keypad and iButton reader.

(8) Visual red and green LED indicators must indicate activation, operational systems status, system error conditions and low power conditions.

(9) Locks meeting this special provision: Schlage/Locknetics CM5596.

H. Exit Devices.

(1) Exit devices are required to be touchpad type, fabricated of brass, bronze, stainless steel, or aluminum, plated to the standard architectural finishes to match the balance of the door hardware.

(2) All exit devices are required to incorporate a fluid damper or other device which eliminates noise associated with exit device operation. Touchpad must extend a minimum of one half of the door width. End-cap will have two-point attachment to door. Ensure touch-pad matches exit device finish, and is stainless steel for US26, US26D, US28, US32, and US32D finishes. Use only compression springs in devices, latches, and outside trims or controls.

(3) All devices to incorporate a security dead latching feature.

(4) Furnish roller strikes for all rim and surface mounted vertical rod devices, American Standards Association (ASA) strikes for mortise devices, and manufacturer's standard strikes for concealed vertical rod devices.

(5) Mechanism case is required to sit flush on the face of all flush doors or ensure spacers are furnished to fill gaps behind devices. Where glass trim or molding projects off the face of the door, provide glass bead kits.

(6) All non-fire-rated exit devices are required to have cylinder dogging.

(7) Where lever handles are specified as outside trim for exit devices, furnish heavy duty lever trims with forged or cast escutcheon plates. Furnish vandal-resistant levers that will travel to a 90-degree down position when more than 35 pounds of torque are applied, and which can easily be re-set. Lever style will match the lever style of the locksets.

(8) Ensure exit devices are *UL listed* panic exit hardware. Ensure all exit devices for fire rated openings are *UL* labeled fire exit hardware.

(9) Furnish electrical options as scheduled.

(10) Exit devices meeting this special provision: Von Duprin 98 series, Precision D-1100/D-1200 series, Sargent 80 series with deadlatching.

I. Door Closers.

(1) Door closers are required to have fully hydraulic, full rack and pinion action with a high strength cast iron or cast aluminum cylinder. Cylinder body must be 1½ inch in diameter, and ensure the double heat-treated pinion is 11/16 inches in diameter.

(2) Ensure hydraulic fluid is of a type requiring no seasonal closer adjustment for temperatures ranging from 120 °F to -30 °F. Ensure fluid is fireproof and passes the requirements of the *UL10C* “positive pressure” fire test.

(3) Spring power is required to be continuously adjustable over the full range of closer sizes and allows for reduced opening force for the physically handicapped. Hydraulic regulation is required to be by tamper-proof, non-critical valves. Closers must have separate adjustment for latch speed, general speed, and backcheck.

(4) All closers must have solid forged steel main arms (and forged forearms for parallel arm closers).

(5) Closers must not incorporate a pressure relief valve.

(6) All closers must have metal covers.

(7) Closer cylinders, arms, and metal covers are required to have a powder coating finish which has been certified to exceed 100 hours salt spray testing by an independent testing laboratory used by Builders Hardware Manufacturers Association (*BHMA)* for *ANSI* certification. For metal components that can't be powder coated, ensure a special rust inhibiting finish (SRI) is used.

(8) Door closers meeting this specification: LCN 4010/4110 series, Norton 7500/PR7560, or approved equal (standard screws).

J. Protection Plates. Furnish kick plates as scheduled, with 4 beveled edges. Furnish with machine or wood screws, finished to match plates. Ensure plates are 8 inches high by 2 inches less than width of door (LWOD) on single doors, 1 inch LWOD on pairs of doors.

K. Door Stops and Holders. It is the responsibility of the hardware supplier to furnish door stops for all doors in accordance with the following requirements:

(1) Wall stops are required to be used wherever possible.

(2) Where wall stops cannot be used, provide dome type floor stops of the proper height.

(3) At any opening where a wall or floor stop cannot be used, ensure a heavy-duty overhead stop is used.

L. Thresholds and Weatherstrip. Furnish as scheduled and per architectural details. Match finish of other items as closely as possible. Furnish only those units where resilient or flexible seal strip is easily replaceable and readily available.

M. Silencers. "Push-in" type silencers for each hollow metal or wood frame, 3 for each single frame, 2 for each pair frame. Omit where gasketing is scheduled.

3. Finishes.

A. With the exception of all items listed below, ensure the finish of all hardware is US26D - satin chrome or US32D - satin stainless steel.

B. Exceptions are as follows:

(1) Door Closers - aluminum powder coat finish.

(2) Coordinators - prime painted.

(3) Thresholds - mill finish aluminum.

(4) Weatherstrip and Sweeps - clear anodized aluminum.

(5) Silencers - grey.

4. Keying.

A. All locks and cylinders are required to be construction master keyed and master keyed per the Department’s instructions, to existing key system.

B. Ensure all locks and cylinders, except cylinders for keypad locks, are interchangeable core type.

C. Furnish 3 keys per lock, 6 construction master keys, and a total of 6 master keys for each group.

D. Deliver all master keys directly to the Department by the hardware supplier, who must obtain a receipt for delivery of same.

**c. Construction.**

1. Examination.

A. Examine doors and frames, with installer present, for compliance with requirements for installation tolerances, wall and floor construction, and other conditions affecting performance.

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

2. Preparation. Steel doors and frames: Comply with *ANSI A115.1.*

A. Surface-Applied Door Hardware. Drill and tap doors and frames in accordance with *ANSI A250.6.*

3. Installation.

A. 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."*

B. Install each door hardware item to comply with manufacturer's written instructions. Where cutting and fitting are required to install door hardware onto or into surfaces that are later to be painted or finished in another way, coordinate removal, storage, and reinstallation of surface protective trim units with finishing work. 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 in accordance with industry standards.

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

D. Thresholds. Set thresholds for exterior and acoustical doors in full bed of sealant complying with requirements of the Special Provision for Joint Sealants.

4. Adjusting.

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

(1) Spring Hinges. Adjust to achieve positive latching when door is allowed to close freely from an open position of 30 degrees.

(2) Door Closers. Adjust sweep period so that, from an open position of 70 degrees, the door will take at least 3 seconds to move to a point 3 inches from the latch, measured to the leading edge of the door.

B. Six-Month Adjustment. Six months after date of completion, installer is required to perform the following:

(1) Examine and readjust each item of door hardware as necessary to ensure function of doors, door hardware, and electrified door hardware.

(2) Consult with and instruct the Department’s personnel on recommended maintenance procedures.

(3) Replace door hardware items that have deteriorated or failed due to faulty design, materials, or installation of door hardware units.

5. Cleaning and Protection.

A. Clean adjacent surfaces soiled by door hardware installation.

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

C. Furnish final protection and maintain conditions that ensure door hardware is without damage or deterioration at time of completion.

**d. Measurement and Payment.** This work will not be measured and paid for separately but is considered as having been included in other bid items in the contract.